



Proceedings of
The 20th North American Conference
on Chinese Linguistics

(NACCL-20)

Volume 1

25-27 April 2008
Columbus, Ohio



Edited by
Marjorie K.M. Chan
and Hana Kang



Proceedings of
The 20th North American Conference
on Chinese Linguistics
(NACCL-20)

Dedicated to Professor Edwin G. Pulleyblank
in honor of his 85th birthday

VOLUME 1

East Asian Studies Center

25-27 April 2008
Columbus, Ohio



Edited by
Marjorie K.M. Chan
and Hana Kang

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PREFACE

The 20th North American Conference on Chinese Linguistics (NACCL-20) was held at The Ohio State University, Columbus, Ohio, on 25-27 April 2008. NACCL-20 celebrated the twentieth anniversary of this annual conference and the conference's first return to its birthplace at The Ohio State University.

A total of 115¹ papers were delivered at the conference in multimedia classrooms and lecture hall, with presenters representing over 70 institutions from 13 countries and regions. Three plenary speakers were invited. Our special invited guest and speaker was Edwin G. Pulleyblank (蒲立本), Professor Emeritus, University of British Columbia, Vancouver, Canada, and one of the world's most respected and influential scholars in Chinese linguistics and Chinese history. Co-sponsored in association with The Institute for Chinese Studies (ICS) as part of the Institute's "Rethinking China" Lecture Series, Professor Pulleyblank's plenary speech was a public lecture and was, hence, open to all. Furthermore, indicated in the NACCL-20 conference website (<<http://chinalinks.osu.edu/naccl-20/>>) that was created in August 2008, *The Proceedings of the 20th North American Conference on Chinese Linguistics* would be dedicated to Professor Pulleyblank, in honor of his eighty-fifth birthday, which he had then just celebrated that month.

Two plenary speakers with international reputation in Chinese linguistics as well as close connections to NACCL's twenty-year history were James H.-Y. Tai (戴浩一), National Chung Cheng University, Taiwan—senior organizer and inaugurator of the NACCL series when he was a faculty member at The Ohio State University—and Yen-hui Audrey Li (李艷惠), University of Southern California, the creator of the NACCL Proceedings series. Two other colleagues were also invited, who also had historical ties to NACCL, namely, Thomas Ernst (殷天兴), at University of Massachusetts and Dartmouth College, and Robert Sanders (沈德思), University of Auckland, Auckland, New Zealand. We deeply appreciate our five colleagues who have accepted our invitation to come to join us in celebrating NACCL's 20th anniversary.

In total, over 170 people attended the conference. There were 142 pre-registered presenters and out-of-town attendees, with the remainder being Ohio State University faculty and students (graduate students as well as undergraduate students) who had

¹ The preliminary Schedule in the conference's Program Book contained 116 paper titles. Withdrawal of two papers and adding of one prior to the start of the conference resulted in 115 papers in the final program. All authors who had registered to attend the conference did so, despite some needing to scramble to reschedule their flights when Columbus-based Skybus suddenly went bust on 4 April 2008. The final result was an amazing 100% attendance by the authors in delivering their papers!

PREFACE

expressed interest in attending the conference and were issued name tags prior to the conference.

After the conference ended, the authors were invited to submit their revised papers for camera-ready publication of the *Proceedings of the 20th North American Conference on Chinese Linguistics (NACCL-20)*. The original deadline given to the authors was 31 July 2008, with the deadline then extended to 10 August 2008. Because the NACCL-20 Proceedings would be the first proceedings to be published online in electronic form, some modifications in the stylesheet were made, with additional instructions placed online at the NACCL-20 website, including some screenshots and sample NACCL papers, to aid the authors to prepare their camera-ready papers.

The authors of 74 of the 115 papers made revisions and submitted their camera-ready proceedings paper to the NACCL-20 organizers. As in the case of the Program Book for the conference, the editorial work on the proceedings was done by Marjorie K.M. Chan, Chair of the NACCL-20 Organizing Committee, and Hana Kang, President of the Graduate Association of Chinese Linguistics (GACL). The papers for the *Proceedings of the 20th North American Conference on Chinese Linguistics (NACCL-20)*, totalling over one thousand pages, have been divided into nine, theme-based parts, and placed in two volumes: Parts 1 through 6 are in Volume 1 and Parts 7 to 8 are in Volume 2. Part 1 contains the five invited speakers' papers (those also being the only papers that were permitted to exceed the 18-page limit); Part 2 are papers on phonetics and phonology; Part 3 is on word-formation and numeral classifiers; Part 4 pertains to some issues in second language acquisition; Part 5 covers sociolinguistics, signed language, and language contact; Part 6 deals with topics in historical linguistics; Part 7, containing 29 papers, deals with syntax and semantics; Part 8 contains papers on sentence-processing and psycholinguistic studies; and Part 9 is on pragmatics and discourse analysis.

The NACCL-20 conference was organized by Marjorie K.M. Chan, who designed the NACCL-20 website (in August 2007) and maintained it. The organizing committee included two committee members, faculty members in Japanese linguistics in her Department of East Asian Languages and Literatures at The Ohio State University: Mineharu ("JJ") Nakayama and Etsuyo Yuasa. In addition, a special component of the NACCL-20 Organizing Committee was OSU's Graduate Association of Chinese Linguistics (GACL): Hana Kang (President & NACCL-20 Research Assistant), Bo Zhu (Vice President), Yi He (Treasurer), Chunsheng Yang (President-Elect), Inae Oh, Helena Riha, Jing Yan, and Rongbin Zheng.



Marjorie K.M. Chan
Hana Kang

Columbus, Ohio
September 2008

ACKNOWLEDGEMENTS

The NACCL-20 conference, held at The Ohio State University on 25-27 April 2008, was made possible through the generosity of our sponsors and the help from all those who had chipped in, volunteered, and worked diligently to assist in preparing for the conference and during the 2-1/2 day conference. Besides two anonymous donors, The Ohio State University sponsors were the following units and departments:

East Asian Studies Center* (*Patricia Sieber, Director; Amy Carey, Assistant Director*) & Institute for Chinese Studies (*Patricia Sieber, Director*)

Office of International Affairs (*Dieter Wanner, Interim Associate Provost*)

College of Humanities (*John W. Roberts, Dean*)

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Department of East Asian Languages and Literatures (*Mari Noda, Chair*)

Department of Linguistics (*Beth Hume, Chair*)

Department of Slavic and East European Languages and Literatures (*Daniel Collins, Chair*)

**This event is sponsored in part by a U.S. Department of Education Title VI Grant.*

NACCL-20 also gratefully acknowledges help from reviewers of the many abstracts that were received by the 30 November 2007 deadline, as well as help from Thomas Ernst (NACCL Steering Committee Chair), Janet Xing (Western Washington University, NACCL-18 organizer who provided helpful tips in summer 2007), and previous NACCL organizers whose conference websites were useful for working out the deadlines, etc. Representatives from sponsoring units (Patricia Sieber, EASC and ICS; Mari Noda, DEALL; Chris Brew, Linguistics) gave welcoming remarks. Linguistics faculty members in different units at The Ohio State University also gave generously of their time to chair panels during the conference. These include: Mary Beckman, Donald Winford, Chris Brew, James M. Unger, Mineharu Nakayama, Etsuyo Yuasa, Daniel Collins, and Alan Hirvela. Two conference attendees, Drs. Beverly Hong and Mien-hwa Chiang, as well as conference presenters, also assisted with chairing panels.

Our thanks also go to the following staff members in different units—and in different buildings on the OSU campus—who had worked cheerfully to help make the

ACKNOWLEDGEMENTS

conference a success. Jennifer McCoy Bartko (Accounts Manager) at the East Asian Studies Center served as NACCL-20 Administrative Assistant, and worked tirelessly for the conference. She also manned the Registration Desk in the conference lounge and, with help from Amy Carey (EASC Assistant Director) during the morning of the first and last day, took care of all the logistics in the lounge throughout the entire 2-1/2 days of the event. Jennifer's student assistant, Graeme Henson, was our Graphics Designer who produced all the wonderful graphics for the conference—NACCL-20 logo for the website and the covers of both the Program Book and the Proceedings volumes, the flyer and poster for Professor Pulleyblank's ICS lecture, conference on-site signs for program schedules, as well as every name tag worn by the conference attendees. At the College of Humanities, we have Jody Croley Jones (Web Services Manager who oversees the OSU College of Humanities' web server) and her assistant, Miles Oldenburg (Web Developer), who designed the online NACCL-20 abstract submission form and registration form and adjusted the forms to meet our specific needs. Senior Systems Developer, James Cheng, also assisted with some tweaking on the web server to enable proper display of Chinese characters in the system. At OSU's Foreign Language Center, Karen Lynn Moore (Information Associate, Foreign Language Publications) processed the registration fees that were paid via credit card. Her help was enlisted because EASC did not have the means to accept credit card payment. Last but not least, our staff in the Department of East Asian Languages and Literatures—Debbie Knicely (Office Administrative Associate), Hui Chu (Office Associate), and Soyoung Han (Office Assistant) —fielded phone-in questions, reserved rooms for conference activities, took care of budgetary matters that came through the department, as well as gave general logistic support. And, of course, our students, both graduate and undergraduate, were enthusiastic and eagerly helped in whatever ways they could to make our visitors welcome during the conference.

We also express our thanks to the Chinese Language Teachers Association, to China Books, and to Cheng & Tsui for their support, in placing ads in the conference's Program Book that helped with printing costs.

Our acknowledgements are not complete without *huge* thanks, on behalf of the NACCL-20 Organizing Committee, to the conference participants who came from near and far to The Ohio State University, in Columbus, Ohio, to help celebrate the 20th anniversary of the NACCL conference! We close with heartfelt thanks to the contributors of this two-volume set of Proceedings, for their timely submission of their papers, which enabled the NACCL-20 Proceedings to be published in September, a record time of just five months after the conference ended.

History of NACCL: The First Two Decades

Marjorie K.M. Chan
The Ohio State University

This is a brief history of the North American Conference on Chinese Linguistics (NACCL) on its the twentieth anniversary, piecing together information from various sources.¹ The story begins in mid-May 1988, the year that The Ohio State University was hosting the third of its series of conferences on Chinese linguistics. That conference—the Third Ohio State University Conference on Chinese Linguistics (OSUCCL III)—was organized by Thomas Ernst (殷天兴),² then teaching at OSU’s Department of Linguistics, in collaboration with his two colleagues in the Department of East Asian Languages and Literatures, James H.-Y. Tai (戴浩一) and Marjorie K.M. Chan (陳潔雯).³ Tom Ernst’s recollection of the pivotal event that gave birth to NACCL is described below in his own words:

The Genesis

The genesis of NACCL took place in Columbus, Ohio, during OSUCCL III (the OSU Conference on Chinese Linguistics) in 1988. A group of participants—including Tom Ernst, Jim Huang, Jerry Packard, and Jim Tai—were enjoying dinner at a local restaurant, when it was suggested that we should keep hosting Chinese linguistics meetings on an annual basis. There was instant and enthusiastic agreement, and soon the group adopted the name NECCL (North East Conference on Chinese Linguistics), with Jim Tai agreeing to host the first meeting at OSU the following year, and Jerry Packard hosting it at the University

¹ The history of NACCL presented here is based on what I had researched and written in August 2007 for the NACCL-20 website (“About NACCL”), with additional resourcees consulted for this piece (e.g., Tai 1989, Chan and Ernst 1989).

² Tom Ernst organized the First Ohio State University Conference on Chinese Linguistics (OSUCCL I) in Spring 1986. As Tai (1989:v) noted, “In spite of being the first try with limited logistic support, the conference was a real success in that many stimulating discussions were generated and many interesting questions wre posed. More significantly, it germinated keen interest and enthusiasm among Chinese linguists at The Ohio State University to hold another meeting in the following year.” The second event, which took place in Spring 1987, was hosted by Frank Hsueh and James H.-Y. Tai (the latter then a visiting faculty member). It was named the Ohio Symposium on Chinese Linguistics, with the theme of “Functionalism and Chinese Grammar.” (The papers from that symposium were later edited as a monograph by Tai and Hsueh (1989).

³ The papers from OSUCCL III were subsequently collected for a Proceedings volume that was edited by Chan and Ernst (1989).

HISTORY OF NACCL

of Pennsylvania the year after that. The name was changed to (NACCL) North American Conference on Chinese Linguistics to indicate the reality of its wider geographical scope, and for the next few years the meeting site continued its rotation to universities represented by participants at that first meeting: Cornell University (Jim Huang), University of Michigan (Bill Baxter and Duanmu San), University of Delaware (Tom Ernst) and USC (Audrey Li).

— Thomas Ernst (Email of 31 July 2008)

Based on the reconstructed history, the precursor of the NACCL conference series was a series of three conferences/symposia hosted in three consecutive years at The Ohio State University:

- Spring 1986: The First Ohio State University Conference on Chinese Linguistics (OSUCCL I), organized by Thomas Ernst.
- Spring 1987: The Ohio Symposium on Chinese Linguistics, organized by Frank F.S. Hsueh and James H.-Y. Tai.
- Spring 1988: The Third Ohio State University Conference on Chinese Linguistics (OSUCCL III), organized by Thomas Ernst, James H.-Y. Tai, and Marjorie K.M. Chan.

In his Preface to the *Proceedings of the Third Ohio State University Conference on Chinese Linguistics (13-14 May 1988)*, Tai (1989:v) wrote the following concerning OSUCCL III:

Because of the interest generated during the conference, it was decided that a regional conference on Chinese linguistics, named the Northeastern Conference on Chinese Linguistics (NECCL), be held annually. A Consortium of four universities—Cornell University, University of Delaware, University of Pennsylvania, and The Ohio State University—was formed to rotate in hosting the annual meetings. Ohio State will be hosting the first one in Spring 1989.

The hosts of the four universities in that Consortium would be C.-T. James Huang (黃正德), then at Cornell University; Thomas Ernst, who was going to be at University of Delaware beginning Autumn 1988; Jerome L. Packard (裴吉瑞), then at University of Pennsylvania; and James H.-Y. Tai and Marjorie K.M. Chan at The Ohio State University.

From that dinner at a local restaurant in Columbus in Spring 1988, an annual regional conference on Chinese linguistics was founded, to be hosted by different universities in the northeast region on a rotating basis. That decision gave birth to the Northeast Conference on Chinese Linguistics (NECCL), which would evolve just two years later into the North American Conference on Chinese Linguistics (NACCL).

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As was decided, in spring 1989, the year after OSUCCL III, Ohio State University hosted the First Northeast Conference on Chinese Linguistics (NECCL-1). James H.-Y. Tai (now at National Chung Cheng University in Taiwan), as the senior member, together with Marjorie K.M. Chan and their new colleague, Robert Sanders (沈德思, now at Auckland University in New Zealand), formed the trio that hosted the conference.⁴ Note that although the conference was initially conceived as a regional, northeastern conference, NECCL-1 drew scholars and students from well beyond the confines of the northeast, with participants from all over the United States as well as from abroad.

The second NECCL conference was held at the University of Pennsylvania, hosted by Jerome L. Packard, now at the University of Illinois at Urbana-Champaign (where, incidentally, he helped to co-host NACCL-8 with his then-senior colleague, Chin-chuan Cheng (鄭錦全)). These early conferences were well-received and attracted participants from all over the United States and beyond.

One important reason for the tremendous interest in NECCL is that there simply was no other conference series anywhere in the world at that time that was dedicated solely to the presentation of research on Chinese linguistics. (Thus, NACCL has, since its birth, embraced both theoretical and empirical research, and all subfields of Chinese linguistics.) The formation of the NACCL conference series, hence, met a serious need in the field. The closest counterparts were such conferences as the annual International Conference on Sino-Tibetan Languages and Linguistics and the annual meeting of the Chinese Language Teachers Association, both with different scope and foci.

By the third conference—hosted by C-T. James Huang, currently at Harvard University but at Cornell University at the time of hosting that conference—there was strong interest among the participants to expand the geographical scope of the conference to the rest of the United States and to adopt a new name to reflect that extended geographical territory. With an amendment suggested by this author to include her home country of Canada, NECCL underwent a very meaningful, sound-symbolic name change from NECCL to NACCL—to become the North American Conference on Chinese Linguistics.

NACCL has thrived in the intervening years through the dedication of scholars in Chinese linguistics who generously donated their time and energy to host the NACCL conferences. This can be seen in the list compiled by Yen-hui Audrey Li (李艷惠) of past NACCL conferences, posted at the USC website with information on venues and past organizers.⁵ (For ease of reference, that list, with some minor adjustments, is included here as an Appendix.)

An important development came in 1994 with Audrey Li's hosting of NACCL-6 and the publication of a NACCL proceedings. The inaugural, two-volume set of NACCL-6 Proceedings was published in 1995 under Audrey Li's supervision, paving the way for

⁴ For a report on NECCL-1, see Chan (1989).

⁵ URL: <<http://www.usc.edu/schools/college/ealc/chinling/html/naccl.htm>>.

HISTORY OF NACCL

a series that has continued to the present. Past NACCL Proceedings volumes are distributed by the Graduate Students in Linguistics at the University of Southern California through their GSIL Publications website.⁶ Upon the recommendation of Audrey Li, beginning with the *Proceedings of the 20th North American Conference on Chinese Linguistics (NACCL-20)*, NACCL proceedings will henceforth be in electronic form and disseminated online for ease of production and easier access by a wider readership.

Over the past decade and a half, since the early 1990's, the World Wide Web ("the Web") has revolutionized how information is released to the world community.⁷ While the NACCL Proceedings recorded the scholarly achievements over the years since 1994, on another front, NACCL hosts soon began to harness the World Wide Web for information dissemination. Not surprisingly, the first NACCL host to utilize the Web was none other than Chin-chuan ("CC") Cheng (鄭錦全), one of our most esteemed—and computer-savvy—Chinese linguists, who was also strategically located at the University of Illinois, the birthplace of first web browser, Mosaic, the precursor to Netscape (Mozilla). Since NACCL-8 (1996), every NACCL conference has been posted online for wide dissemination of information. In 2008, twelve years since the first NACCL conference had a web presence, only four NACCL conference websites are still available online, constituting roughly one-third of the websites created for the NACCL conference series.⁸ The four NACCL conferences that still have home pages are NACCL-14 (2002), NACCL-18 (2006), NACCL-19/IACL-15 (2007), and the current conference, NACCL-20 (2008).⁹

The continued success of NACCL has also depended on the passing of the baton each year. On that, a great deal of debt is owed to NACCL-5 host then at the University of Delaware, Tom Ernst, who took the important step of establishing a NACCL Steering Committee that consisted of past NACCL hosts, and guided the committee to assist "newbie" NACCL organizers. He also ensured that there would be a succession of NACCL

⁶ URL: <http://www.usc.edu/dept/gsil/list.html#NACCL_Proceedings>.

⁷ As Chan (2003:50, fn.3) documented, "The World Wide Web portion of the Internet made its debut in 1991, and by November 1991, Mosaic, the first WWW browser for all three major computing platforms (PC, Macintosh, Unix), was released. Netscape followed in 1994 and Internet Explorer the year after."

⁸ There were seven NACCL conference websites when NACCL-20 went online, but only four remained by September 2008, including NACCL-20. Although the NACCL-11 (1999) website at Harvard University has been removed, NACCL-22 (2010) will be held there in conjunction with the 18th Annual Meeting of the International Association of Chinese Linguistics (IACL-18). We can expect to see a new NACCL/IACL conference website posted at Harvard in a year's time.

⁹ The URLs are as follows:

NACCL-14 (2002): <<http://www.pshap.com/naccl/>>

NACCL-18 (2006): <<http://www.wvu.edu/depts/mcl/naccl18/>>

NACCL-19/IACL-15 (2007): <<http://www.columbia.edu/cu/ealac/chinese/events.htm>>

NACCL-20 (2008): <<http://chinalinks.osu.edu/naccl-20/>>

HISTORY OF NACCL

hosts. Through his efforts, NACCL was held annually, and individual organizers benefited in being able to consult previous hosts, so that much collegial, behind-the-scenes teamwork exists in the hosting of NACCL conferences. Tom Ernst has continued in the capacity of NACCL Steering Committee Chair until the conclusion of NACCL-20. At the NACCL Steering Committee Meeting chaired by Tom during NACCL-20, attended by two other committee members (Audrey Li and Yen-Hwei Lin),¹⁰ eight past NACCL hosts (Marjorie Chan, San Duanmu, Qian Gao, Baozhang He, Jerry Packard, Chaofen Sun, James Tai, and Robert Sanders), and the following year's host (Yun Xiao)—that is, those who were attending NACCL-20—Tom announced that he was stepping down from his long chairmanship of the Steering Committee. At the end of the discussion that followed, Marjorie Chan agreed to serve in that capacity for a three-year term, with Tom agreeing to stay on as a member of the NACCL Steering Committee to give continued assistance. Our heartfelt thanks to Tom Ernst for his dedication in chairing the NACCL Steering Committee over the past two decades!

We look forward to new and exciting research that will be presented at the annual NACCL conferences in the years ahead, and we look forward to collaborations with the International Association of Chinese Linguistics (IACL) in hosting joint conferences when IACL meetings are held in North America.

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¹⁰ The NACCL Steering Committee includes three other members: Yafei Li, Hua Lin, and Zhengsheng Zhang.

HISTORY OF NACCL

**Appendix:
NACCL Conferences (1989-2008)**

Year	Conference	Host Institution	Organizers
1989	NECCL-1	The Ohio State University	James H.-Y. Tai Marjorie K.M. Chan Robert Sanders
1990	NECCL-2	University of Pennsylvania	Jerome L. Packard
1991	NACCL-3	Cornell University	C.-T. James Huang
1992	NACCL-4	University of Michigan	William H. Baxter San Duanmu
1993	NACCL-5	University of Delaware	Thomas Ernst
1994	NACCL-6	Univ. of Southern California	Yen-hui Audrey Li
1995	NACCL-7/ ICCL-4	Univ. of Wisconsin at Madison	Tsai-Fa Cheng Yafei Li Hongming Zhang
1996	NACCL-8	U. of Illinois at Urbana-Champaign	Chin-chuan Cheng Jerome L. Packard
1997	NACCL-9	University of Victoria, Canada	Hua Lin
1998	NACCL-10/ IACL-7	Stanford University	Chaofen Sun
1999	NACCL-11	Harvard University	Baozhang He
2000	NACCL-12	San Diego State University	Zhengsheng Zhang
2001	NACCL-13/ IACL-10	University of California at Irvine	C.-T. James Huang
2002	NACCL-14	University of Arizona	Feng-hsi Liu
2003	NACCL-15	Michigan State University	Yen-Hwei Lin
2004	NACCL-16	University of Iowa	Chuanren Ke
2005	NACCL-17	Monterey Language Institute	Qian Gao
2006	NACCL-18	Western Washington University	Janet Xing
2007	NACCL-19/ IACL 15	Columbia University	Lening Liu
2008	NACCL-20	The Ohio State University	Marjorie K.M. Chan

Dedication to Professor Edwin G. Pulleyblank

As NACCL-20 organizer, I am extremely pleased that we were able to invite Professor Edwin (“Ted”) G. Pulleyblank (蒲立本), Professor Emeritus of the University of British Columbia (Vancouver, Canada), as a special invited guest and speaker. The invitation to Ted Pulleyblank—and his gracious acceptance—took place in August 2007, a few days after his 85th birthday. The auspicious timing served as the basis for paying tribute by dedicating to Professor Pulleyblank the *Proceedings of the 20th North American Conference (NACCL-20)* in honor of his 85th birthday, which he celebrated on 7 August 2007.

Professor Pulleyblank’s plenary speech at NACCL-20—“Language as Digital: A New Theory of the Origin and Nature of Human Speech”—was co-sponsored by The Ohio State University’s Institute for Chinese Studies (ICS), as part of the Institute’s “Re-thinking China” Lecture Series. As a result of the co-sponsorship, Professor Pulleyblank’s plenary speech was a public lecture and, hence, open to all.

Professor E.G. Pulleyblank is one of the world’s most respected and influential scholars in Chinese history and Chinese linguistics, and those of us who were his students were most fortunate in having obtained his patient guidance and in having benefited from his deep erudition even years and decades after receiving our training from him. Two other former students of Professor Pulleyblank who presented at NACCL-20, namely, Professor Jennifer W. Jay (University of Alberta) in Chinese history, and Professor Derek Herforth (University of Sydney) in Chinese historical linguistics, graciously agreed to introduce Professor Pulleyblank at the ICS lecture. As part of the NACCL-20 Proceedings’ dedication to Professor Pulleyblank, my colleagues’ introductions at the lecture are included here in the following pages.

Marjorie K.M. Chan
NACCL-20 Organizer

Introducing Ted Pulleyblank

Presented by Jennifer W. Jay
Department of History and Classics, University of Alberta

Professor Ted Pulleyblank began his academic career in Classics, from which he obtained an honors degree from the University of Alberta in 1942, where I now teach. For a comprehensive look at Ted’s scholarship in history and linguistics, I refer you to the UBC website (<http://www.asia.ubc.ca/index.php?id=5053>).

Ted needs no introduction to his versatile and prolific work on Tang historiography and Central Asian history. *The Background of the Rebellion of An Lu-shan* (London: Oxford University Press, 1955), published 53 years ago, remains the most authoritative scholarship on the period in any language. Ted's other monographs and hundreds of substantive articles have served to mentor two generations of historians of the middle period of Chinese history and Central Asia. For example, he examined the doctoral dissertation of the late Professor Denis Twitchett on Tang financial administration and he supervised Professor Wang Gungwu, my own co-supervisor, whose dissertation on the Five Dynasties remains unsurpassed. I want to publicly apologize to Ted for coming up short of his expectations for me, and I also want to thank him for protecting me with his scholarly reputation. I have always felt that my co-supervisor, Professor Igor de Rachewiltz, whose Mongolian studies benefited from Ted's linguistic reconstructions, treated me better because I had studied under Ted. Ted, I stood in awe of your scholarship in 1976, and I remain inspired today, and it is with the greatest honor that I present you as my teacher.

And here to also introduce Ted is Derek Herforth, my UBC classmate.

Introduction of Professor Edwin G. Pulleyblank

Presented by Derek Herforth

Department of Chinese Studies, University of Sidney

Thank you, Jennifer, my *lao tongxue* (old classmate) from UBC (University of British Columbia). It's a great honor to be asked to present the scholar to whom this, the twentieth annual meeting of NACCL, has been especially dedicated.

About the same time that Jennifer was studying history with Professor Pulleyblank, I was beginning to get my feet wet in Chinese historical linguistics under his tutelege. So let me begin with the briefest of personal memories of that time.

I recall Ted as a rather demanding mentor, as you might expect. But, in the way he interacted with his students, he somehow managed to be both invariably incisive and extraordinarily fair. In reading his comments on my student work, I recall being at times overwhelmed by the sheer number of things he knew that I hadn't even thought of. One was constantly made aware of the vast number of issues to be taken into account in doing justice to a problem. At other times, when my efforts fared better, he was unstinting in his praise, support, and encouragement. As a teacher myself, I can deeply appreciate not only the amount of learning he managed to impart to those lucky enough to study with him, but also the attitude with which he instructed and educated us.

In the rest of my brief introduction, I'm going to commit a gross oxymoron, partly demanded by time constraints. I'm going to try to pigeonhole Professor Edwin Pulleyblank.

Now, of course, he can't be pigeonholed, but I find that this is perhaps a useful figure of speech, because even the lowly pigeonhole has three dimensions—breadth, height, and depth. Allow me to make a few remarks in terms of these three dimensions in an effort to characterize briefly Professor Pulleyblank's scholarship.

Jennifer has referred you to the excellent website, maintained by UBC. I would simply like to point out that the totality of Professor Pulleyblank's productivity has not been represented there, in a single place. If you go to the website, you will find listed all his publications since the late 1980s. But the site also includes the information that, for work published prior to 1989, one must go to a special volume of the journal *T'ang Studies* where a catalog of his earlier work has been assembled.¹ This productivity surely correlates with the dimension of height. The number of things Professor Pulleyblank has published, if piled atop each other, would reach very high.

As for breadth, it is well known that Professor Pulleyblank was especially active in the study of the middle period of China's history, dealing both with China per se and with China's nearest neighbors. Within the broad area of linguistics, he has also ranged very widely. Chinese diachronic linguistics was always a major concern, especially phonology and classical grammar. In addition to these, however, he has worked on broader areas in general linguistics, on the typology of vowel systems, for example, and how such studies support new proposals in the reconstruction not only of Chinese but of Indo-European as well. He has written on the early history of the study of Chinese phonology in Europe, and published in the fascinating area which is the subject of tonight's talk, the origin of language itself. So, the breadth is there in ways that have nothing to do with pigeonholes.

The dimension of depth can be appreciated by recognizing that virtually all of the major results of Professor Pulleyblank's research have been definitive in that scholars in the relevant fields have felt it necessary to respond to them. He has defined, over and over again, the nature of the questions, the nature of the current answers, and many of the methodological issues that determine solutions to problems in the several fields he has tended most closely over the decades.

So, while I think that the pigeonhole figure of speech is in one sense hardly apt, at least it can help us capture within a brief compass some of the breadth, depth, and height of Ted Pulleyblank's scholarly achievements. Without further ado, then, allow me to introduce tonight's speaker, the eminent scholar whose career we are honoring here at NACCL-20, Professor Edwin G. Pulleyblank.

¹ *T'ang Studies 7* (1989), prepared by Jennifer W. Jay and Marjorie K.M. Chan, is a Festschrift volume to honor Professor Edwin G. Pulleyblank, with papers from some of his students. The volume contains the complete list of Professor Pulleyblank's publications at the time of that Festschrift.

Language as Digital: A New Theory of the Origin and Nature of Human Speech

Edwin G. Pulleyblank
University of British Columbia

The “language”, so-called, of an electronic digital computer is based on a single, binary, contrast symbolized as 0/1 which is used to create a vocabulary of “bits” (0 or 1) combined into sets of eight, called “bytes”, a set number of which, typically two or four, is called a “word”. The meanings to be assigned to these computer “words” are supplied by the programmer who then uses them to perform computations. My claim is that in human spoken languages we similarly make up words out of combinations of consonants and vowels, referred to collectively as phonemes, of which every language has a well defined, limited, set. This is in contrast to the inarticulate cries of pain, fear, surprise, etc. that, as Darwin noted, we humans share with other animals. The reshaping of the human vocal tract on which Philip Lieberman has placed such emphasis was certainly necessary, but could not by itself have created language. As Darwin suggested, the first use of the voice was probably to enable humans to sing, not to talk. Furthermore, as Merlin Donald has proposed, bipedalism would not only have been a first step towards oral language but would also have freed the hands to communicate by gestures. Donald proposes a mimetic stage of consciousness at the time of *Homo erectus* between the episodic consciousness of lower animals and the mythic consciousness of speaking humans. The final leap to digital phonology and, in Donald’s terms to mythic consciousness, must have been a change in brain structure that took place when *Homo sapiens* came with their Cromagnon culture from Africa to Europe and after a period of coexistence replaced the culturally inferior Neanderthals.

0. Introduction

It is generally agreed that the ability to use language is the defining characteristic that above all else distinguishes our own species, *Homo sapiens*, from all other animals. Yet, it is by no means easy to say what this really means or how this unique capacity could have evolved. In spite of increasing efforts by researchers in a wide variety of fields in the last half century nothing like a consensus has yet emerged.

As I have recently come to see it, human spoken language is a new, digital, form of communication and cognition, superimposed on the analogue forms of cognition through the senses and communication through cries, gestures and pheromones that we share with other animals. The ‘language’, so-called, of an electronic digital computer is

based on a single, binary, contrast symbolized as 0/1 which is used to create a vocabulary of “bits” (0 or 1) combined into sets of eight, called “bytes”, a set number of which, typically two or four, is called a “word”. The meanings to be assigned to these computer “words” are supplied by the programmer who then uses them to perform computations. In human spoken languages we similarly make up words out of combinations of consonants and vowels, referred to collectively as phonemes, of which every language has a well defined, limited set.

With the exception of small inventories of interjections like English *sh!* ‘be quiet’, single phonemes, like computer bits, are meaningless by themselves. It is combinations of these consonants and vowels, not the separate phonemes, to which meanings are assigned. This is surely what lies behind the much cited observation of Wilhelm von Humboldt in the early nineteenth century that language “must make infinite employment of finite means” (1988:91). Other linguists have used different terms to refer to the same thing. André Martinet (1949) called it double articulation. In his enquiries into language origins Charles F. Hockett used the term duality of patterning (Hockett 1960, 1978, Hockett and Ascher 1964).

There is, of course, a further stage in human spoken language, the combining of words by rules of syntax to form sentences. Noam Chomsky, the dominant figure in the generative school of linguistics that has come to the fore since the middle of last century, has taken this rather than phonology to be the essential foundation of human language. He has frequently cited von Humboldt but, rather than referring, as I do, to phonology as the finite base on which the infinite structures of language rest, he emphasizes the role of syntax as the means by which humans construct infinitely many sentences. As he himself recently pointed out, however, already in the 16th century Galileo Galilei, the founder of modern experimental science, “describe[d] with wonder the discovery of a means to communicate one’s most secret thoughts to any other person ... with no greater difficulty than the various collocations of twenty-four little characters on a paper.” (Chomsky 2002: 46). But this is surely a clear reference to phonology as the defining characteristic of human language; for what Galileo referred to by his “twenty-four little characters”, were the letters of the Italian alphabet. How humans acquired the ability to attach meanings, not holistically to individual sounds produced by their vocal organs but to combinations of what are discrete but meaningless phonemes to which no meanings are attached separately is surely the fundamental problem if we are to account for the power of human language as a unique communicative and cognitive tool that distinguishes us, as far as we can tell, from all other living organisms on planet earth.

This duality of patterning, that is, combining consonants and vowels to make words, is what makes possible alphabetic writing. At a more basic level it is what enables us to hold in memory the 60,000 to 80,000 or more words that are estimated to be the working vocabulary of an educated adult speaker of a language like English and to add freely to this list as required by the progress of knowledge or by changes in current patterns in expression. Imagine having to memorize such a vocabulary if the individual

items were perceived simply as holistically different sounds rather than combinations of a strictly limited set of consonants and vowels according to definite rules. Moreover new words are constantly being added, as technical terms, as borrowings through contacts with other languages, as slang, so that dictionaries have to be constantly rewritten. Proper names are also an arbitrary, infinitely extendable list for each of us. Consider the telephone books that we constantly make use of.

1. Syllables as Basic Units in Phonology

If we think of the phonemes of a language which the letters of an alphabet of the Graeco-Roman tradition are designed to represent as referring to interchangeable vocalizations of the same basic kind, it may not be immediately obvious how they can give rise to the kind of either/or duality that is required to make language a digital system. My claim is that consonants and vowels are two basically contrastive types of vocalization. In every language they combine into syllables according to definite rules and it is, generally speaking, the syllables that count as the computing bytes to which meanings are attached. The words so defined are then further organized by syntactical rules into sentences and longer discourses. Individual phonemes can be treated, alone or in combinations, as morphemes prefixed, suffixed or infixes to modify the meaning of words or show their relations to other words in a sentence but it is only in combination that individual consonants and vowels are capable of having meaning.

The alphabets of India in the Brahmi tradition, show much greater insight than our own alphabet into the way language actually works. They begin by listing the separate vowel signs, arranged in a logical order, *a-i-u*, etc., based on place of articulation. Then come the consonantal signs similarly arranged by place and manner of articulation. The consonantal signs, which cannot be pronounced separately in isolation, are assumed to have an inherent *-a* vowel that can be modified by diacritics or deleted in case the consonant comes at the end of an utterance. Works on the history of writing commonly credit the Greeks with perfecting the alphabet that they borrowed from the Phoenicians by adding vowel signs but what the Greeks did was merely to interpret some of the Phoenician consonantal signs as vowels in order to suit the structure of their own language. Because Indian alphabets treat consonantal signs as implying an inherent *-a* vowel, they are sometimes dismissed as “mere syllabaries”. In fact, the ancient Indian grammarians were far ahead of the rest of the world before the nineteenth century in their analysis of the structure of language.

2. Vowels as Consonants and Consonants as Vowels

It must be stressed that the contrast between 0 and 1 in digital computing has nothing to do with the numerical value of these symbols in mathematics. Their role is simply to provide a two-way contrast. What 0 represents in one such language may correspond to what the same programmer represents by 1 in another computer language. In the same way spoken languages may without contradiction use the point vowels [i] and [u] as semivowels [j] and [w] occupying consonantal positions in a syllable. In English

this occurs with the letters *y* and *w* in words like *you* and *say* or *we* and *how*. In the original Latin alphabet, which did not distinguish upper and lower case, the letters I and V were used without confusion both for the vowels [i] and [u] and for the corresponding semivowels [j] and [w]: thus IVLIVS for Julius and VENVS for Venus. Modern European languages like English that have adapted the Latin alphabet to their own needs usually distinguish the vowels and the semivowels but this does not affect their identity in terms of articulation.

Whether one needs to recognize a semivowel corresponding to the low back vowel [ɑ] is more controversial. No semivowel [ɑ̣] is recognized in the International Phonetic Alphabet. I have long been arguing, however, that one needs to recognize the role of such a pharyngeal glide. It plays the role of coda in words like *far* [fɑ̣] and *near* [niɑ̣] as pronounced in r-dropping dialects such as southern British or Boston English and also in Mandarin Chinese in words like *dé* 得 [tə̣] ‘get’. See, among others, Pulleyblank 1998 and 2003.

Not only can vowels invade the territory of consonants in this way. Sounds that are primarily consonantal can also appear from time to time in place of vowels in the nuclei of syllables in many languages. Thus, in Mandarin Chinese words like *si* 絲 (IPA [sɿ] ‘silk’ and *shí* 十 (IPA [ʂɿ] ‘ten’ have no vowel as such. The initial sibilant becomes voiced and spreads into the syllabic nucleus. (For the phonetic interpretation see Chao 1968:24.) In both cases an earlier high front vowel [i], still preserved in other dialects, has been lost. Compare Xiamen dialect [si] ‘silk’ and [sip] ‘ten’. There are also languages like Berber in which obstruents (stop consonants) can occur in syllabic nuclei (Dell and Elmedlaoui 1985). It is even claimed that in the Salishan language Nuxalk, on the west coast of Canada (also known as Bella Coola), although many words do have vowels forming syllables in a normal way, some words consist of strings of unsyllabified obstruents (Bagemihl 1991, Shaw 2002). What does seem clear is that representatives of the three point vowels [a, i, u] are found in all languages, even though the two high vowels, *i* and *u*, may sometimes be present underlyingly only as semivowels, alone or attached to consonants as secondary articulations. In all languages the generalization holds that words are made up of a strictly limited set of phonemes—vowels and consonants—that have no inherent meaning in themselves but can be combined in unlimited ways to convey meanings. As for the way in which vowels, becoming semivowels, can invade the territory of consonants, and consonants can invade the territory of vowels in some languages, this corresponds to the fact that in computer language 0 and 1 have no numerical significance and merely function as a two-way contrast.

3. Theories of the Origin of Language

How did the human brain in evolving its vocal communication system, achieve this infinite capacity for symbolization, which has enabled mankind to achieve unparalleled dominance over the planet? In the west enlightenment thinkers of the eighteenth century who challenged the traditional account in the Christian Bible sometimes speculated

on how language could have arisen or been invented in prehistoric times but, lacking any scientific concept of evolution, could not get very far. In the following century Darwin's theory of evolution implied that the language faculty must have arisen by the same process of natural selection that has been responsible for the vast differentiation of life forms on the planet. Darwin himself had insightful remarks on the subject in *The Descent of Man*. After describing the ways in which various birds and animals make a variety of expressive sounds, he went on to say:

“The use of articulate language is, however, peculiar to man; but he uses, in common with the lower animals, inarticulate cries to express his meaning, aided by gestures and movements of the muscles of the face. This especially holds good with the more simple and vivid feelings, which are but little connected with our higher intelligence. Our cries of pain, fear, surprise, anger, together with their appropriate actions, and the murmur of a mother to her beloved child, are more expressive than any words. That which distinguishes man from the lower animals is not the understanding of articulate sounds, for, as everyone knows, dogs understand many words and sentences. In this respect they are at the same stage of development as infants, between the ages of ten and twelve months, who understand many words and short sentences, but cannot yet utter a single word. Nor is it the mere capacity of connecting definite sounds with definite ideas; for it is certain that some parrots, which have been taught to speak, connect unerringly words with things, and persons with events. The lower animals differ from man solely in his almost infinitely larger power of associating together the most diversified sounds and ideas; and this obviously depends on the higher development of his mental powers.” (1998:88)

What Darwin did not succeed in making fully clear was the difference between articulate human language and the limited, holistic recognition of human words that dogs are capable of understanding or parrots can imitate. Darwin commented that, although language had to be learned and so could not be called a true instinct, the babbling of infants showed that humans had an instinctive tendency to speak. Another interesting comment that has been largely overlooked by those who have developed theories of language origin in more recent time is Darwin's remark: “When we treat of sexual selection we shall see that primeval man, or rather some early progenitor of man, probably first used his voice in producing true musical cadences, that is in singing.” (1998:90).

By the time of Darwin the recognition of the close relationship between Sanskrit, the classical language of India, and Greek and Latin, the classical languages of Europe had given rise to the new discipline of comparative philology devoted to reconstructing the parent language from which all these languages had developed over time, referred to as Indo-Germanic or Indo-European. This seemed to have achieved the status of a science and to its practitioners speculation about the origins of the human language faculty seemed a frivolous waste of time, leading to a famous ban on papers on the subject by the Linguistic Society of Paris in 1866.

4. Research on the Evolution of Language in the Twentieth Century

The Parisian injunction did not put an end to speculation on the origin of language in the hundred years that followed. One may mention, for example, the book *Language: Its Nature, Development and Origin* by the eminent linguist, Otto Jespersen, first published in 1922, which is an excellent account of the history of linguistics up to his time. He had, however, little of substance to add on the evolution of the human language capacity, to the purely speculative conjectures that had been current since the eighteenth century. More recently there has been no lack of attempts to propose a solution, without achieving anything like a consensus. The series of articles by Charles Hockett in which he attempted to define the distinguishing characteristics of human language as compared to vocal communication in other animals has been referred to above. Most notable from our present point of view is his singling out of duality of patterning as a basic characteristic of language in contrast to communicative use of vocal cries by non-humans (Hockett and Ascher 1964:139).

An important line of inquiry in the twentieth century has been investigation of the cognitive and communicative abilities of our closest living relatives, the anthropoid apes. In the 1940s attempts were made to bring up infant chimpanzees in a human environment and get them to learn to speak as if they were human babies. Although one of these infant chimpanzees named Viki was eventually able to recognizably produce a few words, it was soon realized that it was futile to try to go beyond this. Such primate vocal tracts are simply not equipped to produce the sounds of human speech. Attempts to train primates to communicate by using the hand shapes of ASL (American Sign Language) or by using lexigrams—arbitrary symbols placed on a board to represent words—have been somewhat more successful. Most impressive are the achievements of Kanzi, a bonobo or pygmy chimpanzee that as an infant spontaneously learned to use a keyboard to communicate his wishes to his human caretakers while his mother Matata was being taught unsuccessfully to do so. From listening to his human guardians Kanzi also acquired a passive understanding of a number of spoken English words, without, of course, being able to reproduce English sounds or to go on adding to this vocabulary without limit in the way that human children can as they become fluent speakers and listeners of their native languages.

There is much disagreement as to how much can be concluded from these experiments about the linguistic potential in the brains of non-human animals. What does seem clear is that, for all the non-human animals that have been studied in this way, the symbols interpreted as equivalent to words, whether ASL hand shapes or lexigrams, are recognized and learned holistically, not broken down into recognizable but separately meaningless components like the phonemes of spoken language. So also the names and words of command that dogs or horses can learn to recognize from their human masters. The same is surely also true of ‘talking’ birds such as parrots that, unlike non-human primates, can recognizably imitate human speech sounds and even develop a limited vocabulary of words to which they can holistically attach meanings. What they evidently cannot do is to

enlarge this vocabulary without limit as humans can by breaking down the words that they learn into meaningless subordinate units, consonants and vowels.

5. The Evolution of the Human Vocal Tract — Song as the Stimulus for its Evolution?

In the last half-century the studies on the evolution of the human vocal tract by Philip Lieberman and colleagues have defined at least one *sine qua non* for the attainment of human language capacity.¹ There is a clear anatomical difference related to speech between humans and the anthropoid apes, namely the position of the larynx. In the anthropoid apes of Africa the larynx is positioned high, close to the opening to the nose, with which it can make a watertight seal in such a way that air can pass through it to the lungs while food or drink can pass around it to the stomach. This is also the case for newborn human infants. In adult humans, on the other hand, the larynx is much lower down, with the result that, as noted already by Darwin in the *Origin of Species*, food or drink can go down the wrong way and cause choking. It seems likely that the change in the position of the larynx was initiated by bipedal locomotion and upright posture.

Its positive contribution to the evolution of language, as Philip Lieberman has emphasized, was to increase the length of the passage between the larynx and the lips, allowing the tongue to divide the oral tract at different points in such a way as to produce efficiently and reliably the formants (overtones) of the three ‘point vowels’ [a, i, u].

While Lieberman is certainly right to emphasize the importance of the reshaping of the human throat in preparing the way for the acquisition of language, his apparent assumption that this was all that was needed for the holistic emotive sounds of non-human animals to turn into articulate words is hard to justify. We still use inarticulate screams and murmurs to express surprise or other emotions but there is no confusion between this and spoken language. Lieberman seems to imply that the proto-hominoids somehow already foreseeing their destiny as masters of life on the planet, subconsciously understood that acquiring language was necessary to this end and from generation to generation tried to reshape their throats to make this possible. This is surely not the way that Darwinian evolution works. Small changes that unexpectedly lead in quite new directions are typical of how major changes get started.

Darwin himself supposed that song rather than language had been the first end to which the evolution of the human voice had been directed. In *The Descent of Man* Darwin said “When we treat of sexual selection we shall see that primeval man, or rather some early progenitor of man, probably first used his voice in producing true musical cadences, that is in singing, as do some of the gibbon-apes at the present day; and we may conclude from a widespread analogy, that this power would have been especially exerted during the courtship of the sexes, and would have expressed various emotions, such as love, jealousy, triumph and would have served as a challenge to rivals.” (1998, 584 ff.) This insight of Darwin has been largely neglected in more recent study of human

¹ Lieberman and Crelin 1971, Lieberman 1991, etc.

evolution. It should be noted that in connecting the origins of music and language Darwin was following in the footsteps of enlightenment thinkers of the eighteenth century. See, for example, Downing A. Thomas, *Music and the Origins of Language* (1995).

In the twentieth century, long after Darwin's day, in the search for human origins most attention was paid to the African anthropoid apes—chimpanzees, bonobos and gorillas, none of which are songsters. The arboreal apes of Southeast Asia, gibbons, siamangs and orangutans, whose singing ability Darwin already knew about, have been much less studied. They sit on the branches of trees with an upright posture that makes them face forward and gives them a more human appearance than chimpanzees and gorillas. The name orangutan in fact means “person of the forest” in Malay. I have so far not been able to find in any publication a measurement of an orangutan throat but the physical resemblance to humans and their capability in song make it pretty clear that the shape of the throat is not what prevents them from making the vowels and consonants of human language.

As for human voices, I note that although Darwin refers to song as having a role in courtship, he doesn't explicitly mention the lowering of young men's voices at puberty, which is one of the first steps in distinguishing the two sexes in their roles in procreation—not as spectacular as a peacock's plumage but perhaps playing a similar role in differentiation of the sexes. Skeletal remains cannot tell us whether any of the fossil African hominids between Lucy (*Australopithecus*), the first African hominid to walk upright on two feet, and *Homo sapiens* were capable of song. The fact that there are still, today, singing apes in Southeast Asia does, however, suggest that this was probably already true for at least some of the bipedal African species from which humans are assumed to have evolved. The reshaping of the vocal tract on which Philip Lieberman has placed such emphasis can hardly from the beginning have been directed towards enabling us to talk. It may, however, have been encouraged by the pleasurable musical sounds that it made possible.

6. Universal Distinctive Features as the Basis of Phonemic Distinctions

In the prevailing theory of phonology in North America in the first half of the twentieth century, associated especially with the name of Leonard Bloomfield, phonemes of a language at any one synchronic stage were supposed to be defined ‘objectively’ by an outside observer using the principle of minimal pairs (minimal referring to their phonetic content). This was brought into question by members of the Prague school led by Nikolai Trubetzkoy who, by comparing the phoneme inventories of many languages, developed the concept of universal distinctive features, forming the basis for the phoneme systems of all human languages. This concept was introduced into North America after the Second World War by the exiled Russian linguist, Roman Jakobson.

As first presented by Roman Jakobson, Gunnar Fant and Morris Halle in *Preliminaries to Speech Analysis* (1951) the theory of distinctive features was defined primarily in acoustic terms like compact vs. diffuse, flat vs. plain, grave vs. acute, etc. In his own

writings Jakobson continued to emphasize such acoustic terms, but in *The Sound Pattern of English* by Noam Chomsky and Morris Halle (1968) there was a return to a more traditional analysis of the articulation of consonants and vowels in terms of place and manner of articulation. At the same time there have been great advances in the experimental measurement and analysis by phoneticians of speech sounds in a wide variety of languages, notably in North America in the work carried on by Peter Ladefoged and colleagues at the University of California at Los Angeles. There has also been much study of the stages by which infants in the first two years of life acquire competence in recognizing and producing the sound systems of their native tongues.

Children learn to speak their native languages by an unconscious process and it is by no means easy to step back and analyze what is involved in this familiar activity. Distinctive feature theory as developed by Chomsky and Halle was based primarily on place of articulation measured along the passive upper surface of the oral tract from the opening of the lips to the teeth, the hard and soft palates and the pharynx to the glottis. An important change introduced by a joint paper in 1998 by Morris Halle, a leading theorist of the generative school, and the experimental phonetician, Peter Ladefoged placed the emphasis instead on the role of the active articulators—lips (labial), tongue tip and blade (coronal), tongue body (dorsal), tongue root (pharyngeal) and the glottis.

There are still matters of disagreement. A matter of particular concern to me is the assumption in standard theory of a three-way distinction in the vertical dimension of tongue height in the articulation of vowels supplemented by a rather ill defined feature [\pm tense]. Thus, in standard theory English is said to have a three-way distinction in vowel height supplemented by a binary feature tense/lax as in the five ‘front’ vowels: [i] as in *Pete* [+high, +tense], [ɪ] as in *pit* [+high, -tense], [e] as in *pate* [-high, -low, +tense], [ɛ] as in *pet* [-high, -low, -tense] and [æ] as in *pat* [-high, +low, -tense]. The specification [-high, -low] for [e] and [ɛ] implies that the combination [+high, +low] is ruled out as self-contradictory. As pointed out by William S-Y. Wang, however, this implies that [\pm high] and [\pm low] are in a single dimension of tongue height and opens the possibility of adding a further feature [\pm mid] between them. The use of such multivalent features has been accepted by some theorists but seems to be incompatible with the hypothesis that phonology is organized in the brain like a digital computer.

As I have been arguing for some time (see most recently Pulleyblank 2003), this particular problem can be solved by recognizing that so-called ‘low’ vowels, in particular IPA low back [ɑ] and low front [a], are not articulated by increasing the separation of the surface of the tongue from the hard palate beyond the so-called mid point but by positioning the root of the tongue relative to the back of the throat, that is, retracting the root of the tongue toward the wall of the pharynx or advancement of the root of the tongue away from the wall of the pharynx, giving the features [+RTR] and [-RTR]. Just as in the feature [\pm high] one either raises the tongue towards the roof of the mouth for [+high] [i] and [ɪ] or lowers the tongue from the roof of the mouth for [-high] [e] and [ɛ]. For what are traditionally called ‘low’ vowels, one either draws the root of the tongue towards the

pharynx for [+RTR] [ɑ] or advances the root of the tongue from the pharynx for [-RTR] [a]. Not all languages make use of [-high] or [-RTR]. Thus, Mandarin Chinese has [+high] [i] but does not have [-high] [e]. It also has a neutral [a] (or [ɑ]) but does not distinguish the two possibilities (which do contrast as short and long respectively in Cantonese). In addition to the voiceless and voiced pharyngeal fricatives [ħ ʕ] recognized by the IPA my claim is that we need to recognize a pharyngeal approximant, that is, semivowel [q̠], which is not at present recognized by the IPA though it is implied by Ladefoged's erst-while proposal to mark pharyngealization, as in the so-called emphatic consonants of Arabic, by raised [ɑ] (Ladefoged 1982:211). He did not at that time cite an example of such an approximant but in *Sounds of the World's Languages* (1996) he and Ian Maddieson have a section called 'Vowel-like Consonants' in which they explicitly identify initial 'r' of Danish as a 'pharyngeal approximant' Moreover, as I have argued, Arabic pharyngeals as separate consonants behave phonologically like fricatives, not semivowels, since they are subject to final devoicing and voicing assimilation rules that otherwise apply to obstruents. See also Pulleyblank (2003:719ff) for additional evidence for the need to posit [q̠] as a pharyngeal semivowel in a variety of languages.

If we abandon the ill-defined feature [±tense] and add [±RTR] the five front vowels of English can be redefined as [i] [+front, +high, -RTR], [ɪ] [+front, +high, +RTR], [e] [+front, -high, -RTR], [ɛ] [+front, -high, +RTR], [æ] [+front, -RTR] with no specification for the dorsal feature [±high], the assumption being that in the last case the roof of the tongue is not used as an articulator. Historically in Germanic languages the distinction between the vowels labeled [tense] and [lax] was one of length and the English lowest so-called 'front' vowel [æ] was earlier not a front vowel but the short form of the low unrounded vowel [ɑ] in *father* which I would specify simply as [+RTR], with no specification for the coronal and dorsal articulations responsible in other languages for the features [±front] and [±high]. The corresponding [-RTR] vowel can be identified in IPA as a low central [a] or slightly raised central [ɐ]. This is what we find in German corresponding to the vowel which in English was fronted to [æ].

When [±RTR] was first identified as the basis for African vowel harmony, the correspondence with [±tense] in European languages was noted but abandoned because it seemed to work differently for the two systems. This can be explained, however, by the different function in the two cases. In African languages with Tongue Root vowel harmony [±RTR] serves to link affixes with corresponding root syllables by making them agree in respect of this feature. In English and German, on the other hand, the length distinction in the case of what are traditionally called high and mid vowels with the Dorsal feature [±high] was strengthened by applying the feature [+RTR] to the short vowels, while what are traditionally called low vowels do not in fact have a Dorsal articulation. In both English and German the maximal long back vowel is simply [+RTR] [ɑ]. In German the corresponding short vowel is [-RTR], = IPA [a] or [ɑ], while in English it has lost its tongue root articulation and been further fronted to [æ] (Pulleyblank 2003:722-24).

The claim is that these four articulators are used separately or in combination, along with modifications at the larynx and velum (for \pm nasal), to produce all the consonantal and vowel sounds that are used in human speech. I have shown elsewhere how this theory throws light on the history of the Chinese language and I will not go into details here. The significance of the claim for understanding the evolution of language as a unique achievement of human intelligence is that it implies a special adaptation in the human brain to attach meanings, not to separate sounds, whether consonantal or vocalic, but to their syllabic combinations.

7. An Intermediate Mimetic Stage between Anthropoid Apes and Humans — Sign Language as Preceding Vocal Language?

It is generally agreed that a decisive first step in the evolution of our own species from the anthropoid apes of Africa, chimpanzees, bonobos, and gorillas, from whom we are ultimately descended was the emergence of bipedal australopithecines, of which the skeletal remains, nicknamed Lucy, found in Ethiopia in 1973 were a first example. Bipedalism would have had the inevitable effect of making the animal pull its chin down so that its eyes could look forward along a path in front. It would also have given a more human appearance and effected an enlargement of the oral cavity, a first step towards providing necessary space for musical sounds and to form the sounds of speech as we know it.

Upright posture freed the hands for making stone tools, for throwing stones and eventually spears, and also, as for communicating by pointing and gestures. The earliest examples of the genus *Homo*, first *Homo habilis* and then *Homo erectus*, appear about two million years later. Apart from the improved cultural artifacts that begin to appear there is evidence of increasing brain capacity. The neurologist Merlin Donald (1991) has proposed that at this time the hominid brain progressed from what he calls the episodic consciousness, characteristic not only of anthropoid apes but of mammals in general, first to mimetic consciousness and finally, with the achievement of language, to what he calls mythic consciousness. He associates the mimetic stage with the appearance of *Homo erectus*, about 1.5 million years ago. *Homo erectus* had a brain capacity considerably larger than the preceding *Homo habilis*, about 80% of that of a modern human. The stone tools of the associated Acheulian culture which lasted for over a million years represent a considerable advance over anything found coming from the time of the preceding *Homo habilis*.

By the term mimetic Donald implies that *Homo erectus*, by standing on two legs, would have freed his hands and been capable of using them to communicate by signs. Gestural theories of language origin have appeared in the west since the time of Plato. The late Gordon Hewes who himself favored such a theory, gives a useful account of this idea in his article “The Current Status of the Gestural Theory of Language Origin”, published in *Origins and Evolution of Language and Speech*, edited by Horst B Stekles, Stevan R. Harnad and Jane Lancaster, the report of a Conference held in the New York

Academy of Sciences in October 1976. It seems to me very probable that, as Donald suggests, *Homo erectus* could have developed a mimetic form of communication by hand gestures referring to objects and actions in the environment. This would have helped the brain to focus on such units of meaning and to be ready to give them names and talk about them verbally when the brain made its leap to constructing vocal syllables and using them as the building blocks for spoken words.

8. The Cognitive Leap to Digital Phonology: *Homo Sapiens* Outlives *Homo Neanderthalensis*

In 1856 remains of what appeared to be either an abnormal modern human or an earlier very similar species was discovered in the Neander Valley in Germany. The discovery of other similar skeletons soon made it clear that they were indeed a separate species. The Neanderthals seem to have survived in Europe until about 30,000 years ago, by which time they were contemporary with modern *Homo Sapiens* who had arrived more recently from Africa. It is clear, however, that there were major and growing cultural differences between the two species. Lieberman has attempted to show that Neanderthals' vocal tracts were not so well adapted as those of *Homo Sapiens* to making the sounds of human language. Others have disagreed with his analysis.

If I am right, this is irrelevant. Whether or not our hominid ancestors down to and including the Neanderthals had the physical capability of making distinct consonants and vowels does not necessarily mean that they would have automatically begun to do so, treating them as the meaningless building blocks for the syllabic combinations that *homo sapiens* uses as the basis for spoken language. This would have required an adaptation within the brain. As far as I have been able to discover, neurologists still have no way to observe how this is achieved in the brains of living human beings. Still less is it possible to tell from examination of the skulls of extinct pre-modern hominids whether, even if their vocal tracts were physically capable of co-articulating language-like sounds, they actually had the capacity in their brains to combine them into syllables and attach meanings to them in the human way. My guess is that, as many investigators have supposed, the sudden efflorescence of cave art in France and Spain in the upper Paleolithic and given the name Cromagnon signals the appearance in Europe of our own species *Homo sapiens*. Neanderthals, who had just as large brains, survived along with our own species for some time. Yet, though similar in many ways, they remained culturally inferior.

One must, I think, assume that *Homo sapiens* underwent a decisive change in brain structure that enabled our species to distinguish consonants and vowels and use them as the building blocks of human speech. Just what would have caused this to take place is difficult to say. It is presumably the type of change that has been called a "spandrel" by Steven Jay Gould and Richard Lewontin, that is, a phenotypic characteristic that developed during evolution moving it in a new direction rather than direct adaptation in a continuing line. Although Neanderthals had as large brains as present day humans and in all probability were capable of making the same oral sounds, they were culturally inferior in

various ways. They could not compete with humans and eventually died out. Presumably they had not undergone the necessary change in brain structure to enable them to combine consonants and vowels to form words.

9. What Darwinian Advantage was Conferred by the Capacity to Produce Speech Sound

It is easy enough to see that the capability of forming doubly articulated language has been in the long run an enormous advantage to homo sapiens. As a cognitive tool even more than for communication it can be seen as the one adaptation of the human brain that gives us the superiority that we enjoy over all other life forms on the planet. It is also seems clear that the lowering of the larynx was a necessary pre-adaptation to make this possible. What is not so clear is the immediate selective advantage that this modification of the oral tract would have conferred when it was first achieved, especially when set against the increased possibility of choking.

To the extent that lowering of the larynx was simply a by-product of upright bipedal posture, necessitating a downward turn in the face, one may imagine that the better view that it gave over the grasslands in which it is thought hominids became differentiated from their primate fellows would have been an initial advantage. The capacity for song, that is, modulating the pitch of the voice in pleasurable ways, and the sexual dimorphism of the human voice are also, no doubt, related to the restructuring of the vocal tract that made speech possible and probably also need to be taken into account. In discussing “Sexual Selection in Relation to Man” Charles Darwin said:

“The capacity and love for singing or music, though not a sexual character in man, must not be passed over. Although the sounds emitted by animals of all kinds serve many purposes, a strong case can be made out, that the vocal organs were primarily used and perfected in relation to the propagation of the species.”
(Darwin 1998: 587)

Admittedly, this does not necessarily have anything directly to do with the evolution of double articulation of vocal sounds as the basis of language but it seems possible that the communicative advantage of evolving doubly articulated language should be sought not only in such activities as co-operative hunting and gathering but also in the pleasurable qualities that the evolution of the vocal tract gave to the human voice. The ability to make a distinction between consonantal and vocalic sounds and attaching meanings to them in combination rather than separately would have required a further adaptation in the brain..

10. Prelinguistic and Non-linguistic Analogue Cognition

Much of the recent literature on the origins of language makes the question synonymous with the origin of consciousness and cognition. It seems to be assumed that because we cannot talk to our non-human fellow creatures and they cannot talk to us, human

cognition and consciousness are totally different from anything we share with other animals. In the ordinary meaning of consciousness, that is, being conscious as opposed to unconscious, or awake as opposed to asleep, with dreaming as an intermediate state, this is surely quite untrue at least as far as mammals and birds are concerned, creatures that share with humans diurnal rhythms of sleep and wakefulness.

Cognition is also something that we commonly think of as depending on language and therefore belonging only to humans and not to other animals, but is this true? Direct perception of the world through the senses is something we share with other animals and it is easy to show that there are aspects of this perception that are impossible to put into words. If one meets an acquaintance on the street, one recognizes him or her instantly without being able to express in words how this is accomplished or to describe the person in words so that someone else who does not know the person could do the same. In the same way, one instantly recognizes a familiar voice on the telephone. Dogs go one better. They can distinguish individual people by their smell. Indeed, I would argue that such pre-linguistic, animal, apprehension through the senses is still the primary source of our knowledge of the world we live in. On the other hand, by using words, syllabic combinations of the vocalic and consonantal sounds made by our vocal organs, to focus on and refer to particular aspects of that sensory apprehension humans have been able to turn themselves into a new, uniquely powerful, form of life. But our primary source of knowledge of ourselves and our surroundings remains our analogue, sensory, apprehension.

Translating our sensory, analogue, apprehension of the world into the digital format of language is not a simple, straightforward matter. The applicability of a word is a yes/no question that may not be easily determined. Take the question of colour. The visible spectrum observable with the human eye is a continuum from infrared to ultraviolet. But languages have a limited, small, number of specific colour names from two, black and white, in the simplest case to six or seven, and the boundaries between colour terms are not necessarily exactly the same in different languages or even for individual speakers. The boundary between blue and green or between red and orange can differ for different individuals. This is obviously a severe restriction for someone trying to give an exact description of a colour in words. In choosing pigments to represent colours artists depend directly on their eyes, not on verbal descriptions.

Open your eyes and look around you. Whether inside a room or out in the open air, would it be possible for you to give a “complete” description, including names of all the objects large and small that are in your field of vision, their colours, including small shades of difference, bright spots and shadows, shapes and sizes. Sitting now in my study with my computer in front of me and a window partially slatted against the sunny, partly clouded, afternoon sky separating me from the outside, if I were ever to attempt such a pointless exercise as to try to make a list of every little detail, it would take me hours and, of course, I could never finish it because the view is constantly changing. Directly in front of me is a leafy tree blowing in the wind. Every now and then a bird flies by. That in itself makes a static, or even a changing list pointless. Of course, that isn’t what lan-

guage is all about. Language focuses on something of interest. If I were a dog, or even a chimpanzee, I am pretty sure that the physical sensation would be quite comparable, even though I wouldn't have the faintest idea of what things like the computer screen and keyboard were all about; but I would have eyes and ears and, no doubt, a nose that would be aware of smells that I, as a human, am totally unaware of. What I can do as a human is to focus on and give names to things, describe them and think about them, and find ways to control and modify them.

11. The Mental Evolution of Primates, from Episodic, to Mimetic, to Mythic

The psychologist, Merlin Donald (1991, 2001), has proposed a three-stage evolution of the mammalian brain from primate to human—from episodic to mimetic to mythic. The first, episodic phase corresponds to what I have referred to above as the analogue, direct awareness of our surroundings through the senses, which we share with other animals. It is still our simplest and most direct contact with the world we live in. We recognize directly through the senses a familiar face or voice as we do other features of the world we live in without infallibly being able to give it (or them) a name. Some animals such as bloodhounds can go one better and recognize individuals by their smell. Donald argues that the mimetic stage would have come about when hominids, standing on two feet, could use their hands to communicate with one another by imitating things that they observed in the environment.

12. Syntax: How do we get from Words to Sentences?

Our analogue apprehension of the world through the senses already distinguishes between objects and actions, that is, in linguistic terms, between nouns, such as man, woman, dog, tree, and verbs, such as walk, strike, eat, fall, fly, etc. It also distinguishes descriptive qualities of such objects and actions, the semantic basis of adjectives and adverbs. As perceived by the senses these different aspects of a situation are simultaneous but turned into spoken words they have to be strung together one after the other in some order that will make clear the relations between them. In other words, we need to develop rules of syntax. Although the kinds of relationships between words that have to be expressed in language may be common to all mankind, there is great variation in how this is actually achieved, whether by word order or declension and conjugation or by particles, and even within the same language, one finds unpredictable changes over time. This suggests to me that the idea that Universal Grammar is an inherent module in the human brain determining the rules of syntax is a mirage.

Let me illustrate this point by some examples in the history of the Chinese language. In the early days of generative grammar one started with the formula: $S = NP + VP$. “Sentence implies Noun Phrase plus Verb Phrase”, a word order that was subject to transformations in the case of questions, commands, etc. At first sight this seems to work for English, which, apart from exclamations, does generally speaking require a verb to make a sentence. There are many languages, however, in which this is not the case.

This shows up, for example, very clearly in written Chinese in usages that correspond to the English verb ‘to be’. In Chinese, ancient and modern, adjectives form predicates without a separate verb: **shān gāo** “mountain high” = “the mountain is high”; **shān bù gāo** “mountain not high” = “the mountain is not high”. Constructions for predicating, “A is B” where A and B are both nouns, are even harder to fit into the Chomskyan formula. They have gone through a whole series of permutations from the earliest times to the present. In the pre-classical language there was a particle, now pronounced **wéi** (negative **fēi**), which was used as a copula to introduce a noun predicate: **wéi gǒu** “it is a dog” (note that there is no subject pronoun corresponding to English “it”). It differed from a transitive verb in various ways, for instance in how to form a question. In a question, a pronoun standing for the object of a transitive verb was placed in front of the verb: **hé yǒu** “[he/she] what has?” = “what has [he/she]?” In the case of the copula, the question particle followed the copula: **wéi hé** “[it] is what?” Later, in the classical language, **wéi** developed the more restricted meaning of ‘only’ and the function of predicating a noun was taken over by the particle **yě** placed at the end of the sentence: **gǒu yě** “it is a dog”, **hé yé** “it is what?” Still later, leading to the development of modern Mandarin, the demonstrative pronoun **shì** “this/that” introducing a noun predicate came to have the meaning of a copula and the final particle **yě** was dropped.

The predication of resemblance was even more variable. In the preclassical language there was a copula **rú** 如 “is like” that behaved like the noun copula **wéi**: **rú hé** “is like what?”. In the classical language, however, the word order changed and **rú** was treated as a transitive verb: **hé rú** “is like what?” At the same time a new noun construction emerged in which, by using the particle **yóu**, which was an adverb “still, yet” with verbal predicates, a noun predicate in **yě** could be modified so as to imply similarity rather than identity: **yóu yuán mù ér qiú yú yě**: “it is like (literally: “it is still”) climbing a tree to hunt for fish.” As in English, there was also a verb **sì** “resemble” which took an object like an ordinary transitive verb.

Finding a way to express in digital yes/no terms of language the complex shades of resemblance between phenomena is not a straightforward matter. I suppose that this uncomfortable imprecision is what lies behind the ubiquitous peppering of conversation with “like” by the younger generation of English speakers in North America nowadays.

13. Do Languages Evolve?

That languages change over time is a matter of common observation. The discovery in the eighteenth century of similarities between Sanskrit, the classical language of India, Old Persian, the classical language of Iran, and Greek and Latin, the classical languages of Europe gave rise to the hypothesis that all these languages as well as many others including Celtic, Germanic, Slavonic, Armenian, etc. had a common origin and to the discipline of Comparative Philology, devoted to reconstructing this common origin and studying, step by step, how the later forms had developed. At first the prestige of the classical languages led to the common assumption that changes had generally been for

the worse. An observation that might seem to confirm this, is the perpetual tendency for the loss of distinctions through phonetic wear and tear as new generations of children learn their native language. In the case of English more than other European languages this has led to the phenomenon of silent letters preserved in conventional spelling but not pronounced, like the initial *k* in words like *know* and *knave* or *gh* in words like *though* and *fight*. A change of this kind that is currently in progress is the loss of initial aspiration in words traditionally spelled with initial *wh*. Growing up in Western Canada in the twenties of last century, I learned to distinguish words like *which* and *witch*. When I first went to Southern England, where they had already merged, I sometimes found this confusing. By now this distinction seems to have disappeared throughout the English speaking world.

All languages are subject to gradual change as they pass from one generation to the next and are adapted to new demands that are placed upon them by the needs of the cultures they serve. New words are acquired. Other words slip into obsolescence.

14. Problems Arising from the Digital Nature of Language

The applicability of a word is a yes/no question but many of the phenomena one wishes to talk about do not fit easily into yes/no categories. The word ‘kill’ seems simple enough but what about ‘murder’? My *Chambers Twentieth Century Dictionary* defines it first as a noun, “the act of putting a person to death intentionally and unlawfully” and then as a verb, “to kill (ordinarily a person) unlawfully with malice aforethought”. This seems clear enough but as we all know the applicability in a particular legal case is something that may be hard to prove, especially when the law provides for a distinction between first degree and second degree murder, as well as for a lesser degree of responsibility in the case of manslaughter, defined as homicide without malice aforethought. No doubt our ancestral pre-human hominids sometimes killed each other but they didn’t have to bother themselves about such niceties. I suspect, however, that the emotions of the parties to such situations involved were not all that different.

Humans create words for things that they cannot easily apprehend with their senses or show to others. Can anyone, for example, show me a ‘soul’ or tell me how to go about perceiving one? In this case my dictionary provides a number of suggestive definitions: “that which thinks, feels, desires, etc.: the ego: a spirit, embodied or disembodied: innermost being or nature: that which one identifies with oneself: moral and emotional nature, power or sensibility ...”. These definitions, of course, reflect a traditional religious belief in an afterlife but even for speakers of English who have no such belief, ‘soul’ and its derivative ‘soulful’ are words that one needs to know and may find oneself using in ordinary discourse. The etymology of ‘soul’ is obscure. ‘Spirit’ which is sometimes used as a synonym for ‘soul’, originally meant ‘breath’, to which modern science has given chemical as well as a biological meaning but which in earlier times could be thought of as something that gave life to the body and might therefore continue after death and survive in some way. The Chinese word *qi*, also originally “breath”, has also had a long history in Chinese philosophy and medicine. God, with or without a capital G,

is an even more problematical word that presumably does not bother non-human forms of life but assumes enormous importance for good and ill among humans who can talk about it. Think not only of the catastrophic consequences that have been wrought by the conflicting claims of different religions but also of the wonderful works of art, poetry and music that humans have created in the name of religion.

15. Sign Language as Analogue Communication

Any comprehensive discussion of the human language faculty nowadays needs to say something about the sign languages of the deaf. Through the work started by William C. Stokoe on American Sign Language (ASL) and continued by many others over the last half century it does indeed seem clear that for face to face communication signing with the hands can function very efficiently. When we look at its inner structure, however, there are big differences. In spite of Stokoe's attempted analysis of ASL hand signs into elements of place (called *tab* for *tabula*), active hand (called *dez* for *designator*) and action of the hand or hands (called *sig* for *signation*), these are not really comparable to the distinctive features of phonemes. While phonemes are in principle by themselves devoid of semantic content, ASL signs begin as imitative and although they may be conventionalized and simplified, they retain traces of iconicity which, judging by dictionaries of ASL seem to be basic in learning and remembering. Stokoe's system has never been used as a medium for writing. Later dictionaries are arranged in order by English glosses and illustrate the hand movements by drawings. See, for instance, Sternberg 1994. Another feature of ASL that shows its limitation as a fully independent language is the not infrequent use of finger spelling, especially for proper names. To become literate the deaf have to learn to read English or whatever spoken language is in use in their country. This is, I am sure, a heavy burden. No doubt a sympathetic teacher who can communicate with students in their native sign language can be helpful.

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The Nature of Chinese Grammar: Perspectives from Sign Language*

James H.-Y. Tai

National Chung Cheng University

Chinese grammar exhibits typological features shared by sign languages and young creole languages. Furthermore, like sign languages, Chinese, as much as possible, contextualizes the knowledge of the world, thereby simplifying the syntactic structure and allowing relatively free word order and argument selection. The structural similarities between sign languages and young creole languages can be accounted for by the fact that both types of languages are young languages with an acquisition ambience of mixed language inputs in contact situations. Yet, while young creoles lack inflectional morphology, sign languages have enriched, simultaneous inflectional morphology due to the visual-gestural modality effects. If inflectional morphology in spoken language is a property of old languages, as proposed by Aronoff, Meir, and Sandler (2005), then why didn't Chinese, during the course of its long history, develop a rich morphology, as with European languages? A reasonable explanation is that Chinese has opted to utilize functional mappings rather than inflections for making distinctions among different word classes. This strategy is in line with Nisbett's (2003) contention that Chinese cognition focuses on relations rather than on attributes of individuals. Furthermore, given the the circumstances whereby both sign language and Chinese optimize world knowledge to simplify syntactic structures, the "Simpler Syntax" hypothesis recently advanced by Culicover and Jackendoff (2005) can be made even simpler.

0. Introduction

The past four decades of research on sign languages—started by William Stokoe and his associates (Stokoe 1960; Stokoe, Casterline, and Croneberg 1965) and later advanced by Klima and Bellugi (1979), Liddell (1980, 2003), Fischer and Siple (1990), Siple and Fischer (1991), Emmorey (2002), Meier, Cormier, and Quinto-Pozos (2002), and Sandler and Lillo-Martin (2006)—have clearly demonstrated that human language can be produced in two modalities, the visual-gestural modality of signed languages and

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the auditory-vocal modality of spoken languages. Sign languages are produced and perceived through the gestural-visual modality, and yet with all necessary properties which distinguish human language from animal communication systems. As with spoken language, sign language is a rule-governed system. Thus, like spoken language, sign language has elaborate systems of phonology, morphology, syntax, semantics, and pragmatics.¹ Neurolinguistic findings in the past two decades also suggest that the brain's left hemisphere is dominant for signed language, just as it is for spoken language (Emmory 2002). It is now well-established that sign languages are natural languages.

The discovery and demonstration that language can be expressed not only through the vehicle of speech, but also through the vehicle of sign, has profound implications for linguistics, psychology, anthropology and other disciplines under the umbrella of cognitive science. This should be taken as one of the most crucial research findings in the study of language. No longer can we equate language with speech alone. Nor can we discuss design features of human language based solely on the data from spoken languages (Hockett 1960, Tai 2005). Language universals as well as language disparities should now be drawn from both signed and spoken languages (Sandler and Lillo-Martin 2006). Language universals can be approached from the set of properties shared between signed and spoken languages—in other words, the non-effects of modality—while the differences between signed and spoken languages are, for the most part, due to modality effects. We will briefly discuss *modality non-effects* and *modality effects* in section 1 and section 2 respectively. Section 3 outlines the typological similarities between sign languages and young creole languages and their similarities in acquisition environments. In section 4, we propose that Chinese began as a creole language that, during the course of its long history, had adopted functional mappings in lieu of inflectional morphology. In section 5, we use word order and argument selection to show that Chinese grammar maximizes pragmatic inferences to simplify syntactic structures. Section 6 concludes the paper.

1. Modality Non-Effects

The non-effects of modality as identified in Meier (2002) are: (1) conventionality of pairing between form and meaning; (2) duality of patterning by means of which meaningful units are built of meaningless sublexical units; (3) productivity of new vocabulary through derivational morphology, compounding, and borrowing; (4) syntactic structure building on syntactic categories such as nouns and verbs and embedded clauses such as relative and complement clauses; (5) similar timetables for acquisition; and (6) lateralization in the left hemisphere.

It appears, however, that these non-effects are only first approximations. Under further scrutiny, these non-effects are likely to exhibit still more detailed differences between

¹ Phonology in sign language refers to the system of basic contrastive parameters such as different handshapes, locations, movements, and orientations and the rules of composition of these parameters. The term 'cherology' was used in the early studies of sign languages, but the term has since been replaced by 'phonology' to stress the parallelism between signed and spoken languages.

the two modalities. Let me briefly comment on each of the six aforementioned non-effects. First, although conventionality of pairing between form and meaning holds true for both modalities, at both lexical and syntactic levels, iconic motivations are much more pervasive in signed languages. In contrast, arbitrary association is the general rule for spoken languages, although iconicity in syntax (Haiman 1980, 1985) and onomatopoeia and sound symbolism in phonology (Hinton, Nichols & Ohala 1994) have been documented for spoken languages.

Second, duality of patterning, one of the most important design features of human language, holds true for signed languages as well as for spoken languages. As with spoken languages, signed languages use a small limited set of basic elements, i.e., basic handshapes, in conjunction with other parameters such as location of articulation, hand movement, and palm orientation, to form the basic vocabulary items in the lexicon. However, there is also a difference here. While the phonemic units in spoken languages are themselves non-meaning-bearing units, the basic handshapes in signed languages are often meaningful by themselves. It is only when they serve as sublexical units that their iconic motivations are submerged. It appears that the preservation of iconic motivation for the whole lexical units forces the sublexical handshapes to function as meaningless units. For instance, in TSL the basic handshape /HAND/ by itself stands for hands, but it can be used to form lexical items such as HOUSE and NOW, in both of which cases it becomes a meaningless sublexical unit. This difference between the two modalities may have some important implications for the emergence of duality of patterning in the course of the evolution of human language (Tai 2005).²

Third, as with spoken languages, signed languages create new vocabulary through derivational morphology, compounding, and borrowing. However, derivational morphology appears to be more limited in signed languages than in spoken languages. This may be attributed to the youth of signed languages rather than to modality effects (Aronoff, Meir & Sandler 2005). In contrast, compounding seems to be the most important mechanism in creating new vocabulary in signed languages, but this is not necessarily the case in spoken languages. As for the mechanism of borrowing, while borrowed words in spoken languages are subject to phonological regulations of the recipient language, whole signs can be borrowed from one sign language to another sign language without much alternation. Thus, the same sign HOUSE is used Chinese Sign Language, Japanese Sign Language, and Taiwan Sign Language.³ Furthermore, since all these three sign languages also make use of Chinese characters, character spelling is not uncommon in these languages. As Chinese characters and signs both involve visual perception, they are more compatible with one another than is the case with speech perception. In communities where the spoken language of the hearing is written down in an alphabetic or syllabic script, the deaf use

² Following the convention, signs are in upper-case letters throughout the paper.

³ In terms of language families, Taiwan Sign Language and Japanese Sign Language belong to the same family, but not Chinese Sign Language.

fingerspelling instead. Both character-signing and fingerspelling can be borrowed into sign languages, often creating some variations (Battison 1978, 蘇秀芬 2004).

Fourth, the statement that all sign languages have the same parts of speech as in spoken languages needs to be qualified. It seems that prepositions are absent in all sign languages. It is no accident that in their most recent book on sign language and linguistic universals (Sandler & Lillo-Martin 2006), there is no mention of prepositions at all. This may have to do with the circumstance whereby spatial relations—as expressed in English prepositions ‘in’, ‘on’, ‘at’, ‘from’ and ‘to’—can, in signed languages, be expressed visually and iconically without explicit morphemes.⁴ The category of auxiliaries is in general absent in sign languages. Smith (1989) first found three auxiliaries in TSL and claimed that TSL may be the only sign language with auxiliaries. It should be noted that each of these three auxiliaries plays the role of agreement, which is very different in nature from the auxiliaries in spoken languages. Later, Fischer (1996) showed that something akin to AUXI in TSL exists in Japanese Sign Language (JSL), Sign Language of Netherlands (SLN), and Danish Sign Language (DSL). As Fischer (1996:117) concludes, this AUXI-like sign appears to have the fundamental function of agreement. In sign languages, it is often the case that many nouns are signed using actions associated with those nouns. In ASL and other sign languages, these semantically-related nouns and verbs are signed by producing the nouns with smaller, restrained, and repeated movement (Supalla & Newport 1978). However, this is not the case in TSL. The distinction in TSL can be made only in syntactic or discourse contexts. Furthermore, embedding in relative and complement clauses in sign languages is often expressed by non-manual, facial expressions. One of the most difficult tasks in sign language analysis is to identify such expressions and their structural relationship to manual expressions. As to the trade-offs between word order and verb agreement, all the sign languages reported so far have the class of agreement verbs. In addition, all known sign languages use the topic-comment structure. With agreement verbs and topic-comment structure, sign languages appear to have relatively freer word order than do most spoken languages.

Fifth, regarding similar timetable for language acquisition, deaf children acquiring sign language also go through the “babbling” stage when they practice, with their hands, different locations, movements, and handshapes (Lillo-Martin 1999). As a matter of fact, deaf children produce their first words as early as 5-month old, about six to seven months earlier than hearing children, who normally produce their first words in spoken language around one-year old (Newport and Meier 1985). Furthermore, according to Siedlecki and Bonvillian (1993), deaf children seem to master locations first, and then movement, and

⁴ In TSL and ASL, there is a sign with downward movement of the cup-shape hand which indicates the existence of an object at a certain location. This sign functions like the locative verb ‘zai’ in Chinese rather than preposition ‘at’ in English. See 鄒雅靜 (2004) for a detailed discussion of static spatial relations in TSL.

finally handshapes. Thus, the order of phonological acquisition is different from that of spoken languages. It is safe to assume that further studies on the order of acquisition will reveal more differences between these two modalities with respect to the order of acquisition.

Sixth, neurolinguistic findings in the past two decades suggest that the left hemisphere of the brain is dominant for spoken languages as well as signed languages. The left brain has been known to be more important for language and the right is more important for vision and spatial activities. Evidence from brain-damaged deaf people, however, suggests differences between signs using syntactic space and signs using topographic space (to be discussed in the following section). Syntactic space involves the left hemisphere, whereas the topographic space involves the right hemisphere.

In sign languages, nouns denoting objects can be represented either by shape features or part features of the objects, or by actions associated with the objects, as we have mentioned earlier. Using fMRI technique, Chiu et al. (2005) have found that the neural substrates mediating the representation took different dynamically distributed forms. Modality effects certainly deserve further and deeper study when we have developed more sophisticated neurolinguistic techniques.

In sum, the six general statements on the modality non-effects made by Meier (2002) need to be further qualified with minor but non-trivial modality effects as we know more about sign languages from different linguistic analyses, facts of language acquisition, and psycholinguistic and neurolinguistic evidence.

2. Modality Effects

There are also modality effects responsible for the structural differences between signed and spoken languages in the lexicon, morphology, syntax, and semantics. Two most important effects are iconic representation of objects and actions and indexic/ostensive identification of referents in signed languages (Meier 2002). Furthermore, as pointed out by Liddell (2003), signed languages also utilize general non-linguistic spatio-cognitive principles to construct meanings. In the discussion below, we will focus on these modality effects on the syntax of sign languages, showing how it contributes to the relative syntactic uniformity of sign languages, in contrast to relative syntactic diversity of spoken languages.

2.1. Three Classes of Verbs

One very important contributing factor to the relative uniformity of sign languages is that all natural sign languages reported so far contain three classes of verbs: plain verbs, agreement verbs, and spatial verbs. For example, American Sign Language (Padden 1983) and Taiwan Sign Language (Smith 1989; Chang, Su and Tai 2005) are not genetically related, but both signed languages have these three classes of verbs; moreover, each class of verbs exhibits similar syntactic behavior in the two languages. This situation holds despite the fact that the same concept may be expressed in one language as plain verb and in the other language as agreement verb, and vice versa. For instance, LOVE in TSL is an agreement verb, while it is a plain verb in English; LIKE in TSL is a plain verb, while it is

an agreement verb in English. The distinction between plain verbs and agreement verbs is not entirely based on the semantics of the verbs as Aronoff, Meir and Sandler (2005:322) would like to believe. Rather, the distinction is made whether the signs for the verbs are body-anchored or not. Plain verbs are body-anchored and allow only small local movements of the hand, while agreement verbs are not body-anchored and allow the hand to move from one direction to another in signing space. Thus, the sign LIKE is body-anchored in TSL but not in ASL. Conversely, the sign LOVE is body-anchored but is not in TSL. Such contrastive examples aside, most agreement verbs identified in TSL are also agreement verbs in ASL (戴浩一、蘇秀芬 2006). Presumably, membership of spatial verbs does not vary from one sign language to another. And all spatial verbs in all sign languages exhibit classifier predicates regardless of whether they express static spatial relations or dynamic spatial relations that involve change of location. What varies from one sign language to another is the use of different classifier handshapes in classifier predicates involving spatial verbs (Emmorey 2003).

Both agreement verbs and spatial verbs move the hand from one direction to another, but the hand movements in these two kinds of verbs are of a very different nature. While agreement verbs use **syntactic space**, spatial verbs use **topographic space**. Topographic space is used to present a schematized layout of the entities and events as they exist in the visual world. For example, to sign “The book is on the table,” the topographic space is used to show the spatial relationship “on” between the book and the table. The sign for BOOK must be placed above, or on top of, the sign for TABLE in the signing space. For another example, to sign “The car bumped along past the tree,” the topographic space is used to show the path trajectory of the moving of the sign for CAR toward, and then past the sign for TREE. Thus, in representing both static and dynamic spatial relationship in sign language, topographic space is able to create a spatial layout that reflects the spatial relationship between the entities involved in the real world.

Spatial verbs in sign language use topographic space. They are thus able to give visual information about path, trajectory, speed, and even manner and aspect of the movement of action by the verb. They are also able to give information about the location of the action as in signing “The dog is running around in the house.” In contrast, syntactic space is used to express abstract concepts and relationships in signing space. Thus, different handshapes can be placed in different areas of the signing space to represent various concepts. For example, in ASL, the sign for CANDY is placed on the chin, the sign for SUMMER moving before the forehead, and sign for TRAIN moving before the dorso (see Klima & Bellugi 1979:42). In TSL, the sign for YESTERDAY is placed above the shoulder, the sign for NOW moving before the stomach, and the sign for DAYS OF THE WEEK moving from the armpit. In all these examples, the location of the sign does not reflect location of entities in the visual world, nor does the moving represent a trajectory in the real world. Syntactic space can also be used to show the contrast between two groups of different people or two different abstract concepts. Thus, in describing people belonging to two opposing political parties, the signer might place a sign referring to one

group on the left of his/her signing space, and the other group on the right side. It is also not uncommon for a signer to place the concept of HEALTH in one area of the signing space, and WEALTH in another area to show the relative merits of the two. Furthermore, syntactic space allows the moving in signing space between two defined points to express grammatical relations, as in “I sent a book to my friend in Japan.” Here, the location of “my friend” in the signing space is not the location in the real world, but rather, where the book is directed. In short, plain verbs and agreement verbs in sign languages use mostly syntactic spaces.

Although not all linguists find the distinction between syntactic space and topographic space significant (Liddell 1990, Johnston 1991), we find it is very useful for characterizing three types of verbs in sign languages, including TSL. Furthermore, there is evidence from brain-damaged deaf people and experiments on healthy signers that supports the distinction. As noted earlier, although sign languages are visual languages, they are primarily located in the left hemisphere of the brain. However, the evidence shows that while the use of topographic space in sign languages also engages the right hemisphere of the brain, the use of syntactic space is restricted to the left hemisphere (Poizner, Klima & Bellugi 1987; Emmorey, Corina & Bellugi 1995).

2.2 Iconicity and Simultaneous Morphology

The iconicity in the use of topographic space is highly relevant to the theory of signs proposed by Peirce (1932:2.247, 277-82) in which a crucial distinction is made between “imagic” and “diagrammatic” iconicity. In imagic iconicity, a sign resembles its referent with respect to some visual or conceptual characteristics. In diagrammatic iconicity, none of the signs necessarily resembles its referent, but their relationships to each other mirror the relationships of their referents in the visual or conceptual world. Thus, photographs and statues involve imagic iconicity, but maps and technical diagrams involve diagrammatic iconicity.

The visual-gestural modality allows for an abundance of simultaneous morphology for sign languages in both lexicon and syntax. Even Monomorphic signs have a simultaneous appearance. The pioneering phonemic analysis of ASL monomorphic signs by Stokoe (1960) consists of three phonetic parameters (hand configuration, location, and movement) to be simultaneously initiated. Although later Liddell and Johnson (1986) demonstrated the existence of sequential phonology in terms of LML (location-movement-location) in a sign syllable, the same hand configuration spans over the whole LML sequence, yielding an appearance of simultaneity. Signs in sign language tend to be monosyllabic and often preserve iconic motivations, and thus are iconic images. Simultaneous compounds are also abundant in sign languages. For instance, many TSL verbs incorporate the /MAN/ handshape on the weak hand to express actions such as TELL, LOVE, HELP, LEAD, and KILL. Bringing the /MAN/ handshape and the /WOMEN/ handshape together means MARRY, while moving the two handshapes apart means DIVORCE. Possible

examples of simultaneous affixation also exist in TSL, and the clearest case involves both prefix-like and suffix-like negation markers (Tsay, Myers, Tai & Lee 2008).

Topographic spatial relationships in sign languages necessarily preserve spatial arrangement of the entities in the real world. They are expressed in sign languages with diagrammatic iconicity which involves simultaneous initiation of two or more monomorphic signs. This kind of diagrammatic iconicity holds true in the representation of both static and dynamic spatial relationships in sign languages, as illustrated by the two examples above, “The book is on the table” and “The car bumped along past the tree.” In the second example, in TSL as well as in ASL, not only is the manner of a car moving along iconic to the “bumping” in the visual world, but the trajectory of the car moving past the tree is also iconic to the visual world. The iconicity of the manner of moving cannot be properly classified either as “imagic iconicity” or “diagrammatic iconicity”. Nor can the trajectory of moving properly be so characterized. They are visually iconic, but are neither “iconic images” nor “iconic diagrams” as in Peirce’s original taxonomy of signs. They are expressed with simultaneous morphology in the classifier predicate, where the classifier hand configuration representing the entity in question, the movement of the entity, and the manner and the path of the movement all cluster together along the temporal dimension. In essence, by simultaneous morphology, the classifier predicate represents the static spatial relationship in the three-dimensional world and the dynamic spatial relationship in the four-dimensional world; that is, three-dimensional entities move along the temporal dimension.

In addition to verb agreement and classifier predicates, all sign languages use simultaneous morphology to indicate various kinds of verbal aspects, such as continuative, frequentative, intensive, iterative, and resultative. These aspectual modulations are expressed through the different manners of moving the same hand configuration. These manners consist of different combinations of iconic features, such as reduplicated, even, tense, fast, elongated and end-marked (Klima & Bellugi 1979). These iconic features simultaneously accompany the movement of the hand configuration of signs to indicate verbal aspects.⁵

2.3. Word Order Freedom

Word order is relatively freer in sign languages than in spoken languages, despite the fact that sign languages vary in their preferred word order as do spoken languages. Three factors seem to contribute to the relatively freer word order in sign languages. The first factor has to do with the fact that all known sign languages have agreement verbs. One of the most important functions of word order is to indicate the subject-object relationship. However, this relationship can also be expressed by verb agreement in both signed languages and spoken languages. Thus, there are trade-offs between fixed word order and verb agreement for indicating the subject-object relationship.

⁵ See 劉曉梅 (2005) for a study of aspectual modulations in TSL.

The second factor is that sign languages in general are topic-comment languages. Li and Thompson (1976) have proposed a typological distinction between topic-oriented languages like Chinese and subject-oriented languages like English. Sign languages have been described as topic-comment languages like Chinese. For instance, ASL has been described as a topic-comment language since Fischer (1978). TSL is also a topic-comment language. In both signed and spoken languages, the topic sets up the spatial, temporal, or nominal framework for the predication. Sutton-Spence and Woll (1999) characterize topic in BSL as: (1) it comes first, (2) it is followed by a pause, (3) the eyes are widened during the topic, followed by a pause, (4) it can be accompanied by a head nod, and (5) it may be signed with one hand while producing the comment with the other hand. Based on our limited study, topic in TSL also possesses these syntactic characteristics. In TSL as in BSL, both nouns and verbs can be marked as the topic, resulting in SVO, OSV, and VOS orders. Topic structures as well as verb agreement allows null arguments (Lillo-Martin 1999). While this typological feature also holds true to spoken languages, the prevalence of this feature in sign languages can be attributed to modality effects.

The third factor is that real world knowledge allows signed languages to have more flexible word order than spoken languages. Thus, in both BSL and TSL, either *MAN NEWS-PAPER READ* or *NEWSPAPER MAN READ*, in addition to *MAN READ NEWSPAPER* are possible. It is because our knowledge of the real world tells us that man can read the newspaper but not vice versa. It is only when the real world allows both possibilities that we have to resort to SVO order or to agreement in sign languages. While this kind of word order flexibility also exists in spoken languages, such as Mandarin, this phenomenon is very common in sign languages.

2.4 Grammaticalized Facial Expressions

Facial expressions are used universally to indicate the emotional states of surprise, anger, happiness, fear, sadness, and disgust (Ekman & Friesen 1975). In sign languages, however, facial expressions are grammaticalized to distinguish sentences types, namely, declaratives, yes-no questions, wh-questions, conditionals. Furthermore, in addition to the marking of topic as mentioned earlier, embedding structures, such as restrictive relative clauses, are also marked by facial expressions, as in ASL (Liddell 1980). Facial expressions are also used to express agreement in TSL (戴浩一、蘇秀芬 2006). These nonmanual signals in sign languages are based on brow-raising, head-tilting, lip-raising, and forward or backward movement of the head and the body. As they are grammaticalized, their assignment of linguistic functions may vary from one language to another (Kegl, Senghas & Coppola 1999). They present formidable challenges to the analysis of sign languages even for sophisticated sign language researchers.

3. Sign Languages and Young Creole Languages

Relative syntactic uniformity of sign languages cannot, however, be accounted for entirely by the modality effects. It has been pointed out by previous researchers in ASL

(Fischer 1978, Gee & Goodhart 1988) that ASL exhibits striking similarities to young creole languages in grammatical structures. This is summarized in Aronoff, Meir, and Sandler (2005:307):

“These commonalities include: no distinction between tensed and infinitival clauses, no tense marking but a rich aspectual system, no pleonastic subjects, no true passives, the occurrence of transitive verbs with agent subjects as intransitives with patient/theme subjects as well, pervasive topic-comment word order; both young creole languages and ASL make extensive use of content words as grammatical markers; neither young creole languages nor ASL use prepositions to introduce oblique cases; both use preverbal free morphemes to express completive aspect; and both rely heavily on prosodic cues like intonation for expressing certain syntactic relations (such as those encoded by relative clauses and conditionals in other languages).”

As pointed out by Aronoff, Meir, and Sandler (2005), there are three factors which likely contribute to the similarities between sign languages and young creole languages: language origin, conditions of acquisition, and age. Let us briefly examine these factors. Sign languages, like pidgins, arise spontaneously when people who do not share a common language need to communicate, as demonstrated in the emergence of Nicaragua Sign Language in the 1980s.⁶ Less than 10% of deaf children are born to deaf parents. In other words, more than 90% of the children are born to hearing parents who do not sign. Thus, deaf children use home signs and gesture to communicate with each other before they enter the deaf school for formal education. As a result, most deaf children are not exposed to a full-fledged language in early childhood and they have to develop a linguistic system on the basis of impoverished and inconsistent input. This situation is no different from the situation in which creole speakers of “the first generation” develop a language from a pidgin in the mixed environment of other languages. Just as young creole languages evolve from pidgins and other ambient languages, sign languages develop from inconsistent and mixed sources of home signs and gestures. The conditions under which sign languages are acquired also resemble those under which the youngest creole languages are acquired. They differ from young creole languages in that each generation of deaf children faces the same conditions of inconsistent and impoverished input. In this sense, sign languages are re-creolized with each and every generation of signers (Fischer 1978). The development of full-fledged sign languages is heavily dependent upon the establishment of schools for the deaf. The education system gathers deaf children together to form a stable community with its own cultural and social institutions which in turn sustain the conventionalization of a linguistic system. The establishment of schools for the deaf in Europe began in late eighteenth century. ASL can be traced back about two hundred and fifty years old, while TSL can be traced back to the early nineteenth century when schools for the deaf were

⁶ The spontaneous emergence of Nicaragua Sign language is, however, recently disputed by Polich (2005).

established shortly after Taiwan was colonized by Japan in 1895. According to Woodward (1978), ASL had resulted from the creolization of French Sign Language which was brought to the United States in 1816. Similarly, TSL can be a result of creolization of Japanese Sign Language when brought to Taiwan in 1915, when deaf education was established in Taiwan by the Japanese government.

While sign languages are young languages, they have rich, simultaneous inflectional morphology, as illustrated in section 2.2. In this respect, they differ markedly from young creole languages, which normally have little morphology, inflectional or derivational. Here, an important distinction needs to be made in sign languages between simultaneous morphology and sequential morphology. As examined briefly in section 2.2, simultaneous morphology in sign languages is largely inflectional. Moreover, general patterns of agreement, classifier predicates, and aspectual modulations are exhibited across different sign languages, notwithstanding their variations from one language to another. Compared with the abundance of simultaneous morphology, sequential morphology appears to be very limited. This is true for ASL and ISL (Aronoff, Meir & Sandler 2005) as well as for TSL (Tsay, Myers, Tai & Lee 2008). Furthermore, sequential morphology is derivational and is specific to individual sign languages, and variations in sequential morphology are considerably larger than the simultaneous morphology within each individual sign language. It should also be noted that, whereas simultaneous morphology is more transparent in iconic motivations, sequential morphology appears to be arbitrary.

Aronoff, Meir and Sandler (2005) refer to the rich inflectional morphology in sign languages as “the young language puzzle.” They solve the puzzle by means of modality effects. They argue that inflectional morphology in sign language is not due to age, as in the case of spoken languages but, rather, due to modality effects. In spoken languages, inflectional morphology takes a much longer time to develop than does derivational morphology. In sign languages, iconic simultaneous morphology is based on spatial cognition, proving itself more suitable than arbitrary sequential morphology. Thus, while sign languages are young languages, they have rich, simultaneous inflectional morphology, but little sequential morphology.

4. The Chinese Puzzle

One cannot fail to notice that Chinese grammar also exhibits common structural features noted between sign languages and young creole languages. Yet, Chinese is definitely not a young language. The Chinese puzzle is therefore created: if the development of inflectional morphology in spoken language is a function of age, why didn't Chinese, during the course of its long history, develop a rich inflectional morphology, as did European languages? The question can be answered, if we assume that Chinese was a creole language to start with, and that Chinese had opted to utilize functional mappings rather than inflections for making distinctions among different word classes to indicate different parts of speech. It is true that, to a certain extent, parts of speech in Modern Chinese can be characterized by their syntactic distributions within the framework of

prototype theory (Tai 1997). Nonetheless, justifying part-of-speech assignments in Modern Chinese is often controversial (McCawley 1992). Lacking inflectional morphology, Modern Chinese seems generally to rely on functional mappings (Tai 1982). It appears that the one-syllable-for-one-word monosyllabic structure of the Chinese language came to exist before the introduction of Chinese characters. Thus, the trinity of one character for one syllable and one word was already firmly rooted in Chinese language even before the period of Classical Chinese, as evidenced in the inscriptions on oracle bones in the Shang Dynasty (c. 16th-11th century B.C.) The use of functional mappings can be illustrated by the following examples from classical texts. The first two sets of examples are taken from the *Laozi (Daodejing)* and the *Zhuangzi*, with translations provided by Harbsmeier, as reported in Wenzel (2007), and the third example is a well-known example from the *Lunyu (The Analects of Confucius)*, with translation provided by Pulleyblank (1995).

A. 老子：

知不知上

know \ not \ know \ top

‘To know that you don’t know is best.’

(or ‘know and to believe not to know is best.’)

不知知病

not \ know \ know \ sick

‘Not to know that you know is sick.’

(or ‘Not to know and to believe to know is sick’)

夫唯病病故不病

- \ only \ sick \ sick \ thus \ not \ sick

‘Only who is sick of this sickness is not really sick.’

(or ‘Who is only sick of this sickness is not really sick.’)

B. 莊子：

生生者不生

life \ life \ - \ not \ life

‘What gives life to what is living does not live itself.’

C. 論語：

君君，臣臣，父父，子子

ruler \ ruler, minister \ minister, father \ father, son \ son

Let the ruler act as the ruler should, the minister as a minister, the father as father, the son as son.

The (A) example from the *Laozi* shows that the meaning of each word as well as their compositional meaning can only be properly interpreted from the contextuality of Laozi's philosophy. The word 病 can function as predicate adjective 'to be sick', as transitive verb 'to be sick of', or as a noun 'sickness'. Similarly, in the (B) example from the *Zhuangzi*, the word 生 can function as transitive verb 'to give birth to', as noun 'living things', or as intransitive verb 'to live'. In the (C) example from Confucius, nouns function as verbs, akin to denominal verbs in English (Tai 1997, Chan & Tai 1995).

In sum, the Chinese puzzle can be solved if we assume that Chinese was a creolized language to start with, and that it had opted to use functional mappings rather than inflectional morphology to indicate parts of speech. The monosyllabic structure motivated the preservation of the logographic writing system, which in turn may have perpetuated the employment of functional mappings because of the high compatibility of one character for one monosyllabic word.⁷ Thus, despite the age of the language, Chinese grammar has managed to serve its purposes without developing inflectional morphology.

5. World Knowledge and Syntax

Functional mappings require contextuality for proper interpretation. The interface between functional mappings and textual information is, in essence, no different from the interface between conceptual structure and world knowledge. There are two kinds of inference, logical inference and pragmatic inference. While the former depends on formal syntactic rules and their logical implications, the latter relies on the computation of conversational content based on relevance to reality and the intentions of the speaker and the hearer.⁸ Let us use *word order* and *argument selection* to show how pragmatic inference can play a key role in Chinese syntax.

When a sentence has an animate subject and an inanimate object, native speakers of Beijing Mandarin seem to accept all six possible word orders except VSO. This can be illustrated in (1) with the intended meaning 'He ate the apple.'

- (1) a. Pingguo ta chi-le. 'He ate the apple.'
 apple he eat-Asp
 b. Ta pingguo chi-le.
 c. Ta chi-le pingguo.
 d. Chi-le pingguo, ta.
 e. Pingguo chi-le, ta.
 f. *Chi-le ta, pingguo.

⁷ Notice that the Japanese had to develop the kana system for inflectional morphology when it adopted the Chinese writing system during the Tang Dynasty (618-907 A.D.).

⁸ See Sperber and Wilson (1995) for a detailed account of the notion of relevance and inference in human cognition and communication.

The relative freedom of word order freedom in (1) is permitted because there is no ambiguity with respect to the grammatical relationship between the agent and the patient. It is not surprising to find that ASL also allows all possible word orders except VSO when there is only one plausible way to interpret the grammatical relations in a sentence (Fischer 1975). The picture is, however, a little complicated here and deserves a brief discussion. Note that there is a pause (and a drop in amplitude) before the postposed subject ‘ta’ in (1d) and (1e). The OSV order in (1a) can be taken as a sentence with topicalized object. (1c) is the canonical SVO order. Our main concern here will be the grammaticality of the SOV order in (1b), as compared with (2b) and (3b). When both subject and object are animate, there are two scenarios. In the first scenario, the relation that the verb denotes is unlikely to be reversed. For example, in (2), in the real world, it is unlikely that the rabbit eats the tiger. We might expect (2b) to be as acceptable as (1b). However, native speakers of Beijing Mandarin would still feel uncomfortable with it, even though there is no misunderstanding of the meaning of the sentence.

- (2) a. Tuzi laohu chi-le. ‘The tiger ate the rabbit.’
 rabbit tiger eat-ASP
 b. ?Laohu tuzi chi-le.
 c. Laohu chi-le tuzi.
 d. Chi-le tuzi, laohu.
 e. ?Tuzi chi-le, laohu.
 f. *Chi-le laohu, tuzi.

In the second scenario, both subject and object are animate and in the real world their relationship, as denoted by the verb, can be reversed, as in the case of (3). In this situation, (3b) is ungrammatical with the intended meaning as shown, ‘The tiger ate the lion.’ It can only mean ‘The lion ate the tiger.’

- (3) a. Shizi laohu chi-le. ‘The tiger ate the lion.’
 lion tiger eat-ASP
 b. *Laohu shizi chi-le.
 c. Laohu chi-le shizi.
 d. Chi-le shizi, laohu.
 e. ?Shizi chi-le, laohu.
 f. *Chi-le laohu, shizi.

Sentences (1b), (2b) and (3b), taken together, show that the functional role of word order arises to meet the need to avoid ambiguity in semantic functions such as agent versus patient, or in syntactic functions such as subject versus object. They also show that the object property of animacy also plays an important role in Chinese word order. Our observation here is consistent with previous psycholinguistic findings that animacy as a validity

cue weighs more than word order in the Competition Model proposed by Bates and MacWhinney (cf. Li & Bates 1993).

We now turn to argument selection in Chinese to see how pragmatics plays a role in argument selection in Chinese grammar. Consider the following verbal phrases in construction with the verb *chi* ‘to eat.’⁹

- | | |
|---|---|
| (4) Chi niuroumian.
eat beef noodles | ‘Eat beef noodles.’ |
| (5) Chi Sichuan guan.
eat Sichuan restaurant | ‘Dine at a Sichuan restaurant.’ |
| (6) Chi da wan.
eat large bowl | ‘Eat a large bowl (of food).’ |
| (7) Chi wanshang.
eat evening | ‘(The banquet/meal) is in the evening.’ |
| (8) Chi touteng.
eat headache | ‘(The medicine) is for headache.’
(or ‘Take it for headache.’) |

Examples (4)-(8) show that a transitive verb in Mandarin Chinese like *chi* ‘to eat’, besides its regular theme object argument, can take location, instrument, time, reason, and other expressions as its object argument. Li (2001) adopted light verb syntax proposed by Huang (1997) for Chinese to account for this and other kinds of unselected subject and object arguments in Mandarin Chinese. Thus, the surface transitive verb *chi* is embedded under the empty higher light verb phrase and verb phrases containing abstract verbs such as AT, USE, and FOR. However, the formal account would not be able to explain why the transitive verb *he* ‘to drink’ cannot have the same set of unselected object arguments as *chi* ‘to eat’. It appears that eating is such an important activity in Chinese culture that, for communicative efficiency, its syntax is simplified with rich pragmatic inferences. In a frequency count by Tao (2000), the frequency of *chi* is much higher than *he* and other related verbs. In terms of Zipf’s (1935) law, the more frequently a word is used in a language, the shorter is the word. We can extend this law from the length of a word to the length of a phrase or sentence.

6. Conclusions

Sign languages, despite their youth, have enriched, simultaneous inflectional morphology due to modality effects from the visual-gestural mode of communication. In contrast, young creole languages have little inflectional morphology. While morphology in sign languages is iconically-based, inflectional morphology in spoken languages is

⁹ We exclude metaphoric expressions such as *chi-cu* ‘be jealous’, *chi-kui* ‘be at a disadvantage’ and *Zaijia chi fumu, chuwai chi pengyou* ‘One lives on his parents when at home, but on friends when traveling.’

arbitrary. Aronoff, Meir, and Sandler (2005) propose that inflectional morphology in spoken language is a function of age, and that the arbitrariness of grammatical systems is a property of old languages, and not of human language. Chinese, despite its long history, still lacks inflectional morphology. The Chinese example shows that a very old language does not have to develop inflectional morphology. While we view arbitrariness not to be the fundamental property of human language, we are of the opinion that arbitrariness and iconicity are both due to modality effects: arbitrariness to the auditory-vocal modality of spoken languages and iconicity to visual-gestural modality of signed languages.

With respect to typological features, Chinese grammar exhibits a striking similarity to that of sign languages and creole languages. These features include: no tense marking but a rich aspectual system, pervasive topic-comment word order, and several others, as mentioned in section 3. Furthermore, as with young creole languages, Chinese lacks inflectional morphology. The Chinese puzzle can be solved if we assume that Chinese was a creole language to start with and that it had opted for functional mappings rather than inflectional morphology to indicate parts of speech and other kinds of grammatical functions. This strategy is compatible with Nisbett's (2003) theory that Chinese cognition focuses on relations between individuals rather than on the attributes of an individual. The introduction of Chinese characters for monosyllabic words in the early history of this language may also have contributed to the perpetuation of the monosyllabic structure.

Finally, as in the case of sign languages, Chinese prefers pragmatic inferences to formal syntactic constraints, with the result of simplifying the syntax. Given the fact that both sign language and Chinese optimize world knowledge to simplify syntax, the "Simpler Syntax" hypothesis recently advanced by Culicover and Jackendoff (2005) can be made even simpler. Liddell (2003) suggests that sign languages make great use of non-linguistic cognition to achieve the same effect of communication as in spoken languages. We are tempted to speculate here that Chinese and young creole languages would fall into the middle of the continuum from sign languages to inflectional spoken languages in making use of non-linguistic cognition, in addition to pragmatic inference and world knowledge. It is our hope that this speculation can lead to meaningful research questions regarding the interface between grammar and meaning in human communication.

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Case, 20 Years Later*

Yen-hui Audrey Li
University of Southern California

The theory of abstract Case in the framework of Government and Binding played an important role in capturing cross-linguistic generalizations regarding order and constituency and accommodating exceptions to word order universals. Case was shown to be relevant even in languages without morphological case markings. Indeed, Li (1985, 1990) demonstrated that Case facilitated the understanding of a wide range of grammatical structures in Chinese. However, as the linguistic theory evolved, it became possible to replace a Case approach to word order with a verb-raising analysis, which seems to challenge the significance of Case in the grammar of Chinese. This paper is to show that the empirical generalizations supporting Case in the earlier works but questioned in some other works are still valid, and that the research on Case further sheds light on other issues such as the finer structure of clauses in Chinese.

0. Introduction

The notion of Case¹ and the theory of Case in the framework of Government and Binding (Chomsky 1981) have played a very important role in describing cross-linguistic generalizations regarding word order and constituent structures. Languages with overt morphological case markings demonstrate well how cases are good indications of order and constituency. For instance, a nominative case-marked element is generally the subject of a clause, bearing a close relation to Tense (or Agreement) and an accusative case-marked phrase is generally the object of a verb, bearing a close relation to the verb. Therefore, nominative and accusative cases are good clues to grammatical relations and the structural positions occupied by subjects and objects; morphological cases can be understood as encoding structural relations.

However, not all languages are marked with morphological cases. Some, like modern Mandarin Chinese (referred to here simply as Chinese), do not exhibit any case markings.

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¹ The capitalized “Case” will be used to refer to abstract Case and the lower case “case”, to morphological case.

Nonetheless, such languages also have grammatical relations like subjects and objects, which typically appear in fixed positions. Structural relations are no less relevant in such languages. Not surprisingly, the theory of abstract Case, which governs the distribution of NPs (arguments) in relation to their Case assigners, such as verbs or Tense (Agreement), helps determine order and constituency in languages like Chinese, which was the theme of Li (1985, 1990). This work built on the insight from typological studies and the generative theory on phrase structures –X'-structures, and captured important generalizations regarding the distribution of various categories and their ordering in Chinese. The research also raised interesting questions that had not been asked in a significant manner.

However, as theories evolved and new insights and tools became available, some important facts regarding ordering in Chinese were captured in a different manner --- specifically, by way of a more elaborate clausal structure which contains light verb positions where verb-movement lands. The word order within verb phrases was derived by the height of verb movement. Such an approach to word order raises the question of whether the notion of Case plays a role in the grammar of Chinese, not having any overt morphological markings. This paper argues that Case is still relevant in capturing the distribution of different categories, including null categories. In the process, we hope to show how linguistic facts can be better understood when they are anchored theoretically, how theories provide road maps to the discovery of significant generalizations, and how better understanding of linguistic facts leads to the refinement of linguistic theories.

This paper is divided into four parts. The first section sketches the interesting challenges Chinese poses for the studies of language universals in typological works and the generative X'-theory. Section two briefly describes a Case approach to word order and its advantages over the earlier accounts. The third touches on the evolution of theories, which made available the verb-movement approach to word order. The last part reviews the current state of affairs and discusses some issues involving the notion of Case.

1. Case, X'-Theory And Word Order

As widely recognized in typological studies of word order possibilities in natural languages, there are cross-categorial similarities among languages (see, for instance, the seminal work by Greenberg 1963, and the universals archive website <<http://typo.uni-konstanz.de/archive/intro/index.php>> by Frans Plank and Elena Filimonova, Universität Konstanz), which can be much better understood if phrase structures are couched in X'-theory (Hawkins 1983). X'-theory, specifying that each phrase (XP) is headed by X, is able to capture the generalization that the category of a phrase is normally the category of the head of the phrase and that many languages are consistently head-final (such as OV, Postpositional) or head-initial (such as VO, prepositional), which are not accommodated by the simple re-writing rules of phrase structures in the early transformational grammar $A \rightarrow B + C$ (cf. Chomsky 1957, 1965). For instance, the patterns below can be

straightforwardly described as a consistently head-initial language in the terms of X'-theory [XP → X + Complement, X being V or P or N]:

- (1) a. [VP V + NP]
 b. [PP P + NP]
 c. [NP N + NP/PP/clause]

A strong interpretation of X'-theory is that languages should be consistently head-final or head-initial cross-categorially. Interestingly, Chinese is a problem to the cross-categorial generalizations in ordering: it seems to have both SVO and SOV patterns and both post-positions and prepositions appear to be possible.

(2) SVO

- a. wo xie-wan-le gongke le.
 I write-finish-LE homework LE
 'I finished writing the homework'

SOV

- b. wo (ba) gongke xie-wan-le.
 I BA homework write-finish-LE
 'I finished writing the homework'

(3) a. prepositional:

cong nar
 from there
 'from there'

- b. postpositional (localizers: *shang* 'top/on', *xia* 'under/below', *li* 'inside', *wai* 'outside'...) '
wu-wai
 house-outside
 'outside the house'

Within NPs,² however, Ns always appear in the final position [NPN]:

- (4) a. ta-de na-ke xiyou-de wo hen xihuan de lanhua
 he-DE that-CL rare-DE I very like DE orchid
 'that rare orchid of his that I like very much'

² Since Abney (1987), distinguishing an NP and a DP has been widely accepted (see, among others, Li 1998, 1999a,b for the importance of making such a distinction in Chinese). Because the distinction is not relevant to this work, we only use the label NP for the sake of simplicity.

- b. *diren dui chengshi de pohuai*
 enemy to city DE destruction
 ‘the enemy’s destruction of the city’

sentence-final question particle (an OV pattern):

- (5) *ni xihuan na-ge lanhua ma?*
 you like that-CL orchid Q
 ‘Do you like that orchid?’

Since the 70’s, different proposals have been put forward to determine the basic word order of Chinese and to account for the seemingly mixed properties, such as (Li and Thompson 1975, Tai 1973 etc. for SOV and Chu 1979, Huang 1978, Li 1979, Mei 1979, Sun and Givon 1985, among others, for SVO as the basic order of Chinese). Li (1985, 1990) examined the properties of the relevant patterns from a generative viewpoint and argued that Chinese is SVO, SOV being the result of topicalization or focalization or the use of the marked *ba* construction. The apparent postpositions such as localizers behave more like nouns (nominal clitics, see Huang, Li and Li 2008, chapter 1 for a recent perspective of the issue). The distribution of the so-called “postpositional phrases” is actually more like that of noun phrases: they can appear in typical argument positions, such as objects of Ps in the following examples.

- (6) *ta zai fang-li xie zi.*
 he at room-inside write word
 ‘He wrote in the room.’
- (7) *ta ba fang-li he fang-wai dou qing ganjing le.*
 he BA room-inside and room-outside all clean clean LE
 ‘He cleaned the inside and outside of the room.’

In other words, Chinese is head-initial with respect to V+ Object and prepositional in regard to P + Object, but is head-final within NPs; i.e., Chinese is essentially head-initial (VO, Prepositional), but noun phrases are exceptions (Huang 1982). Chinese has other properties typical of OV languages, such as the prominence of sentence final particles (question article), and the ordering of modifiers preceding modifyees. The mixed properties make Chinese a challenge to the typological studies or a strong version of X’-theory. Li (1985, 1990) argues that such mixed properties follow from the interaction of a consistently head-final pattern interacting with the requirement on Case assignment --- a Case approach to word order (cf. Koopman 1984, Travis 1984)

2. A Case Approach

It is clear from languages such as English, which demonstrates overt morphological case marking in some instances, how case encodes structural relation. As mentioned, a nominative case marked NP is generally the subject of a tensed clause. An accusative case generally indicates the direct object of a verb (or a P, in languages that do not distinguish accusative case from oblique case morphologically).

- (8) a. *He* saw *her*.
 b. *She* has an interest in *him*.

Case is a good indicator of the relation between an NP and the related tense (agreement) or a V/P. Such relations also exist in languages without morphological case markings. The notion of abstract Case brings together languages with and without morphological cases. In the framework of Government and Binding (Chomsky 1981) a V/P is a Case assigner and assigns Case to its complement. In contrast, an N is not a Case assigner, which captures the obligatoriness of prepositions such as *in* and *of*, when nouns take objects (*interest – her, fear – him*).³

- (9) like him; saw her, about them
 (10) have interest *in* her; in fear *of* him

Such a difference in Case-assigning capabilities provides an understanding of the mixed properties of Chinese. Chinese has many OV properties: it has the ordering of modifiers before modifiees; it has sentence-final (question) particles. On the other hand, it also has prominent VO properties: verb+object, prepositional; apparent postpositions are not adpositions but are more like nouns (nominal clitics). The mixed properties in word order can be understood if Chinese is essentially a head-final language - capturing all the OV properties - except when Case assignment takes place. Case assignment obeys a directionality requirement; specifically, Case is assigned from left to right in Chinese, deriving the word order of an object following a V/P. Because N does not assign Case, NPs are head-final consistently.

The directionality requirement on Case assignment captures in a principled way the exceptions: exceptions are not true exceptions. They are simply the result of the interaction among different modules of grammar: X'-theory and the head parameter (head-initial vs. head-final) interacting with Case theory (an NP must bear a Case and Case assignment is subject to a directionality requirement).

Such an approach makes very specific predictions. First, without other intervening factors, it should be possible to find a language that is a mirror-image of Chinese: head-

³ The mechanism of Case assignment (a Case feature transferred from a Case assigner to a Case assignee) can also be understood as Case checking of the Case features of the two relevant items.

initial but Case assigned from right to left (cf. Koopman 1984, Travis 1984). In regard to Chinese, we should predict that only constituents receiving Case in Chinese appear on the right of their Case assigning head: V/P + Object. Constituents NOT assigned Case in Chinese should not appear on the right of a head, i.e, nouns in the final position within noun phrases, sentence-final particles (Complementizer head taking an IP complement). Most of these predictions are born out. However, there have also been controversial issues about such a Case approach to word order. The main ones are

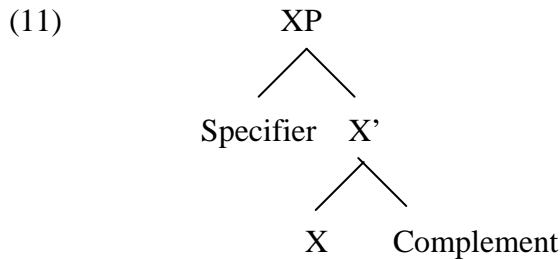
- (i) distribution of PPs, clauses: they should not occur in Case positions due to the Case Resistance Principle as in Stowell (1981) - Case assigners should not appear in positions assigned Case
- (ii) distribution of NPs that are not arguments: should Case be required on every NP or every argument NP?
- (iii) properties of adjectives
- (iv) properties of the constituents occurring postverbally
- (v) distinction between finite and non-finite clauses (tensed clauses or non-tensed)
- (vi) whether Chinese has structures corresponding to raising constructions, passives and unaccusatives (ergatives) - verbs not assigning Case to their complements.

These issues have been debated in many works, which we will not repeat here. Interested readers are referred to Ernst (1988, 1994, 2003a,b), Y. Li (1997a), Y.-H. A. Li (1985, 1987, 1990), Paul (1988, 1996, 1999, 2005), Tang (1990, 1993a,b, 1994), Tsai (1994, 1995), among many others. Nonetheless, it is worth pointing out that most of these issues could be raised and better understanding of the many relevant structures became possible because of the precise predictions made by the analysis based on the notion of Case. The predictions led us to the discovery of more generalizations, demonstrating the critical role of methodology to the advancement of research.

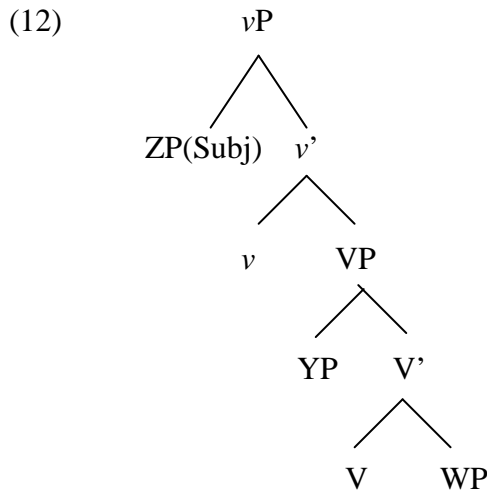
3. V-Raising

Despite the exciting and bountiful research on the issues centering around the notion of Case, theories keep evolving. New tools and clearer descriptions of the properties and mechanisms of human languages in general and specific languages became available. Pertinent to the issue of word order, there have been proposals about a universal basic word order for all natural languages and other ordering variants are the results of grammatical operations, notably movement. For instance, Kayne (1994) proposes that all languages have the word order of SVO, the result of spelling out a hierarchical structure according to the linearization rule put forward by him (see the discussion of Linear Corres-

pendence Axiom in Kayne 1994). Deviations from this basic word order, such as the SOV order in Japanese, are the products from X or XP-movement. Modifying this proposal, Takano (1996) argues that the universal hierarchical structure should be spelled out as SOV, according to his linearization mechanisms. More precisely, languages share the basic hierarchical structure, such as the one given by X'-theory:⁴



Spelling out (linearizing) such a structure derives the ordering of Specifier-Complement-X, i.e., SOV word order (e.g., Japanese), according to Takano. The ordering of SVO, such as in English, is derived by the movement of a verb to a higher projection.



(The verb can have two complements YP and WP (double complement verbs) or only one appears (single complement verbs))

In an earlier study, Pollock (1989) argues that the difference between French and English in ordering is due to the fact that French allows verbs to move to Inflection but

⁴ Kayne's 1994 spell out rule forces him to claim that all specifiers are adjoined elements.

English does not.⁵ Important differences in ordering between the two languages are illustrated below:

French allows [V Adv Object], not English

- (13) a. *John likes not Mary
 b. Jean (n')aime pas Marie.
- (14) a. *John kisses often Mary.
 b. Jean embrasse souvent Marie.
- (15) a. *My friends love all Mary.
 b. Mes amis aiment tous Marie.
 c. My friends all love Mary.
 d. *Mes amis tous aiment Marie.

According to Pollock, verbs must have moved to a higher position in French but do not do so in English. Other works such as Larson (1988) and many others allow verbs in English to move to a higher projection. This contrasts with Japanese, which does not move its verbs at all, according to Takano (see note 5). The generalization that emerges is that the height of verb movement is responsible for the type of elements appearing post-verbally.

Empirically, Chinese is more restricted than English in what may occur postverbally:

- (16) a. I will discuss (with John) (carefully) (at school) (tomorrow).
 b. wo hui (mingtian) (zai xuexiao) (zixi-di) (gen Zhangsan) taolun.
 I will tomorrow at school carefully with Zhangsan discuss
 'I will discuss (with Zhangsan) (carefully) (at school) (tomorrow).'
- c. *wo hui taolun (gen Zhangsan) (zixi-di) (zai xuexiao) (mingtian).
 I will discuss with Zhangsan carefully at school tomorrow
 'I will discuss (with Zhangsan) (carefully) (at school) (tomorrow).'

⁵ In Pollock (1989), lexical verbs in English do not undergo movement. In the expanded structures containing much more functional projections, it is possible to maintain the insight of Pollock's study and claim that verbs undergo movement in English, as long as the verb moves to a lower position than in French. Nonetheless, the word order facts in English are quite complicated and do not seem to fall under a simple verb movement easily (considering the distribution of adverbs). Various types of XP movement, especially the so-called "remnant movement" might also be involved (see, for instance, Cinque 1999).

Even though limited, Chinese still allows some constituents in postverbal position, in contrast to the strict verb-final pattern in Japanese. The contrast between these languages can be captured by a verb movement approach if verbs in Chinese also undergo movement, but the landing position is low in the tree structure (lower than the landing site of verb movement in English, also see note 5). Indeed, there have been important works arguing for the presence of V-to-*v* movement in Chinese: (Huang 1997, Tang 2001, among many others)

(17) Laoshi song-le Zhangsan yi-ben shu, Lisi yi-zhi bi.
 teacher give-LE Zhangsan one-CL book Lisi one-CL pen
 ‘The teacher gave Zhangsan a book and Lisi a pen.’

(18) Zhangsan kan-guo xiao mao yi-ci, xiao gou liang-ci.
 Zhangsan see-GUO little cat one-CL little dog two-CL
 ‘Zhangsan has seen the kitten once and the puppy twice.’

Huang (1997) suggests that verb movement is responsible for the fact that a logical object appears in the possessor position in (19) and the duration or frequency phrase, postverbally:

(19) a. tamen bang-le wo-de piao
 they tie-LE my ticket
 ‘They kidnapped me.’
 b. qing ni bie kai Lisi-de wanxiao.
 please you don’t make Lisi’s fun
 ‘Please do not joke with Lisi.’

(20) a. ta kan-le san tian (de) shu.
 he read-LE three day(‘s) book
 ‘He read (books) for three days.’
 b. ta chang-le liang ci (de) ge.
 he sing-LE two time (‘s) song
 ‘He sang twice.’

However, the verb does not move high, therefore disallowing a negation word like *meiren* ‘nobody’ in the object position:⁶

⁶ According to Christensen (1986), Kayne (1998), Huang (2003), negation expressions like ‘nobody’ are the result of negation combined with a negative polarity item such as ‘anybody’. Therefore, these negative words are possible only if negation and the negative polarity item licensed by negation are adjacent to each other at some stage of derivation.

(21) *wo xihuan mei-ren.

I like nobody

A verb-movement approach seems to capture the word order variations in different types of languages, making the notion of Case to word order irrelevant.⁷ Does this mean that the notion of Case can also be eliminated from grammar, especially for a language like Chinese, which does not show any overt case marking (see note 7)? The answer is clearly negative. Case is still the motivation for movement in the analysis of passives in Huang (1999), Huang, Li and Li (2008, chapter 4), Ting (1995), etc. Case is still referred to in the updated account of the distribution of clauses in Tsai (1995), following the proposal that clauses are assigned Case in Chinese in Li (1985, 1990). In the extensive study of resultative compounds by Y. Li (1993, 1995, 1997b, 1999), Case dictates what can follow the resultative compound verbs. Lin (2001) argues for the unselectiveness of subjects and objects in Chinese but crucially needs the notion of Case to constrain the distribution of NPs. Indeed, looking back to the issues debated in the literature, Case still helps us better understand grammatical properties and assist in the choice of appropriate analyses or structures among available options. In what follows, I will demonstrate the consistent role of Case with two instances: the distribution of PPs and the structure of clauses.

4. The Role of Case in Some Current Issues

Two of the current issues that Case can help us take a fresh look at are those regarding PPs in prenominal positions and the seemingly conflicting claims about the Case status of clauses in Chinese.

4.1. PPs

PPs being relevant to the issue of Case begins with Stowell's (1981) Case Resistance Principle, disallowing Case to be assigned to a Case assigner. P is a Case assigner and a PP should not be assigned Case. In Chinese, Li (1985, 1990) argued that the Case Resistance Principle is also valid in Chinese and accounts for why real PPs are not found in canonical argument positions. Li also suggested that *de* appearing within nominal expressions might be related to Case: it is a Case assigner, assigning Case to the preceding NP and clauses. P itself is a Case assigner; therefore, PPs do not appear in the position preceding *de* within nominal expressions. This suggestion was challenged in the works questioning the validity of the generalization that PPs do not occur in the modification

⁷ It is possible that Case is the motivation for verb-movement: a verb needs to move to certain positions to check Case features. For instance, French might have subject and/or object agreement projections (plus other likely candidates such as dative projections, oblique projections), requiring verbs to move up to these functional projections for Case purposes; whereas Chinese has fewer and Japanese, none of such functional projections and verbs do not have the same kind of movement for Case purpose (thanks to Catherine Huang for the interesting discussions).

structure (those with *de* within NPs). Interestingly, Cheung (2006), Larson & Yamakido (2005, 2006) revived the account and analyzed *de* as a Case marker, grouping it with the *eze* marker in Persian and other similar languages. In what follows, I will discuss the relevant empirical generalization and suggest that Li's (1985) original observation holds if we consider the counterexamples raised in the literature from a different perspective. I will also present a modified account for why the modifier preceding *de* can be understood as an element receiving Case in light of the recent analysis of *de* by Li (2007a).

The empirical issue of concern is what may appear in the XP position in the nominal expression [XP *de* N(P)]. It is clear that many categories are possible, as illustrated below:

- (22) a. zhuyao de (natio) daolu Adj + *de* + N(P)
 main DE that road
 'the main roads'
- b. (nage) xuesheng de (naben) shu NP + *de* + N(P)
 that student DE that book
 ' (that) student's book'
- c. wo gei ta de (naben) shu Clause + *de* + N(P)
 I give him DE that book
 'the book that I gave to him'

These facts can be summarized below:

- (23) a. NP ----> Modifier + *de* + N(P)
 b. Modifier: Adjective or NP or Clause

What is conspicuously missing in the list of categories possible as a modifier is a PP (a VP can be subsumed under a clause, with the subject of the VP relativized). In Li (1985, 1990), the following types of examples were used to demonstrate the impossibility of PPs in the modifier position:

- (24) a. wo wei ta kai le yi-ge wuhui
 I for him open LE one-CL party
 'I held a party for him.'
- b. *wei ta de wuhui
 for him DE party
 'party for him.'
- c. wei ta kai de wuhui

for him open DE party
'party that was held for him.'

(25) a. ta cong/gen yinhang jie qian.
he from/with bank borrow money
'He borrowed money from the bank.'

b. *cong/gen yinhang de qian
from/with bank DE money
'money from the bank.'

c. cong/gen yinhang jie de qian
from/with bank borrow DE money
'money borrowed from the bank.'

(26) a. wo dui ta ti le henduo jianyi.
I to him raise LE many suggestion
'I made many suggestions to him.'

b. *dui ta de henduo jianyi
to him DE many suggestion
'many suggestions to him.'

However, it has been suggested in the literature that some PPs seem to be possible in the pre-nominal modifier position, specifically, *dui* and *guanyu* phrases (see, for instance, a recent work Paul 2005a).

dui phrases:

(27) dui ta de daiyu/taidu
to him DE treatment/attitude
'the treatment of/attitude towards him'

(28) guanyu ta de baodao
regarding him DE report
'the report regarding him'

Are these true PPs, real counterexamples to the generalization that PPs do not appear in the pre-nominal position in Chinese? I will argue below that neither is a true counterexample.

4.1.1. The *Dui* Phrase

It is important to note that even though there are cases like (27) showing the occurrence of a *dui* phrase as a pre-nominal modifier, the *dui* phrase actually cannot stand alone in such a position: a subject is always contained in these cases. The following examples demonstrate the obligatory presence of a subject.

(29) a. ta zhidao/xihuan *(nimen) dui ta de daiyu
 he know/like you to him DE treatment
 ‘He knows/likes *(your) treatment of him’

b. ta zhidao/xihuan *(nimen) dui ta de taidu
 he know/like you toward him DE attitude
 ‘He knows/likes *(your) attitude towards him’

(30) a. *(nimen) dui ta de daiyu hen hao
 you to him DE treatment very good
 ‘*(Your) treatment of him is very good’

b. *(nimen) dui ta de taidu hen hao
 you toward him DE attitude very good
 ‘*(Your) attitude towards him is very good.’

Even with those that do not seem to have a subject overtly, there is always a covert one as required by interpretation:

(31) dui ta de daiyu yinggai hao yidian.
 to him DE treatment should good a.bit
 ‘(Your) treatment of him should be better.’

The coverb subject glossed as ‘your’ in this example can be another person prominent in the discourse. Regardless of how the subject is interpreted, the fact is that there must be a subject. That is, the *dui* phrase is part of a structure containing a subject. What is such a structure? A very likely candidate is the derived nominal structure investigated in Fu (1994). The noun *daiyu* ‘treatment’ in *ni dui ta de daiyu* ‘your treatment of him’, *taidu* ‘attitude’ in *ni dui ta de taidu* ‘your attitude toward him’ are two place predicates, assigning a subject and an object thematic role. These nouns may be derived by movement of the two-place predicate from within a clausal structure containing the subject, predicate and the object to the modified noun position (cf. Fu’s analysis of derived nominal structures. Also see Ning 1993 for an analysis of this pattern). Alternatively, it is also possible to analyze the modified noun as base-generated and directly assigning thematic roles to its subject and object arguments. The choice of either one is not as important as the fact that a *dui* phrase does not appear alone in the modifier position

(preceding *de*). It is part of a bigger structure. Accordingly, a *dui* phrase does not constitute a counterexample to the claim that a PP cannot be a nominal modifier.

4.1.2. The *Guanyu* Phrase

In contrast to a *dui* phrase, a *guanyi* phrase seems to be able to stand alone as a nominal modifier. This is probably the only instance that may qualify as a prenominal PP modifier. The question is why only a *guanyu* phrase is allowed in the modifier position and not any other PPs. A clue to the answer can be found in an interesting difference between a *guanyu* phrase and other real PPs: a real PP cannot appear with the copula *shi* in a predicate position; but a *guanyu* phrase can.

(32) a. *Zhangsan **shi** cong Beijing de nanbian.
 Zhangsan be from Beijing DE south
 ‘Zhangsan is from South of Beijing.’

b. *zhe qian **bu-shi** gen/xiang ta de pengyou
 this money not-be from he DE friend
 ‘This money is not (borrowed) from his friend.’

(33) zhe baodao **shi** guanyu nimen de weilai.
 this report be regarding you DE future
 ‘This report is regarding your future’

This suggests an answer to why, in general, PPs are not found in the prenominal modifier position but a *guanyu* phrase can. The latter can come from a clause with a copula *shi*, which is deleted when it is at the beginning of a relative clause at the left periphery of the nominal phrase.

(34) [[(shi) guanyu nimen de] weilai]
 be regarding you DE future

If this account is on the right track, again, we do not have a true instance of a PP as a pre-nominal modifier. The *guanyu* PP is simply part of a clausal structure with a copula as its predicate, which happens to be unpronounced. There is support for such a claim from conjunction structures. Aoun and Li (2003), Zhang (to appear) note that Chinese chooses conjunction words according to the categories of the conjuncts. Pertinent to our discussion, the conjunction word *erqie* is used to conjoin two clauses or two verb phrases

(35) dongwuyuan de he/gen/*erqie xuexiao de shebei
 zoo DE and/and/and school DE facilities
 ‘facilities of the zoo and the school’

- (36) tamen bu xihuan de erqie/*he/*gen hen gui de dongxi⁸
 they not like DE and/and/and very expensive DE thing
 ‘things that they do not like and are expensive’

It is also generally true that conjunction conjoins like categories. Interestingly, the following example shows that a nominal expression seemingly is conjoined with a clause using a clausal conjunction word *erqie*.⁹

- (37) suoyou dongwuyuan de erqie keyi jinjuli jiechu youke de
 all zoo DE and can close contact visitor DE

 dongwu dou yao zhushe yimiao.
 animal all should inject vaccine

‘All the animals in the zoos and which may have close contact with visitors much receive the vaccine.’

The following example seems to demonstrate that a bare adjective is conjoined with a clause:

- (38) zhuyao de erqie women yijing taolun-guo de shiqing
 main DE and we already discuss-ASP DE matter
 ‘the main matters that we have discussed’

These two cases do not seem to conjoin like categories, as with conjunction structures in general (see Munn 1993, Zhang to appear, for a clearer understanding of the nature of like-category constraints). However, note that the copula *shi* ‘be’ is required before the adjective or the nominal expression in the above examples when the ordering of the conjuncts is reversed:

- (39) suoyou keyi jinjuli jiechu youke de erqie *(shi) dongwuyuan de
 all can close contact visitor DE and be zoo DE

 dongwu dou yao zhushe yimiao.
 animal all should inject vaccine

⁸ *He* and *gen* are possible if the conjuncts are two nominal expressions; i.e., there should be an implicit nominal expression directly following the first *de* when these two conjunction words are used.

⁹ Thanks to Yafei Li (personal communication) for this example.

- (40) women yijing taolun-guo de erqie *(shi) zhuyao de shiqing
 we already discuss-ASP DE and be main DE matter
 'the main matters that we have discussed'

Other similar examples are:

- (41) a. jiu de erqie ta hai xihuan de yifu bu duo.
 old DE and he still like DE clothes not many
 'Clothes that are old and he still likes are not many.'
- b. ta hai xihuan de erqie *(shi) jiu de yifu bu duo.
 he still like DE and be old DE clothes not many
 'Clothes that he still likes and are old are not many.'

Note that it is not that *erqie* cannot be followed by an adjective in such constructions or that the ordering of the conjuncts cannot be reversed. The following sentences show that *erqie* conjoins two adjectival modifiers and the ordering of the two conjuncts can be easily reversed.¹⁰

- (42) a. jiu de erqie gui de yifu yiding meiren yao.
 old DE and expensive DE clothes certainly nobody want
 'Old and expensive clothes, certainly nobody wants.'
- b. gui de erqie jiu de yifu yiding meiren yao.
 expensive DE and old DE clothes certainly nobody want
 'Expensive and old clothes, certainly nobody wants.'

These peculiar properties regarding conjunction can be nicely captured if there is a *shi* occurring at the left periphery of a relative clause at the edge of the modification structure and it is deleted. Then, all the cases above have same-category conjuncts and the conjuncts of *erqie* are never nominal phrases.

There are other patterns illustrating the deletion of *shi* at the left-periphery of a modification structure [modifier + noun] and some of them are even obligatory. For instance, *shi* is optional in the predicate position preceding an adjective or a nominal phrase with *de*.¹¹

¹⁰ The sentence is acceptable, even though it sounds redundant because of the brevity of the phrases and the repetition of *de*, when the sentence could mean exactly the same without *de* repeated.

¹¹ This is *de*₂ in Zhu's works such as Zhu (1961, 1982, 1993),

- (43) a. zhe-kuai bu (shi) hong de.
 this-CL cloth be red DE
 ‘This piece of cloth (is) red.’
- b. ta de lian (shi) yuan de.
 he DE face be round DE
 ‘His face (is) round.’
- (44) a. zhe-ge xuesheng (shi) san-nianji.
 this-CL student be three-grade
 ‘This student (is) of the third grade.’
- b. zhe-ge xuesheng (shi) shiwu sui.
 this-CL student be fifteen age
 ‘This student (is) fifteen years old.’

Such an optional *de* must not occur when the subject of the clause is relativized.¹²

- (45) a. (*shi) hong de bu
 be red DE cloth
 ‘cloth that is red’
- b. (*shi) yuan de lian
 be round DE face
 ‘face that is round’
- (46) a. (*shi) san-nianji de xuesheng
 be three-grade DE student
 ‘student that is of the third grade’
- b. (*shi) shiwu-sui de xuesheng
 be fifteen-age DE student
 ‘student that is fifteen years old’

If *shi* is deletable when it is at the left-periphery of a modification structure [modifier + noun], i.e., when it is in the first conjunct, not the second conjunct of a modifying phrase,

¹² In more complex cases, *shi* can be present happily:

- (i) ta qing ke de shihou zhi yong [shi hong de erqie shi zui xiyou de zhuo-bu]
 he invite guest DE time only use be red DE and be most rare DE table-cloth ‘
 ‘When he invites guests, he only uses table clothes that are red and most rare.’

our proposal would lead us to predict that a *guanyu* phrase (with a deleted *shi*) can be the first conjunct of *erqie* in the pre-nominal modifier position, but not the second conjunct. The prediction is born out, as illustrated by the following examples:

(47) (shi) guanyu Lisi de erqie women dou hen you xingqu de baogao
 be regarding Lisi DE and we all very have interest DE report
 ‘the report that is regarding Lisi and we are all interested’

(48) women dou hen you xingqu de erqie *(shi) guanyu Lisi de baogao
 we all very have interest DE and be regarding Lisi DE report
 ‘the report that we are all interested and is regarding Lisi’

The distribution of *shi* supports the claim that a *guanyu* phrase modifying a noun actually is part of a clausal structure containing a *shi*, which is deleted at the peripheral position. Accordingly, the claim that a PP cannot be a pre-nominal modifier in Chinese holds.

An important question that arises is why a PP can be a nominal modifier in other languages such as in English but not in Chinese. While the limited space prevents us from detailing a possible account, we would like to suggest that the contrast is related to the modification structure. To illustrate with the contrast between English and Chinese, we note that Chinese modification structure involves *de*, which behaves like a conjunction word (Li 2007a, Zhang, to appear). That is, in a modification structure [_{α} XP *de* YP], *de* is a conjunction word.¹³ When a conjunction structure is in a Case position, both conjuncts are Case-marked. This can be demonstrated by the conjunction pattern in English, which exhibits overt case markings.

(49) a. [He and she] are best friends.
 b. I like [him and her].

This amounts to saying that a nominal modifier in Chinese is assigned Case because the entire nominal phrase is in a Case position and the modifier forms a conjunction structure with the modified noun, both in need of Case.

In contrast, Aoun and Li (2003) argue that relativization in English does not have the same structure as in Chinese. It involves complementation (Kayne 1994). Paul (2005a) extends Aoun and Li’s analysis of relativization to those with an adjective as a modifier. Li (2007a) also analyzes all cases involving *de* in Chinese nominal phrases as having the same conjunction structure (but end up as adjunction because of the lack of

¹³ Moreover, *de* does not have categorical features and cannot determine the category of the phrase α . In the nominal structure, α is still YP and XP becomes an adjunction, as in Aoun and Li (2003).

the contribution of categorical features by *de*, see note 13). If this distinction holds, it is expected that only the Chinese type of languages puts nominal modifiers in Case positions (the same Case as the modified noun). The constraint on PPs used as a nominal modifier is just an instance of the empirical generalization captured by Stowell's CRP that PPs in general do not appear in Case positions. Therefore, the notion of abstract Case is quite relevant: it underlies the account for the constraints on what categories may function as nominal modifiers.¹⁴

4.2. Clauses

Another instance pertinent to the issue of whether the notion of Case plays a role in grammar involves the distribution of clauses, as compared to NPs. In the earlier literature on Case, it was noted that clauses do not appear in the same positions as NPs because the former cannot occur in Case positions and the latter can (Stowell 1981). The contrast can be illustrated by the fact that a Case-assigner is required when the object is an NP in the following instances, but is prohibited when the object is a clause.

- (50) a. Mary was afraid (*of) that the idea wouldn't work.
 cf. Mary was afraid *(of) it.
 b. I am happy (*about) that he is coming.
 cf. I am happy *(about) his coming.

The contrast demonstrated in these pairs suggests that NPs must occur with Case assigners, not clauses. The generalization put forward in Stowell (1981) is that clauses do not appear in Case positions (when they seem to occur in typical subject or object positions, they actually have moved to non-Case positions. The Case Resistance Principle was proposed to capture the observed generalization that clauses do not occur in Case positions). The difference in Case requirement between NPs and clauses made it possible to claim that verbs can semantically select something consistently (such as a proposition) but the Case assignment capability of a verb would determine the possibility of an object

¹⁴ Modifiers can precede demonstratives without *de*:

- (i) renshi ta nage laoshi
 know him that teacher
 'the teacher that knows him'

This pattern should be derived by the deletion of *de*: *de* is deleted when a modifier directly precedes a demonstrative. Other elements in complementary distribution with demonstratives such as the quantifier *mei* 'every' does not allow such deletion. *De* is obligatory:

- (ii)*renshi ta meige laoshi
 know him every teacher
 'every teacher that knows him'

NP or a clause (see the distinction between the notions of c-selection and s-selection extensively discussed in Grimshaw 1979, Pesetsky 1982).

- (51) a. I asked the question.
b. I asked whether he is coming.
- (52) a. I wonder whether he is coming.
b. *I wonder the question.

On the other hand, Li (1985, 1990) noted that clauses in Chinese can appear in typical Case positions, such as the object of a P, just like an NP (also see Tsai 1995):

- (53) a. wo dui ta gai-bu-gai lai meiyou yijian.
I to he should-not-should come not-have opinion
'I have no opinion on whether he should come or not.'
- b. zhe-jian shi gen ta mingtian yao likai meigyou guanxi.
this-CL matter with he tomorrow will leave not-have relation
'This has nothing to do with him leaving tomorrow.'

A logical conclusion in Li's study on the role of Case in Chinese --- Case describes the distribution of various categories in grammar --- was that clauses are also assigned Case in Chinese, just like NPs.

However, in Li's (2005, 2007b) recent works on empty categories, the following generalization has been observed: in Chinese, when a verb allows a nominal object, it also accepts a null object; when a verb only allows a clausal object, it does not accept a null object, as stated and illustrated below,

- (54) a. If a verb is subcategorized for a nominal object, the object can be empty.
b. If a verb is subcategorized for a clausal object only, the object cannot be empty.

Verbs allowing a nominal object and a null object:

- (55) a. wo tingdao-le na-jian shi.
I hear-LE that-CL matter
'I heard that matter.'
- b. wo tingdao ta de-le da jiang le; ta ye tingdao-le.
I heard he get-LE big prize LE he also hear-LE
'I heard that he got a big prize; he also heard.'

Verbs disallowing a nominal object and a null object. *Zheme(yang)* ‘so’ must appear:

- (56) a. *wo renwei/yiwei na-jian shi.
I think/ think that-CL matter
‘I thought/thought that matter.’
- b. wo renwei/yiwei ta hen congming; tamen ye *(zheme(yang))
I think/ think he very smart they also so
renwei/yiwei.
think/ think
‘I thought that he was smart; they also thought.’
- (57) a. *wo cai na-jian shi.
I guess that-CL matter
‘I guess that matter.’
- b. wo cai ta hen congming; tamen ye *(zheme(yang)) cai.
I guess he very smart they also so guess
‘I guess that he is smart; they also guess.’
- (58) a. *wo dasuan na-jian shi.
I plan that-CL matter
‘*I planned that matter.’
- b. wo dasuan mingtian qu; tamen ye *(zheme(yang)) dasuan.
I plan tomorrow go they also so plan
‘I planned to go tomorrow; they also planned.’

This correlation can be subsumed under the following condition, in the spirit of the Visibility condition in the Case and theta-theory of Government and Binding (Chomsky 1981, 1986).

(59) Visibility condition on empty categories

Empty categories in argument positions must be Case-marked in order to be visible.

This means that a null object is possible if Case is assigned to the object position. Such a visibility condition may capture the different possibilities of a null object between English and Chinese. As is well-known, Chinese, not English, allows an empty object:

- (60) a. John saw him. *Mary saw, too.
b. I like him. *She doesn’t like.

cf.

- (61) a. John kanjian-le ta; Mary ye kanjian-le.
 John see-LE him Mary also see-LE
 ‘John saw him; Mary also saw.’
- b. wo xihuan ta; ta bu xihuan.
 I like him he not like
 ‘I like him; he doesn’t like.’

This contrast can be captured by an adapted inverse Case filter in Bošković (1997,134-142).

- (62) English, not Chinese, requires Case to be realized on a lexical item.

The obligatoriness of realizing Case features and the requirement on null arguments to be Case marked conspire to rule out any null objects in English. If a Case feature is available, it must be realized; if such a feature is not available, a null argument is not licensed. This also captures the fact that the object CPs in the following instances cannot be “deleted” (cf. Lobeck 1995, Merchant 2001 for the impossibility of CP deletion in English).

- (63) a.*Mary was afraid that the idea wouldn't work and Bill was [_{AP} [happy [_{CP} e]]].
 b.*I suppose that he will come and they suppose [_{CP} e], too.

The facts presented so far show two conflicting generalizations: those in (53) show that clauses are like NPs and are Case-marked in Chinese. In contrast, the second set of facts generalized in (54) shows that clauses in Chinese, just like those in English, are not like NPs and cannot be Case-marked. How can this conflict be resolved? Two logical options suggest themselves:

- (64) a. Clauses must always be assigned Case in Chinese but not in English. (54) should not be accommodated by Case.
 b. Different types of clauses must be recognized. That is, we need to recognize finer peripheral structures for clauses (Cinque 1999, 2002; Rizzi 1997, 2004). A clause may have some or all of these projections at the left periphery: Force Phrase, Topic Phrase, Focus Phrase, Operator 1 Phrase, Operator 2 Phrase, etc. Case is required with certain projections but not the others.

The latter option might be on the right track. Note that English also has different Case requirements on different types of clauses. Indeed, it seems that only *that* clauses

are not assigned Case.¹⁵ Clauses with *wh*-phrases are Case-marked, in addition to gerundive or participial clauses.

- (65) a. I am concerned that he will win the election.
 b. *I am concerned about that he will win the election.
 c. I am concerned about who will win the election.
 d. *I am concerned who will win the election.

(66) I am interested *(in) [him/his presenting this case].

Although Mandarin Chinese generally does not have overt complementizers and it is difficult to identify different types of clauses, it does not mean that Mandarin does not distinguish different types of clauses (see, for instance, recent works by Paul 2005b, 2008). An interesting area to investigate might be those dialects with rich “sentence final particles”. We leave this issue for further research.¹⁶

5. Conclusion

The notion of Case, though quite abstract in Chinese, not having any overt morphological case marking, helps us describe linguistic generalizations in clearer and more precise terms. For instance, it enables us to make sense of why the word order possibilities in Chinese were consistent challenges to typological studies. It also helps us make concrete predictions, allowing us to ask interesting questions that were not questioned before and to discover more generalizations systematically. Even though analyses based on further evolved theories continue surfacing and empirical generalizations questioned, what is important is that theories provide the roadmap for a scientific research to move forward methodologically. Hypotheses can be proved wrong or correct through systematic testing of the relevant predictions. “Counterexamples” provide us opportunity to investigate the relevant structures in different perspectives more carefully and to be able to ask more questions, thereby leading to further research and offering better understanding of the properties of individual languages and human languages in general.

¹⁵ In a few cases, prepositions can take a clausal object in English: *Stopping that would be a great idea except that the value of the project is tied to it.* *He departs from the tradition in that he does not indicate where the elements are located.* It is not clear if these cases also involve extraposition so that the clauses are not in Case positions (Stowell 1981). More studies are necessary to determine the Case status of clauses in English as well.

¹⁶ Simpson and Wu (2002) for *kong* in Taiwanese and the limited distribution of clauses headed by *kong*. Subordinate clauses headed by *kong* generally occur as the object of verbs in postverbal position and do not occur as objects of prepositions.

(i) *gua tui kong i khi tha tshe jin tsansying.
 I to KONG he go read book very agree
 ‘I quite agree that he goes to school.’

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Adverbs and Positive Polarity in Mandarin Chinese*

Thomas Ernst

University of Massachusetts, Amherst, and Dartmouth College

Speaker-oriented adverbs (SpOAs), such as *yexu* “perhaps” and *xingkui* “fortunately” are positive polarity items (Nilsen 2004): in the normal case, they may not occur after negation, or in questions and the antecedents of conditionals. I show here that their distribution can be nicely predicted on a version of Giannakidou’s (1999) Non-Veridicality (NV) theory, in which SpOAs are taken as expressions of the speaker’s strong commitment to the proposition Q represented by the adverb, requiring that Q be true in all worlds in the speaker’s belief model. Empirically, this NV approach has the advantage of capturing not only SpOAs’ basic distribution, but also cross-linguistic and lexical variation. Theoretically, the results support the NV theory of polarity over scalar approaches (such as Nilsen’s), and provide evidence for a semantically-oriented theory of adverb ordering (contra Cinque 1999).

1. Introduction

Recent attempts to account for the linear order of adverbials primarily in terms of their semantics, such as Ernst 2002, Haider 2004, and others, have had the added benefit that they also help illuminate the syntax-semantics interface, and even contribute to various puzzles in semantic theory. In this paper I will show that speaker-oriented adverbs (SpOAs) offer such an opportunity. SpOAs in Mandarin Chinese include *dagai* “probably”, *xianran* “obviously”, and *xingkui* “fortunately”, as illustrated in 1-2:

- (1) a. Zhangsan {xianran / dagai / xingkui} mashang ba chezi mai-diao-le.
Zhangsan obviously probably fortunately immediately BA car sell-off- PRF
“Zhangsan {obviously / probably / fortunately} sold his car immediately.”
b. *Zhangsan mashang {xianran / dagai / xingkui} ba chezi mai-diao-le.
Zhangsan obviously probably fortunately not will BA car sell-off-PRF
“Zhangsan immediately {obviously / probably / fortunately} sold his car.”

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- (2) a. Zhangsan {xianran / dagai / xingkui} bu yao ba chezi mai-diao.
 Zhangsan obviously probably fortunately not will BA car sell-off
 “Zhangsan is {obviously / probably / fortunately} (not) going to sell his car.”
 b. *Zhangsan bu {xianran / dagai / xingkui} yao ba chezi mai-diao.
 Zhangsan not obviously probably fortunately will BA car sell-off

These adverbs must precede aspectual adverbs like *mashang* “immediately,” as shown by the contrast in 1: all three SpOAs are fine preceding *mashang* in 1a, but are ungrammatical when following *mashang* in 1b. As the ungrammatical sentences 2b show, these adverbs also must precede regular, unmarked negation (*bu* “not”).

Most of the ordering facts like those in 1, where pairs of adverbs may only occur in one order, can be handled by the general mechanisms outlined in Ernst 1999, 2002. However, the contrast in 2 poses a problem for any theory that hopes to explain adverb order by means of semantics – that is, a theory in which impermissible orders derive from some sort of semantic ill-formedness. This is because, as 3 illustrates, there is nothing in principle to rule out negation taking wide scope over the notions of obviousness, possibility, good fortune, and the like:

- (3) a. Zhangsan bu keneng yao mashang huilai.
 Zhangsan not possible will immediately return.
 “It’s not possible that Zhangsan will return immediately.”
 b. It’s not {fortunate / probable} that Fred will return immediately.”

So either there is a more nuanced explanation based on semantics, or else the more syntactic accounts for adverb ordering, such as Cinque 1999 in general and Xu 1997 for Chinese, may be correct.

I will argue that there is indeed a nuanced semantic account of sentences like 2b, based on the idea first advanced by Nilsen 2004 that SpOAs are positive polarity items. Nilsen pointed out on the basis of English and Norwegian data that not only do adverbs like those in 4 resist being in the scope of negation, as in 5a, but also are normally barred in questions and conditionals, two other classic negative polarity environments, as in 5b-c.

- (4) George {probably / unfortunately / strangely} has not sold his house.
 (5) a. *George has not {probably / unfortunately / strangely} sold his house.
 b. *Has George {probably / unfortunately / strangely} sold his house?
 c. *If George has {probably / unfortunately / strangely} sold his house, then we should be sure to get his new address.

I will show first that this pattern of SpOAs holds equally in Mandarin, and then outline an analysis of it based not on Nilsen’s “strengthening” theory, but on the (Non)Veridicality

theory of Giannakidou 1999 and other recent work (see Ernst 2008 for more extensive discussion). To the extent that this effort is successful, it will provide evidence both for (i) the semantically-based conception of adverb ordering as in Ernst 2002, 2007, and (ii) for Giannakidou's theory of polarity phenomena, as opposed to scalar theories of polarity, of which Nilsen's is one variety.

2. Basic Facts

Speaker-oriented adverbs include those in 6 in Mandarin (I will use the term *adverb* here, although strictly speaking some of these are merely adverbials, i.e. not of the syntactic category ADV):

(6) Mandarin Speaker-Oriented Adverb(ial)s:

EVALUATIVE: *buxing* “unfortunately”, *xingkuai* “fortunately”, *hen qiguai de* “strangely”, ...

EPISTEMIC: *dagai* “probably”, *yexu* “possibly”, *kending* “definitely”, ...

EVIDENTIAL: *xianran* “obviously”, *haoxiang* “apparently”, ...

The pattern shown for negation in 2b and 5a is general for this class: that is, SpOAs normally must precede, not follow negation. 7 provides another example:

- (7) *Zhangsan bu {dagai / buxing / haoxiang} hui jia.
 Zhangsan not probably/ unfortunately / apparently return home
 “Zhangsan did not {probably/unfortunately/apparently} return home.”

Note that, although sentences with the perfective *meiyou* are equally unacceptable, as 8 illustrates, this is not a legitimate test, because ungrammaticality could be accounted for on the grounds that SpOAs, which represent propositional modifiers, cannot come into play until the semantic representation of a complete proposition is finished, while perfective aspect is internal to the proposition. That is, the syntactic ordering in 8 directly reflects the independently necessary order of semantic composition: first aspect, then propositional modifiers.¹

- (8) *Zhangsan meiyou {dagai / yiding / haoxiang} hui jia.
 Zhangsan not-PRF probably/definitely/apparently return home
 “Zhangsan did not {probably/definitely/apparently} return home.”

¹See Foley and van Valin 1984, Ernst 2002 for discussion of how this ordering may be accounted for more formally.

Note also that we cannot assume a blanket prohibition on the negator *bu* combining with a directly following adverbial, as implied in the analysis of Huang 1988, since such cases certainly exist (see Ernst 1995 for further discussion):

- (9) Jinrong bu mashang huida.
 Jinrong not immediately answer
 “Jinrong doesn’t answer immediately.”
- (10) Tamen bu huxiang bangmang.
 they not each-other help
 “They don’t help each other.”
- (11) Ta bu tiantian dou jiang de qingchu.
 s/he not every-day speak DE clear
 “He doesn’t speak clearly every day.”

The solution instead must be more oriented towards the semantics of the items in play in the relevant constructions, not just negation but also questions and conditionals. Bellert 1977 first noted, for English, that SpOAs do not fit well in questions. 12-13 illustrate this for Chinese:

- (12) *Jiaozi { haoxiang / buxing } bei gou chi-diao-le meiyou?
 dumpling apparently fortunately by dog eat-up-PRF not-PRF
 “Were the dumplings {apparently/unfortunately} eaten by the dog?”
- (13) *Ta {xianran / dagai / yexu} mai-le yibu xinde Rolls-Royce ma?
 s/he obviously/probably/perhaps buy-PRF a-CL new Rolls-Royce Q
 “Has she {obviously/probably/perhaps} bought a new Rolls-Royce?”

We cannot use the usual A-not-A question pattern as legitimate data, since all “core” adverbials block question formation of this sort, for independent reasons (Ernst 1994). Such questions are crashingly bad, as 14 illustrates. Particle questions with *ma* are often better than the basic A-not-A pattern in 14, as 15 shows, and they are also better than the “tag” version of A-not-A questions seen in 12:

- (14) *Lisi {xianran / buxing / chuhuyiliaode} yao-bu-yao zai chengli gongzuo?
 Lisi obviously / unfortunately / unexpectedly will-not-will at city work
 “Will Lisi {obviously / unfortunately / unexpectedly} work in the city?”
- (15) Lisi {*xianran / ??buxing / ?chuhuyiliaode} yao zai chengli gongzuo ma?
 Lisi obviously / unfortunately / unexpectedly will at city work Q
 “Will Lisi {obviously / unfortunately / unexpectedly} work in the city?”

There is some variation among speakers as to exactly how much better the second two adverbs are in sentences like 15, but at least there is a consistent contrast in the direction indicated, with particle questions yielding better environments for the adverbs.

Finally, SpOAs are generally unacceptable in the antecedents of conditional sentences, as shown in 16-17:

- (16) *Zhangsan ruguo {dagai / yexu } hui jia-le, jiu zaogao-le.
 Zhangsan if probably / perhaps return home then mess
 “If Zhangsan {probably / perhaps} went home, that’s a real problem.”
- (17) *Ruguo Zhangsan {xianran / xingkuai } yijing ba gongke zuowan-le,
 if Zhangsan obviously fortunately already BA homework finish-PRF
 women jiu keyi chuqu.
 we then can go-out
 “If Zhangsan has obviously/fortunately already finished his homework, then we can go out.”

All three of the environments just examined, negation, questions, and the antecedents of conditionals, are classic negative polarity environments. This can be seen in 18a-c, where the Chinese WH-word *shenme* takes its normal negative-polarity value of an indefinite pronoun in these three constructions:

- (18) a. Ta meiyou shuo shenme.
 s/he not-PRF say something
 “She didn’t say anything.”
- b. Ta shuo-le shenme mei-you?
 s/he say-PRF something not-PRF
 “Did she say anything?”
- c. Ta ruguo shuo-le shenme, jingcha jiu manyi-le.
 s/he if say-PRF something police then satisfy-PRF
 “If she said anything, the police will be happy.”

While positive and negative polarity environments are not always in exact complementary distribution, they generally are (see Baker 1970 and Ladusaw 1996). Thus the data shown in 12-17 constitute prima facie evidence that SpOAs are positive polarity items. Since this seems to be a robust pattern for SpOAs not only for Chinese and English, but also for Dutch, French (Ernst 2008) and Modern Greek (Anastasia Giannakidou, p.c.), it appears that we have a notable cross-linguistic phenomenon to account for.

3. Speaker-Oriented Adverbs and (Non)Veridicality

3.1. Speaker-Oriented Adverbs as Speakers' Commitment

SpOAs have often been taken as representing a speaker's commitment to the truth of a proposition (e.g. Palmer 2001, Papafragou 2006). Thus, it is often said that a sentence like 19 has a semantic representation roughly like 20, where FORTUNATE makes an evaluation of the following bracketed proposition P, and represents the speaker's commitment to the truth of P:

- (19) Mao xingkui huilai-le.
 cat fortunately return-PRF
 "Fortunately the cat came back."

- (20) FORTUNATE [_P RETURN (cat)]

While this is indeed the case, it is more relevant to the special behavior of SpOAs that they represent the speaker's strong commitment to the truth of the proposition Q, for which the main predicate is the adverb itself – thus in 20, labeled as in 21, Q is "it is fortunate that the cat came back."

- (21) [_Q FORTUNATE [_P RETURN (cat)]]

Similarly, even for non-factive adverbs like *probably* and *possibly* that do not presuppose the truth of their associated proposition, in a sentence like 22, the speaker may still be taken as committed to the larger proposition Q, as in 23:

- (22) Mao dagai huilai-le.
 cat probably return-PRF
 "The cat probably came back."

- (23) [_Q PROBABLE [_P RETURN (cat)]]

3.2. (Non)Veridicality

Given this concept of speaker's commitment, we can see that SpOAs are *veridical*; that is, they require the truth of the proposition Q. This fits precisely into the theory of polarity behavior promoted in a series of recent papers by Anastasia Giannakidou (1999, 2006, 2007), based primarily on data from Modern Greek and English. This (Non)Veridicality (NV) theory holds that both positive and negative polarity find their roots in a set of semantic contexts with different truth-conditional entailments. It is well known, for example, that, cross-linguistically, some NPI's are licensed or forbidden only in the strongest of these contexts, especially negation, while others are more broadly sensitive, such as to "affective" adverbs like *rarely* or to interrogative constructions (see Zwarts

1996, van der Wouden 1997). Thus polarity licensers form the hierarchy in 24, with stronger classes more to the left; each class on the left forms a subset of those to its right (illustrative examples are provided below the class labels):

- (24) a. Antiveridical < Strictly Nonveridical
 b. Antimorphic \subseteq Anti-Additive \subseteq Downward Entailing \subseteq Nonveridical
not *nobody, never* *rarely, no longer, few* questions, conditionals

All of these nonveridical operators – *not*, *never*, and *rarely* in English and their equivalents in other languages, plus question and conditional operators – do not preserve truth value: they are thus *nonveridical*. The strongest of them, on the left, reverse truth value (speaking loosely), so that they are termed *antiveridical*. The central tenet of the NV theory is that NPI’s are licensed in such nonveridical environments. This is stated in 25:

- (25) Main Licensing Condition for Negative Polarity Items
 (adapted from Giannakidou 1999:408)

A negative polarity item A will be licensed in a sentence S iff S is nonveridical.

More recent versions of this approach replace 25 with more precise conditions that account for variation among different types of nonveridical operators, and different types of polarity items. For our purposes, we must invoke the reverse licensing condition for positive polarity items in 26, based on 25 and proposed in Ernst 2008:

- (26) Licensing Conditions for Positive Polarity Items
 (adapted from Giannakidou 1999):

- a. A positive polarity item A is blocked in the local scope of a nonveridical operator.
 b. In certain cases, A may be licensed indirectly despite being in the local scope of a nonveridical operator in a sentence S, iff S gives rise to a positive implicature ϕ .

In what follows I will provide a somewhat more precise version of 26a to account for the distribution of SpOAs, and also address the effect of 26b, known as *indirect licensing*.

3.3. The Analysis

At the first stage, it can readily be seen that a simple licensing condition like 26a correctly predicts the data given above, given that SpOAs are positive polarity items. In negative contexts like 27b (=2b), where *bu* is antiveridical and thus the most extreme nonveridical operator, the adverbs *xianran* “obviously”, *dagai* “probably”, and *xingkuai* “fortunately” are all within the scope of negation and thus are blocked:

- (27) a. Zhangsan {xianran / dagai / xingkui} bu yao ba chezi mai-diao.
 Zhangsan obviously probably fortunately not will BA car sell-off
 “Zhangsan is {obviously probably fortunately} (not) going to sell his car.”
 b. *Zhangsan bu {xianran / dagai / xingkui} yao ba chezi mai-diao.
 Zhangsan not obviously probably fortunately will BA car sell-off

The licensing condition works equally well for the somewhat weaker, strictly nonveridical environments represented by questions and the antecedents of conditional sentences; in addition to the data above, examine 28a-b for questions, and 29a-b for conditionals (in all cases, the corresponding declarative sentences are grammatical):

- (28) a. *Lisi {dagai / yexu} cong Deguo huilai-le ma?
 Lisi probably / perhaps from Germany return-PRF Q
 “Has Lisi {probably / perhaps} come back from Germany?”
 b. *Ta {xianran / xingkui} mai-le henduo xinde yifu ma?
 s/he obviously / fortunately buy-PRF many new clothing Q
 “Did she {obviously / fortunately} buy a lot of clothes?”
- (29) a. *Ruguo Lisi {dagai / yexu} cong Deguo huilai-le, women yinggai ding
 if Lisi probably / perhaps from Germany return-PRF we should fix
 shijian gen ta jianmian.
 time with her/him meet
 “If Lisi has {probably / perhaps} come back from Germany, we should fix a
 time to meet with her/him.”
 b. *Ruguo ta {xianran / xingkui} mai-le henduo xinde yifu,
 if s/he obviously / fortunately buy-PRF many new clothes
 na jiu hao-le (zaogao-le).
 so then good-PRF (a mess-PRF)
 “If s/he {obviously/fortunately} bought a lot of new clothes, that’s good
 (a problem).”

At this point, though, it is important to consider how the rough, blanket condition in 26 can be sharpened. There are several reasons to sharpen it, other than the usual desire to be as precise as possible. First, 26b gives no insight into *why* SpOAs should be blocked in nonveridical contexts; given the formulation as it stands, there is no particular reason why nonveridical operators should have this particular effect on them. Second, as noted above, much research has shown that polarity items differ to some extent in their licensing contexts both within languages and cross-linguistically. In this light, it is a virtue of the NV approach that it can account for this variation, by referring to different kinds of nonveridical operators, as laid out in 24, but also by invoking different, specific types of semantic ill-formedness for the different contexts. Thus we must thus show how SpOAs

induce a specific kind of ill-formedness in negative, interrogative, and conditional contexts. Third, there are significant problems for the scalar approaches to polarity, such as those explored by Krifka 1995, Chierchia 2004, and others, including the “strengthening” version proposed by Kadmon and Landman 1993 and adopted specifically for SpOAs by Nilsen 2004. Laying these out would take us too far afield here, but they are discussed (among other places) in Giannakidou 2006. Just to at least mention one salient problem, it is well-known that questions are not uniformly downward-entailing environments (see Ladusaw 1996), as such approaches usually require, yet they clearly license negative polarity items, and block positive polarity items including SpOAs. Therefore, we ought to be able to show that the (Non)Veridicality theory can handle such cases more naturally.

In order to achieve this more detailed and more empirically adequate analysis, we may start by focusing on SpOAs’ salient property of expressing a speaker’s strong commitment to the truth of Q, the proposition of which the adverb represents the main, highest predicate, as in 21, repeated here:

(21) [_Q FORTUNATE [_P RETURN (cat)]]

We do this by positing a lexical representation for an adverb like *xingkui* that includes what amounts to specifications of veridicality, a guarantee of the truth of the relevant propositions, along the lines of 30:

(30) [*xingkui* (P)] = a. [P] = 1 in $M_B(s)$
 b. $\forall w \in M_B(s)$, [it is fortunate that P] = 1 in w

$M_B(s)$ refers to the speaker’s belief model, for which I provide Giannakidou’s definition in 31; the technicalities need not concern us here, as what is important is that the analysis be grounded in the set of worlds compatible with what the speaker believes to be true:

(31) Definition of Belief Models (= Giannakidou’s 1999:395 (45)):

Let $c = \langle cg(c), W(c), M, s, h, w_o, f, \dots \rangle$ be a context.

A model $M_B \in M$ is a set of worlds associated with an individual x, representing worlds compatible with what x believes.

30a captures the fact that such adverbs are factive, so that the proposition P that they modify is taken as true, and thus says that the proposition P that *xingkui* combines with is taken as true. The same sort of representation holds for *xianran* “obviously” and other SpOAs of this type. 30b is the crucial part of an SpOA’s lexical representation, that which makes it a positive polarity item: for all worlds in the speaker’s belief model, Q (= it is fortunate that P) is true in that world. This condition requires that Q be true in the speaker’s **entire** belief model. This means complete commitment to its truth: a completely veridical stance.

Now we may identify the specific semantic ill-formedness that accounts for the adverbs' positive polarity behavior: it is a clash between this extreme veridicality requirement and the nonveridicality of negative, interrogative, and conditional contexts. When a speaker negates a proposition Q, there is at least one world in the belief model $M_B(s)$ in which Q is false. Yet the use of an SpOA like *xingkui* requires that Q be true in all worlds in that model. The resulting representation is semantically ill-formed, and sentences like 32 are thus always ungrammatical.

- (32) *Zhangsan bu xingkui hui qu canjia mingtiande huiyi.
 Zhangsan not fortunately will go attend tomorrow's meeting.
 "Zhangsan will not fortunately attend tomorrow's meeting."

The same holds for questions and conditionals, since they allow Q to be true in some worlds and false in others. For example, in a simple question like 33, assuming a standard analysis of questions derived from Karttunen (1977) and Gronendijk and Stokhof (1984), the question's denotation is the set shown in 34: {FORTUNATE (Zhangsan will attend tomorrow's meeting), ~FORTUNATE (Zhangsan will attend tomorrow's meeting)}. Thus Q (FORTUNATE (Zhangsan will attend tomorrow's meeting)) is true in some worlds and false in others, and 33 is bad because, once again, the adverb's lexical requirement is not met.

- (33) *Zhangsan xingkui hui qu canjia mingtiande huiyi ma?
 Zhangsan fortunately will go attend tomorrow's meeting Q.
 "Will Zhangsan fortunately attend tomorrow's meeting?"

- (34) {FORTUNATE (Zhangsan will attend tomorrow's meeting),
 ~FORTUNATE (Zhangsan will attend tomorrow's meeting)}

The same logic holds for conditional sentences, since the antecedent's proposition may be either true or false, in a parallel way.

3.4. A Refinement: Variation

It turns out that the pattern shown above for SpOAs is the most extreme, and that the larger number of them may sometimes occur in some nonveridical contexts. *Xingkui* "fortunately" (as well as *haihao* "luckily") is bad in all contexts, and we can continue to treat it as just outlined, and call it a *strong* SpOA. But others, like *dagai* "probably" and *chuhuyiliaode* "unexpectedly", are sometimes allowed – we can term them *weak* SpOAs. It is revealing, though, that when the weak adverbs are acceptable, or at least more acceptable, this occurs only in strictly nonveridical contexts like questions and conditionals, not in the stronger, antiveridical context of negation. Just as revealing is that, in Mandarin, this typically occurs not in everyday, neutral questions, but rather in questions

where the speaker and context presuppose the truth of the relevant proposition. These are therefore cases of what Giannakidou terms *indirect licensing*; alluded to earlier with 26b, repeated here:

- (26) b. In certain cases, A may be licensed indirectly despite being in the local scope of a nonveridical operator in a sentence S, iff S gives rise to a positive implicature ϕ .

What is crucial for such cases is that, despite the presence of morphological or syntactic negation, there is some sort of positive implicature that the proposition in question is true.

Examine the contrast between the strong adverb *xingkui* in 35 and the weak adverb *dagai* in 36:

- (35) a. *Zhangsan bu xingkui hui qu canjia mingtian de wuhui.
Zhangsan not fortunately will go attend tomorrow 's dance
"Zhangsan will not fortunately go to tomorrow's dance."
b. *Zhangsan xingkui hui qu canjia mingtian de wuhui ma?
Zhangsan fortunately will go attend tomorrow 's dance Q
"Will Zhangsan fortunately go to tomorrow's dance?"
c. *Zheyang yi lai, Zhangsan bu jiu xingkui hui qu canjia mingtian de
this-way come Zhangsan not then fortunately will go attend tomorrow 's
wuhui ma?
dance Q
"This way, won't Zhangsan fortunately go to tomorrow's dance?"
- (36) a. *Zhangsan bu dagai hui qu canjia mingtian de wuhui.
Zhangsan not probably will go attend tomorrow 's dance
"Zhangsan will not probably go to tomorrow's dance."
b. ?Zhangsan dagai hui qu canjia mingtian de wuhui ma?
Zhangsan probably will go attend tomorrow 's dance Q
"Will Zhangsan probably go to tomorrow's dance?"
c. Zheyang yi lai, Zhangsan bu jiu dagai hui qu canjia mingtian de
this-way come Zhangsan not then probably will go attend tomorrow 's
wuhui ma
dance Q
"This way, won't Zhangsan probably go to tomorrow's dance?"

Suppose we are planning a dance, and are thinking about who might attend. For 35, imagine that Zhangsan is a popular person, so that his attendance would help us by making many other people want to go to the dance. On this scenario, 35a ought to be similarly well-formed; but the negative sentence in 35a is bad, and so are the two ques-

tions in 35b-c, including the second one in which the speaker is expecting it to be true that Zhangsan will indeed, fortunately, be attending the dance. By contrast, in 36, once again the negative sentence (in 36a) is bad, but the questions are better, especially where the biasing context is brought out in 36c – the speaker expects the answer to be positive, i.e. that Zhangsan will probably go to tomorrow’s dance. (Speakers differ in their exact judgments, but all of them report 35a-c to be equally unacceptable, while there is a clear contrast in 36 between negation in 36a and the questions in 36b-c.)

This contrast can be handled neatly on the NV theory, and underscores the analysis based on SpOAs being positive polarity items because they represent the speaker’s commitment to truth. We keep the lexical representation of strong SpOAs, the relevant condition of which is given again for *xingkui* as 37, but posit a less stringent requirement on truth for weak SpOAs like *dagai* “probably” in 38:

(37) [*xingkui* (P)] : $\forall w \in M_B(s)$, [it is fortunate that P] = 1 in w

(38) [*dagai* (P)] : for all w in some subset W of $M \in M_B(s)$,
[it is probable that P] = 1 in w

The most crucial part of 38 is its reference to subsets of worlds (W): with 38, we can appeal to a speaker’s expectations or assumptions, taken as a subset of his beliefs (represented by the worlds in $M_B(s)$). In questions like 36c, what is relevant is the expectation of a positive answer, i.e. that Zhangsan will indeed probably go to the dance. This may not be absolute truth as required for the strong adverbs, but a weaker version by which the proposition is true in worlds that the speaker expects to come true.

The phenomenon shown in 36 with weak SpOAs seems somewhat limited in Chinese, but more robust in English. Weak adverbs occur comfortably in negative questions like 39a, which conventionally implicate the truth of the proposition at issue, as discussed in Romero and Han 2004.

- (39) a. Has the committee not mysteriously ignored its responsibilities by refusing to address this issue?
b. *Has the committee not oddly ignored its responsibilities by refusing to address this issue?

39b shows that English strong adverbs like *oddly* cannot occur in these contexts, as expected given the strong condition in their lexical representations. It is not clear to me whether or not this represents a stronger effect in English than in the cases like 36b in Chinese, but if so it may be that there is a genuine conventional implicature in English, but a weaker, more contextually-determined effect for cases like 36 in Chinese. More relevantly, perhaps, English also allows weak SpOAs in low-tone metalinguistic negation, as illustrated in 40:

- (40) a. – But they **haven't** mysteriously abandoned their research!
 b. – *But they **haven't** amazingly abandoned their research!

In 40a, imagine that a previous speaker has asserted that they have mysteriously abandoned their research; the speaker of 40a then emphatically denies this, with stress on the negated auxiliary and low tone on the following material, copied from the previous utterance. Again, English speakers generally accept weak adverbs like *mysteriously* in such contexts but reject strong ones such as *oddly* (see Ernst 2008 for discussion).

By contrast, Chinese speakers that I have consulted uniformly reject the equivalent sentences in Mandarin:

- (41) – *Zhangsan MEIyou dagai jie(-le) hun!
 Zhangsan NOT probably get-PRF-married
 “Zhangsan **didn't** probably get married!”

41, denying a previous speaker who maintains that Zhangsan probably got married, still seems to be unacceptable. The difference between English and Chinese can be captured if we assume slightly different lexical representations for weak SpOAs in the two languages. *Mysteriously* in 40a, representing weak SpOAs in general, has as part of its lexical entry the expanded condition in 42, where not only is a subset of the speaker's belief model allowed in evaluating the truth of Q, but the *hearer's* belief model ($M_B(h)$) is as well:

- (42) [[mysteriously (P)]] : for all w in some subset W of $M \in \{M_B(s), M_B(h)\}$,
 [[it is mysterious that P]] =1 in w

In other words, it does not matter that the speaker uses negation in cases like 40a, because the semantic representation may ascribe the assertion of mysteriousness to the previous speaker, which in this case we may count as the “hearer”. That is, even though the speaker's belief model takes Q (it is mysterious that they abandoned their research) as false, the previous speaker takes Q as true, so the condition in 42 is fulfilled and the sentence is well-formed. Chinese weak adverbs do not allow for this option, no subset of worlds in the speaker's belief model has Q as true, and so 41 is ruled out as ill-formed.

In a way similar to questions, Chinese allows weak SpOAs much more comfortably in conditional sentences than in negative sentences.

- (43) a. Ruguo jiaozi buxing bei gou chidiao-le, women jiu keyi chi
 if dumpling unfortunately PASS dog eat-PRF we then can eat
 mian.
 noodle
 “If the dog has unfortunately eaten all the dumplings, we can eat noodles.”
 b. Ruguo ta chuhuyiliaode mai-le hen duo xinde yifu, na jiu hao-le.
 if s/he unexpectedly buy-PRF very many new clothes so then good
 “If s/he has unexpectedly bought a lot of new clothes, that's good.”

The corresponding sentences with the strong adverb *xingkui* are much worse:

- (44) a. *Ruguo jiaozi xingkui bei gou chidiao-le, women jiu keyi chi
 if dumpling fortunately PASS dog eat-PRF we then can eat
 mian
 noodle
 “If the dog has fortunately eaten all the dumplings, we can eat noodles.”
- b. *Ruguo ta xingkui mai-le hen duo xinde yifu, na jiu hao-le.
 if s/he fortunately buy-PRF very many new clothes so then good
 “If s/he has fortunately bought a lot of new clothes, that’s good.”

The type of formulation provided in 42, applied to weak Chinese adverbs like *buxing* and *chuhuyiliaode*, accounts for cases like 43: as noted in 34, questions involve a partition into two propositions. Since the set of worlds represented by the positive proposition may count as the set *W* invoked in 42, it is correctly predicted that weak adverbs are possible in antecedents of conditionals, while strong adverbs like *xingkui* “fortunately” (requiring truth in all worlds, not just a subset) are unacceptable.²

4. Two Implications: Arguments for the NV Theory

4.1. Variation

Let us summarize the extent of language-specific and cross-linguistic variation we have seen with SpOAs. Within Chinese (as in English), there is a difference between negation on one hand, and the strictly nonveridical context of questions on the other: weak SpOAs are always bad under negation, but may sometimes be acceptable in questions and conditionals. Between languages, we find that Chinese is less liberal than English in the constructions where weak SpOAs are allowed: at the least, English permits them in questions, conditionals, and low-tone metalinguistic negations like 40, while Chinese only permits them in questions and conditionals.

It constitutes evidence for the NV theory that it can easily handle these differences according to the mechanisms discussed here, and do so in a way that taps into the defining semantic characteristic of SpOAs. That is, the difference between weak and strong adverbs corresponds simply to a difference in how strongly committed the speaker is to the truth of the relevant proposition. Strong adverbs allow no chance that the proposition is false; the speaker holds adamantly to its truth, requiring that the proposition be true in all worlds. Weak adverbs also represent a commitment to truth, but it is a weaker commitment, permitting it to hold for a subset of worlds, such as those *expected* to come true, rather than ones firmly believed to be true. The difference between languages can be attributed to variation in how this weaker option plays out: as shown here, for example, Chinese appears to require hewing to the speaker’s belief model, while English additionally allows access to the previous speaker, in low-tone denials like 40a-b.

It would take us too far afield to show that scalar models in general, and Nilsen’s 2004 “strengthening” model for SpOAs in particular, cannot easily handle this sort of variation (see discussion in Giannakidou 2007 and Ernst 2008). However, we can at least

²I have avoided the question of precisely how the relevant subset of worlds invoked for weak SpOAs in conditional sentences is to be defined. It appears that conditionals may not have as strong a requirement as questions that there be a positive implicature (see Ernst 2008 for discussion), so that 26b may eventually have to be modified to reflect this.

note that they do not make reference to belief models as does the NV theory. It is the possibility of variation within these models, between different belief models and between defined subsets of the worlds within them, that allows the NV theory to explain the data here. Since it is unclear what resources the scalar theories have to match this, it seems that the NV is a better theory of SpOAs' distribution.

4.2. Syntactic vs. Semantic Theories

The account proposed here explains why SpOAs always precede negation in Chinese, and also explains why, most of the time, they are unacceptable in questions and antecedents of conditionals. This is meant as part of the much larger, semantically-based attempt to explain all of linear ordering of adverbs in Ernst 2002. Compare this to the more syntactically-oriented theory of Xu 1997, Alexiadou 1997, and Cinque 1999. This theory holds that each class of adverb occurs in its own dedicated Spec position, licensed by its corresponding head in an empty functional projection. The same is true for negation, so, for example, these theories posit a Neg head licensing a negative adverb like *not* or *bu* (or positing that these are the actual Neg heads; this does not affect the point at hand), and, above this, there is a head (POSS) that licenses SpOAs. This is illustrated in 45 for a modal adverb:

(45) [POSSP possibly [POSS [NEGP not [NEG ...]]]]

This theory thus predicts the obligatory ordering of the adverb first and negation second by simply positing a universally mandated order of functional heads.

Again, without being able to make a full-scale comparison of theories here, we can at least see the argument against this approach and for the semantically-based NV approach. First, consider cases like 36c, as well as 39a and 40a in English, where the adverb *follows* negation. These show that the rigid ordering of heads shown in 43 cannot account for all the data as outlined, in Ernst 2007. The Cinque-style theory in 43 does have ways to cover the alternate ordering, but in doing so must add considerable complexity to the account, and weaken its basic claim of rigid adverb ordering. Perhaps more importantly, both Chinese and English show us that the semantically-based, NV approach accounts for aspects of distribution beyond mere linear ordering. As laid out in Ernst 2007, analyses like 43 need to block SpOAs in questions and conditionals in ways that represent a complete, unrelated add-on, while the NV theory accounts for these facts neatly and in a unified way. Finally, the NV approach offers a well-grounded explanation for why it is precisely *these* adverbs that behave as they do with respect to negation, questions, and conditionals. For all these reasons, there seems to be good reason to adopt the NV approach to linear order over the head-licensing one.

5. Summary and Conclusion

In this paper I have shown that Mandarin Chinese speaker-oriented adverbs are in general positive polarity items, and are thus normally blocked from occurring in nonveridical environments. All of them are barred from occurring in the scope of negation. A small number, such as *xingkuai* “fortunately” are strong speaker-oriented adverbs, being barred in all nonveridical contexts, including not only negation but also questions and the antecedents of conditional sentences. Others – probably most of them – are weak adverbs and can sometimes occur felicitously in the strictly nonveridical contexts of questions and antecedents of conditionals.

I have proposed a semantically-based account of these facts, grounded in a theory of speakers' belief models. Strong speaker-oriented adverbs require the truth of Q (=ADV(p)) for all worlds in the speaker's belief model, as shown in 37; as a result, they are blocked in all nonveridical contexts – because these contexts always involve at least one world in the speaker's belief model where Q is true. Weak speaker-oriented adverbs, on the other hand, require the truth of Q (=ADV(p)) only for a subset of worlds in the speaker's belief model, as in 38, and they may therefore sometimes occur in strictly nonveridical contexts.

I have also suggested that this (Non)Veridicality theory approach has two advantages. First, it allows explaining language-specific and cross-linguistic variation in a simple and straightforward way. Within Chinese, the distinction between strong and weak adverbs in terms of their truth requirements for worlds in the speaker's belief model, combined with the different properties of antiveridical contexts (negation) and strictly nonveridical contexts (questions and conditionals), accounts for the different adverbs' patterns of distribution. Cross-linguistically, the theory proposed here allows capturing at least one difference between English and Chinese by invoking for metalinguistic negation not only the belief model of the speaker, but that of the hearer. Second, this (Non)Veridical approach handles the distribution of speaker-oriented adverbs better than either "scalar" semantic theories (as in Nilsen 2004) or syntactic theories along the lines of Cinque 1999.

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Tonetic Sound Change in Taiwan Mandarin: The Case of Tone 2 and Tone 3 Citation Contours¹

Robert Sanders
University of Auckland

Recent acoustic studies of Taiwan Mandarin citation tones reveal disagreement about whether Tone 2 is dipping or rising and whether Tone 3 is falling or dipping. The present study surveys 33 informants who were subdivided by age, gender and language background. We can generalize that older groups and females are collectively more conservative than their respective counterparts, and likewise that monolinguals and females are collectively more stable than their respective counterparts. We speculate that the primary motivation for this tonetic change is reanalysis of fixed contour patterns by a new generation of speakers, redetermining which portion is meaningful and then making phonetic adjustments to render the newly meaningful part more salient and the remaining background noise less so. When a newly acquired toneme contour comes to resemble the existing contour of another toneme, the second toneme is forced to readjust in order to maintain perceptual distance. This case study offers a plausible model for tonetic sound change in any lexical tone language and helps explain why Chinese exhibits rich diversity in tonetic details across speech communities that are otherwise genetically and geographically very close.

1. Introduction

Over the last two decades acoustic studies examining the citation tones of Taiwan Mandarin (henceforth TM) have started to report pitch contours for single Tone 2 and/or Tone 3 syllables that differ from the prescriptive standard claimed for Putonghua and Beijing Mandarin (henceforth BM). In particular, most of these studies claim that Tone 2 now takes a dipping contour (e.g. Chiung 1999, Fon 1997, Li et al. 2006), though at least one study continues to claim that it is a rising contour (Shi & Deng 2006). Likewise, most studies claim that Tone 3 is now a low, falling tone (e.g. Chiung 1999, Li et al. 2006, Shi & Deng 2006). However, one scholar claims in multiple studies that it remains a dipping contour (Fon 1997, Fon & Chiang 1999, Fon et al. 2004), while a study of two decades

¹ The author would like to Professor Shi Feng of Nankai University, as well as his many graduate students, for their enthusiastic assistance in carrying out the actual acoustic analysis.

ago observed alternation between falling and dipping contours (Shih 1988). These conflicting empirical claims about the citation contours of TM Tone 2 and Tone 3 are summarized in Table 1 below:

Table 1: Conflicting Descriptions of TM Tone 2 & Tone 3 Citation Contours

Tone 2		Tone 3	
Study	Claimed Contour	Study	Claimed Contour
Shi & Deng 2006	Rising	Fon 1997, Fon & Chiang 1999, Fon et al. 2004	Dipping
Chiung 1999, Fon 1997, Li et al. 2006	Dipping	Chiung 1999, Li et al. 2006, Shi & Deng 2006	Low falling
		Shih 1988	Dipping/ Low Falling

The picture projected above is rather puzzling, not only because of the striking discrepancies in empirical claims despite the facts that each of these studies had access to the same speaker population, and that they were all carried out using the same acoustic measurements, but also because, with the exception of Shih (1988), not one of them reported even the slightest degree of variation in pronunciation, either within the pronunciation of a single speaker or across different speakers. The present study attempts to solve the mystery of why this is so.

With the exception of Chiung (1999), which makes use of a robust sampling size of 22 informants, one common characteristic of the above studies is that they are all based upon informant sampling sizes of no more than four individuals, and even the one exceptional study by Chiung was limited to sampling bilingual TM and Taiwan Southern Min (henceforth TSM) graduate students of roughly the same age studying at the University of Texas. Given what we know about sociolinguistic variability and given the striking divergence in findings reported above by different researchers, a decision was made to carry out our own survey using a larger number of informants and which took into consideration the language background, gender and age of those informants. This survey, then, was designed to answer the following questions:

1. What are the empirical acoustic facts for TM Tone 2 and Tone 3?
2. Is it possible for all of the claims presented in Table 1 above to hold some degree of truth (a nuanced truth), or must we discard some of these claims in favor of others (a more absolute truth)?

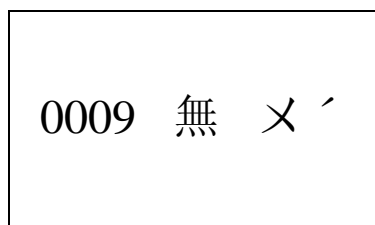
3. If we discover a nuanced truth, can correlations be drawn between various citation tone contour pronunciation and the sociolinguistic variables of age, gender or degree of monolingualism?
4. What might have motivated the observed synchronic state of flux in the first place? Is it more likely to have been external in its origin (i.e. the substratum influence of TSM) or internal?
5. What implications, if any, does the observed pattern of pronunciation of Tone 2 and Tone 3 in TM have for our general understanding of tonetic sound change?

2. Research Design and Procedure²

Altogether 33 informants were recruited to take part in this survey. All were born and minimally educated in Taiwan through the beginning of high school before migrating to New Zealand, although most arrived in New Zealand as adults. Of these 33 informants, 11 were monolingual speakers of TM while 22 were bilingual speakers of TM and TSM; 12 were male and 21 were female; 20 were aged between 50 and 64, 5 were aged between 30 and 49 and 8 were aged between 17 and 29.

Multiple examples of commonly-used characters representing each of the four tones of Mandarin Chinese were selected and then put onto MS Powerpoint slides, together with the desired target pronunciation of each character indicated in *Zhuyin Fuhao*. Altogether seven Tone 2 characters (無, 兒, 魚, 拔, 遲, 鵝, 移) and nine Tone 3 characters (五, 耳, 雨, 把, 齒, 惡, 椅, 耦, 此) were selected. An example of such a Powerpoint slide is shown in Figure 1 below:

Figure 1: Sample Character Presentation Slide



These slides were then presented to informants in a random order, one at a time. In order to insure that each character would be read as an individual syllable and not slurred together with a preceding or following syllable, advancement from one slide to the next only proceeded once the informant had finished pronouncing the slide in front of him/her and had paused.

² The content of Section 2 is taken verbatim and in total from the corresponding section of Sanders (2008).

Each set of recordings was then acoustically analyzed using Mini Speech Lab, a software program developed at Nankai University, which in addition to being able to display F0 pitch contours for individual syllables, is also able to calculate the average tone letters on a 1-5 pitch scale for any set of syllables sharing the same contour and then display the ‘average’ contour for the entire set of tokens of that tonal category against the 1-5 scale. Figure 2 below is an example of a set of seven different Tone 2 syllables of a single speaker, with hand-drawn lines tracking each syllable’s dipping contour:

Figure 2: Pitch tracks of 7 Tone 2 tokens of subject A

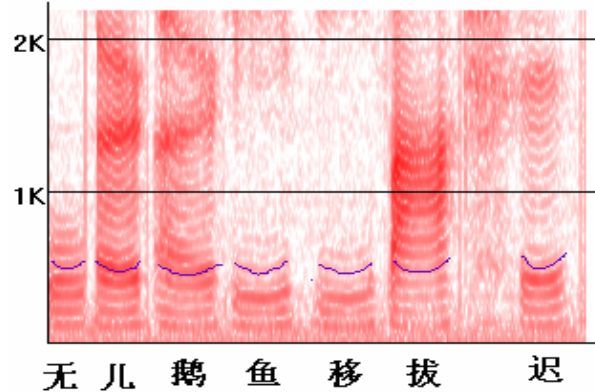
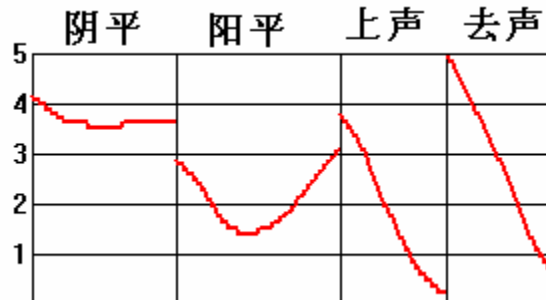


Figure 3, on the other hand, shows the ‘average’ contour for each tone token set for the speaker shown in the above figure, superimposed onto the 1-5 scale tone grid.

Figure 3: Average pitch contour for all four sets of subject A’s tonal tokens superimposed on a 1-5 tone grid



We can see in Figure 3 that all seven tokens of Tone 2 yield an average dipping contour of 213, while the nine tokens of Tone 3 yield a falling contour of 31 or 41 (which contrasts with the average Tone 4 falling contour of 51).³

³ Chiung (1999) claims a 53 contour for TM Tone 4, yielding a distinct low-high register contrast between a falling TM Tone 3 and a falling TM Tone 4. Many of the informants analyzed in this study who favored a falling contour for Tone 3 displayed a similar low-high register contrast with Tone 4.

2.1. Intra-Speaker Variation

It soon became evident that for certain informants, characters belonging to the same tonal category, e.g. Tone 3, were sometimes collectively pronounced with more than one pitch contour by the same speaker, i.e. sometimes the pronunciation had a dipping contour and sometimes a falling contour. An example of contour variation within the pronunciation of a single speaker is shown in Figures 4-5 below:

Figure 4: Pitch contour pronunciations of 7 Tone 2 syllables for subject B

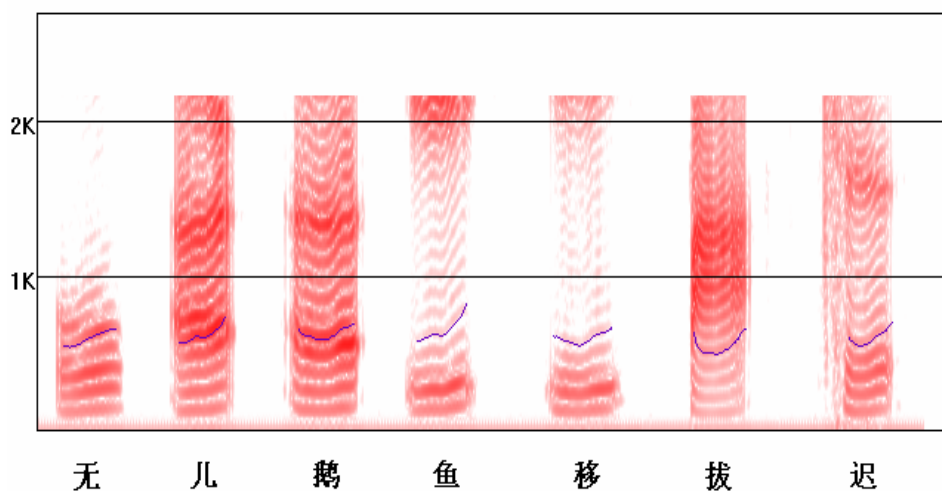
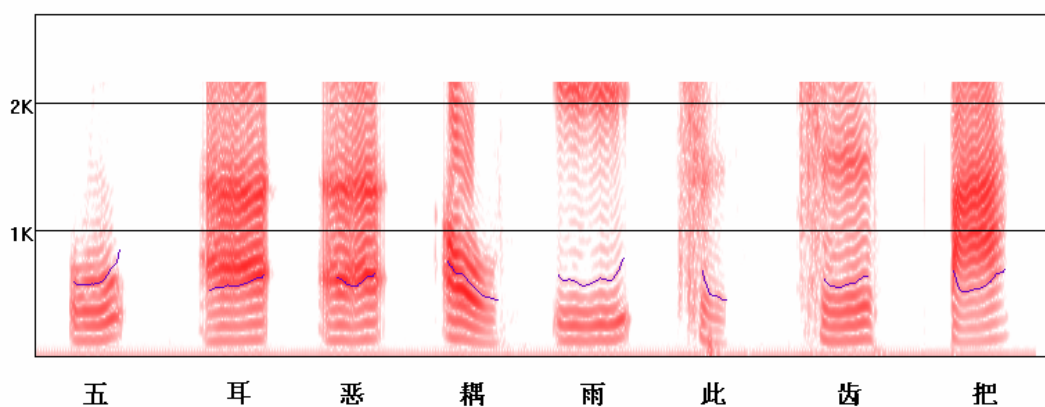


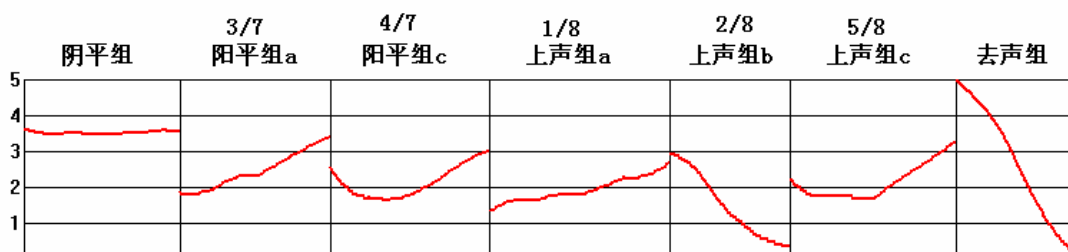
Figure 5: Pitch contour pronunciations of 8 Tone 3 syllables for subject B⁴



The internal variation within the pronunciation of this one speaker for both Tone 2 and Tone 3 is reflected in the 1-5 tone grid shown in Figure 6:

⁴ The acoustic quality of the recording of the ninth Tone 3 character on the list, 椅, was too poor to allow for analysis by the software and therefore is not included in this person's data.

Figure 6: Average pitch contour for all four sets of Subject B's tonal tokens superimposed on a 1-5 tone grid (reflecting variation within an individual's pronunciation of both Tone 2 and Tone 3)



As one can see from inspecting Figures 4-6 above, for subject B, of the seven tokens of Tone 2, three were pronounced with a rising contour averaging 24, while four were pronounced with a dipping contour averaging 213. In the case of this informant's pronunciation of the eight Tone 3 tokens, one was pronounced with a rising 13 contour, two with a falling contour averaging 31, and five with a dipping contour averaging 113 or 114.

2.2. The Separate Issues of Stability and Conservatism

Comparing Figure 3 with Figure 6, it is apparent that two issues must be taken into consideration when evaluating any informant's production of a tonal category. On the one hand, we have to determine whether that informant consistently uses the same contour shape when pronouncing any isolated syllable belonging to the same tonal category, or whether instead there is a degree of variability in the contour shape. If the same contour shape is consistently used then we can call this speaker's production stable. On the other hand, if a speaker is observed to vary the tonal contour shape s/he uses when pronouncing isolated syllables belonging to the same tonal category, then we can characterize his/her production as being unstable. Clearly subject A, as shown in Figure 3, is much more stable in his production of Tone 2 and 3 contour shapes than is subject B, as shown in Figure 6.

However, a second revelation can be uncovered by carefully inspecting Figure 3—although a speaker may prove to be very consistent in his/her pronunciation of a particular tonal category, this fact alone is not indicative of whether or not the speaker's favored contour shape for that category is in fact prescriptively correct. What we see in Figure 3 is that the informant is very consistent in pronouncing Tone 2 with a dipping contour and Tone 3 with a falling contour, when in fact the prescriptively conservative contours for those two tonal categories are rising and dipping respectively. In other words, informant B's production can be characterized as being both stable and innovative in terms of the prescriptive standard, rather than stable and conservative.

The pronunciation of Tone 3 by subject B, as shown in Figure 6, provides yet another piece of evidence in support of the need to treat stability and conservatism as two separate and distinct parameters. In this case we see that of the eight Tone 3 tokens, one is pronounced with a rising contour, three with a falling contour and four with the conservative dipping contour. In other words, although this informant's pronunciation of this tone is very unstable, he marginally favors the conservative dipping contour over either of the other two innovative alternatives. This, then, contrasts with his unstable pronunciation of Tone 2, where he slightly favors the innovative dipping contour over the conservative rising contour. B's pronunciation of Tone 2 is therefore unstable and innovative, while his pronunciation of Tone 3 is unstable and conservative.

2.3. Monolinguals vs. Bilinguals

TSM is frequently cited as a major factor in the development of TM (Kubler 1985, Huang 1993). Therefore informants were divided into two groups—those who spoke only TM and those who were bilingual in both TM and TSM. Designation of membership into the appropriate linguistic group was determined on the basis of a brief written survey asking informants to identify the frequency s/he used TM and TSM in different formal and informal domains. Those who reported frequent use of TSM in domains outside the family were classified as bilinguals; those whose use of TSM was restricted to 'kitchen Chinese' inside the home, as well as those who did not speak any TSM at all, were classified as monolingual.

2.4. Age Grouping

The age range of all 33 informants was 17-64. In an effort both to reflect rough generational units of twenty years and to take into account differences in language use at the time ethnic Southern Min Taiwanese were acquiring TM, these 33 informants were divided into three age groups—50 through 64 (henceforth 'old'), 30 through 49 (henceforth 'middle-aged') and 17 through 29 (henceforth 'young'). Generally speaking, 'old' ethnic Southern Min Taiwanese would have as young children spoken TSM at home with siblings, parents and grandparents and would not have been extensively exposed to TM prior to starting kindergarten or primary school. On the other hand, 'middle-aged' ethnic Southern Min Taiwanese, the offspring of that 'old' group, had parents and siblings with whom they could speak TM at home if they so wished, while TSM was still the more practical language for communicating with grandparents. Young ethnic Southern Min Taiwanese, therefore, represent the first generation where active command of TM may have been sufficient alone for speaking with all generations of one's own family.

3. Results⁵

3.1. Raw Data

The simple picture of the citation contour pronunciation of each Tone 2 and Tone 3 character for all 33 informants is shown in Tables 2 and 3 below.

Table 2: Total Tone 2 contour distribution by individual character

Contour	無	兒	魚	拔	遲	鵝	移
rising	23	19	26	20	21	18	20
dipping	10	14	7	13	12	15	13
TOTAL	33	33	33	33	33	33	33

Table 3: Total Tone 3 contour distribution by individual character

Contour	五	耳	雨	把	齒	惡	椅	耦	此
dipping	24	23	20	22	20	24	20	22	18
falling	8	10	12	9	13	9	9	11	15
rising	1	0	1	1	0	0	3	0	0
TOTAL	33	33	33	32	33	33	32	33	33

Without taking into consideration the sociolinguistic variables of age, gender or linguistic background, the picture directly above looks very unstable, with variable pronunciation the norm across the board, though to slightly different extents depending on the particular character in question. In all cases, however, we note that the prescriptive/conservative tone contour (rising contour in the case of Tone 2, dipping contour in the case of Tone 3) is favored.⁶

Keeping in mind the picture revealed in Figures 3 and 6 above, that the pronunciation of a particular individual can be characterized as being stable or unstable, conservative or innovative, and that these two sets of binary label choices are independent of one another, let us now examine the raw data in Tables 2 and 3 above with reference to each of our three sociolinguistic variables of age, gender and language background to deter-

⁵ The content of Section 3 is taken verbatim and in total from the corresponding section of Sanders (2008).

⁶ This fact may be the effect of sampling bias, in that old informants, who constitute the clear majority of the total number of informants surveyed, happen to be the most conservative group as far as tone contour pronunciation is concerned.

mine whether any patterns can be teased out. For the purpose of this analysis, the pronunciation of an individual speaker is defined as being ‘stable’ if after examining the contour shape of every character belonging to a common tonal category and deciding which contour shape has been used the majority of the time by that speaker, no more than three exceptional tokens can be found. Four or more exceptions to the observed majority preference indicate that that speaker’s pronunciation is unstable. A speaker whose observed preferred contour shape matches the prescribed contour shape for that tonal category is said to be conservative, while a speaker whose observed preference for a particular contour shape differs from the prescribed contour shape is said to be innovative.

3.2. Data by Age Group

Table 4: Relative group stability and collective conservatism by age group

Age 50-64 (20 informants)		Tone 2	Tone 3
Stability	Stable	16	15
	Unstable	4	5
Conservatism	Rising	15*	-
	Falling	-	3
	Dipping	5	17*
Age 30-49 (5 informants)			
Stability	Stable	4	4
	Unstable	1	1
Conservatism	Rising	3*	-
	Falling	-	1
	Dipping	2	4*
Age 17-29 (8 informants)			
Stability	Stable	6	7
	Unstable	2	1
Conservatism	Rising	3*	-
	Falling	-	4
	Dipping	5	4*

*Prescriptive contour shape

The picture revealed by Table 4 is striking in that it provides strong counter-evidence to the seemingly chaotic and unstable synchronic snapshot suggested by the raw data in Tables 2 and 3. In fact, there is strong evidence in Table 4 that not only are Tones 2 and 3 in TM changing respectively from a rising contour to a dipping one and from a dipping contour to a falling contour, but that these changes are accelerating over time. Furthermore, at any point along the change timeline the degree of collective, group instability remains about constant.

As shown in Table 4, in terms of conservative versus innovative tone contour pronunciation, the ratios of 15:5 and 16:3 for the old group, 3:2 and 4:1 for the middle-aged group and 3:5 and 4:4 for the young group, tell us that the older the age group is the greater its collective degree of conservatism, and hence, the younger the age group is the greater its collective innovation. This being the case, we have apparently captured evidence of tone contour change that has been accelerating over time.

At the same time that these changes have been accelerating, there is no evidence to suggest that group pronunciation itself has become more destabilized as a result, given the rather constant stable-to-unstable ratios of 16:4 (4:1) and 15:5 (3:1) for the old group, 3:2 and 4:1 for the middle-aged group and 6:2 (3:1) and 7:1 for the young group.

3.3. Data by Gender

Table 5: Relative group stability and collective conservatism by gender

Male (12 informants)		Tone 2	Tone 3
Stability	Stable	8	8
	Unstable	4	4
Conservatism	Rising	6*	-
	Falling	-	4
	Dipping	6	8*
Female (21 informants)			
Stability	Stable	18	17
	Unstable	3	4
Conservatism	Rising	15*	-
	Falling	-	5
	Dipping	6	16*

*Prescriptive contour shape

There is nothing inherently surprising in what is shown in Table 5. Females are seen to have more stable pronunciation of both tonal categories than do males, with the former displaying a stable pronunciation of Tone 2 at a rate of 18:3 (6:1) versus a rate of 8:4 (2:1) for males, and females preferring a stable pronunciation of Tone 3 at a rate of 17:4 (~4:1) versus a 8:4 (2:1) rate for males. Additionally, females are seen to favor the prescriptive contour of each tone at much higher rates than do males, favoring it at a ratio of 15:6 (5:2) for Tone 2 and 16:5 (~3:1) for Tone 3, while males are seen to favor the prescriptive contour of Tone 2 and Tone 3 at a ratio of 6:6 (1:1) and 8:4 (2:1) respectively. Females have more stable pronunciation and are more conservative than their male counterparts.

3.4. Data by Language Background

Table 6: Relative group stability and collective conservatism by language background

Monolingual (11 informants)		Tone 2	Tone 3
Stability	Stable	10	11
	Unstable	1	0
Conservatism	Rising	6*	-
	Falling	-	5
	Dipping	5	6*
Bilingual (22 informants)			
Stability	Stable	16	14
	Unstable	6	8
Conservatism	Rising	15*	-
	Falling	-	3
	Dipping	7	19*

*Prescriptive contour shape

Table 6 reveals one expected result and one possible surprise. As expected, monolinguals are seen to display a significantly more stable pronunciation of the two contours than do the bilinguals. However, when it comes to which group is more conservative in its pronunciation of the two tones, it is the bilinguals, with ratios of 15:7 (~2:1) for Tone 2 and 19:3 (~6:1), rather than the monolinguals, with ratios of 6:5 (~1:1) for both Tone 2 and Tone 3, that show the higher rate of conservatism. This observation could, however, be the effect of the much larger sample size of old informants in

comparison to middle-aged and young informants, and these old informants tended to mostly be bilingual. Because the current sample size is not large enough to tease apart bilingualism and age, we are not in a position to argue convincingly that bilinguals are more conservative than monolinguals in terms of their tone contour pronunciation. Nevertheless, because of the striking discrepancy in the conservatism ratios between the two groups, it is something worth noting for future investigation.

4. Discussion

4.1. Possible Motivation for Tonetic Change

While scholars like Kubler (1985) and Huang (1993) have noted the substantial substratum influence of TSM on the development of TM, there is insufficient objective evidence to conclude that the changes in tone contour observed here are in fact primarily the products of this type of influence here. This is supported in Table 7 below:

Table 7: Comparison of Citation Contours of Etymological Tone 2 & Tone 3 in TM and TSM

Tonal Category	Old TM	New TM	TSM⁷ (Taipei)	TSM (Kaohsiung)
Yangping (TM Tone 2)	Rising (35)	Dipping (325) ⁸	Rising (13)	Rising (24)
Shang Sheng (TM Tone 3)	Dipping (213)	Falling (21)	Falling (53)	Falling (53)

4.1.1. Yangping

Given that the Yangping tonal category is pronounced with a rising contour in both prescriptive Old TM and TSM, then from a logical point of view, if TSM had actually held sway over the development of New TM Tone 2 then TM Tone 2 should never have changed its basic contour shape in the first place. After all, a rising contour in TSM should have served to reinforce a rising contour in New TM, not push it to take on a dipping contour instead. Obviously another explanation exists for why TM Tone 2 is changing into a dipping contour in citation pronunciation. The general mechanism to be suggested here is one that can account not only for how a so-called rising tone changed into a dipping contour, but also for how any tone shape might change into any other tone shape. This proposed process takes the form of reanalysis, whereby the original tonal contour, a continuous sound signal consisting of one linguistically meaningful segment set adjacent to one or two linguistically meaningless background noise segments, is then resegmented for linguistic meaning and background noise by a new generation of

⁷ All TSM tonal descriptions come from Shi & Deng (2006)

⁸ Li et al. (2006)

speakers⁹. In such cases, what was once partially or fully meaningless background noise may come to carry the linguistic load of the signal while the segment of that sound signal that originally carried all of the linguistic weight might come to be reinterpreted as mere background noise, thus becoming surplus to requirement. Subsequent adjustments can then be made to make the new linguistically meaningful part of the sound signal more salient and the newly insignificant portion(s) of the original sound signal less so. The details of how this process might have taken place in TM both for Tone 2 and Tone 3 will be addressed in more detail in section 4.2 below.

4.1.2. Shang Sheng

On the surface it can easily be argued that in the case of Shang Sheng (TM Tone 3), TSM, with a falling contour in citation form, must have played a significant role in turning the old dipping contour of TM Tone 3 into a falling contour. While we do not want to completely discount any possible substratum influence on the development of TM Tone 3 into a falling citation contour, there nevertheless exist other internal factors that just as well may have served to bring about this same change. First, Tone 3, unlike the other three tonal categories of Mandarin, has one contour specifically limited to citation pronunciation and another contour limited to use when it occurs in connected speech. Whereas the Mandarin Tone 3 citation allotone is dipping, its connected speech allotone is in fact falling. Additionally, in real life the connected speech allotone for Mandarin Tone 3 occurs in natural speech much more frequently than does the citation allotone. From a language acquisition perspective, then, each token of a particular input presented to a child acquiring his native language is a vote influencing the child's eventual choice of which allotone to consider as basic. The significantly greater number of 'votes' calling for a falling contour as opposed to a dipping contour could very well have helped to influence the next generation of TM speakers to adopt the falling contour as the basic contour.

There is also systematic pressure for discarding the existence of a special citation contour for Tone 3. After all, allotonic variation between citation pronunciation and connected speech pronunciation only exists for Tone 3 and does not exist for any of the other three tonal categories of the language. For reasons of systematic regularity alone, there seems to exist some degree of motivation to 'over-generalize' or 'simplify' the system, yielding the straightforward, exceptionless rule that 'speech contour = citation contour'.

Lastly, there is yet another potential mechanism in place, already touched upon in the section immediately above, which might also help facilitate a dipping contour to evolve into a falling contour, i.e. the possibility for a new generation of speakers to reanalyze the linguistically salient and linguistically meaningless components of a tone

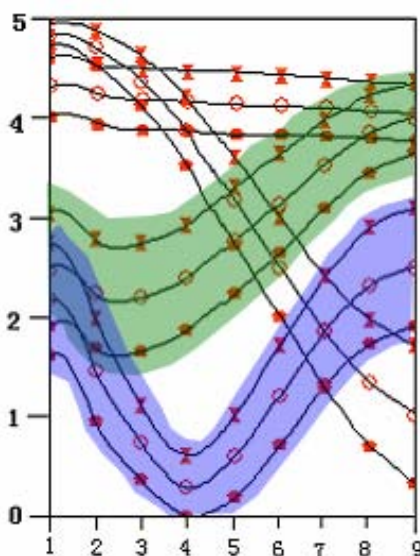
⁹ The breaking down of a continuous signal into linguistically meaningful and linguistically meaningless segments is analogous to how cursive writing in Chinese is processed by native readers. While non-natives may have no idea which parts of the squiggly line embody strokes of the character and which parts are merely transitional movement between strokes, a native speaker can usually work out this information very easily.

category's specific contour shape differently from previous generations. The details of how this reanalysis may have taken place for Tone 2 and Tone 3 are discussed directly below.

4.2. How Resegmentation of the Continuous F0 Speech Signal Might Work

Figure 7 below shows the overall pitch range and average citation pitch contours of Tones 1-4 for 52 Beijing Mandarin speakers as reported in Wang (2006).

Figure 7: Distribution of the Four Citation Contours in Beijing Mandarin (Wang 2006)



Of particular note here are the contour shapes of Tone 2 (shaded in green) and Tone 3 (shaded in blue). A careful inspection of the entire Tone 2 pitch track includes not only the high rise from level 3 to level 5 over the last six milliseconds of the syllable pronunciation, but also a slight downward descent over the two milliseconds preceding the starting point of this prominent rise. Putting the two segments together forms a physical dip at the beginning of the signal. Wang (personal communication) notes that this initial dip is consistently present in the pronunciation of all 52 speakers she studied. In terms of linguistic significance in BM, however, the first two seconds of downward descent is merely background noise; it is the six milliseconds of sharp rise that follow this segment that embody the linguistically meaningful portion of this eight millisecond sound signal.

From the perspective of a child learner of this input, however, there is no a priori reason to assume that this particular pitch track shape must always be interpreted in exactly this way. It is really up to the learner to determine which part of this continuous physical signal conveys meaning and which part of it does not. Once the decision is made by the learner which part of this pitch track is meaningful and which part is not, then s/he is free to do whatever is necessary to make the meaningful segment more prominent and the meaningless portion less so. Should a new generation of speakers decide that the

meaningful portion of this pitch contour includes the beginning portion of the signal, which when combined with the beginning part of the rise forms an initial dip, then this reanalysis could ultimately end up focussing instead on the initial dip as the perceived linguistically meaningful segment rather than the rise. In order to make this dip more salient over the full eight milliseconds of required sound signal, both the height and duration of the initial drop could then be lengthened and the height and duration of the final rise could simultaneously be shortened. Such a move would thus produce a dipping contour shape similar to what we see for Tone 3, though not necessarily of exactly the same pitch range.

In the case of BM Tone 3 above, the entire duration of the dipping contour is linguistically meaningful. However, once again there is no a priori reason to assume that this particular pitch track shape must always be interpreted in exactly this same way, and is therefore potentially a candidate for any type of reanalysis by a new generation of speakers. It is noted in Section 4.1.2 above that there exist system-internal reasons why a citation contour might be reinterpreted as being falling rather than dipping—in connected speech it takes a falling contour and the other three tones of Mandarin have citation contours that match their connected speech contours. It is also noted in that section that there exists one system-external factor, the falling citation contour of Shang Sheng in TSM, which could likewise serve as a substratum motivation for a new generation of TM learners to reinterpret the citation contour of Tone 3 as falling. Certainly the combination of these internal and external factors, coupled with the ease in which a new generation can potentially reanalyze a given pitch contour for linguistic meaning and background noise segmentation, and then modify that contour shape to make the linguistically meaningful segment more prominent and the linguistically meaningless portion less so. In the end it is possible for us to identify in the development of the TM Tone 3 contour shape several potential seeds of change and one very easy to manipulate mechanism to facilitate this change. The question can now be asked whether the changes observed in TM Tones 2 and 3 likely occurred independently of one another or whether it is more likely that the change in one category led to a change in the other.

4.3. Possible Sequencing of This Chain of Events

We believe that it is useful to view a lexical tone system, like the type found in Chinese, in much the same way as we view a vowel system. Each contains a fixed set of categories and, as Saussure (1983) notes in his discussion of phonemes, each individual member/category of that set is defined more in terms of its functional opposition to all other categories belonging to that same set than it does to each category's own individual phonetic particulars. Because of this, the status of a phoneme or toneme does not change even if its respective phonetic details do, just as long as the opposition it experiences with all other phonemic or tonemic categories in that set is maintained. The only time that problems arise in such a system is when the phonetic change to one member of the set is such that it ends up becoming homophonous or at least comes to approximate the pronunciation of another member of that same set. In this case one of two things will happen—

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either two previously functionally distinct categories will merge as one or the pronunciation of the newly encroached upon member of the set will be forced to change as well in order to maintain the existing salient oppositional distance it has thus far experienced with the recently encroaching category. Readjustments in vowel pronunciation in order to maintain or optimize the perceived distance of categorical oppositions take one of two forms, one called a push chain and one called a pull chain.

Based on the distribution of conservative versus innovative pronunciation of Tone 2 and Tone 3 across the three different age groups contained in Table 4 and presented again below, we wish to speculate that the relative sequence of the two tonetic changes in TM reported in the present study possibly unfolded similarly to the manner that a push chain unfolds.

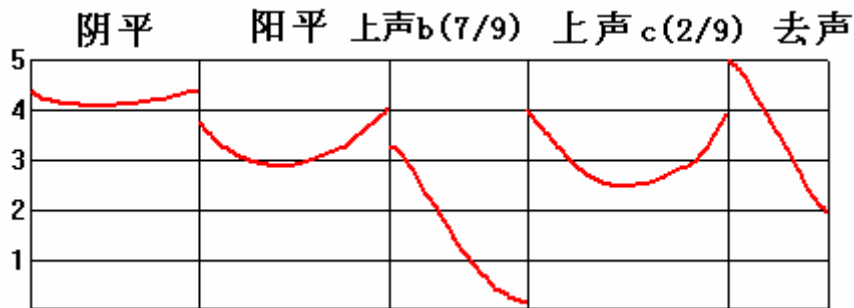
Table 4: Relative group stability and collective conservatism by age group

Age 50-64 (20 informants)		Tone 2	Tone 3
Stability	Stable	16	15
	Unstable	4	5
Conservatism	Rising	15*	-
	Falling	-	3
	Dipping	5	17*
Age 30-49 (5 informants)			
Stability	Stable	4	4
	Unstable	1	1
Conservatism	Rising	3*	-
	Falling	-	1
	Dipping	2	4*
Age 17-29 (8 informants)			
Stability	Stable	6	7
	Unstable	2	1
Conservatism	Rising	3*	-
	Falling	-	4
	Dipping	5	4*

*Prescriptive contour shape

In this table as we move from the old group to the middle-age group to the young group we see that in the case of both Tone 2 and Tone 3 that not only does innovation increase over apparent time, but also that for both the old and middle-aged groups, the change in Tone 2 is more common than the change in Tone 3. That we see more change in Tone 2 than in Tone 3 strongly suggests that Tone 2 began to change before Tone 3 did. If this is so then the first tonetic change created two dipping contours in the system. In their perceptual study of TM Tone 2 and Tone 3 discrimination based on the assumption that both of these tonemes in citation form are indeed pronounced with a dipping contour, Fon et al. (2004) note that the only useful acoustic cues remaining that allow native speakers to distinguish these two particular dipping contours are the degree of slope in the fall and degree of subsequent rise that ends the signal, because the other normal features used to distinguish one tone shape from another, pitch shape and pitch range, have been neutralized. as a result, Tone 2 is perceived to be encroaching upon Tone 3. In response to this encroachment, and supported by the internal motivation discussed in Sections 4.1.2 and 4.2 above, Tone 3 then likely began to evolve into a falling contour. This new falling citation contour for Tone 3 then created another problem in the system, as Tone 4 was already itself pronounced with a falling contour. However, it would appear that TM speakers are adjusting to this encroachment upon Tone 4 by Tone 3 by treating these two falling contours as belonging to two different registers (occupying different pitch ranges), which is exemplified for a single speaker in Figure 8 below:

Figure 8: Subject C's Four Citation Tones



In the above figure we see that Tone 2 for this particular speaker is consistently dipping and that Tone 3 is largely falling (7 out of 9 tokens). Additionally, we see that the falling contour of Tone 3 has a pitch range of 31, whereas the pitch range of Tone 4 is no longer the prescriptive 51, but has been shortened to merely cover the pitch range 53. By contracting the pitch range of Tone 4 and positioning it in a pitch sector comfortably above that of the normal pitch range occupied by the Tone 3 falling contour, a high-low register distinction has been created which can help to maintain the perceptual distance between Tone 3 and Tone 4.

4.4. What Changes in TM Tone Contours Might Tells Us about Tonetic Sound

Change in Chinese in General

From both a diachronic and synchronic perspective, tonal categories (tonemes) seem to be remarkably stable, with regular correspondences easily established over time and distance between any one variety of Chinese and another. At the same time, however, the phonetic details of individual tonal categories vary hugely even over very short geographical distances, strongly suggesting that tonal contours are themselves inherently unstable and subject to frequent change in shape. The present study has managed to capture a series of such tonetic changes within TM that likely unfolded over a short period of just three to four decades. However, despite these tonetic changes, the tonemic system itself has been left intact, with the original four tonemic categories preserved. In the scenario proposed here, tonetic change initially came about as a result of reanalysis of a continuous sound signal by a new generation of speakers, who in the process of acquiring their native language reassigned linguistic meaning and background noise status to different segments of set tonal contour patterns they were hearing. In the process of identifying a new linguistic locus and new areas of background noise within that continuous sound signal, conditions were created allowing for easy manipulation of that pitch track to make the linguistically relevant portion more prominent and lessening the prominence of the background noise. Original minor features of the pitch wave, such as a small dip, could then be accentuated while linguistically less meaningful portions, such as a rise in pitch, could then be shortened or eliminated altogether. With this reanalysis and phonetic readjustment a new contour was then created for Tone 2 that began to encroach acoustically upon Tone 3, which under pressure from Tone 2 and with other factors as well pushing it to take on another contour shape, it changed into a falling contour. This new falling contour then began to encroach upon Tone 4, which reacted by shortening its full pitch range, thus maintaining a clear distance from the new Tone 3 pitch contour. This sequence of events for tonetic change closely replicates the unfolding of the commonly observed phenomenon known as a vowel push chain.

We wish to suggest that what has been uncovered here provides a window not only into what transpired over time in TM, but more importantly, it offers one very plausible mechanism by which lexical tone languages in general, including Chinese, evolve over time. It is not being suggested that this is the only route by which tonetic change takes place. However, it does represent a very plausible explanation for why we observe such a rich diversity of tonetic details across speech communities that are otherwise so genetically and geographically close, and hence, supports the impression that globally speaking, that tonetic details are relatively transitory while tonemic categories remain significantly more stable.

5. Conclusion

Returning now to the original research questions, we see now that the general trend over time in TM is for the Tone 2 citation contour to be dipping and for the Tone 3

citation to be falling. However, this remains a change in progress, meaning that it is still possible to observe variation between the original prescriptive contour shape and its innovative counterpart, both across speakers and within the speech of a single individual. This variation, however, is not completely random, as it can, to a certain degree, be correlated with specific sociolinguistic variables. Specifically, males are more likely than females and bilinguals are much more likely than monolinguals to display individual variation in contour shape pronunciation. At the same time, however, age does not appear to be a factor in determining the likelihood that variation within the pronunciation of a given individual will occur, although it is clearly the case that the older a speaker is the greater the likelihood that s/he will employ a conservative contour shape for both Tone 2 and Tone 3 when it is pronounced in isolation.

A second key variable when considering the likelihood that a given speaker of TM will favor either a conservative or innovative contour is the speaker's gender, with females displaying a much stronger tendency than males to employ a conservative contour shape. It may also be the case that language background exemplifies a third important variable in the conservative/innovative opposition, although the sample size of this study does not allow us to tease apart language background from speaker age and thus discover a definitive answer to this question.

We speculate that the original motivation for the tonetic changes observed here was reanalysis of the citation contour of Tone 2 by a new generation of TM speakers. These new speakers took what was once a linguistically meaningless portion of the original Tone 2 citation pitch track, a slight downward slope at the very beginning of the pronunciation, and reanalyzed that downward slope, together with the rise that followed it, as being linguistically meaningful. Subsequent adjustments were then made to make the new linguistically meaningful dipping contour more salient and the less significant rise at the end of the original sound signal less salient. The result of this reanalysis and readjustment was a dipping contour that closely resembled the Tone 3 citation contour both in terms of contour shape and pitch range. Already under a certain amount of pressure from its more frequently used connected speech allotone and from TSM to be pronounced with a falling contour anyway, Tone 3 adjusted to the encroachment of the new Tone 2 contour and became falling. However, this new falling tone was in danger itself of encroaching upon the existing Tone 4 falling contour, so an adjustment was made to Tone 4 whereby it changed its pitch range of 51 by ceding the 31 range to Tone 3 and keeping the 53 range for itself.

The mechanism of pitch track reanalysis by a new generation of speakers, with subsequent phonetic readjustment to make the linguistically meaningful portion of the continuous sound signal more salient and rendering the other meaningless portion(s) of that same signal less salient provides both a credible motivation and a simple mechanism for realizing tonetic change. In the study presented here, change within the tonemic system proceeded in exactly the same manner as a vowel push chain, with tonetic change to one member of the toneme set initiating a chain of events that led to tonetic change in

other members further down the line. With Tone 2 changing from a rising contour to a dipping one it then began to encroach upon the pitch contour of Tone 3, thus motivating tone 3 to likewise change its contour shape in order to maintain its perceptual distance from Tone 1. In this particular case, there already existed additional internal and external pressures motivating Tone 3 to change into a falling contour. However, in so doing, this new contour came to encroach upon the falling contour of Tone 4, and in an effort to maintain their perceptual distance the pitch range was divided into two registers, one high, one low, with Tone 4 occupying the upper register and Tone 3 occupying the lower one. The scenario proposed here not only provides a window into what likely transpired in the tonetic evolution of TM, but more importantly, it also offers a workable model for how tonetic change might unfold in any lexical tone language. Such a scenario, in turn, provides a very simple and plausible explanation for why we observe in languages like Chinese such a rich diversity of tonetic details across speech communities that are otherwise so genetically and geographically close.

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The Spotty-Data Problem in Phonology*

San Duanmu

University of Michigan

A common goal of a phonologist is to describe the phonology of a language. The job would be easier if the boundaries of phonology are clear, but they are often not. I discuss some examples, especially what I call the spotty-data problem, which refers to the fact that we often do not have enough data to figure out certain rules or constraints in a language. I also offer an explanation why phonological data are so spotty and suggest that sometimes universal generalizations might be easier to determine than language-specific ones.

1. What is the phonology of a language?

Phonologists often work to describe the phonology of a language. But what exactly is the phonology of a language? According to Halle (1962), it is a set of rules. This conception follows from Chomsky's (1957) proposal that a grammar is a set of rules that define a set of possible and impossible linguistic structures. The set of rules is limited, but the set of structures defined by them can be infinite, because some rules can be 'recursive'. For example, the recursive rules in (1) can generate infinitely long sentences and the recursive rules in (2) can generate infinitely long words.

- (1) $S \rightarrow NP VP$
 $VP \rightarrow V S$
 $VP \rightarrow V NP$

An infinitely long but grammatical sentence:

I know you know I know you know...that you have a dog.

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- (2) N \rightarrow A-ness
A \rightarrow N-less

Grammatical words, which can be infinitely long:

red-ness, red-ness-less, red-ness-less-ness, red-ness-less-ness-less,...

The sentence or words in (1) and (2) may have never been used before, but they are nevertheless grammatical, because they can be derived from the rules of English.

Chomsky's proposal outlines generative grammar, in which the set of rules are well defined, so are the set of structures they generate, whether the structures are limited in size or infinitely long, and whether the structures are familiar or new. In other words, if we can figure out the grammar of a language, we can predict or generate all and only correct structures in the language.

Halle (1962) offers a similar view of what phonology is. According to him, the phonology of a language is a set of rules that can generate all and only correct phonological forms of a language. In addition, because the speaker of a language has the knowledge of the grammar, she or he has the intuition to judge whether a structure is or is not good in the language, whether the structure has been used before or not. In particular, speaker intuition can be used to judge whether a sound sequence is well formed, even if it is not a real word, as shown in (3).

- (3) Speaker judgment on potential words in English (Halle 1962)
a. Good (possible words): [bɪk], [θɒd], and [nɪs]
b. Bad (impossible words): [tsaim], [gnait], and [vniŋ]

None of the words in (3) are (or were) real English words but those in (3a) are possible words while those in (3b) are not. This conception of what phonology (or grammar) is has led to extensive rule-based research for the next 20-30 years, such as Chomsky and Halle (1968) on English phonology and Cheng (1973) and Lin (1989) on Chinese phonology.

Chomsky (1981) replaces grammatical rules with principles, parameters, and lexical specifications. Similarly, Prince and Smolensky (1993) argue that rules should be replaced with ranked constraints. However, the essence of the generative proposal remains the same: the grammar and the structures it generates are well defined, so is the knowledge or intuition of the speaker.

2. Gradient intuition

However, many studies have found that the intuition of native speakers is not always clear. For example, Frisch et al (2000), Myers and Tsay (2005), and Zhang (2007) have shown that speaker judgment on possible words is not clear cut but gradient. Similarly,

many studies have noted that consistent judgment on syllable boundaries can be hard to obtain (e.g. Gimson 1970, Treiman and Danis1988, Giegerich 1992, Hammond 1999, Steriade 1999, Blevins 2003), and this has led to different analyses in some cases. An example is shown in (4), where a dot indicates a syllable boundary and [t̩] is an ambisyllabic [t] (a single [t] that belongs to both the first and the second syllable).

- (4) Syllable boundary in *city*
 Pulgram (1970), Kahn (1976): *city* (ambisyllabic [t̩])
 Selkirk (1982): *cit.y*
 Halle and Vergnaud (1987): *ci.ty*
 Burzio (1994): *cit.ty* (geminate [tt])

The lack of speaker intuition on syllable structure may be taken as evidence that there are no syllables, a position held by Chomsky and Halle (1968). It is also possible thought that not everything is intuitively obvious. For example, we are not exactly aware of how we see colors, how we digest food, or how we walk. Similarly, if we rely on intuition alone, we would wrongly conclude that the earth is flat. Indeed, although many phonologists agree that words are made of consonants and vowels and that consonants and vowels are in turn made of distinctive features, the assumptions are far from obvious to the average person, or even to some linguists (such as Ladefoged 2001). The lack of intuitive judgment on linguistic structures means that linguists have to work harder in figuring out patterns of grammar.

Frisch et al (2000) have shown that speaker judgment on possible words (non-words) in English is based on frequency. A non-word whose parts occur frequently in existing words, such as those in (4), is likely to be judged better than one whose parts occur infrequently, such as those in (5).

- (5) Non-words whose parts occur frequently in English words
 [midət], [kinəp], [henət], ...
- (6) Non-words whose parts occur infrequently in English words
 [zoɪʒəʃ], [jʊgɔɪl], [vɔθəʃ], ...

Frisch et al (2000) can also explain why speaker judgment is sometimes quite clear, as noted by Halle (1962): [bɪk], [θɒd], and [nɪs] are judged to be possible words because their parts occur frequently in English words, whereas [tsaim], [gnait], and [vnɪg] are judged to be impossible words because [ts-, gn-, vn-] never occur as onsets in English.

Still, an important question remains: How often are boundaries of phonology vague? For example, do speakers have clear judgment 95% of the times and uncertain judgment just 5% of the times? Or is the extent of uncertainty far greater than that?

3. The spotty-data problem

I shall show that the uncertainty in phonological analysis is far more extensive than previously conceived. I shall call it the spotty-data problem (Duanmu 2008), which refers to the fact that there are often not enough data for making reliable generalizations, even if we examine the entire lexicon of a language. To begin, let us consider the ratios between possible words and actual words in English. First, consider the number of possible CVC syllables in American English, shown in (7), where V is a short (lax) vowel.

(7)	CVC syllables in American English	
	Initial C: 23	[p, b, t, d, k, g, f, v, θ, ð, s, z, ʃ, ʒ, h, tr, dr, tʃ, dʒ, m, n, l, r] ¹
	Lax V: 5	[ɪ, ʊ, ɛ, ʌ, æ]
	Final C: 21	[p, b, t, d, k, g, f, v, θ, ð, s, z, ʃ, ʒ, tʃ, dʒ, m, n, ŋ, l, r]
	CVC:	2,415

American English has 24 consonants, including the affricates [tr, dr, tʃ, dʒ]. Of these 23 can occur in the onset (excluding [ŋ]) and 21 can occur in the coda (excluding [h, tr, dr]). American English also has 5 short (lax) vowels. This gives $23 \times 5 \times 21 = 2,415$ possible CVC syllables. However, the actual number of occurring CVC syllables is a lot smaller, as seen in (8), based on the CELEX lexicon (Baayen et al 1993).

(8)	The spotty-data problem in English			
	Word form	Possible	Used	% used
	CVC	2,415	615	25.5%
	CVCCVC	5,832,225	6,000	0.1%

Excluding affixes and homophones, English has about 3,000 uninflected monosyllabic words, which include CVVC (842), CVC (615), CCVVC (453), CCVC (326), etc. The second most frequent type, CVC, includes 615 syllables. This means that just one fourth of all possible CVC words are used. In dialects that have more short vowels, the percentage of occurring syllables could be even lower. If we consider disyllabic words, the percentage of occurring syllables becomes diminishingly small. For example, if any two CVC syllables can form a disyllabic word, there are about 6,000,000

¹ Whether [tr, dr] are single sounds (affricates) or clusters of two each does not affect the point being made here. Phonetically, [tr, dr] are affricates, as noted by many phoneticians, such as Jones (1950), Abercrombie (1967), Gimson (1970), and Wells (1990). Phonologically, one might ask whether stop + approximant can create an affricate. The answer is yes, such as [t] + [j] → [tʃ] in *get you* and [d] + [j] → [dʒ] in *did you*. One might also ask that, if we treat [tr, dr] as affricates, would we increase the English phoneme inventory by two? The answer is no; all we need to say is that when the phonemes [t, r] or [d, r] occur in the same onset, they form an affricate.

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possible disyllabic words, yet English only uses around 6,000 uninflected disyllabic words. This means that just 0.1% of all possible disyllabic words are used.

Because there are so few occurring forms, it is often hard to determine what the general pattern is, or what rules or constraints one should propose. As an example, let us take a closer look at monosyllables in English. English has at least 59 productive onsets, shown in (9)-(12). The distinction between productive and unproductive onsets is not a technical one. Unproductive onsets mostly include those that only occur with one vowel; for example, Cj and CCj only occur with the vowel [u]. Should we include all onsets in the calculation, the spotty-data problem would be even more serious.

- (9) Occurring productive onsets in English (59 in all)
 C onsets (22 in all)
 CC onsets (30 in all)
 CCC onsets (6 in all):
 Lack of an onset (1 in all)
- (10) Productive C onsets (22 in all):
 p, b, t, d, k, g, f, v, θ, ð, s, z, ʃ, h, tr, dr, tʃ, dʒ, m, n, l, r
 Unproductive C onsets (1 in all):
 ʒ
- (11) Productive CC onsets (30 in all):
 bl (*black*), br (*bring*), dr (*dry*), dw (*dwelt*), ʃr (*shrink*), ʃw (*schwa*),
 fl (*fly*), fr (*fry*), gl (*glad*), gr (*green*), gw (*penguin*), kl (*class*), kr
 (*cry*), kw (*quick*), pl (*plot*), pr (*price*), sl (*sleep*), sw (*swim*), tr (*try*),
 tw (*twin*), θr (*three*), θw (*thwart*), st (*stop*), sp (*spot*), sk (*sky*), sn
 (*snake*), sm (*smack*), sf (*sphere*), ʃm (*schmaltz*), ʃn (*schnitzel*)
 Unproductive CC onsets (36 in all):
 bj (*beauty*), dj (*duty*), fj (*few*), gj (*argue*), hj (*huge*), kj (*cute*), lj
 (*volume*), mj (*music*), mw (*moiré*), nj (*news*), nw (*peignoir*), pj
 (*pure*), pw (*puissance*), sj (*suit*), sr (*Sri Lanka*), tj (*tube*), vj (*view*),
 vw (*reservoir*), zl (*zloty*), zj (*presume*), ʒw (*bourgeois*), θj
 (*enthuse*), km (*Khmer*), kn (*Knesset*), kv (*kvass*), sv (*svelte*)
- (12) Productive CCC onsets (6 in all):
 str (*string*), skr (*screen*), skw (*square*), spr (*spring*), spl (*splash*),
 skl (*sclerosis*)
 Unproductive CCC onsets (4 in all):
 stj (*studio*), skj (*skew*), spj (*spew*), tsw (*Tswana*)

Given 59 productive onsets, we expect there to be at least 59 different monosyllables with the rhyme [ɪl] (the most frequent VC rhyme). However, only 29 of them occur in the CELEX lexicon. The 30 non-occurring ones are shown in (13).

- (13) Non-occurring monosyllables with the rhyme [ɪl]
 vɪl, θɪl, ðɪl, zɪl, ʃɪl, lɪl, jɪl; blɪl, dwɪl, ʃmɪl, ʃnɪl, ʃwɪl, flɪl, glɪl, gwɪl, klɪl, krɪl,
 plɪl, prɪl, sɪl, slɪl, smɪl, snɪl, θwɪl; strɪl, skrɪl, skwɪl, sprɪl, splɪl, sklɪl

A few of the syllables may be used in words that CELEX failed to collect, such as *skill* and *krill*. It has also been proposed that there is a constraint against C+[lɪl] (Clements and Keyser 1983: 21, Davis 1988: 25), or against [lɪl] in general (Pierrehumbert 1994: 186), although there is a word *lilt*. Still, there are many others left, which seem to be accidental gaps, because they do not seem to violate any obvious phonological requirement.

Besides accidental gaps, there are forms that seem to be outliers (or exceptions)—those that do not seem to fit the patterns of other syllables. For example, [ts] is rarely used as an onset in English, but it occurs in *Tswana* [tswa:][na] and *scherzo* [skeəʒ][tso]. Similarly, [s] does not occur with a fricative in word-initial position except in *svelte*, *sforzано*, *sphagnum*, *spheroid*, *sphincter*, *sphinx*, and *sphere*. Most of these words can probably be labeled as foreign or uncommon, although it is hard to rule out *sphere* this way. In Chinese there are outliers, too. For example, Cantonese generally disallows two labial sounds in a syllable, but it has the word [pʌm] ‘pump’. Similarly, in Standard Chinese a palatal onset usually does not go with a diphthong that ends in [i], but then there is a marginal word [jai] ‘cliff’, which most people pronounce as [ja].²

If we always know what accidental gaps are and what outliers are, it can still be reasonably easy to figure out the rules in a grammar. But the problem is that it is not always clear whether an occurring form is an outlier or a good word, nor is it easy to decide whether a non-occurring form is a potential word or simply ungrammatical. Our decisions on such cases would lead to fairly different versions of English phonology. For example, (14) and (15) show two ways to treat *Tswana* and *scherzo*.

- (14) Decision:
Tswana and *scherzo* are outliers (not good words) in English.³

² Two reviewers point out that few speakers use [jai] any more, but [ja] instead. The point remains the same though: before [jai] dropped out of use, it was the only word of the form [jVi], where V is any vowel. Was it an outlier then, or was it well-formed but simply infrequent?

³ A review points out that *Tswana* and *scherzo* are clearly borrowed foreign words. If we exclude them, English has no onset [ts]. How can the lack of onset [ts] in English be explained? The answer I suggest is that a language does not need to use every possible onset. In fact, this is

Generalizations:

English words and syllables cannot start with [ts].

[tsæt, tsɪl, ...] are impossible (ungrammatical) words in English.

(15) Decision:

Tswana and *scherzo* are good words (not outliers) in English.

Generalizations:

English words and syllables can start with [ts].

[tsæt, tsɪl, ...] are potential words in English.

Similarly, the decision on words like *sphere* can lead to two analyses, shown in (16) and (17).

(16) Decision:

sforzano, *sphagnum*, *spheroid*, *sphincter*, *sphinx*, and *sphere* are outliers (not good words) in English.

Generalizations:

English words and syllables cannot start with [sf].

[sfit, sfain, ...] are impossible (ungrammatical) words in English.

(17) Decision:

sforzano, *sphagnum*, *spheroid*, *sphincter*, *sphinx*, and *sphere* are good words (not outliers) in English.

Generalizations:

English words and syllables can start with [sf].

[sfit, sfain, ...] are potential words in English.

If we treat [sf] as an outlier, we expect [sfit] *sfit* and [sfain] *sfine* to be ungrammatical in English (they seem to be as marginal as *Tswana* or *sforzano*). On the other hand, if [sf] is not an outlier, we expect [sfit] *sfit* and [sfain] *sfine* to be accidental gaps or potential words in English.

As another example, consider occurring and non-occurring monosyllables with VC rhymes in English again, shown in (18).

expected from the spotty-data problem. It is worth noting that the lack of onset [ts] in English is not because [ts] is ill-formed in any way: German uses it without any problem, and English could adopt it any time when words like *Tswana* and *scherzo* become part of the daily vocabulary, or the vocabulary of English learning children.

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- (18) English monosyllables with VC rhymes
- | | |
|---|-------|
| Productive onsets: | 59 |
| Occurring VC rhymes: | 101 |
| Possible monosyllables with VC rhymes: | 5,959 |
| Occurring monosyllables with VC rhymes: | 1,069 |

As seen earlier, English has 59 productive onsets. In addition, English has 101 occurring VC rhymes. Therefore, there are 5,959 possible monosyllables with VC rhymes. However, only 1,069 occur in the CELEX lexicon. The 101 VC rhymes are shown in (19). The number of occurring onsets for a rhyme is in parentheses and the CELEX [O] can be [ɒ] or [ɑ] in American English.

- (19) VC rhymes and the number of onsets they occur with in monosyllables
- [ɪl] (29), [ɪp] (26), [æk] (25), [ɪt] (25), [Ot] (25), [æt] (24), [ɪk] (23), [Op] (23), [æg] (22), [æf] (22), [æp] (21), [æm] (20), [ʌm] (20), [ɪm] (19), [Ok] (19), [ʌg] (19), [æd] (18), [æɪ] (18), [ɛd] (18), [Ob] (18), [Od] (18), [ʌf] (18), [ɛl] (17), [ɛn] (17), [ɛt] (17), [ɪŋ] (17), [Og] (16), [ʌb] (16), [ʌt] (16), [æb] (15), [ɪm] (15), [ɪg] (14), [ɪtʃ] (14), [ʌk] (14), [ɛs] (13), [Os] (13), [Oʃ] (13), [ʌn] (13), [ʌʃ] (13), [æŋ] (12), [ɛk] (12), [ɪf] (12), [ɪb] (11), [ɪz] (11), [ʌd] (11), [æʃ] (10), [ɛʒ] (10), [ɪd] (10), [On] (10), [Oŋ] (10), [ʌs] (10), [ʌʒ] (9), [ʌŋ] (9), [ɛg] (8), [ɛtʃ] (8), [ɪs] (8), [Of] (8), [Oʃ] (8), [ʊk] (8), [ʌl] (8), [æs] (7), [ɛf] (7), [ɛm] (7), [Ol] (7), [Om] (7), [ʌtʃ] (7), [ɛp] (6), [ɪʃ] (6), [Oθ] (6), [ʊd] (6), [Oʒ] (5), [ʌp] (5), [ʌv] (5), [æɪ] (4), [ɛb] (4), [ɛʃ] (4), [ɪʒ] (4), [ɪθ] (4), [ɪv] (4), [ʊl] (4), [ʊʃ] (4), [ʊt] (3), [ʌz] (3), [æʒ] (2), [æf] (2), [æv] (2), [æz] (2), [ɛθ] (2), [ʊtʃ] (2), [æθ] (1), [əɪ] (1), [əɪ] (1), [əɪ] (1), [əɪ] (1), [əv] (1), [ɛv] (1), [ɛz] (1), [ɪð] (1), [Ov] (1), [Oz] (1), [ʊf] (1), [ʊs] (1)

The non-occurring monosyllables with high-frequency rhymes are probably accidental gaps, although even the most frequent rhymes hardly occur with half of the onsets. A harder question is what to do with low frequency rhymes, such as those that only occur with one onset each. For example, [ɪð] occurs in just one monosyllable (alternative pronunciations excluded), which is *with*. Is *with* an outlier (exception)? The answer again leads to two analyses, shown in (20) and (21).

- (20) Decision:
with is an outlier (not good word) in English.

Generalizations:

[ɪð] is not a possible rhyme in English.

[mɪð, nɪð, tɪð, ...] are impossible words in English.

(21) Decision:

with is a good word (not an outlier) in English.

Generalizations:

[ɪð] is a good rhyme in English.

[mɪð, nɪð, tɪð, ...] are potential words in English.

If *with* is an outlier (phonologically bad but still used as an exception) in English, non-words such as [mɪð, nɪð, tɪð, kɪð, ...] would be ungrammatical. If *with* is phonologically good (not an outlier) in English, the same non-words would be accidental gaps and potential words.

Next consider Cantonese. Yip (1988: 82) suggests that Cantonese Chinese has a restriction against syllables that have two labial consonants, one in the onset and one in the coda, such as [pɪm] and [map], but she notes a few exceptions, such as [pʌm] ‘pump’. Should we say that Cantonese disallows syllables with two labial consonants, or should we say that Cantonese is in principle open to their use, but happens not to have used any (or many) such words? The two options are shown in (22) and (23).

(22) Decision:

[pʌm] ‘pump’ is an outlier (not good word) in Cantonese.

Generalizations:

Cantonese allows no syllable with a labial onset and a labial coda.

[pau, mau, ...] are impossible words in Cantonese.

(23) Decision:

[pʌm] ‘pump’ is a good word (not an outlier) in Cantonese.

Generalizations:

Cantonese allows syllables to have a labial onset and a labial coda

[pau, mau, ...] are potential words in Cantonese.

Indeed, one might also want to ask: why should [pʌm] ‘pump’ be an outlier in Cantonese, if *map* and *Pam* are perfect syllables in English?

Next consider Standard Chinese. We mentioned earlier that Standard Chinese generally lacks syllables that have a palatal or front glide in the onset and a front high vowel in the coda, but there is one word [jai] ‘cliff’, which many people pronounce as

[ja]. Is [jai] an outlier so that Standard Chinese has a restriction against two front high vowels (Lin 1989, Duanmu 2000), or is [jai] a good syllable and there is no such restriction? Also, why should [jai] ‘cliff’ be an outlier in Standard Chinese, if [tʂai] ‘release’ occurs in other Mandarin dialects, such as Chengdu? Consider another case in Standard Chinese, where the medial glide cannot be [ɥ] if the initial C is a sonorant, such as [nɥa], [nɥan], [nɥauŋ], [lɥa], [lɥan], and [lɥauŋ], but there are two exceptions, [nɥe] ‘mistreat’ and [lɥe] ‘abbreviate’. Should these syllables be outliers, or should we say that most syllables with a medial [ɥ] happen to be accidental gaps?

A reviewer suggests that ‘if we can foresee the future of a language, it won’t be difficult to make a decision’ on whether a form is an outlier or not. For example, if we look at Standard Chinese alone, we might be unsure whether [nɥe] and [lɥe] are outliers, but if we look at other Chinese dialects, many of which lack any sonorant + [ɥ] combination, or if we look at historical trends, where sonorant + [ɥ] combinations seem to be dropping out, then we might conclude that [nɥe] and [lɥe] are outliers. It is true that sometimes we can tell whether a form is dropping out of a language, such as [jai] in Standard Chinese. However, to ‘foresee the future of a language’ in general is far from easy, and I am not aware of any serious proposal in this regard. In addition, outliers and accidental gaps are synchronic notions, not diachronic ones. For example, if CCV syllables are evolving towards CV syllables, as the reviewer might believe, should we say that all CC onsets in English are outliers? Clearly we do not, because CC onsets are part of English grammar here and now.

4. Explaining the spotty-data problem

Why are so many possible words not used in English? One might suspect that there are phonological constraints that rule out most of the disyllabic words, but this is unlikely: there are no known phonological constraints that would rule out 99% of the disyllabic combinations. Instead, the answer in my view is that a language simply does not need many morphemes, which make up words (Duanmu 2008).

Let us consider the size of morpheme inventories in English and Chinese. For simplicity and consistency in calculation, I take the number of morphemes in Chinese to be roughly the same as the number of characters. This method ignores homographs. For example, the character 白 can mean ‘white’ or ‘in vain’ but it is counted as one morpheme. The analysis also over-counts disyllabic morphemes, although there are not many in Chinese. For example, 蜻蜓 ‘dragonfly’ and 玛瑙 ‘amber’ are each one morpheme, but they are counted as two morphemes each, even though the parts have no meaning by themselves.

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For English, I take the number of morphemes to be roughly the same as the number of words that are labeled as single morphemes in CELEX (excluding proper names). This method will count homographs because CELEX lists them separately. For example, *bank* (of money) and *bank* (of river) are listed separately and will be counted as two morphemes. However, the analysis excludes bound morphemes, such as *bio-*, *pre-*, *-ology*, *-er* and *-ly*. The undercount of bound morphemes in English is compensated by the inclusion of homographs, which are excluded in Chinese. Therefore, the overall effects of the counting method probably balance out for the two languages.

In both languages, zero derivations (i.e. a change of word category without an overt affix) are excluded. For example, in English *dry* (adjective) is included but *dry* (verb) is not. Similarly, in Chinese 干 is counted once, although it can be a verb 'to dry', an adjective 'dry', or a noun 'dried food'.

I use two electronic corpora for the comparison, Da (2004) for Chinese and CELEX for English. The basic information of the corpora is given in (24).

(24)	Chinese	English
	Da (2004)	CELEX (Baayen et al 1993)
	Corpus	
	Size	259 million characters
	Morphemes	12,041 character types
		18 million words
		7,401 monomorphemic words

The English corpus has fewer morphemes because it covers modern English only, while the Chinese corpus covers both classic and modern texts. In addition, many characters in the Chinese corpus are rarely used. If we ignore uncommon morphemes, the similarity between the languages becomes more evident. To see it, let us consider the coverage of character or word tokens in each corpus. The data are shown in (25), up to the 7,000th most frequent morpheme. The Chinese calculation is made by Da (2004). The English calculation is made by me.

(25)	Cumulative corpus coverage by the number of most frequent morphemes	
	Most frequent	Chinese coverage
		English coverage
	1,000	86.1740%
	2,000	87.3571% (<i>wise</i> , 723)
	3,000	94.2505% (<i>liquid</i> , 204)
	4,000	97.2358% (<i>leap</i> , 78)
	5,000	98.6762% (<i>loom</i> , 35)
	6,000	99.4708% (<i>tankard</i> , 16)
	7,000	99.9268% (<i>clunk</i> , 5)
		99.9802% (<i>gull</i> (verb), 0)

The first 1,000 most frequent characters in Chinese cover 86% of all character tokens and the first 1,000 most frequent English morphemes, which ends at *wise* (occurring 723 times), cover 87% of all word tokens. In both languages, the first 4,000 most frequent

morphemes cover 99% of all occurring tokens, and the first 6,000 most frequent morphemes cover 99.9% of all occurring tokens. The bottom 454 morphemes in English, such as *asp* (noun), *barm* (noun), and *gull* (verb), do not occur in the frequency corpus (the frequency corpus was one of the sources from which the CELEX lexicon was gathered), but it is reasonable to assume that they are infrequent and do not affect the overall results. In any case, in both Chinese and English, morphemes beyond the first 6,000 most frequent ones cover just 0.1% of all occurrences.

It is unclear how many morphemes are used in other languages. However, it is reasonable to assume that they are unlikely to be much larger than those in English and Chinese, because English is used world wide and has borrowed many words from other languages, and the Chinese corpus was based on not only modern usage but also a large amount of texts from classic literature. If so, in most languages the number of morphemes needed is just a very small fraction of possible words available.

So if a language only needs 1% (or a few percent) of all possible words, which ones would be chosen? There are two possibilities: either the words are chosen more or less arbitrarily, or they are chosen according to phonological principles. Our examination of syllables in English and Chinese shows that word forms can often be chosen arbitrarily. If so, it can sometimes be difficult to make phonological generalizations in a language, because we cannot be sure whether the generalizations are real or merely artifacts.

5. What can phonologists do?

Despite the spotty-data problem, there are plenty of things phonologists can do. First of all, there are often clear rules or generalizations that should be included in the description of a language. For example, American English has a rule to flap [t, d] between vowels, Standard Chinese has a rule to change Tone 3 to Tone 2 when the following tone is Tone 3, and Shanghai Chinese has a rule to delete the underlying tone from the second word of a disyllabic compound. These are features that distinguish one language from another.

The phonology of a language should also describe which sounds and words are used in the language and, based on such inventories, what types of sound sequences are used in syllables. In addition, the phonology should also describe which sounds and words are used frequently and which occasionally, and based on such information one can predict which non-words would sound more acceptable to native speakers than other non-words, although it is another question whether more acceptable non-words will actually be adopted earlier than others.

Phonologists can also look for universals that hold for all languages. Ironically, this may sometimes be easier than looking for generalizations of a particular language. The reason is that, because of the spotty-data problem, there are often not enough data in a given language, yet if we look at all languages, we have a lot more data for making generalizations.

6. Summary

A language often uses only a few thousand morphemes, which can often be distinguished by just a small fraction of all possible combinations of consonants and vowels in its sound inventory. Therefore, many possible syllables or word forms will not occur, not because they violate any phonological constraint, but because the language simply does not need so many syllables or word forms. The paucity of occurring forms (i.e. the spotty-data problem) makes it hard sometimes to figure out a phonological rule or constraint. Still, there are often clear language-particular generalizations to make, as well as universal generalizations that are true for all languages.

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Tone Production in Mandarin Chinese By American Students: A Case Study

Lijuan Guo

Harbin Institute of Technology

Liang Tao

Ohio University

This study reports finding on the developmental stages of tone production at the sentence level by American students in their first year of learning Mandarin Chinese. The study aims to identify the different developmental characteristics of each of the four tones in near-natural speech over one academic year. 16 native speakers of American English in first-year Chinese language classes participated in this study. The data were collected at the end of each academic quarter for two non-consecutive quarters. The study analyzed learners' tonal performance and identified the different developmental characteristics of each of the four tones in both prepared and spontaneous oral speech during the first and third quarters of the 2006-2007 academic year. The study confirmed the difficulty of tone 3 in near-natural conversations.

1. Introduction

It is generally agreed upon that Mandarin Chinese (hereafter, Chinese) is one of the most difficult languages for English L1 learners to study (Ross, 2001). The syllable structures [(consonant) vowel (n/ng)] of Chinese are not particularly difficult for American learners of Chinese; instead, it is lexical tones that make the mastery of the language a challenging task (Shen, 1989). American learners of Chinese have very little difficulty in learning the perceptual discrimination of tones, but always experience difficulties in producing tonally correct speech (Chen. G. T., 1974). Moreover, as a Chinese instructor, I find that students can produce isolated tones correctly. However, they often have problems producing correct tones in connected speech, i.e. they mix up tones at the sentence level. For instance, students mispronounce tone 3 for tone 1, or mistakenly produce tones 1 or 4 instead of tone 2. They probably did not think they produced the wrong tones. I have often heard students say that they will never learn the tones, and even advanced level students still struggle with tones. This study intends to examine and analyze the tone production of 16 American learners of Chinese. More specifically, I will analyze their tonal performance and identify the different developmental characteristics of each of the four tones in both prepared and spontaneous

oral speech during two non-consecutive academic quarters (the first and third quarters in the 2006-2007 academic year).

2. Literature Review

As discussed above, Chinese tones can be described verbally by pitch contour (level, rising, falling) and pitch register (high, low, mid). For instance, tone 3 is a mid falling-rising tone, while tone 1 is a high level tone. Earlier studies such as Li and Thompson (1977), Tse (1978), and Yue (1980) claimed that in first language (L1, hereafter) acquisition, the hierarchy of difficulty of tonal acquisition for native Chinese children was as follows: the level tone (i.e. tone 1) was easier than the falling (i.e. tone 4), the rising (i.e. tone 2) and the falling-rising (i.e. tone 3) tones; the falling tone was easier than the rising tone (referred to by Shen, 1989). Specifically, the acquisition order is: tone 1, tone 4, tone 2, and tone 3.

A number of auditory analysis and acoustic analysis studies on L2 learners' acquisition of Chinese tones (Chen, G. T., 1974; Chen, Q., 1997; Wang, 1995; Shen, 1989; White, 1981) have been conducted in order to establish American learners' hierarchy of difficulty of tonal acquisition as well as to explore the reasons for the tonal misproduction. An acoustic study by Shen (1989) claimed that tone 4 and tone 1 are the most problematic tones for American learners because they are less marked than tone 2 and tone 3. Shen (1989) claimed that L1 acquisition is different from L2 acquisition due to the different internal and external environments. Regarding the internal environment, unlike L1 learners, L2 learners have already acquired their native language before learning L2, indicating that they have already had the knowledge of another language. Concerning the differences of external environments, Shen (1989) goes further to point out that many L2 learners learn their second language from formal classroom instruction, while other L2 learners might pick up the language in different environments such as from their peers. Therefore, the differences of settings might bring different influence to the process of the L2 language acquisition (Shen, 1989).

Miracle's (1989) word-level acoustic analysis rejected the tonal acquisition order for American learners established in Shen's study. Miracle found that the students' tonal errors were evenly distributed among the four tones. The research revealed that although there is no significant difference, tone 2 might be particularly challenging for American learners.

Moreover, contrary to Shen's (1989) study, Lee et al (in press), Wang (1995), and Yue's (1986) studies displayed a different acquisition order for American learners. Yue's (1986) study found that the tonal acquisition order for L1 and L2 is similar: tone 1 is the easiest to acquire, followed by tone 4, tone 2 and tone 3 (referred to by Shen, 1989). Another word-level study on American learners' tonal acquisition order conducted by Wang (1995) supported Yue's findings on the hierarchy of difficulty. This study found that tones 2 and 3 are significantly more difficult for American learners to learn than

tones 1 and 4. Lee, Tao & Bond's (in press) tone perception study also displayed similar results.

From previous studies we can see that there is no agreement on the acquisition order. According to Peng & Hu (2006), the disagreement on the hierarchy of difficulty of the four tones might be mainly due to the differences of data types on which analyses were based. The method of data collection in Shen's study was to ask students to read a familiar text. The data collection at the sentence-level indicated that the investigated tones were not isolated tones but were merged in a phonological context, which inevitably affects the investigated tones. Whereas the data of other studies (Yue, 1986, referred to by Shen, 1989; Wang, 1995) were gathered from isolated words or phrases and, therefore, the surrounding phonological context had no effect on the participants' tone production.

Although previous studies did not arrive at an agreement on American learners' tonal acquisition order, studies agree American learners do have difficulties in learning Chinese tones. The interesting question is what, then, causes the difficulties? Previous studies claim that American students' difficulties in learning Chinese tones are caused by the physical differences of the two languages. For instance, G. T. Chen (1974) conducted an acoustic study that compared the pitch range between native Chinese speakers and native English speakers. He tested both word-level and sentence-level pitch, and found the average pitch range of Chinese speakers in their native language was 1.5 times wider than that of native English speakers speaking English. G. T. Chen (1974) thus, suggested that native speakers of non-tonal languages should learn to widen their normal pitch range in order to successfully produce Chinese tones. White (1981) provided another answer to the question of why learning Chinese tones is a challenging task for American learners. White (1981) found that American learners' tonal errors are not caused by randomly replacing one tone with another; rather, they are systematic errors that probably stem from speakers' transfer of English intonation patterns into Chinese sentences. To explain the observed tonal errors from a linguistic perspective, White (1981) compared the system of Chinese tones to that of English intonations. White found two major differences between Chinese tones and English intonations. First is the significantly wider pitch range of Chinese. The second difference is that mechanisms of stress in the two languages are different. He thus concluded that the systems of Chinese tones and English intonations include phonetic, phonological, and syntactic levels, while the system of English intonations also includes a pragmatic level. A tonal error analysis by Q. Chen (1997) also confirmed White's (1981) account of what causes American learners' tonal errors. Q. Chen's research clearly showed the interference of English intonation in both the elicited-speech test and the tonal perception task. The cause of the difficulty was not only learners' narrower pitch ranges, but also the negative transfer of English intonation. Studies by Chao (1980, referred to by Shen 1989) and Zhao (1989, cited in Shen, 1989) indicated that American learners' tonal misproduction stems from pitch register instead of pitch contour. It needs to be pointed out that even though Shen's study displayed a

different acquisition order from the other studies, her auditory and acoustic analysis of eight American learners, was consistent with the claims by Chao (1980) and Zhao (1989) that American learners' tonal misproduction was attributed to L1 interference. In addition, Gui's (2000) study, which focused on the interference of English intonation in Chinese tone production, analyzed common tonal errors of American learners. The study further proved that the main cause to those errors laid on the interference of English intonations in Chinese tones.

To those possible explanations, Wang, Jongman & Sereno's (2001) contrastive study in the perceptive domain provided more evidence about the reason why American learners have difficulties in acquiring Chinese tones. This study claimed that Chinese tones are predominantly processed in the left cerebral hemisphere by native Chinese speakers, suggesting that tones are processed as linguistic units, just like segmental properties. This study also revealed that, unlike native speakers of Chinese, American learners with no previous exposure to any tonal languages processed Chinese tones bilaterally. The causes of the difficulties encountered by American learners have been explored previously by the studies. However, many of those studies discussed have been done only at the word level. I believe that a more relevant way of detecting tone production improvements is beyond the lexical level. Moreover, according to White (1981), American learners' tonal errors mainly occur in sentences or in combinations of words, not in isolated syllables.

This study attempts to analyze students' tonal production at the sentence level so the effects phonetic context might have on tone production can be discovered. Moreover, no previous study has measured American learners' tonal production improvements. As a longitudinal study, this research aims at examining American learners' development of tonal production over two academic quarters. Thus, the developmental process of students' tone production will be tracked in order for an instructor to employ specific techniques. All of the previous studies in this area were conducted using purposefully elicited data or data from perception tasks. However, the data for this study is based on near-natural speech, which will help give us a better picture of American learners' acquisition of Chinese tones. At the time, the participants were unaware that their oral presentations would be used for a research project; therefore their tone production was not effected by additional stress.

3. Research questions

This study is based on the following research questions:

1) Are the four tones learned equally well? Which tones are produced with less accuracy, which tones are produced with more accuracy? 2) Are there any general improvements of the four tones in near-natural language use? 3) Do the participants try to avoid producing certain tones, such as tone 3?

4. Hypotheses

To answer these questions, based on the previous studies and my own language instruction experience, I have formulated three hypotheses that I will be testing throughout my research.

1) The four tones are not learned equally well. Tones 2 and 3 are produced with less accuracy than tones 1 and 4. 2) General improvements of the four tones can be detected in near-natural language use. 3) Students will not avoid producing certain tones.

5. Methodologies

5.1 Participants

The participants consisted of 16 native speakers of American English who studied first-year Chinese in the 2006-2007 academic year at Ohio University (OU). The reason I chose the 16 participants out of the 56 first year students is that these students are taking Chinese courses right now at OU, which makes it is easy for me to ask them to sign the consent form. They had four contact hours each week with their instructors during the 2006-2007 academic year. The 16 participants from different majors studied Chinese in three different classes. All three teachers co-taught the first quarter but not the third quarter. None of the students had any previous experience in learning Chinese before taking the first-year class.

5.2 Instruments

The data are the existing video taped oral presentations as part of the final exams of the three first-year classes in two academic quarters: the fall quarter and the spring quarter. Students gave the three-minute presentations in pairs. Not all of the 16 participants were paired with one another. There are two parts of each pair of presenters' oral presentation. One part is a prepared conversation between the two speakers. The other is a spontaneous question-and-answer part, when the audience (the whole class except for the presenters and the teacher) were requested to ask questions according to each conversation; the presenters were supposed to answer the questions raised by the audience. Each student was requested to ask at least three questions throughout all of the presentations. Certain grammar patterns and vocabulary the students had learned were assigned to be used in the prepared presentation. All the 16 participants took the two final oral presentations.

5.3 Procedure

The video taped oral speeches were converted into DVD for the convenience of listening and watching before the transcription was conducted. I transcribed each participant's oral presentations. With the transcriptions ready, I started to work on the rating of the accuracy of tones. One more native speaker of Chinese was invited to evaluate the oral presentations in order to confirm my evaluations. This second rater is a Chinese scientist who has never been exposed to nonnative speakers of Chinese. The reason I

asked one more native speaker rather than a veteran teacher is to avoid possible bias from Chinese instructors who are more or less familiar with American students' tone production. My second rater and I worked independently. The criteria for evaluation were established according to the 1 to 5 numerical scales for the normal pitch range of a native Chinese speaker. I trained my second rater to use the 1 to 5 numeral scale-criteria before he started to work on the evaluation to help him determine whether a tone is indeterminate or unacceptable. Therefore, his judgment was based on the 1 to 5 numeral scale-criteria as well as a native Chinese speaker's intuition. The second rater was allowed to listen to each utterance as often as he wanted. My judgment was based on the 1 to 5 numeral scale-criteria, on the linguistic training I have received, and on my past language teaching experience. I counted the total number of each of the four tones produced by each participant. For example, a participant produced tone 1 ten times, and produced tone 3 nine times. Then my second rater and I evaluated each participant's tone production for each tone according to the three categories: unaccepted tones, indeterminate tones and acceptable tones. For instance, the participant produced the first tone five times acceptably, three times indeterminately and two times unacceptably. Lastly, I calculated the percentage of each category for data analysis. So, the participant produced the first tone acceptably 50 percent of the time, indeterminately 30 percent and unacceptably 20 percent. To answer my research questions, I will only focus on the acceptable tones for data analysis for the time being; the indeterminate tones and unacceptable tones will be taken into consideration in follow-up studies.

5.4 Data Analysis

I carried out statistical analysis to see whether there are any differences between the two raters' evaluations. The agreement between the two raters' evaluations was tested using the General Linear Model Test. The result reflects that there is no significant difference between the two sets of evaluations in the categories of acceptable tones ($p > .1$) and that of unacceptable tones ($p > .1$), confirming that the instructor's judgment was based on the standard perception of native speakers. Therefore, the data discussion of this study is based on my own evaluation.

6. Results And Discussion

In the following discussion, *Test One* will be used to stand for the participants' oral speeches in the fall quarter, while *Test Two* stands for their oral speeches in the spring quarter.

Figures 1, 2 and 3 show the raw scores of Test One and Test Two. In these figures, *AC* stands for the number of acceptable tones, *TN* is used for the total number of the participant's tone production for each tone, *AC (%)* refers to the percentage of acceptable tones, and the *average* stands for the 16 participants' average percentage of acceptable tones.

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Subjects	Tone 1			Tone 2			Tone 3			Tone 4		
	AC	TN	AC(%)	AC	TN	AC(%)	AC	TN	AC(%)	AC	TN	AC(%)
1	2	7	28.571	4	12	33.333	2	13	15.385	4	7	57.143
2	10	11	90.909	6	7	85.714	13	23	17.391	9	14	64.286
3	8	12	66.667	3	4	75	4	8	50	11	11	100
4	7	11	63.636	1	7	14.286	7	17	41.176	15	24	62.5
5	6	9	66.667	5	8	62.5	10	18	55.556	7	14	50
6	6	7	85.714	10	13	76.923	13	21	61.905	8	13	61.538
7	4	6	66.667	12	16	75	16	19	84.211	5	6	83.333
8	8	10	80	1	8	12.5	9	21	42.857	8	16	50
9	5	5	100	3	13	23.077	6	25	24	10	15	66.667
10	7	10	70	3	3	100	8	21	38.095	5	8	62.5
11	10	12	83.333	9	14	64.286	12	17	70.588	12	15	80
12	13	15	86.667	4	4	100	8	20	40	13	26	50
13	6	7	85.714	8	20	40	15	26	57.692	13	19	68.421
14	12	16	75	4	8	50	10	21	47.619	9	17	52.941
15	12	17	70.588	4	8	50	9	16	56.25	8	15	53.333
16	16	19	84.211	2	4	50	9	14	64.286	5	9	55.556
average		174	75.272		149	57.039		300	47.938		229	63.639

Figure 1: Test One

Subjects	Tone 1			Tone 2			Tone 3			Tone 4		
	AC	TN	AC(%)	AC	TN	AC(%)	AC	TN	AC(%)	AC	TN	AC(%)
1	23	35	65.714	8	34	23.529	21	57	36.842	36	58	62.069
2	8	17	47.059	14	18	77.778	31	39	79.487	16	30	53.333
3	4	4	100	8	16	50	16	23	69.565	26	30	86.667
4	2	3	66.667	7	14	50	16	25	64	9	20	45
5	19	32	59.375	17	24	70.833	20	54	37.037	15	40	37.5
6	7	13	53.846	10	21	47.619	23	28	82.143	25	33	75.758
7	11	15	73.333	9	16	56.25	34	53	64.151	15	31	48.387
8	19	29	65.517	9	12	75	15	45	33.333	18	34	52.941
9	9	13	69.231	20	30	66.667	13	24	54.167	11	23	47.826
10	9	13	69.231	13	30	43.333	14	39	35.897	21	25	84
11	7	13	53.846	13	14	92.857	22	32	68.75	9	14	64.286
12	18	25	72	7	12	58.333	29	44	65.909	22	33	66.667
13	13	16	81.25	11	17	64.706	22	32	68.75	19	26	73.077
14	12	19	63.158	14	28	50	31	53	58.491	16	19	84.211
15	3	6	50	11	12	91.667	22	29	75.862	6	14	42.857

GUO AND TAO: AMERICAN LEARNERS' TONE PRODUCTION

16	4	9	44.444	4	12	33.333	11	52	21.154	10	21	47.619
		262			310			629			451	
average			64.667			59.494			57.221			60.762

Figure 2: Test Two

Subjects	Tone 1		Tone 2		Tone 3		Tone 4	
	Test1	Test2	Test1	Test2	Test1	Test2	Test1	Test2
1	7	35	12	34	13	57	7	58
2	11	17	7	18	23	39	14	30
3	12	4	4	16	8	23	11	30
4	11	3	7	14	17	25	24	20
5	9	32	8	24	18	54	14	40
6	7	13	13	21	21	28	13	33
7	6	15	16	16	19	53	6	31
8	10	29	8	12	21	45	16	34
9	5	13	13	30	25	24	15	23
10	10	13	3	30	21	39	8	25
11	12	13	14	14	17	32	15	14
12	15	25	4	12	20	44	26	33
13	7	16	20	17	26	32	19	26
14	16	19	8	28	21	53	17	19
15	17	6	8	12	16	29	15	14
16	19	9	4	12	14	52	9	21

Figure 3: Total Number of the 16 Participants' Tone Production

6.1 Test One

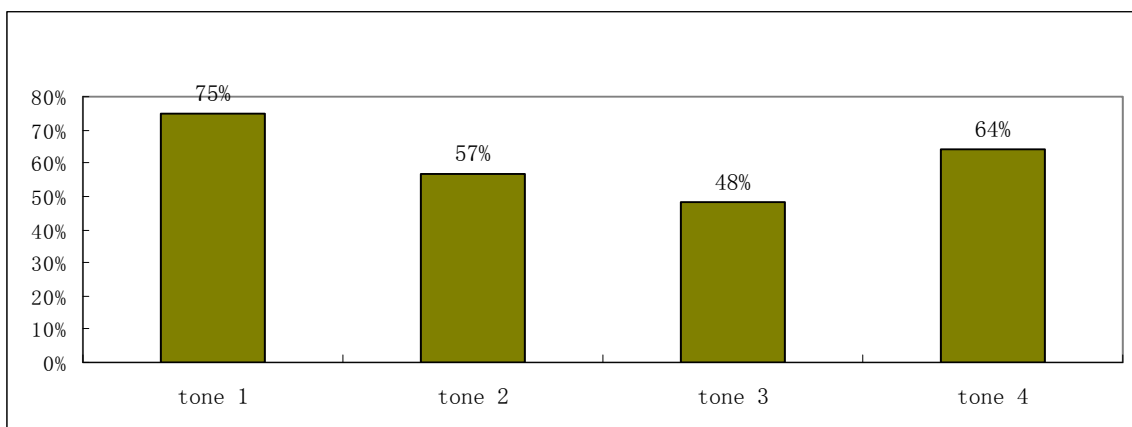


Figure 4: Percentage Distribution of Acceptable Tones in Test One

Figure 4 shows the order of accuracy rate of the four tones: tone1 (75%), tone 4 (64%), tone 2 (57%) and tone 3 (48%). The statistical analysis from Multivariate Tests did not indicate significant differences in the accuracy rates of tone 1 (75%) and tone 2 (57%), and tone 4 (64%) and tone 2, which I did not expect. However, the statistical analysis shows significant differences in the accuracy rates of tones 1 and 3 (48%), and tones 4 and 3, which I did expect. The difference between tones 1 and 3 is 27.33 % ($p < .05$), and the difference between tones 4 and 3 is 15.70 % ($p < .05$). The significant difference between tone 3 and tones 1 and 4 highlights the fact that tones 1 and 4 were produced with the greatest accuracy, while tone 3 was produced with the least accuracy.

6.2 Test Two

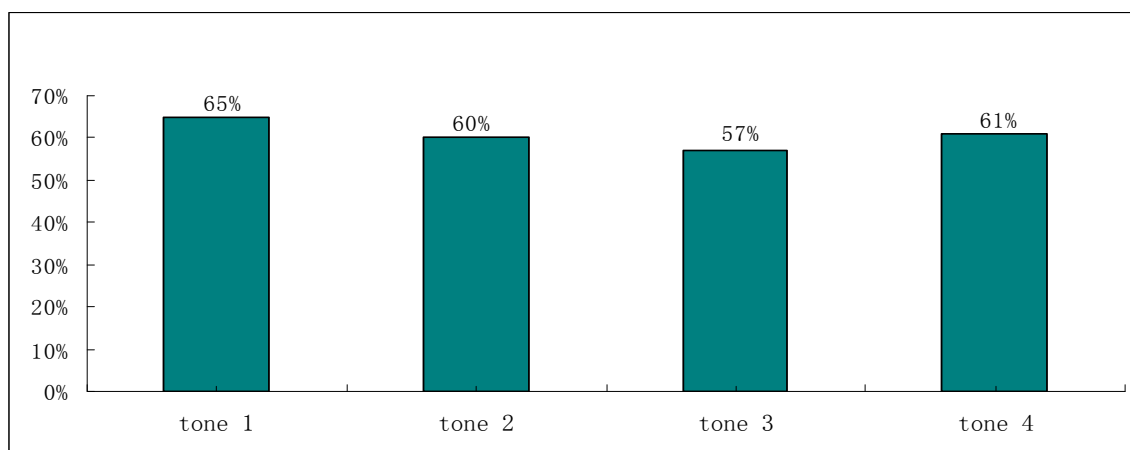


Figure 5: Percentage Distribution of Acceptable Tones in Test Two

Figure 5 also displays an order of the accuracy rate in Test Two: tone 1 (65%), tone 4 (61%), tone 2 (60%) and tone 3 (57%). However, the statistical analysis from the Multivariate Tests did not show any significant differences in the accuracy rate among the four tones. This implies that the differences in the accuracy rate have been minimized. In other words, there is tendency of moving toward uniformity. The next chart (Figure 6) further supports my view.

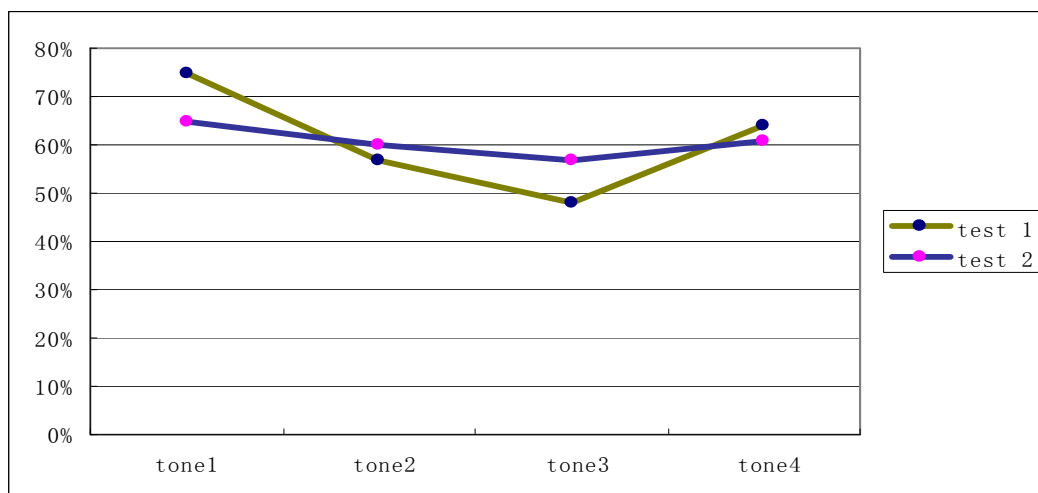


Figure 6: Percentage Distribution of Acceptable Tones

Figure 6 revealed that in Test One, the accuracy rate of the four tones forms a V curve, indicating the significant differences between tone 3 and tones 1 and 4. In other words, tones 1 and 4 were produced with greatest accuracy, while tone 3 was produced with the least accuracy. However, in Test Two, the distribution of the accuracy rate levels, indicating that the development of the four tones has moved toward uniformity. Moreover, it is obvious that the acceptable rating of tones 2 and 3 has increased in Test Two. The results also displayed that 10 (62.5%) out of 16 participants' accuracy rates for tone 3 increased, and 8 (50%) out of 16 participants' accuracy rates in tone 2 increased (see figures 1 & 2). Given that students themselves might pay more attention to the two difficult tones, this result is not at all surprising. In addition, the fact is likely a result of the teachers' emphasis. I also interviewed the instructors to see whether they made extra efforts to alert students about tones 2 and 3 in the spring quarter. I was told they did in both the winter and the spring quarters. On the other hand, this might indicate that students can produce tones in shorter sentences correctly. However, they often have problems producing correct tones in longer sentences. For instance, participants 2 and 16's percentage of acceptable tones in tone 1 are both above 80 % in Test One (see figure 1), while in Test Two those decreased to below 50% (see figure 2). Regarding tone 4, participant 3's percentage of acceptable tones is 100% in Test One (see figure 1), while it declined to 86% in Test Two (see figure 2). This trend can also be seen in participant 7's tone production. The percentage of her acceptable tones in tone 4 is 83% in Test One (see figure 1), while it decreased to 48% (see figure 2) in Test Two. The decline can serve as a reminder for both students and teachers that students, especially at the early stages of their study, need to pay more attention to each of the four tones, even though they might think tone 1 and tone 4 are easier. On the other hand, although the accuracy rates of tones 1 and 4 appear to decrease, the ratings are higher still than those of tones 2 and 3.

Therefore, the reason for the decrease might be that the students thought tones 1 and 4 were easier compared to tones 2 and 3. They might have thought they knew how to produce them after the first quarter's study, they, thus, did not have to study more on them later on. Or it might be because the teachers emphasized the study of tones 2 and 3 rather than tones 1 and 4.

6.3 Improvements: Test One and Test Two

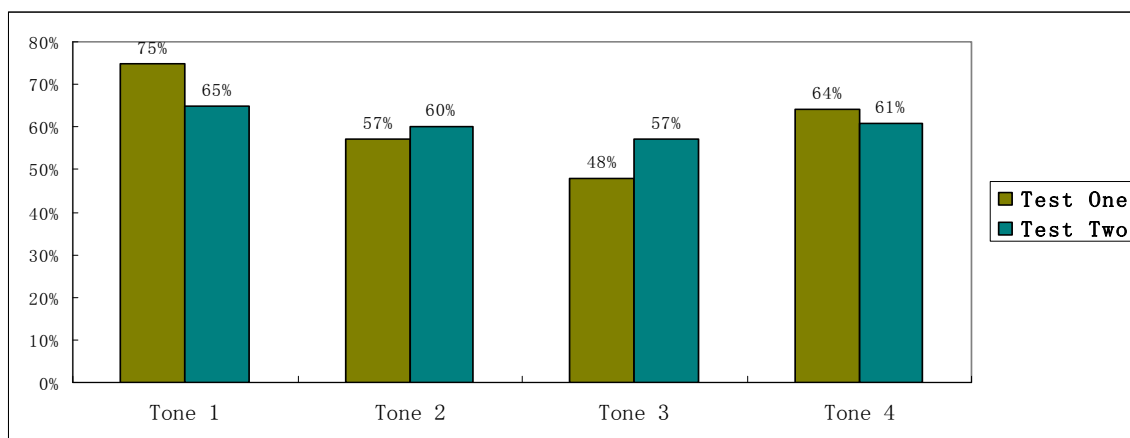


Figure 7: Percentage Distribution of Acceptable Tones

Figure 7 shows that the orders of accuracy rate in these two tests are the same: tone 1, tone 4, tone 2 and tone 3. However, as discussed above, there are no significant differences in the accuracy rates among the four tones in Test Two. Even though there is a trend of improvement of tones 2 and 3, the results from statistical analysis did not show any significant improvement. Instead of improvements, there are decreases of accuracy rates in tones 1 and 4.

Even though I did expect improvements, unfortunately, the statistical analysis from the Independent T-test did not show any significant improvements between the two tests. However, I believe there is overall improvement beyond the accuracy rate of the tones because there are a few other factors that influence students' tone production. First of all, the mean lengths of utterance (MLU, hereafter) were greater in Test Two than in Test One (see Figure 8).

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Subjects	Test One		Test Two	
	number of utterances	number of syllables	number of utterances	number of syllables
1	12	39	17	124
2	16	55	23	104
3	9	35	15	73
4	15	59	16	62
5	11	49	26	150
6	14	54	20	95
7	13	47	17	115
8	18	55	19	120
9	17	58	16	90
10	13	42	23	119
11	15	58	14	73
12	16	65	19	114
13	16	72	15	91
14	13	62	15	119
15	15	56	20	61
16	13	46	18	94
total number	226	852	293	1664

Figure 8: Numbers of Syllables and Utterances

I tabulated the 16 participants' tone productions in order to calculate the MLU in each test. The results showed that the MLU is 3.8 in Test One and 5.7 in Test Two. Moreover, there is no significant increase in the number of utterances overall. The total numbers of the 16 participants' utterances in Test One is 226 and 293 in Test Two while there is a significant increase in the number of syllables. The total number of the 16 participants' syllables in Test One is 852; however the total number of their syllables in Test Two is 1664 (see figures 3 & 8).

The second factor that needs to be noticed is that a speed-accuracy trade-off may have influenced the students' speech. Although the accuracy rates of tones 1 and 4 declined, both the speed of their speech and the number of their syllables increased, and the sentence structures got more complicated. I calculated the 16 participants' total syllables for each tone in the two tests. Figure 9 shows the distribution of the 16 participants' syllables of each tone of the two tests.

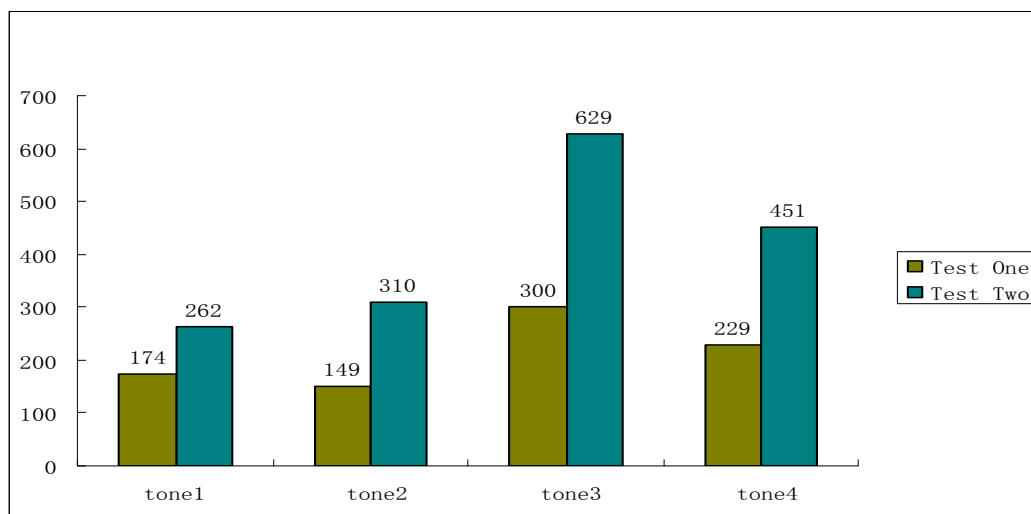


Figure 9: 16 Participants' Total Number of Syllables

Figure 9 convincingly highlights the fact that the total number of syllables for all the four tones significantly increased in Test Two. Moreover, in Test Two, the complexity and prosody of the sentences greatly increased. Therefore, the reduced accuracy of tones 1 and 4 in Test Two may have reflected tone production in conversations at the sentence level; whereas in Test One many tones may have been produced at the lexical level.

In addition, in Test Two, students produced longer sentences at a faster pace. For example, in Test One, participant 2 produced a six-syllable utterance for about 3.5 seconds indicating she used 0.58 second to produce one syllable; while in Test Two, she produced a seven-syllable utterance for about 2.7 seconds meaning she produced one syllable in 0.39 second (see figures 10 & 11).

Figures 10 and 11 also displayed that in Test One, the student divided the six-syllable sentence into 3 units. In addition, it is easily seen that the participant paused longer between each syllable and each unit in Test One; however, she did not divide the seven-syllable sentence into units in Test Two, and she did not pause between each syllable either. As discussed above, in Test One, students might unconsciously produce tones at the lexical level rather than the sentence level to make the utterance easier to produce. However, they were more confident in producing tones in Test Two, so they pronounced them more naturally in terms of rhythm.

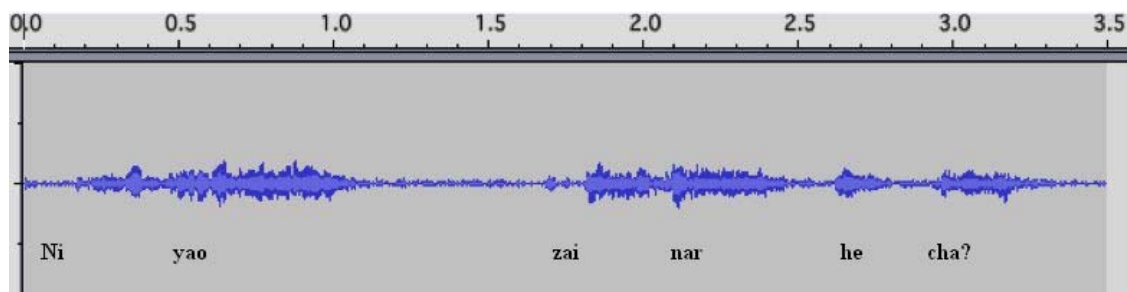


Figure 10: Participant 2's Six-syllable Sentence in Test One

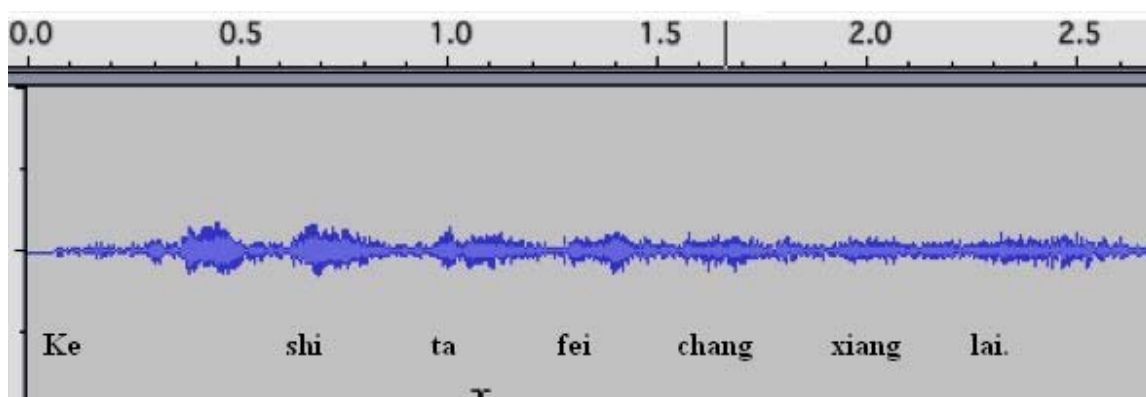


Figure 11: Participant 2's Seven-syllable Sentence in Test Two

I interviewed some of the participants. They said that they paid more attention to syntactical structures and semantic meanings than to tones because they preferred to express themselves meaningfully than to pronounce accurately. Therefore, this may not indicate a decrease or decline in the quality or ability of speech; rather it is a normal phenomenon or stage at this level of tone production.

6.4 Tone 3

The production of tone 3 is significantly more frequent than that of tone 1, tone 2 and tone 4 in both of the two tests (See figures 3 & 9). Moreover, there is a significant increase in the number of the participants' productions of tone 3, from 300 in Test One to 629 in Test Two. Furthermore, I calculated the number of the 16 participants who produced tone 3 more than the other tones. The results shows that 11 out of 16 (68.8%) participants produced tone 3 the most in Test One, 12 out of 16 (75%) participants produced tone 3 the most for Test Two; figure 9 displays that the frequency of usage of tone 3 ranks second in Test One, and first in Test Two. The results convincingly highlight the fact that no correlation exists between the frequency of usage of a particular tone and its degree of difficulty. Obviously, the participants did not try to use avoidance as a

strategy, to be specific, to avoid pronouncing tone 3 because it is the most problematic one.

To sum up, my first hypothesis was partially confirmed. That is, tones 1 and 4 are produced with the greatest accuracy. However, in Test two no significant improvements were found, which means my second hypothesis was rejected. My third hypothesis was confirmed, indicating the participants produced tone 3 most frequently. It might be interesting to investigate the frequency of the four tones' production in my follow up studies.

7. Conclusion

By collecting data from oral presentations, this study analyzed American learners' tonal production at the sentence level in order to investigate learners' tonal progress over the two non-consecutive academic quarters.

This analysis and investigation identifies student problem areas regarding tonal production. The results of this study may provide insights into the difference of the four Chinese tones, and how American students learn the four tones so that Chinese teachers can better understand students' specific difficulties in order to help them improve tonal production. That is important because early monitoring and practicing of tones from instructors is a crucial, beneficial aspect of tone production by American students. In addition, the study attempts to remind Chinese instructors that their primary task is not merely to teach learners how to produce these tones in isolation. A teacher's fundamental task is to know the learners' tonal performance at the sentence level and to help them consciously overcome L1 interference.

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Processing Linguistic and Musical Pitch by English-Speaking Musicians and Non-Musicians

Tsun-Hui Hung* and Chao-Yang Lee
Ohio University

**Now at the Ohio State University*

The perception of music and speech both involve processing complex acoustic stimuli. It remains unclear, however, whether the same or distinct mechanisms are implicated in music and speech perception. Previous research suggested that musical training may facilitate linguistic pitch perception. (Alexander, Wong, and Bradlow, 2005) Deutsch et al (2006) reported higher proportion of absolute pitch possessors in tone language (Mandarin) speakers. This study explored the relationship between musical and linguistic pitch processing in four experiments. Two groups of participants were involved, musicians and non-musicians, all participants are native American English-speakers. The results show that despite limited exposure to the Mandarin tones, the musicians identified the intact Mandarin tones at 68% correct, outperforming non-musicians with 44% correct. The results also show that despite limited amount of pitch information in the stimuli, tone identification accuracy reached 54% for musicians and 36% for non-musicians in the silent-center condition; and 31% correct for musicians and 28% correct for non-musicians in the onset-only condition. While these results appear to suggest that musical training might facilitate linguistic pitch processing, no significant correlation was found in the identification accuracy between musical tones and Mandarin tones, weakening the argument that musical and linguistic pitch processing are closely associated.

0. Introduction

Pitch processing is involved in both spoken language comprehension and music perception. Given the functional role of pitch in linguistic and music contrasts, a legitimate question is whether the same processing mechanism is implicated in both linguistic and music pitch processing.

This study explored linguistic and musical pitch processing by examining Mandarin tone identification by 36 English-speaking musicians and 36 non-musicians, and musical note identification by the musicians.

We investigated how native English speakers with or without a musical background dealt with identifying acoustically modified Mandarin tones produced by multiple speakers. Since pitch processing is involved in both lexical tones and music, identification of lexical tones and musical notes both involve mapping pitch information

onto discrete linguistic or musical categories. If common processing mechanisms are involved, performance in musical and linguistic pitch processing should be correlated.

Our goal was to evaluate the nature of non-native lexical tone processing by incorporating common challenges to speech perception and to assess the tone of absolute pitch in the musicians' advantage in lexical tone processing commonly reported in the literature (Gottfried & Riester, 2000; Gottfried, Staby, & Ziemer, 2001; Alexander, Wong, & Bradlow, 2005; Wong, Skoe, Russo, Dees, & Kraus, 2007)

The present study aimed to explore the relationship between linguistic and musical pitch processing by addressing the following questions: (1) What is the role of musical background in the perceptual processing of intact and incomplete Mandarin tones? If musical pitch processing abilities could facilitate linguistic pitch processing, musicians would be expected to perform better than non-musicians in the Mandarin tone task. (2) What is the nature of the musicians' advantage in identifying Mandarin tones, if there is indeed an advantage?

1. Experiment 1: Mandarin tone identification

1.1 Materials

The Mandarin syllable *sa*, produced with all four tones by 16 female and 16 male native speakers, was selected to generate the stimuli for this experiment. The modified syllables included "silent-center" and "onset only" syllables, where the majority of the voiced portion of a syllable was attenuated to silence and devoid of F0 information. The silent-center syllables were generated by removing all but the first and final 15% of the voiced portion. The onset-only syllables were generated by removing all but the first 15% of the voiced portion. The fricative [s] was preserved in all intact and modified syllables.

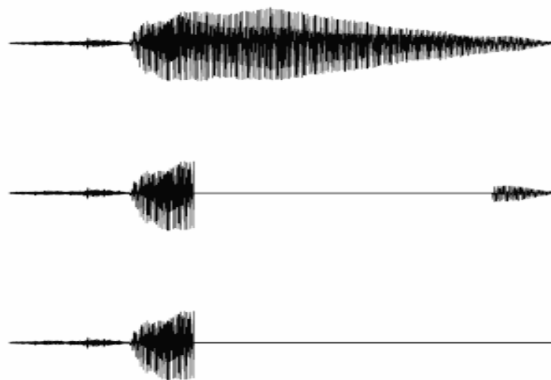


FIGURE 1

An example of the acoustic modifications: intact, silent-center, and onset-only syllables

1.2. Procedure

The participants were directed to four keys on the keyboard labeled with “→”, “↘”, “↗”, and “↙”, representing the high-level (Tone 1), high-falling (Tone 4), low-rising (Tone 2), and low-dipping (Tone 3) tones, respectively. They were asked to respond after each syllable by pressing one of four labeled keys.

1.3. Data analysis

Response accuracy and reaction time were automatically recorded. Reaction time was measured from stimulus offset to avoid the potential confound of intrinsic duration differences among the four tones. Only correct responses were included in the reaction time analysis. For each syllable type, response data were evaluated to examine the effects of tone and musical background.

1.4. Results

Musicians without prior Mandarin experience were able to identify Mandarin tones with 68% accuracy for intact syllables and 54% accuracy for silent-center syllables. The musicians were more accurate than the non-musicians in tone identification from all three types of syllables. For reaction time, the accuracy difference between the musicians and the non-musicians became less as the amount of acoustic input was reduced.

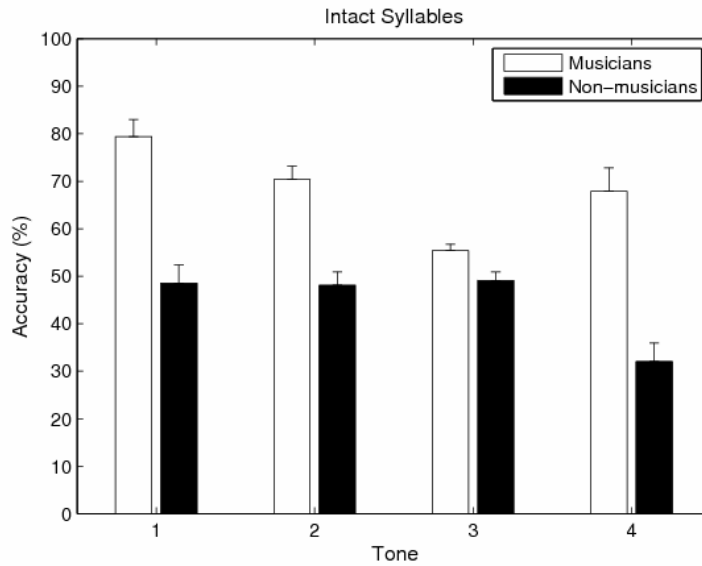


FIGURE 2
The accuracy of tone identification for intact syllables as a function of musical background and tone.

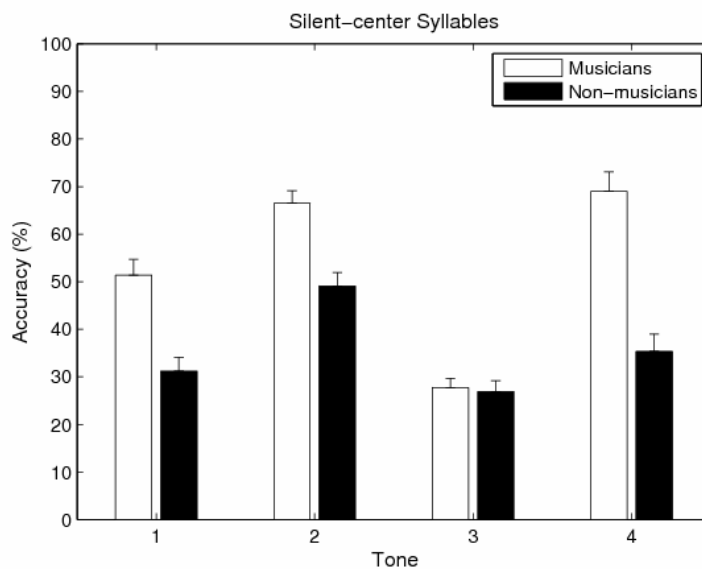


FIGURE 3
The accuracy of tone identification for silent-center syllable as a function of musical background and tone.

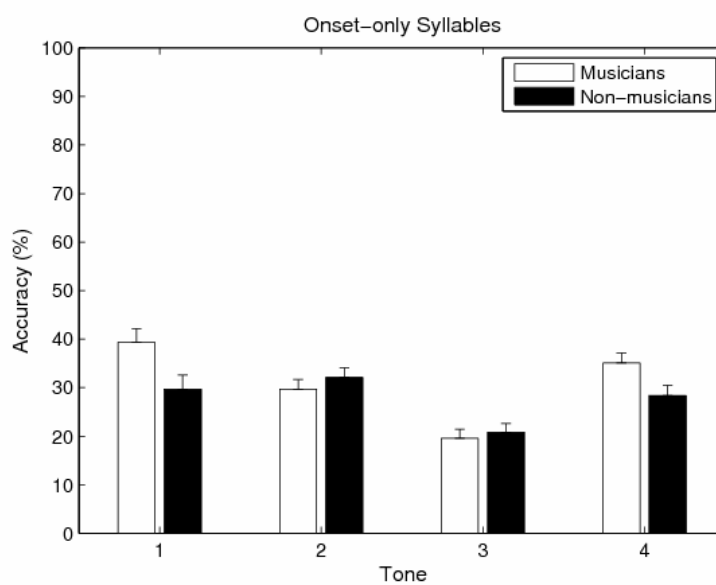


FIGURE 4
The accuracy of tone identification for onset-only syllables as a function of musical background and tone.

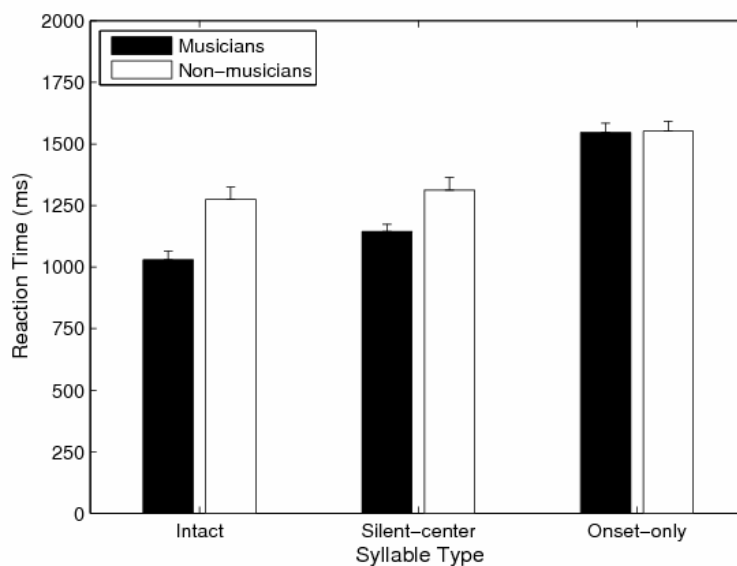


FIGURE 5

The reaction time of tone identification as a function of musical background and tone.

2. Experiment 2: Music note identification by musicians

2.1. Materials

In this experiment, the 36 musicians who participated in the Mandarin tone experiment were asked to listen to synthesized musical tones of three timbres (piano, pure tone, and viola) and to identify the notes in the absence of a reference pitch. Thirty-six notes that spanned a three-octave range from C3 (131 Hz) to B5 (988 Hz). The 36 notes were ordered such that any two consecutive notes were separated by more than an octave and were 500 ms long. Their task was to notate the notes that they had heard on the staff paper immediately after each note was played, and to apply accidental signatures if applicable.

2.2. Results

The ANOVA revealed no significant timbre effect. The values of the correlation between these two sets of variables were generally low, ranging from $-.014$ to $.329$.

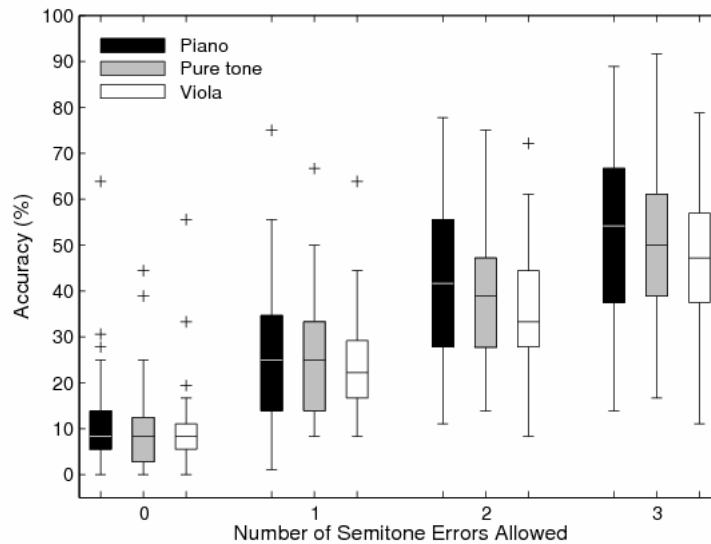


FIGURE 6

The accuracy of musical note identification arranged by timber and the number of semitone errors allowed.

3. Discussion

The Mandarin tone experiment showed that the musicians were able to identify multi-speaker intact and silent-center Mandarin tones with accuracy exceeding chance.

Furthermore, the acoustic modifications revealed tone specific effects of reduction; namely, Tone 2 and Tone 4 were minimally compromised even when the majority of the syllable center was absent. It has been shown that silent-center Mandarin tones could be identified quite accurately by native and non-native listeners despite missing substantial F0 information, indicating that listeners are capable of reconstructing lexical tones based on limited acoustic input (Gottfried & Suiter, 1997; Lee, Tao, & Bond, 2006, 2008).

In the musical pitch task given to the musicians, accuracy of musical note identification was generally low even when errors up to three semitones were allowed. The correlation between the Mandarin tone and musical note identification performance was weak.

By simulating common challenges to speech perception with degraded stimuli and speaker variability, the present study showed that the benefit of musical experience varied depending on the amount of acoustic input. Specifically, even though the musicians were faster and more accurate in identifying intact Mandarin tones, the reaction time advantage disappeared for silent-center syllables. The advantage of musical training in learning to identify non-native lexical tones depends on the amount of acoustic input. It would be of interest to investigate if other types of degraded signal (e.g., noise) would exert a similar effect. Future work could further explore the basis of the advantage.

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Talker and Contextual Effects On Identifying Fragmented Mandarin Tones

Chao-Yang Lee, Liang Tao and Z. S. Bond
Ohio University

This study investigated identification of fragmented Mandarin tones produced by single versus multiple speakers. Six minimal pairs, including all six Mandarin tonal contrasts, were digitally processed to generate intact, silent-center, center-only, and onset-only syllables. The syllables were produced either in isolation or with a carrier phrase *qing3 shuo3* __ (“Please say __”). The stimuli were presented in four blocks: (1) single speaker, isolated syllables; (2) single speaker, syllables with the carrier; (3) multiple speakers, isolated syllables; and (4) multiple speakers, syllables with the carrier. Forty native listeners and 55 non-native listeners were put under time pressure to identify the tones of the syllables and both response accuracy and reaction time were measured. Overall, the results showed higher accuracy for the single-speaker stimuli and when the syllables were presented with the carrier. For the native listeners, context facilitated identification of multiple-speaker stimuli more than single-speaker stimuli. For the non-native listeners, in contrast, context did not interact with the speaker effect. Identification of Tone 4 was consistently most accurate and least compromised by acoustic modification among the four tones. The results indicate different processing strategies for native and non-native listeners when dealing with incomplete acoustic input.

1. Introduction

Impoverished acoustic signal and inter-speaker variability are common challenges to speech perception. The acoustic signal to be deciphered by a listener is rarely clear and intact. The physical characteristics of a spoken message can also differ greatly among speakers despite identical linguistic content. Yet human listeners are known to be able to overcome these obstacles and uncover the linguistic representation intended by the speakers. Research on speech perception has identified many sources of information available in the acoustic signal and the phonetic knowledge involved in the decoding process (Pisoni & Remez, 2005). Cross-linguistic studies have further revealed similarities and differences between native and non-native perception of phonological contrasts (Sebastián-Gallés, 2005). Together they suggest a highly efficient speech perception system conditioned by the nature of the listener’s linguistic background.

The purpose of this study was to examine how native and non-native listeners identify Mandarin tones from incomplete acoustic input and how the two groups of listeners deal with speaker variability. To these ends, we adopted the “silent-center” paradigm (Strange, Jenkins, & Johnson, 1983), where various parts of a syllable were digitally silenced, leaving only partial input available. Identification of tones from these fragmented syllables was compared between syllables produced by a single speaker and those produced by multiple speakers. Comparisons were also made between tones produced in isolation and those produced with a carrier phrase to evaluate the contribution of phonetic context. Finally, participants were put under time pressure to make tone judgments. Reaction time was measured in addition to the traditional accuracy measure to explore the online nature of lexical tone processing.

The silent-center paradigm has provided important evidence for how vowels and lexical tones are identified from incomplete acoustic signal. In particular, studies on English vowels have shown that listeners are capable of using dynamic spectral information from consonant-vowel and vowel-consonant transitions to identify vowels despite missing steady-state formant information (e.g., Strange, Jenkins, & Johnson, 1983). Analogously, listeners of Mandarin Chinese have been shown to be able to identify silent-center tones as accurately as intact and center-only tones (Gottfried & Suiter, 1997), indicating the perceptual system’s ability to integrate information from syllable onset and offset for tone identification. Using a speeded-response version of the task, Lee, Tao, and Bond (2008) showed that silent-center tones were not identified as accurately as intact and center-only tones under time pressure. The reaction time analyses further revealed that center-only tones were not identified as quickly as intact tones despite comparable accuracy. Despite the processing cost incurred under time pressure, identification of these fragmented tones remained highly accurate. In sum, these studies showed that the center of the syllable, which was traditionally regarded as providing the critical information, is not necessary for reliable identification of vowels or tones.

Furthermore, silent-center studies on lexical tones have also revealed processing differences between native and non-native listeners in the use of context for tone identification. Gottfried and Suiter (1997) found that the addition of a syllable following the test tone significantly facilitated tone identification accuracy for native but not non-native listeners. Lee, Tao, and Bond (submitted) showed that non-native listeners were not compromised as native listeners were (Lee et al., 2008) by test tones that had been edited out from a precursor carrier phrase and “cross-spliced” with a different carrier phrase. Earlier studies focusing on the perceptual impact of tonal coarticulation had also shown that native listeners were sensitive to contextual tonal variation (Xu, 1994). Taken together, these findings suggest that native tone identification is characterized by efficient use of tonal context, while non-native listeners focus on syllable-intrinsic information and make relatively little use of contextual tonal information for tone identification. Specifically, since non-native listeners did not pay much attention to context, adding a

context did not help (Gottfried & Suiter, 1997). Presenting a conflicting context did not hurt their tone identification either (Lee et al., submitted).

Incorporating speaker variability into this line of inquiry allows further evaluation of fragmented tone identification by native vs. non-native listeners in important ways. How listeners deal with speaker variability has been a central issue in phonetic perception research (Johnson, 2005). As noted, speakers differ in vocal tract characteristics, thus the acoustic signal generated by different speakers will inevitably show variability even when the linguistic content is the same. Numerous studies have shown that listeners take into consideration context as a reference frame for phonetic perception (e.g., Ladefoged & Broadbent, 1957). Speaker variability is certainly an issue for lexical tone perception, which relies primarily on the perception of a speaker's f_0 . Since f_0 range varies across speakers, the actual f_0 for a given tone produced by different speakers will most likely show variability as well. Not surprisingly, native listeners take into consideration the information provided by context in tone identification (Leather, 1983; Lin & Wang, 1985; Fox & Qi, 1990; Moore & Jongman, 1997; Wong & Diehl, 2003). These findings indicated that listeners engage in some kind of speaker normalization process for tone perception just as they do for vowel perception.

What is the role of speaker variability in perceiving acoustically incomplete tones? How would context impact identification of tones produced by multiple speakers? Will the processing difference found earlier between native and non-native listeners manifest itself in the same way when speaker variability is introduced? These issues are involved in explicating the perceptual system's ability to compensate for impoverished acoustic signal. These issues are also important in accounting for the nature of native vs. non-native processing of lexical tones hinted in earlier studies (Gottfried & Suiter, 1997; Lee et al., 2008; Lee et al., submitted).

Predictions can be made regarding the potential effects of speaker variability, context, and linguistic experience. First, it is conceivable that speaker variability adds to the processing demand; therefore tone identification from a multiple-speaker stimulus set should be more error-prone and time-consuming than from a single-speaker set. Second, context offers more information about individual speaker characteristics and should facilitate tone identification from a multiple-speaker stimulus set more than a single-speaker set. Finally, speaker variability might pose a greater challenge to non-native listeners; therefore their identification performance would be compromised more than native listeners.

In sum, the objective of this study was to answer the following questions: Do listeners identify tones produced by multiple speakers at the same level as tones produced by one speaker? To what extent does linguistic context affect the identification of the tones? Do native and non-native listeners use different strategies when dealing with Mandarin multiple-speaker tones with and without context? How do native and non-native listeners respond to tone fragments representing different sources of information? What are the acoustic bases for tone judgments? Below we report a perception

experiment where native and non-native listeners attempted tone identification from syllables that were digitally processed to generate four types of stimuli varying in the amount of acoustic information. Results from acoustic analyses were then presented to discuss the acoustic bases for the tone identification performance.

2. Perception Experiment

2.1 Method

2.1.1 Materials

Six minimal tone pairs were selected including all six tonal contrasts in Mandarin: 1-2 (*xing* 星行), 1-3 (*xi* 西洗), 1-4 (*si* 司四), 2-3 (*hai* 还海), 2-4 (*shi* 十是), and 3-4 (*da* 打大). All of these are high-frequency, common words known by all participants. All participants were also familiar with the convention of designating Mandarin tones by the numbers 1, 2, 3, and 4.

Ideally, minimal tone pairs should be selected from the same set of syllables to control for segmental structure, considering the potential effects of syllabic structure on tone (Shih, 1987). However, since the same set of stimuli would be presented to non-native listeners, our primary concern was that the selected words should have been learned and known by the non-native learners as well. This decision was also motivated by many findings that lexical status and word frequency/familiarity can impact phonetic perception (Ganong, 1980; McQueen, 1991; Connine, Clifton, & Cutler, 1987), including tone identification (e.g., Fox & Unkefer, 1985). Nonetheless, efforts were made to select words with simple syllabic structure. In the end, all selected words were consonant-vowel or consonant-vowel-nasal syllables.

To examine the effect of context, the 12 syllables were read in isolation and with a carrier phrase *Qing3 shuo1* __ (“Please say __”). To examine the effect of speaker, the syllables were recorded by five native speakers of Mandarin. One female speaker (from Shandong) was used for the single-speaker conditions; two additional female speakers (one from Beijing and one from Changchun) and two male speakers (both from Beijing) were used for the multiple-speaker conditions.

The recording was made in a sound-treated booth in the School of Hearing, Speech and Language Sciences at Ohio University with a high-quality microphone (Audio-technica AT825 field recording microphone) connected through a preamplifier and A/D converter (USBPre microphone interface) to a Windows personal computer (Dell). The recording was sampled using the Brown Lab Interactive Speech System (BLISS, Mertus, 2000) at 20 kHz with 14-bit quantization.

Each test syllable was digitally modified with BLISS to generate four types of syllables: intact, center-only, silent-center, and onset-only. In particular, the first six and final eight pitch periods of the intact syllables were digitally edited to generate the modified syllables. The center-only syllables were constructed by removing the first six and final eight pitch periods of a syllable. The silent-center syllables were generated by preserving only the first six and final eight pitch periods. The onset-only syllables were

produced by preserving only the first six pitch periods of the syllables. The removed part or parts were digitally “silenced” such that the overall duration remained the same as that of the intact syllables. There were no perceptible clicks as a result of the signal processing; therefore no further tapering procedure was applied. A total of 480 stimuli (4 tones \times 3 tokens per tone \times 4 modifications \times 2 contexts \times 5 speakers) were used in this experiment.

2.1.2 Participants

The native listeners included 40 native speakers of Mandarin recruited from the Ohio University community with cash compensation. They included 20 females (mean age = 27, $SD = 4.5$) and 20 males (mean age = 26, $SD = 4.7$). All spoke Mandarin on a daily basis and none reported any speech or hearing difficulties. Twenty-five participants reported speaking some dialect of Chinese other than Mandarin, but all identified Mandarin as their native language.

The non-native listeners included 55 Chinese language students at Ohio University. The participants included 33 first-year (14 female & 19 male) students, 16 second-year (five male & 11 female) students, and six third-year (three female & three male) students. At the time of testing, the first-year, second-year, and third-year students had taken approximately three, six, and nine academic quarters of Chinese language classes. Ideally, the number of participants would be evenly distributed across levels of instruction and experience. For this study, we tested all available members of the target population. The non-native participants received partial course credit for participating in this study.

2.1.3 Procedure

The stimuli, saved as individual audio files, were imported to AVRrunner, the subject-testing program in BLISS, for stimulus presentation. The 480 items were divided into four blocks: single-speaker, presented in isolation (48 items); single-speaker, presented with a carrier phrase (48 items); multiple-speaker, presented in isolation (192 items); and multiple-speaker, presented with the carrier phrase (192 items). For each participant, AVRrunner assigned a uniquely randomized presentation order such that no two participants received the same order of presentation. The order of presentation for the blocks was also randomized.

Participants were tested individually in a quiet room in the Department of Linguistics at Ohio University. They listened to the stimuli through a pair of high-quality headphones (Koss R80) connected to a Toshiba laptop computer. The participants were instructed to identify the tone of each syllable by pressing buttons labeled “1”, “2”, “3”, and “4” on the computer keyboard, representing the four Mandarin tones. They were told that some of the syllables have been digitally processed such that parts of the syllable might be missing. They were instructed to make the best guess of the stimulus tones and to respond as quickly as possible.

2.1.4 Data analysis

Response accuracy and reaction time were recorded by BLISS automatically. Reaction time was measured from stimulus offset to avoid the potential confound of intrinsic duration differences among the tones. Only correct responses were included in the reaction time analysis.

For the native listeners, response data from all speaker and context conditions were first combined to evaluate the effects of speaker and context. Responses were then analyzed separately for the four blocks of stimuli to evaluate the effect of acoustic modification and tone under the four speaker (single vs. multiple) and context (isolated vs. contextual) conditions. For each block, repeated measures ANOVAs were conducted on response accuracy and reaction time with acoustic modification (intact, center-only, silent-center, & onset-only) and stimulus tone (1, 2, 3, & 4) as fixed factors and participants as a random factor. When a main effect was significant, the Bonferroni post-hoc test was used for pair-wise means comparisons to keep the family-wise Type I error rate at 5%.

For the non-native listeners, response data from all speaker and context conditions were also combined to evaluate the effects of speaker, context, and year of Chinese instruction. Responses were then analyzed separately for the four blocks of stimuli to evaluate the effect of acoustic modification and tone under the four speaker (single vs. multiple) and context (isolated vs. contextual) conditions. As in the native data analysis, for each block, ANOVAs were conducted on response accuracy and reaction time with acoustic modification (intact, center-only, silent-center, & onset-only) and stimulus tone (1, 2, 3, & 4) as within-subject factors, year of Chinese instruction (first-year, second-year, & third-year) as a between-subject factor, and participants as a random factor. When a main effect was significant, the Bonferroni post-hoc test was used for pair-wise means comparisons to keep the family-wise Type I error rate at 5%.

2.2 Results

2.2.1 Effects of speaker and context

Table 1 shows the average accuracy of tone identification by speaker and context. For the native data, ANOVAs revealed significant main effects of speaker ($F(1, 39) = 59.98, p < .0001$) and context ($F(1, 39) = 119.05, p < .0001$), and a significant speaker-context interaction ($F(1, 39) = 21.32, p < .0001$). Overall, accuracy was higher for the single-speaker stimuli (89%) than for the multiple-speaker stimuli (86%). Accuracy was also higher for tones presented in context (90%) than for tones presented in isolation (85%). The context effect, however, was not uniform across single- and multiple-speakers. In particular, context facilitated tone identification more when listeners heard the multiple-speaker stimuli than when they heard single-speaker stimuli.

For the non-native data, ANOVAs revealed significant main effects of speaker ($F(1, 52) = 18.05, p < .0001$) and context ($F(1, 52) = 15.21, p < .0005$). As in the native data, accuracy was higher for single-speaker stimuli (65%) than for multiple-speaker

stimuli (62%). Accuracy was also higher for tones presented in context (65%) than for tones presented in isolation (62%). Unlike the native listener data, the speaker-context interaction only approached significance ($F(1, 52) = 3.76, p = .058$), indicating that the effect of context was uniform across single- and multiple-speaker stimuli. Although third-year students (73%) clearly outperformed first-year (63%) and second-year (61%) students, the difference was not statistically significant.

Table 1 *Average accuracy (in percentage) of tone identification by speaker, context, and linguistic background. Standard deviation is shown in parenthesis.*

	Speaker	Isolated tones	Contextual tones
First-year	Single	64 (34)	66 (35)
	Multiple	59 (29)	63 (28)
Second-year	Single	60 (34)	65 (32)
	Multiple	57 (29)	61 (28)
Third-year	Single	76 (32)	74 (34)
	Multiple	68 (26)	73 (25)
Native	Single	88 (22)	91 (20)
	Multiple	82 (22)	90 (15)

Finally, since the assignment of speakers into the single- and multiple-speaker conditions was arbitrary, it was necessary to ensure that the speakers were equally intelligible to the listeners in the first place. To this end, the native listeners' accuracy of response to intact syllables produced by the five speakers was taken as the index of intelligibility and was further analyzed. A repeated measures ANOVA was conducted on response accuracy with speaker (five speakers) and context (isolated & contextual) as fixed factors and participants as a random factor. The ANOVA revealed no effect of speaker ($F(4, 156) = 0.83, p = .51$), a significant effect of context ($F(1, 39) = 7.22, p < .05$), and a significant speaker-context interaction ($F(4, 156) = 2.69, p < .05$). The lack of speaker effect indicates that all five speakers were equally intelligible; therefore any effect found in the single- vs. multiple-speaker comparison would not be due to speaker intelligibility issues. Consistent with earlier results, response to intact contextual tones (96%) was more accurate than isolated tones (94%) for all participants. Inspection of the speaker-context interaction revealed that the interaction arose from the greater improvement for a male speaker compared to other speakers when context was added. Nonetheless, the overall null effect of speaker indicated that all speakers were equally intelligible.

2.2.2 *Single-speaker, tones in isolation*

For the native data, ANOVAs revealed significant main effects of modification ($F(3, 117) = 106.82, p < .0001$) and tone ($F(3, 117) = 11.53, p < .0001$), and a significant modification-tone interaction ($F(9, 351) = 7.75, p < .0001$). As expected, intact syllables (97%) and center-only syllables (98%) were identified most accurately, followed by

silent-center syllables (85%) and onset-only syllables (70%). Pair-wise means comparisons showed all contrasts were significantly different except between intact and center-only syllables. Tone 4 was identified more accurately (95%) than Tone 3 (87%), Tone 1 (85%), and Tone 2 (83%). Pair-wise means comparisons showed all contrasts involving Tone 4 were significant. The interaction shows that for Tones 1, 2, and 3, accuracy dropped significantly for the silent-center and onset-only syllables. In contrast, the modifications hardly compromised Tone 4 identification.

Just as for the native listener data, for the non-native listener data, ANOVAs revealed significant main effects of modification ($F(3, 156) = 70.04, p < .0001$) and tone ($F(3, 156) = 18.74, p < .0001$), and a significant modification-tone interaction ($F(9, 468) = 7.75, p < .0001$). The main effect of year of instruction only approached significance ($F(2, 52) = 3.06, p = .056$).

The difficulty of identifying syllable modifications followed the native listener patterns. Intact syllables (77%) and center-only syllables (76%) were identified most accurately, followed by silent-center syllables (59%) and onset-only syllables (45%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables. Tone 4 (77%) and Tone 1 (69%) were identified more accurately than Tone 2 (57%) and Tone 3 (53%). Pair-wise means comparisons showed all contrasts between the two groups were significant. Third-year students (76%) outperformed first-year (63%) and second-year (60%) students, although these differences only approached significance.

The interaction shows that acoustic modification influenced identification of the four tones in quite different ways. Specifically, removing the onset and offset did not influence Tone 1 identification; Tone 2 actually benefited from highlighting the center information; Tone 3 identification accuracy dropped linearly as less acoustic input became available; and Tone 4 was least compromised by acoustic modification.

2.2.3 Single-speaker, tones in context

For native listeners, ANOVAs revealed significant main effects of modification ($F(3, 117) = 81.02, p < .0001$) and tone ($F(3, 117) = 11.49, p < .0001$), and a significant modification-tone interaction ($F(9, 351) = 18.28, p < .0001$). Intact syllables (98%) and center-only syllables (97%) were identified most accurately, followed by silent-center syllables (93%) and onset-only syllables (76%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables and between center-only and silent-center syllables. Tone 4 (96%) and Tone 3 (94%) were identified more accurately than Tone 2 (89%) and Tone 1 (85%). Pair-wise means comparisons showed the two groups are different from each other except between Tones 3 and 2. The interaction shows that identification of silent-center tone identification improved significantly with the addition of context and that Tone 4 remains quite accurate despite acoustic modification.

For the non-native listeners, ANOVAs revealed significant main effects of modification ($F(3, 156) = 56.65, p < .0001$) and tone ($F(3, 156) = 16.9, p < .0001$), and a significant modification-tone interaction ($F(9, 468) = 9.46, p < .0001$). Intact syllables and center-only syllables (both at 78%) were identified most accurately, followed by silent-center syllables (59%) and onset-only syllables (49%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables. Tone 4 (80%) was identified most accurately, followed by Tone 1 (68%) and Tone 3 (63%); Tone 2 (53%) was identified least accurately. All pair-wise means comparisons were significant except for the contrast between Tones 1 and 3. The interaction shows virtually the same pattern as the isolated tones reported earlier, indicating the addition of context did not change the pattern of response substantially for the non-native listeners.

2.2.4 Multiple-speaker, tones in isolation

For the native data, ANOVAs revealed significant main effects of modification ($F(3, 117) = 385.04, p < .0001$) and tone ($F(3, 117) = 17.17, p < .0001$), and a significant modification-tone interaction ($F(9, 351) = 26.11, p < .0001$). Intact syllables (97%) and center-only syllables (94%) were identified most accurately, followed by silent-center syllables (76%) and onset-only syllables (61%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables. Tone 4 (89%) was identified more accurately than Tone 3 (82%) and Tone 1 (82%); and Tone 2 (75%) was identified least accurately. All pair-wise means comparisons were significant except between Tones 3 and 1. The interaction shows that center-only syllables were identified as accurately as intact syllables for all tones but Tone 3. Identification of silent-center and onset-only tones in contrast were compromised across the board, even for Tone 4. This indicates that talker variability added difficulty to tone identification particularly in the silent-center and onset-only syllables.

For the non-native data, ANOVAs revealed significant main effects of modification ($F(3, 156) = 179.46, p < .0001$) and tone ($F(3, 156) = 25.45, p < .0001$), and a modification-tone interaction ($F(9, 468) = 15.52, p < .0001$). Intact syllables (77%) were identified most accurately, followed by center-only syllables (71%), silent-center syllables (50%) and onset-only syllables (38%). Pair-wise means comparisons showed all contrasts were significant. Tone 4 (73%) was identified most accurately, followed by Tone 1 (59%) and Tone 2 (56%), and Tone 3 (48%) was identified least accurately. All pair-wise means comparisons were significant except between Tones 1 and 2. The interaction shows that the impact of modification varied across tones, similar to the previous two conditions. The addition of more speakers did not seem to change the response pattern of the non-native listeners.

2.2.5 Multiple-speaker, tones in context

For the native data, ANOVAs revealed significant main effects of modification ($F(3, 117) = 196.79, p < .0001$) and tone ($F(3, 117) = 17.04, p < .0001$), and a significant

modification-tone interaction ($F(9, 351) = 18.8, p < .0001$). Intact syllables (98%) and center-only syllables (97%) were identified most accurately, followed by silent-center syllables (87%) and onset-only syllables (78%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables. Tone 4 (95%), Tone 3 (91%), and Tone 1 (90%) were identified more accurately than Tone 2 (84%). All pair-wise means comparisons were significant except between Tones 4 and 3 and between Tones 3 and 1. The interaction shows that the addition of context in the multiple-speaker setting appeared to have facilitated identification of onset-only tones most substantially. This is conceivable. In particular, since onset-only tones were deprived of the majority of syllable-intrinsic tonal information, the addition of the context could have provided extrinsic information that would be particularly useful when speaker variability exists.

For the non-native data, ANOVAs revealed significant main effects of modification ($F(3, 156) = 147.77, p < .0001$) and tone ($F(3, 156) = 24.84, p < .0001$), and a significant modification-tone interaction ($F(9, 468) = 14.55, p < .0001$). Intact syllables (77%) and center-only syllables (74%) were identified most accurately, followed by silent-center syllables (57%) and onset-only syllables (48%). Pair-wise means comparisons showed all contrasts were significant except between intact and center-only syllables. Tone 4 (80%) was identified more accurately than Tone 1 (64%), Tone 3 (57%), and Tone 2 (55%). All pair-wise means comparisons were significant except between Tones 1 and 3 and between Tones 3 and 2. The interaction plot shows a similar pattern to the isolated condition.

3. Acoustic Analyses

The perception experiment showed that for both groups, identification was more accurate for single-speaker tones and when the tones were presented in context. However, compared to non-native listeners, native listeners were facilitated more by context when dealing with multiple-speaker stimuli. Detailed analyses of the four blocks also revealed that native listeners' response to modified tones were influenced by speaker and context, but non-native listeners' response pattern remained quite consistent irrespective of speaker or context. One possibility is that native listeners were more sensitive to changes in the acoustic signal resulting from the speaker and context variations. But what are the specific acoustic changes involved? To explore the acoustic basis of the perceptual response patterns, acoustic analyses were conducted on duration and fundamental frequency of the stimuli, the two acoustic measures that are most relevant to tone identification.

3.1 Results

3.1.1 Duration

Table 2 shows the average duration of three components of the syllable rhyme, which carries f_0 information: the first six pitch periods, the center, and the final eight pitch periods. ANOVAs were conducted with speaker (single & multiple), context

(isolated & contextual), and tone (1, 2, 3, & 4) as fixed factors on the duration of the three components. When a main effect was significant, the Bonferroni post-hoc test was used for pair-wise means comparisons to keep the family-wise Type I error rate at 5%.

Table 2 *Average duration (in ms) of the three components of the syllable rhyme that carries f_0 information. Standard deviation is shown in parenthesis.*

Isolated tones	Tone	First six periods	Center	Final eight periods
Single	1	19 (0)	307 (23)	26 (1)
	2	28 (2)	363 (45)	24 (2)
	3	31 (1)	447 (53)	39 (1)
	4	18 (1)	241 (48)	68 (20)
Multiple	1	27 (8)	326 (81)	36 (11)
	2	35 (10)	364 (75)	40 (12)
	3	38 (13)	381 (99)	57 (12)
	4	26 (7)	211 (77)	64 (12)
Contextual tones	Tone	First six periods	Center	Final eight periods
Single	1	17 (1)	269 (2)	25 (1)
	2	29 (0)	349 (40)	26 (0)
	3	32 (1)	404 (9)	40 (1)
	4	18 (3)	190 (16)	80 (25)
Multiple	1	26 (7)	264 (68)	35 (10)
	2	36 (10)	286 (67)	40 (13)
	3	38 (12)	311 (105)	57 (14)
	4	25 (6)	136 (59)	92 (35)

For the duration of the first six periods, the ANOVA showed significant main effects of speaker ($F(1, 104) = 13.78, p < .0005$) and tone ($F(3, 104) = 11.78, p < .0001$). The average duration of syllable onsets was longer for the multiple-speaker syllable fragments (31 ms) than for the single-speaker syllable fragments (24 ms). This difference was expected, as the multiple-speaker stimuli included items produced by two male speakers, whose longer period contributed to the higher average. This observation was confirmed by Table 3, which lists the average duration of the first six pitch periods for individual speakers. In addition, the average duration for Tone 2 (34 ms) and Tone 3 (37 ms) was also longer than for Tone 1 (25 ms) and Tone 4 (24 ms). This finding was also expected since the former set of tones starts with lower f_0 values, implying longer periods.

Table 3 *Average duration (in ms) of the first six pitch periods, center, and final eight pitch periods of the syllable rhyme for individual speakers. Standard deviation is shown in parenthesis.*

Condition	Speaker	First six periods	Center	Final eight periods
Single	Female	24 (6)	321 (87)	41 (23)
Multiple	Female 1	24 (3)	362 (85)	50 (38)
	Female 2	24 (5)	321 (106)	44 (19)
	Male 1	34 (7)	183 (69)	51 (12)
	Male 2	44 (9)	275 (84)	65 (16)

For the duration of the center, the ANOVA showed significant main effects of speaker ($F(1, 104) = 4.45, p < .05$), tone ($F(3, 104) = 22.86, p < .0001$), and context ($F(1, 104) = 9.89, p < .005$). The average duration of syllable centers was longer for single-speaker stimuli (321 ms) than multiple-speaker stimuli (285 ms). The average duration for Tone 3 (362 ms), Tone 2 (331 ms), and Tone 1 (294 ms) was longer than Tone 4 (182 ms), attributable to inherent differences in f_0 . All pair-wise comparisons were significant except between Tones 3 and 2 and between Tones 2 and 1. Tones on isolated syllables (324 ms) were longer than tones in context (260 ms), which was conceivable.

For the duration of the final eight periods, the ANOVA showed significant main effects of speaker ($F(1, 104) = 9.85, p < .005$) and tone ($F(3, 104) = 32.76, p < .0001$). The average duration was longer for multiple-speaker stimuli (53 ms) than single-speaker stimuli (41 ms). Again, this finding was to be expected, as the multiple-speaker stimuli included items produced by two male speakers, whose longer period contributed to the higher average. Again, this observation was confirmed by Table 3, which also lists the average duration of the final eight pitch periods for individual speakers. The average duration for Tone 4 (77 ms) was longer than Tone 3 (53 ms), which is in turn longer than Tone 2 (37 ms) and Tone 1 (34 ms). All pair-wise means comparisons were significant except between Tones 2 and 1. Again, this was expected since Tone 4 ends with a lower f_0 and thus longer periods than the other tones.

3.1.2 Fundamental frequency

The f_0 contours of the intact syllables by speaker and context were generated by BLISS with autocorrelation. The shapes of these contours are consistent with traditional descriptions of the four Mandarin tones. No discernible f_0 differences were observed between the isolated and contextual tones.

To obtain a more fine-grained measure of the f_0 information available in the partial acoustic input, the f_0 of the first six pitch periods for each syllable was measured. This was accomplished by manually marking each of the six glottal cycles on the waveform display. Overall, for all five speakers, the f_0 contours of the first six pitch periods were basically flat for all four tones. In addition, the four tones formed two

distinct sets, with Tones 1 and 4 having higher f_0 values and Tones 2 and 3 having f_0 lower values. The speaker used in the single-speaker condition (Speaker 1) appeared to have greater separation between the two sets of tones than the speakers used in the multiple-speaker condition (Speakers 2, 3, 4, & 5). Again, there were no discernible differences between isolated and contextual tones.

To evaluate these observations quantitatively, a mean f_0 was obtained by averaging across the six f_0 values for each tone. Since the f_0 contours were all flat and similar to each other, the mean f_0 should be a reasonable summary measure. An ANOVA was conducted on the mean f_0 with speaker (single & multiple), context (isolated & contextual), and tone (1, 2, 3, & 4) as fixed factors. The ANOVA showed significant main effects of speaker ($F(1, 104) = 22.61, p < .0001$) and tone ($F(3, 104) = 27.5, p < .0001$), and a significant speaker-tone interaction ($F(3, 104) = 2.97, p < .05$). It is not surprising that the single-speaker stimuli (269 Hz) had a higher average f_0 than the multiple-speaker stimuli (212 Hz) because latter set included two male speakers. Tone 1 (261 Hz) and Tone 4 (272 Hz) had higher mean f_0 values than Tone 2 (186 Hz) and Tone 3 (174 Hz). Post-hoc tests showed that all pair-wise comparisons between the former and latter sets of tones were significant, confirming an earlier observation that the four tones form two distinct sets in onset f_0 . The speaker-tone interaction showed that the difference between the two sets of tones was greater in the single-speaker condition, again confirming an earlier observation.

4. General Discussion

The research questions in this study dealt with the effect of speaker variability on the identification of incomplete Mandarin tones, the contribution of context to the identification, and the response differences between native and non-native listeners. A perception experiment was conducted to evaluate the accuracy and reaction time of responses to fragmented tones in various speaker-context conditions, and acoustic analyses were conducted to evaluate the bases of those responses.

Speaker variability clearly added processing demand to tone identification. For all listeners, tone identification was less accurate for multiple-speaker stimuli. For non-native listeners, tone identification was also slower for multiple-speaker stimuli. The acoustic analyses showed that the duration and f_0 of the tones were indeed much more variable in the multiple-speaker stimuli than in the single-speaker stimuli, providing partial explanation for increased difficulty of tone identification when listening to multiple talkers.

The presence of context—a short precursor carrier phrase—also facilitated tone identification. For all listeners, tone identification with context was more accurate. For the native listeners, identification of tones presented in context was also faster. More interestingly, for the native listeners, context was particularly helpful for the multiple-speaker stimuli, as shown in both accuracy and reaction time. In contrast, for the non-native listeners, context was equally helpful irrespective of single-speaker or multiple-

speaker stimuli. In other words, when dealing with multiple-speaker stimuli, native listeners benefitted from the presence of context more than the non-native listeners did.

There are two possible ways context could have facilitated tone identification. One is the listeners' knowledge of tonal coarticulation, which has been shown to impact tone perception by native listeners (Xu, 1994; Gottfried & Suiter, 1997; Lee et al., 2008). The other possibility is that context provides information for speaker normalization (Leather, 1983; Lin & Wang, 1985; Fox & Qi, 1990; Moore & Jongman, 1997; Wong & Diehl, 2003). While both accounts are consistent with current findings that all listeners showed improvement with context, our acoustic analyses did not find evidence for the existence of tonal coarticulation in the tone stimuli presented in context. As noted, the absence of acoustic influence from the precursor carrier tone was most likely due to the test tone being in a prosodically strong position, which prevented the anticipatory coarticulation from occurring. Nonetheless, tones presented in context were still identified more accurately, suggesting that the primary use of context was to establish a reference frame for speaker normalization.

This interpretation is also corroborated by the native data, which showed identification of silent-center and onset-only tones improved most dramatically with the addition of context. In particular, for single-speaker stimuli, the addition of context greatly increased accuracy for silent-center tones. For multiple-speaker stimuli, the addition of context greatly increased accuracy for onset-only tones. Recall that silent-center and onset-only tones were deprived of the majority of the f_0 contour in the middle of a syllable, thus the direction of f_0 movement was not physically present. It is conceivable that context offers a reference frame by exposing the speaker's f_0 range; therefore the extrinsic information could be used to infer tone identity when syllable-intrinsic f_0 information was largely unavailable. Note though that this interpretation applies only to the native data. The non-native data did not show distinct response patterns between isolated and contextual tones for either single-speaker stimuli or multiple-speaker stimuli.

The similarities and differences between the native and non-native data should now become obvious throughout. Both groups of listeners identified tones with lower accuracy when the tones were produced by multiple speakers and when the tones were presented in isolation. As noted, these results are not surprising given the known facilitative effect of context and the challenge of adapting to multiple speaker voices. The differences between the two groups of listeners showed up in two major ways. First, native listeners were facilitated by context more when dealing with multiple speakers than a single speaker; non-native listeners did not show such a preference. Second, for native listeners, identification of silent-center and onset-only tones improved greatly with the presence of context; non-native listeners did not show this preference.

Together these two findings suggest that native listeners were more sensitive to information extrinsic to the test syllable for tone identification, while the non-native listeners relied primarily on syllable-intrinsic information. In particular, as the acoustic

analyses showed, the multiple-speaker set introduces more acoustic variability to the duration and f_0 of the tones. The lack of tonal articulation in the signal also indicated that context was used primarily to establish a reference frame for f_0 judgments in the multiple-speaker set. Since the non-native listeners did not benefit from context in the multiple-speaker set any more than in the single-speaker set, it suggests that the non-native listeners were not relying on speaker normalization as much to aid tone identification. Furthermore, native listeners showed greater improvement for silent-center and onset-only tones when context was given. This indicated that syllable-extrinsic information was particularly useful to the native listeners when syllable-intrinsic information was largely unavailable. Non-native listeners showed no such dramatic improvement for these two types of syllables, suggesting that extrinsic information provided by context did not make a difference between syllables rich or impoverished in intrinsic information. Taken together, the lack of impact of extrinsic information indicated that non-native listeners relied primarily on syllable-intrinsic information for tone identification.

With a few exceptions, the analyses by block showed that the correct identification patterns for tone fragments could be predicted from the amount of acoustic information presented to the listeners. Several observations are noteworthy and consistent with aforementioned interpretations of the data. In particular, for the native listeners, intact and center-only syllables were identified equally accurately, although the reaction time measure revealed that the modified syllable still incurred a processing cost. In particular, adding context to single-speaker stimuli improved identification of silent-center tones such that their accuracy was comparable to the center-only tones. Finally, multiple-speaker stimuli presented in isolation slowed down reaction to silent-center and onset-only tones such that they were no longer comparable to center-only tones.

On the non-native listeners' side, although the accuracy pattern resembles that of the native listeners, reaction time likewise revealed that the non-native listeners were particularly slow in responding to silent-center and onset-only tones. These findings showed that reaction time could be a useful measure to reveal processing differences otherwise not shown in the accuracy measure.

The identification of specific tones across listening conditions and acoustic modifications appeared to show a consistent pattern as well. For both native and non-native listeners, Tone 4 was invariably the most accurate tone and most resistant to acoustic modification. This finding replicated Lee et al. (2008) and Lee et al. (submitted), who reported that the onset of Tone 4 was acoustically most distinct from other tones. The acoustic data in the current study also showed that Tone 4 has the highest average f_0 in the first six pitch periods. For the non-native listeners, Tone 4 is also the only tone that resembles an English intonation contour (Broselow, Hurtig, & Ringen, 1987). These observations may explain the overall high identification accuracy for Tone 4.

On the other hand, Tone 2 was one of the least accurate tones in the current data. This finding also replicated Lee et al. (2008) and Lee et al. (submitted) and is consistent with the finding that intact Tone 2 was the most difficult tone to identify (Broselow et al.,

1987; Wang, Spence, Jongman, & Sereno, 1999). Importantly, Lee et al. (submitted) proposed that the source of Tone 2 identification difficulty is different between native and non-native listeners. The confusion pattern analyses in Lee et al. (submitted) showed that native listeners showed a Tone 3 bias in the Tone 2-Tone 3 confusion while the non-native listeners did not show such a bias. It was proposed that native listeners were looking for positive evidence for Tone 2 (i.e., the rising f_0). When the evidence of f_0 rising was not available due to missing fragments, native listeners would treat the low onset as Tone 3. Non-native listeners, on the other hand, did not or could not use this strategy when fragments were missing. Therefore their Tone 2-Tone 3 confusion did not favor the Tone 3 response. The low accuracy of Tone 2 identification here is consistent with this interpretation.

There is another noteworthy difference between the native and non-native listeners. For the native listeners, Tones 4 and 3 always appeared in a group and so did Tones 1 and 2. For the non-native listeners, in contrast, Tones 4 and 1 formed a group and so did Tones 2 and 3. Recall from the acoustic analyses that Tones 1 and 4 begin with high f_0 onsets and Tones 2 and 3 begin with low f_0 onsets. Given the high-low f_0 onset distinction among the tones, the observation here is that the two most accurate tones for the native listeners included a high- and a low-onset tone, while the two most accurate tones for the non-native listeners were both high-onset tones. This observation implies that the native listeners were capable of making the high-low distinctions, which was not evident for the non-native listeners. As noted, the high-low tone judgment is necessarily relative and will have to take into consideration the f_0 range of a speaker. It was also speculated that context in the current task was primarily used to establish a speaker-specific reference frame. Viewed this way, the tone grouping difference between native and non-native listeners is also consistent with the finding that native listeners were more efficient at using context for speaker normalization.

5. Conclusion

The study reported here showed that native and non-native listeners differed in how they dealt with fragmented Mandarin tones produced by single vs. multiple speakers in isolation or in context. In general, the native listeners were able to make use of information in the context to facilitate tone identification from partial acoustic input. This was shown by the greater facilitation of context in the multiple-speaker set and the substantial improvement of silent-center and onset-only tone identification when context was present. In contrast, non-native listeners showed essentially the same response patterns across speaker and context conditions, indicating their focus on syllable-intrinsic information for tone identification. These results contributed to our further understanding of the nature of lexical tone processing by native and non-native listeners.

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Mandarin Learners' Tonal Patterns: An Experimental Study

Rongrong Liao

Defense Language Institute

This paper introduces an experimental study of Mandarin tonal sequences produced by native English speakers. Sound recordings of learners' Mandarin have been analyzed empirically and acoustically. The conclusions are as follows: tonal variation in accented Mandarin is not correlated to the original Mandarin tones or the context of the original Mandarin tones. The pronounced Mandarin tones selectively transform to each other. The percentage of pronounced Tone 1's and Tone 3's are much higher than those of other pronounced tones in the accented Mandarin. Tonal combination patterns do exist, and there are two basic patterns. Pattern 1 is similar to the tonal combination T1T3, and Pattern 2 is similar to the tonal combination T3T1 or T3T4. The two basic patterns serve as composing elements to form two more tonal combination patterns. The speech stream contains much more Pattern 1 tonal combinations than Pattern 2 tonal combination.

1. Purpose and methods

Patterns of pronunciation by English learners have been extensively studied, but relatively little research of this kind have been conducted for the Chinese language. Analysis of speech samples by Chinese learners found that the most noticeable feature of their accent is that the tones vary greatly in the speech stream, far more than the variation in vowels or consonants. This paper will analyze Mandarin tonal sequences produced by learners who are native English speakers.

In the Mandarin speech of most native English speakers, tones are often pronounced in unexpected forms. Native Mandarin speakers are very sensitive to these transformed tones. Even without the experience of teaching Chinese to foreigners, many of them could identify the "incorrect" tones without difficulty. Experienced Chinese instructors could immediately tell that these Mandarin speaking sounds contain typical features of English accent, and that tonal pronunciations make up a large part of the accent. However, it is hard for them to explain exactly what is different about these tones.

In order to find the reason, and to better understand the tonal phenomena in the learners' speech, the following questions are raised: How do Mandarin tones transform? Can a Mandarin tone transform to some other Mandarin tones? If yes, which tone may transform to which tone? Are there any tones that other tones "prefer to" transform into? Are there any tones that are pronounced much more than other tones? Are there any

patterned tonal combinations? If yes, what are they? To achieve more understanding of the tonal phenomena, an experiment that combines empirical analysis and instrumental analysis was conducted.

First, a group of six learners were asked to spontaneously tell stories and make recording of their story-telling. All of the learners had learned Chinese for more than one year. Each of them was asked to tell stories about their own life experiences, which they could express quite naturally and fluently at normal pace.

Then the sounds in the recordings were analyzed empirically by two listeners (include the author), both native speakers experienced in teaching Mandarin. Portions of the recordings were repeatedly played. The listeners paid special attention first to tones on each syllables one by one, and then to tones in sequences.

Afterwards, the recordings were analyzed with the Praat software package. The acoustic analysis provided pitch tracks (F0 curves), wave forms, and intensity envelopes. When tones on a sequence of two or more syllables were examined, not only the pitch tracks, but also other acoustic data are used for locating syllable boundaries, analyzing stressed pitch contours, and identifying tonal patterns.

When making judgments, such as deciding which tone was produced on a syllable, both auditory impression and acoustic data, mainly pitch tracks, were needed at the same time. The decisions were based on not only repeatedly listening to the recordings, but also carefully examining the pitch tracks. One reason for doing so is that pitch track of a tone may not be same as the image that based on the auditory impression, especially when the syllable is short. For example, the pitch track of the high level tone, Tone 1, in a very short syllable is often a sharp rising-falling curve, not a level and smooth curve.

2. Analyses and Results

2.1 Selective tonal transformation

The first step of analyzing the learners' tonal pronunciations is to examine the tones on each syllable. Portions of the recordings were played again and again; special attention was paid to tones on each syllable, and judgment was made about which tone was actually pronounced. The pitch track of the syllable was also examined to confirm, adjust, or make judgments.

When the learners spoke slowly, with more pauses and strong stresses, it was relatively easy for the listener to judge the tonal categories that they heard; also it was not too hard for them to identify the basic features of many tones. When the learners spoke faster, with less pauses and strong stresses, it was often hard for the listener to tell the features and categories of the tones. Under this kind of situation, pitch tracks provided more accurate information.

The results of the judgment show that in a relatively small percentage of the syllables, the pronounced tones keep the basic features of their original Mandarin tones. In quite a high percentage of the syllables, the tones were pronounced as other Mandarin

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tones; while in the rest of the syllables, the tones were pronounced in forms that do not belong to any Mandarin tones. These facts mean that in the learners' speaking sounds, Mandarin tones may transform to other Mandarin tones or tones with other forms.

In order to see the way that Mandarin tones transform, the times that each tone was pronounced by one learner were counted and put in Table 1. The recording is 110 seconds long, and it contains 273 syllables.

Table 1 Numbers of tones produced in one learner's speaking

Original Tones	Pronounced Tones						
	Tone 0	Tone 1	Tone 2	Tone 3	Tone 4	Other Tonal Form	Sub Total
Tone 0	10	0	1	32	0	3	46
Tone 1	3	40	2	16	1	6	68
Tone 2	2	5	5	11	1	8	32
Tone 3	0	29	1	16	5	6	57
Tone 4	1	18	2	16	19	14	70
Sub Total	16 =10+6	92 =40+52	11 =5+6	91 =16+75	26 =19+7	37	
Total	273						

In Table 1, the original tones are listed in the first column, and the pronounced tones are listed in other columns. The four basic Mandarin tones are represented by "Tone 1" to "Tone 4." The neutral tone is referred as "Tone 0," which are tones on fillers (presented as 啊), particles, and tones that should be neutralized, such as the one on the second syllable of 看看 (Tone 4 + Tone 0). The pronounced tones with pitch curves unlike those of any Mandarin tones were referred as "Other Tonal Form."

With Rows 3 to 7 and Columns 2 to 8, each number shows how many times that a Mandarin tone was pronounced as the same Mandarin tone, other Mandarin tone, or the "Other Tonal Form." For example, the number 29 at Row 6, Column 3 indicates that 29 syllables that originally carry a Tone 3 were pronounced as syllables with a Tone 1. In other words, 29 Tone 3's transformed to Tone 1's.

In the row "Sub Total," the numbers typed in the larger size are the sums of the numbers from Row 3 to Row 7 in the same column. The equalities for the numbers indicate how many tones were produced in their original form and in other forms respectively. For instance, the equality "92=40+52" shows that there are 92 syllables produced with Tone 1; among which 40 are original tone 1's, and 52 were transformed from other tones.

Based on the data shown in Table 1, it is clear that the four Mandarin tones transform among each other. Every single one of the tones may transform to other tones; and each tone may transform to every single one of the other tones. The facts that there are numbers in all slots on the rows for the four Mandarin tones in Table 1 support these conclusions.

In fact, Table 1 also shows that any one of the four Mandarin tones may transform to not just any of the other three tones, but also the tones that carry unexpected pitch curves. As for the neutral tone, it may transform to or transform from any Mandarin tone, as well. Although the limited data in Table 1 for the Learner do not fully show this point, other learners' data do support it. There are many fillers in the learners' speech that are counted as neutral tone syllables, and most of them were pronounced as Tone 3's.

A further analysis of the numbers in Table 1 will lead to some interesting phenomena about the way that Mandarin Tones transform. The numbers in the Rows for Tone 0 to Tone 4 suggest that besides keeping their original tonal forms, Tone 0 and tone 1 tend to transform more to Tone 3 rather than to other tones, Tone 3 tends to transform more to Tone 1 rather than to other tones; and Tone 4 tends to transform to both Tone 1, Tone 3 and "Other Tonal Forms." As for Tone 2, although the numbers show that it also tends to transform to Tone 3 more than other tones, the tendency is not clear, due to the much smaller total sample number.

Put the numbers for the tones together, the statistics in the row of "Sub Total" demonstrate that other tones tend to transform to Tone 1 and Tone 3. The reason is explained in the following: in each of the five equalities that is in the formula " $A = b+c$," "c" represents the number of the pronounced tones that transform from other Mandarin tones. So the five numbers 6, 52, 6, 75, and 7, that on the position of "c" in the four equalities, represent the numbers of tones transformed from other tones to Tone 0-4 respectively. Comparing these numbers, the 53 and 75 for Tone 1 and Tone 3 are significantly larger than 6, 6 and 7 for Tone 0, tone 2, and Tone 4. Therefore, the conclusion is that other tones tend to transform to Tone 1 and Tone 3.

This conclusion indicates that in the learner's speech, the Mandarin tones selectively, rather than equally or randomly, transform to each other. This means that learners prefer to pronounce Tone 1 and tone 3 much more than other tones. In fact, this point is also denoted by the significant phenomenon that Tone 1 and Tone 3 occur much more frequently than other tones. Among the 273 syllables, 92 (33%) were pronounced as Tone 1's and 91 (33%) were pronounced as Tone 3's. Put together, 183 (66%) out of 273 tones were pronounced as these two tones. In other words, two thirds of the syllables carry these two tones, and only one third of the syllables carry Tone 0, Tone 2, Tone 4, and "Other Tonal Form." No wonder experienced instructors always feel that there is something in the learners' speaking sounds that cause the auditory impression of the English accent. This uneven occurrence of the tones must contribute to the learner's accent significantly.

2.2. Patterned Tonal Combinations

Besides selective transformation and uneven occurrence of the Mandarin tones, are there any other aspects of the tones, especially Tone 1 and tone 3, that might also significantly contribute to the learner's accent? Would tonal combinations in the sound sequences demonstrate anything?

With these questions in mind, the second step of analyzing the learners' tonal pronunciations was taken, which was to examine the tonal combinations on syllables that grouped together, and special attention was paid to the pattern of pitch curves. Again, portions of recordings were analyzed empirically and acoustically.

Listening to the recordings, and observing pitch tracks, one impression was that syllables grouped together in the running speech. In normal pace, there were often two to three syllables in a group; but in faster pace, a group contained more syllables. In each group, tones combined together and sound like a tonal unit. Pitch tracks showed the tonal combinations on the grouped syllables clearly. Between groups of pitch curves, there was often a space, reflecting the pause on the boundary between groups. Among the total 273 syllables, there are 78 tonal combination groups, according for 174 (64%) syllables. This means that two thirds of the learner's speech consisted of tonal combinations.

Repeatedly listening to the recordings, the listeners could tell that the tonal accent was obvious and very familiar, which was typical of what they heard in daily instruction. This indicated that there must be some common patterns in the tonal combinations. A closer analysis of what was heard indicated that there were many tonal combinations that sounded very similar to each other.

A careful observation of the corresponding pitch tracks revealed that there were indeed common tonal patterns. The pitch curves of the tonal combinations carry two basic patterns. Pattern 1 is similar to a Tone 1 plus a Tone 3 (T1T3), and Pattern 2 is similar to a Tone 3 plus a Tone 1 or Tone 4 (T3T1 or T3T4).

In most cases, both patterns occur in disyllabic combinations, and only a few in tri-syllabic or other multi-syllabic combinations. When Pattern 1 occurs in disyllabic combinations, if listen to the two tones in the combinations one by one, the first tone sounds just like Mandarin Tone 1, and the second tone sounds exactly like a Mandarin Tone 3. However, when the tones are heard as one unit, it often happens that the pattern does not sound as natural as a typical Mandarin T1T3 combination. The main reason is that in the former, the Tone1 portion, is often much shorter than the Tone3 portion; but in the latter, the two portions are similar in length.

Although the two basic patterns may occur in tri-syllabic or other multi-syllabic groups, there are two more patterns that may occur in these groups. Pattern3 is similar to a Tone 1 plus a Tone 3 and another Tone 1 (T1T3T1) or a Tone 1 plus a Tone 3 and a Tone 4 (T1T3T4); and Pattern 4 is similar to a Tone 3 plus a Tone 1 and another Tone 3 (T3T1T3). Pattern 3 could be viewed as the extended Pattern 1, and Pattern 4 the extended Pattern 2.

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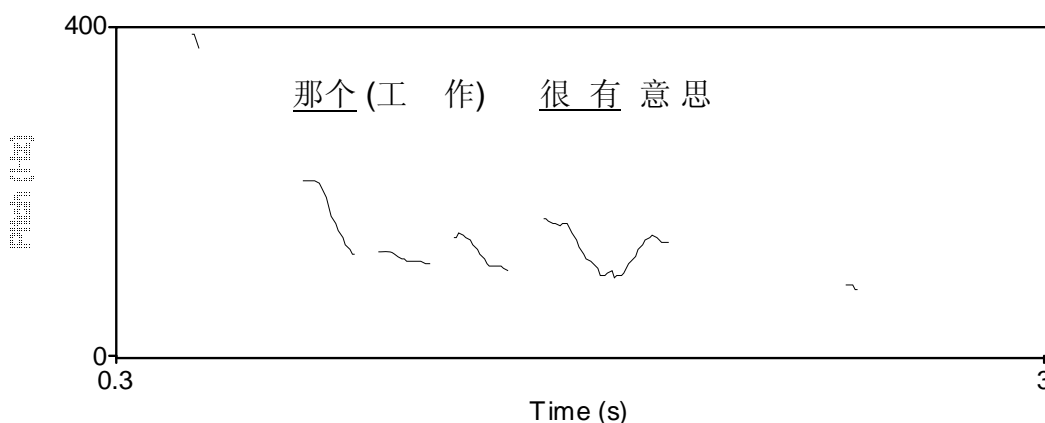
When spoken in a relatively faster pace, with more syllables grouped together, the average length for the tones become shorter. The tonal combination patterns are formed with more tonal forms that do not belong to any typical Mandarin tones, although the basic tonal combination patterns remain the same as described above.

The following are examples of pitch tracks. Patterns 1-4 are marked by underlines, round parentheses, square brackets, and brace brackets respectively in the Chinese characters.

Example 1:

<u>那个</u>	(工作)	<u>很有</u>	意思	
nage	gongzuo	henyou	yisi	
that	job	is very	interesting	
T4T0	T1T4	T3T3	T4T0	---- original tones
T1T3	(T3T4)	<u>T1T3</u>	T4T0	---- pronounced tones

“That job is very interesting.”



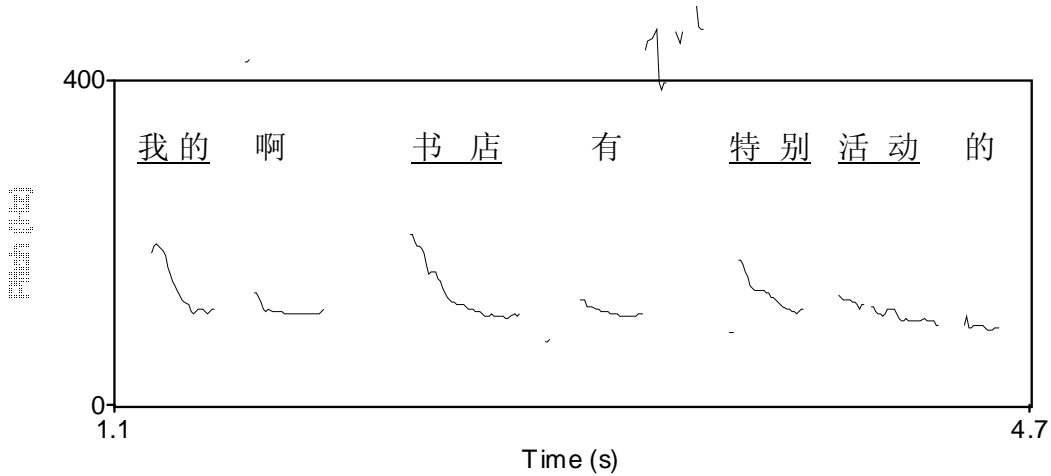
In Example 1, two groups of syllables, 那个 and 很有, carry Pattern 1 tonal combinations, and one group of syllables, (工作), carry a Pattern 2 tonal combination. Because of intonational influence, the high starting portions in the pronounced Tone 1 and Tone 4 are not the same in height, but the basic features for each tone are clear. Notice that the pitch track on the syllable 思 does not show up, for some reasons.

Example 2:

<u>我的</u>	啊	<u>书店</u>	有	<u>特别</u>	<u>活动</u>	的
wode	a	shudian	you	tebie	huodong	de	
my	filler	bookstore	have	special	activity	particle	
T3T0	T0	T1T4	T3	T4T2	T2T4	T0	---- original tones
T1T3	T3	T1T3	T3	T1T3	T1T3	T0	---- pronounced tones

“(When) my bookstore has special activity, ...”

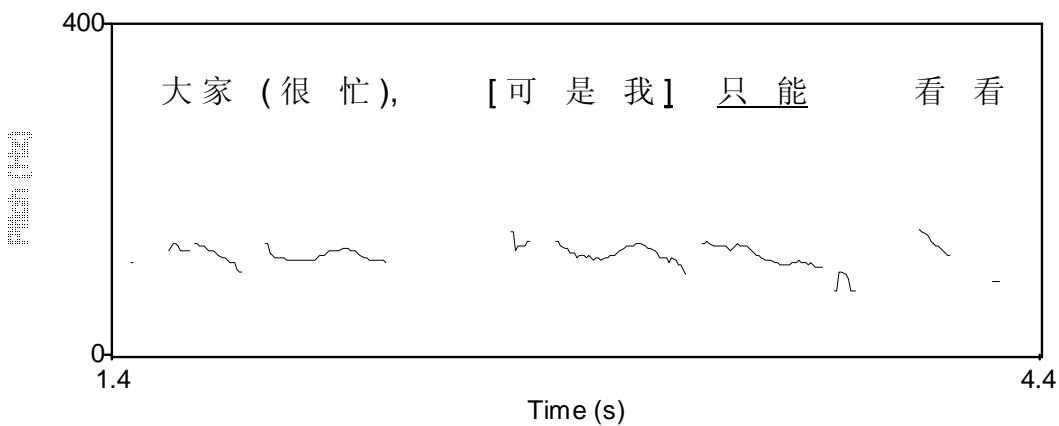
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In Example 2, four groups of syllables, 我的, 书店, 特别 and 活动, carry Pattern 1 tonal combinations. The starting portion of the tonal combination in 活动 is much lower than those in other tonal combinations, due to the resetting of pitch range, which is one type of intonational influence.

Example 3:

大家 (很忙), [可是我] 只能 看看
 dajia henmang keshiwo zhineng kankan
 everybody very busy but I only can watch
 T4T1 T3T2 T3T4T3 T3T2 T4T0 ---- original tones
 T1T4 T3T4 T1T3T4 T1T3 T4T0 ---- pronounced tones
 "Everybody was busy, but I could only watch."



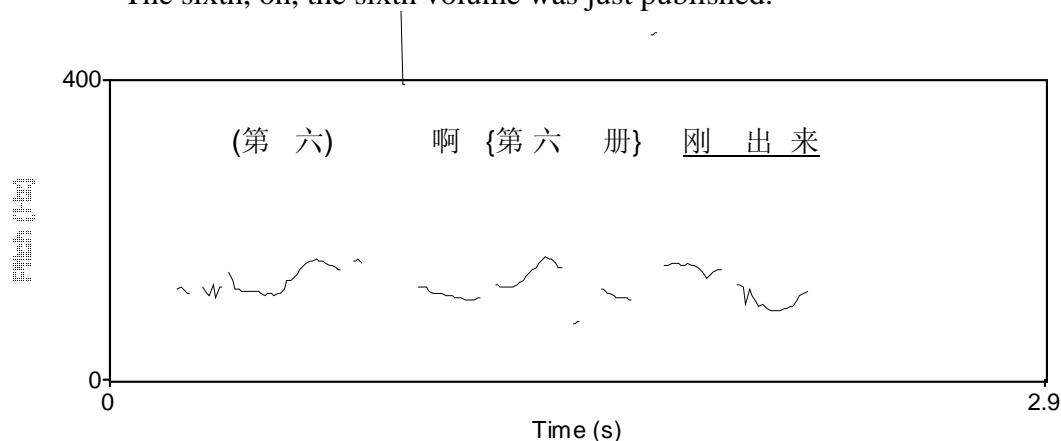
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In Example 3, two groups of syllables, 只能 and 很忙, carry a Pattern 1 and a Pattern 2 tonal combination respectively, and one group of syllables, 可是我, carry a Pattern 3 tonal combination. Although the pitch track between 可 and 是 is broken due to the interruption of the consonant in 是, the three syllables 可, 是 and 我 are in the same group according to auditory impression. In this utterance, the pitch range is relatively narrow, so the difference between higher portion and lower portion of the tones is small.

Example 4:

(第六)	啊	{第六册}	刚	出	来	
diliu	a	diliuce	gang	chulai		
sixth	filler	sixth	volume	just	published	
T4T4	T0	T4T4T4	T1	T1T2	----	original tones
T3T1	T0	T3T1T3	T1	T3T2	----	pronounced tones

“The sixth, oh, the sixth volume was just published.”



In Example 4, two groups of syllables, 刚出来 and the first 第六, carry a Pattern 1 and a Pattern 2 tonal combination respectively. One group of syllables, 第六册, carry a Pattern 4 tonal combination. Because of the interruption of the consonant in the syllable of 册, the pitch track is broken between the syllable 六 and 册. However, according to auditory impression, the two syllables belong to the same group of syllables.

The above analysis shows that the two basic patterns, Pattern 1 and Pattern 2, are both formed by combining Tone 1 and Tone 3 in different orders. Pattern 3 and 4 could be viewed as the extensions of Pattern 1 and Pattern 2. In fact, they could also be viewed as Pattern 1 and Pattern 2 combining together with a portion overlapping. For example, Pattern 3 on 可是我 in Example 3 could be viewed as 可(是我), i.e. Pattern 1 on 可是 and Pattern 2 on 是我 combine to create a single tonal unit, with one portion of each overlapping on 是. For the same reason, Pattern 4 on 第六册 in Example 4 could be viewed as (第六)册, i.e. Pattern 2 on 第六 and Pattern 1 on 六册 combine to one tonal

unit, with one portion of each overlapping on 六. This phenomenon shows that Pattern 1 and 2 are in fact the basic composing elements co-occurring in Pattern 3 and 4.

The above statistics has shown that there are total of 183 Tone 1's and Tone 3's in the recording. How many Pattern 1's and Pattern 2's are there? Among the 78 tonal combinations, only 6 are in the form of Pattern 3 and 4. Counting one Pattern 1 and one Pattern 2 in each Pattern 3 or 4 once, there are 84 total occurrences of Pattern 1 and 2. The recording is only 110 seconds long; so on average, one of the two basic patterns occurs once every 1.2 seconds. If they had equal chances to be pronounced, then each one would occur once every 2.4 seconds.

The interesting fact is that Pattern 1 is pronounced much more than Pattern 2. Among the 84 occurrence of the two patterns, Pattern 1 has 73 (87%) repetitions, while Pattern 2 has 11 repetitions (13%). In other words, during a period of less than two minutes, the learner repeated pattern 1 73 times and Pattern 2 11 times. Such a high frequency of pronouncing Pattern 1 must significantly contribute to the so called English accent. Even for Pattern 2, 11 repetitions in about two minutes are also quite frequent, enough for listeners to build an impression.

The above statistics and sample pitch tracks are all from the data of one learner. The same patterns also appear in other learners' data, although the percentages vary slightly. In general, patterned tonal combinations make up in the range of 50% to 70 % of the total syllables, and the occurrence of Pattern 1 made up about 60% to 90% of the total tonal combinations. As the occurrence of correct Mandarin tones increases, the total percentage of Pattern 1 in the speech decreases.

3. Conclusion And Discussion

The data and analysis presented in this paper leads to the following conclusions: First, to certain extent, tonal variation in accented Mandarin is not correlated to the original Mandarin tones or the context of the original Mandarin tons. The pronounced Mandarin tones selectively transform to each other, with a preference of transforming to Tone1 and Tone 3 more than to other tones, although any tone may transform to any other tones or tones with unexpected forms.

Second, the percentage of pronounced Tone 1's and Tone 3's are much higher than those of other pronounced tones in the accented Mandarin. Most of the pronounced Tone 1's and tone 3's occur in disyllabic- or multi-syllabic groups to form tonal combinations.

Third, tonal combination patterns do exist in the accented Mandarin. There are two basic patterns. Pattern 1 is similar to a Tone 1 plus a Tone 3 (T1T3), with the Tone 1 portion much shorter than the tone 3 portion. Pattern 2 is similar to a Tone 3 plus a Tone 1 or a tone 4 (T3T1 or T3T4). The two basic tonal combination patters serve as composing elements to form two more tonal combination patterns.

Fourth, the speech stream contains sequences of patterned tonal combinations. Pattern 1 occurs much more frequently than Pattern 2. For some learners, Pattern 1 may

repeat as much as 5 times more often. The occurrence of the two patterns together may reach as many as 80 times in a normal paced speech with 280 syllables in two minutes.

The basic reason that accented Mandarin tones vary in the above ways must be that the intonational system of the learners' native language, English, affects the pronunciation of the second language. The two basic tones in English are a high tone and a low tone, which causes the learners to frequently pronounce Mandarin tones in similar ways. In English, tonal change happens cross groups of syllables, but in Mandarin, patterned tonal changes often happen within each syllable, especially when the speech pace is relatively low. Also, the learners need to remember which syllable carries which tone. These all cause difficulties in pronunciation. Therefore, correctly pronounced Chinese carry a smaller number of the tonal combination patterns detailed above, while accented Chinese carry more.

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Patterned Vowel Variation in Mandarin Loanword Adaptation: Evidence from a Dictionary Corpus*

Yen-Hwei Lin
Michigan State University

This quantitative study examines vowel adaptation patterns in English-based Standard Mandarin (SM) loanwords drawn from a dictionary corpus. The findings are: (i) English non-central vowels are mostly matched in backness in SM, (ii) English high and low vowels have a strong tendency to be retained as high and low respectively in SM, whereas matches for English mid vowels mostly vary between mid and low in SM; (iii) the match between mid and low vowels and that between mid and high vowels are tolerated to various degrees, but a match between high and low monophthong vowels rarely occurs; (iv) a rounding mismatch rarely occurs for English unrounded vowels in the adaptation process, whereas non-high back rounded vowels, mid central vowels, and back diphthongs can be matched with an unrounded correspondent in SM. Possible explanations for and theoretical implications of these variation patterns are discussed.

1. Introduction

There is a high degree of variation in adapting English vowels into Standard Mandarin (SM) as it is common to match the same English vowel with several different vowels. English [eɪ] can be adapted to [ei] or the less faithful [i] and [ai], as shown in (1).

(1)	<i>Reagan</i>	[eɪ]	→	<i>lei.gen</i>	[lei.kən]
	<i>Reagan</i>	[eɪ]	→	<i>li.gen</i>	[li.kən]
	<i>Shoemaker</i>	[eɪ]	→	<i>xiu.mai.ke</i>	[çjou.mai.k ^h ʅ]

Deviation from faithful vowel adaptation can sometimes be attributed to individual users' or translators' preferences for particular characters based on semantic considerations or

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other factors (cf. Miao 2006). The question, however, is whether or not the seemingly chaotic variation in SM vowel adaptation is simply arbitrary and random or instead has general patterns and restrictions.

In my previous studies of vowel adaptation in SM loanwords (Lin 2007ab, to appear), I randomly collected more than 200 loanwords, with more than 410 vowel tokens, from publications such as newspapers, magazines and books, from radio and TA broadcasts, and from informal observation in daily life such as conversations and street signs. The findings are that (i) vowel backness is more faithfully replicated than height and rounding, (ii) deviation in height is tolerated but minimal; e.g., a high-mid or mid-low match is acceptable but a high-low match is not, and (iii) central vowels behave as if they are unspecified for and/or ambiguous between front and back. Sample examples are given in (2). The data have been analyzed in Lin (to appear) in Optimality Theory with a set of loanword-specific faithfulness constraints called MIMIC that relates a loanword output to the identifiable foreign percept (Yip 2002, 2006).

(2) Sample examples

a. Examples for high vowels

<i>Grieg</i>	[i]	→	<i>ge.li.ge</i>	[kʎ.li.kʎ]	front high
<i>Grieg</i>	[i]	→	<i>ge.lei.ge</i>	[kʎ.lei.kʎ]	front mid
<i>Judy</i>	[u]	→	<i>zhu.di</i>	[tʂu.ti]	back high
<i>Judy</i>	[u]	→	<i>qiu.di</i>	[tʂ ^h ʝou.ti]	back mid

b. Examples for mid front vowels

<i>Reagan</i>	[eɪ]	→	<i>lei.gen</i>	[lei.kən]	front mid
<i>Reagan</i>	[eɪ]	→	<i>li.gen</i>	[li.kən]	front high
<i>Shoemaker</i>	[eɪ]	→	<i>xiu.mai.ke</i>	[çjou.mai.k ^h ʎ]	front low
<i>Blair</i>	[ɛ]	→	<i>bu.lei.er</i>	[pu.lei.əɪ]	front mid
<i>Blair</i>	[ɛ]	→	<i>bu.lai.er</i>	[pu.lai.əɪ]	front low
<i>Clements</i>	[ɛ]	→	<i>ke.li.men</i>	[k ^h ʎ.li.mən]	front mid

c. Examples for mid back rounded vowels

<i>Owen</i>	[ou]	→	<i>ou.wen</i>	[ou.wən]	back mid
<i>Dole</i>	[ou]	→	<i>du.er</i>	[tu.əɪ]	back high
<i>Gore</i>	[ɔ]	→	<i>guo.er</i>	[kwo.əɪ]	back mid
<i>Gore</i>	[ɔ]	→	<i>gao.er</i>	[kɔu.əɪ]	back low
<i>Ohio</i>	[ou]	→	<i>er.hai.er</i>	[ʎ.xai.ʎ]	back mid unrounded
<i>Oregon</i>	[ɔ]	→	<i>er.le.gang</i>	[ʎ.lʎ.kɑŋ]	back mid unrounded

d. Examples for low vowels

<i>Gallup</i>	[æ]	→	<i>gai.luo.pu</i>	[kai.lwo.p ^h u]	front low
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<i>Jackson</i>	[æ]	→	<i>jie.ke.sen</i>	[tɕje.k ^h ʁ.sən]	front mid
<i>Harry</i>	[æ]	→	<i>ha.li</i>	[x ^a _c .li]	central low
<i>Johnson</i>	[ɑ]	→	<i>qiang.sheng</i>	[tɕ ^h ʝɑŋ.ʂəŋ]	back low
<i>Carter</i>	[ɑ]	→	<i>ka.te</i>	[k ^h ^a _c .t ^h ʁ]	central low
e. Examples for mid central vowels					
<i>Kentucky</i>	[ə][ʌ]	→	<i>ken.de.ji</i>	[k ^h ən.tʁ.tɕi]	central/back mid
<i>Douglas</i>	[ʌ][ə]	→	<i>dao.ge.la.si</i>	[t ^a u.kʁ.la _c .sɿ]	back/central low
<i>Ferdinand</i>	[ə]	→	<i>fei.di.nan</i>	[fei.ti.nan]	front mid
<i>Jeremy</i>	[ə]	→	<i>jie.li.mi</i>	[tɕje.li.mi]	front high
<i>Hillary</i>	[ə]	→	<i>xi.lai.li</i>	[çi.lai.li]	front low
<i>Bird</i>	[ə]	→	<i>bo.de</i>	[pwo.tʁ]	back mid rounded
<i>Curt</i>	[ə]	→	<i>ke.te</i>	[k ^h ʁ.t ^h ʁ]	back mid
<i>Curt</i>	[ə]	→	<i>kou.te</i>	[k ^h ou.t ^h ʁ]	back mid rounded
<i>Wordsworth</i>	[ə]	→	<i>wo.zi.hua.si</i>	[wu.tsɿ.xwa _c .sɿ]	back high rounded/central low

In this study, I examine a larger corpus to provide quantitative evidence for patterned variation in SM vowel adaptation, and to uncover more details of the variation patterns to answer the following questions: (i) In terms of the front-back dimension, what vowels tend to have more faithful matches and what vowels tend to have more variable matches? (ii) In terms of the height dimension, what vowels tend to have more faithful matches and what vowels tend to have more variable matches? Is there further evidence that deviation in height is minimal? (iii) In terms of the rounding dimension, what vowels tend to tolerate a rounding mismatch and what vowels tend not to? (iv) Is there further evidence that central vowels are unspecified for and/or ambiguous between front and back? The next section presents the vowel adaptation patterns in a large dictionary corpus. Possible explanations for and theoretical implications of these variation patterns are then discussed in the final section.

2. The dictionary corpus and the variation patterns

The corpus consists of more than 4200 proper names for place and people with a total of 8974 vowel tokens taken from the appendixes of *Oxford Advanced English-English and English-Chinese Dictionary* (1978), which are transliterated by the five editors of the dictionary. For each English vowel token, the SM correspondent used is recorded and counted, and a database is created to list for each English vowel (i) the types of SM vowels or glide-vowel sequences used to match the vowel and (ii) the

number and percentage of the occurrence for each SM variant. For example, for English [i], 11 types of SM vowels/glide-vowel sequences are found to have been used to match [i] and the frequency of each SM variant is calculated: of the 536 tokens of English [i], 445 (83%) of them are matched with SM [i] and 50 (9%) of them with SM [ei]. Then for each English vowel, the SM variants are grouped into categories in terms of vowel quality: high, mid, low, front, central, back, rounded/unrounded, and the number and percentage for each group are calculated. My assumptions about the vowel qualities in Mandarin and English are given in (3).

- (3) Assumptions of vowel quality
(cf. Lin 1989, 2007b, to appear, Duanmu 2000).

- a. SM phonemic vowels, with /ə/ and /a/ unspecified for backness

	front unrounded	front rounded	central	back rounded
high	i	y		u
mid			ə	
low			a	

- b. SM surface vowels:

	front unrounded	front rounded	central	back unrounded	back rounded
high	i	y			u
mid	e ei ɛ		ə	ɤ	o ou
low	a ai		a _c	ɑ	ɑu

- c. The glides, [j], [ɥ], and [w] are derived from the corresponding high vowels when followed by a non-high vowel: /ia/ → [ja], /uan/ → [wan].
- d. Allophonic rules for mid central /ə/
 /ə/ → [ə] in a closed syllable: [ən], [əŋ]
 /ə/ → [e] when adjacent to [i]/[j]: [ei], [je]
 /ə/ → [o] when adjacent to [u]/[w]: [ou], [wo]
 /ə/ → [ɤ] in a CV or V syllable: [kɤ]
- e. Allophonic rules for low /a/ (Lin to appear)
 /a/ → front [a] before [i]/[n] or after [j]: [ai], [an], [ja].
 /a/ → central [a_c] in an open syllable in [wa_c], [a_c].
 /a/ → back [ɑ] before [u] or [ŋ]: [ɑu], [ɑŋ]
 /a/ → front raised [ɛ] between a high front glide and [n]: [jɛn], [ɥɛn].

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f. English vowels¹

	front unrounded	central	back unrounded	back rounded
high	i ɪ			u ʊ
mid	eɪ ε	ə ʌ ə		oʊ ɔ ɔɪ
low	æ aɪ		ɑ	aʊ

Consider now Table I, in which the most frequently matches for each English vowel are tabulated. The subscripted number after each vowel is the number of tokens found in the data. The patterns exhibited in Table I are summarized in (4).

Table I The most frequently used SM correspondents to each English vowel from the dictionary corpus

English	SM	SM	English	SM	SM
[i] ₅₃₆	[i] ₄₄₅ 83%	[ei] ₅₀ 9%	[u] ₄₉₂	[u] ₄₀₅ 82%	[ou] ₄₄ /[wo] ₂₀ 13%
[ɪ] ₁₆₂₅	[i] ₁₂₈₀ 74%	[ei] ₁₄₄ 9%	[ʊ] ₁₄₈	[u] ₁₀₉ 74%	[ou] ₁₄ /[wo] ₇ 14%
[eɪ] ₃₃₉	[ei] ₁₂₀ 35%	[ai] ₇₁ 21%	[oʊ] ₄₆₉	[ou] ₃₀ /[wo] ₂₃₅ 57%	[u] ₅₉ 13%
[ε] ₅₈₉	[ai] ₁₅₉ /[a] ₃₀ 32%	[ei] ₁₁₀ 19%	[ɔ] ₆₀₀	[wo] ₂₁₀ /[ou] ₅ 36%	[au] ₁₃₇ 23%
[æ] ₈₄₇	[a] ₃₀₄ /[ai] ₄₇ /[ja] ₇₉ 51%	[a _c] ₃₂₉ 39%	[ɑ] ₆₀₅	[a _c] ₃₈₅ 62%	[ɑ] ₁₀₀ 17%
[ə] ₂₁₀₆	[a _c] ₆₀₃ 29%	[ə] ₃₂₂ 15%	[ə] ₁₅₂	[wo] ₄₀ 26%	[ɾ] ₂₈ 18%
			[ʌ] ₁₅₅	[a _c] ₂₉ 19%	[ə] ₂₉ 19%
[aɪ] ₂₃₀	[ai] ₁₄₆ /[a] ₁₄ 70%	[ei] ₂₃ 10%	[aʊ] ₅₈	[au] ₃₄ [ɑ] ₈ 72%	[wo] ₅ 9%
			[ɔɪ] ₂₃	[wo.ji] ₆ 26%	[wo] ₃ 13%

¹ Following the dictionary editors' English transcriptions, the low back rounded vowel [ɒ] in British English is grouped together with [ɔ].

- (4) Patterns exhibited in Table I
- a. The general patterns of (i) backness matching, (ii) possible deviation in height/rounding, and (iii) ambiguity in backness for central vowels are all evident.
 - b. The most frequently used SM correspondents to the high/mid front and back vowels in English are all front and back respectively, and at least one of the SM correspondents in each case deviates in height.
 - c. The low vowels are matched with low vowels with the same backness or with the central low vowel. It is interesting to note that the central low vowel in SM seem to be the preferred match for the English back low vowel (62%).
 - d. For mid central vowels, the most common matches are central or back vowels although the total percentage of the most frequent matches for each vowel is lower than 45%, indicating a greater degree of matching variability.
 - e. For the diphthongs, backness is faithfully matched with possible deviation of height for low diphthongs.
 - f. Rounding mismatch occurs for [ə] (→ [wə]) and [aʊ] (→ [ɑ]).

There are clearly different degrees of variable adaptation for different vowels: Adaptation of mid vowels varies most, and adaptation of low vowels is more variable than that of high vowels but less so than that of mid vowels. We can see that English high vowels are matched with SM high vowels in the majority of the cases, ranging from 74% to 83%. Adaptation of mid vowels are much more variable in height matching, ranging from 15% to 57%. Adaptation of mid central vowels are especially variable: there are 15 SM variants for [ʌ], 17 for [ə] and 29 for [ɐ], and the combined percentage of the two most frequently used variants for each mid central vowel is less than 45%.

Consider now Table II, in which the matches for each English vowel are classified in terms of vowel quality. Again, the subscripted number after each vowel is the number of tokens found in the data. A rounding mismatch occurs when an English rounded vowel is matched with an unrounded correspondent in SM, and when an English unrounded vowel is matched in SM with a rounded vowel. The last column in Table II indicates the percentage of the SM matches that differ from the English vowel in rounding. The patterns exhibited in Table II are summarized in (5).

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Table II SM variants used for each English vowel in terms of vowel quality

English	SM front	SM central	SM back	SM high	SM mid	SM low	rounding mismatch
[i] ₅₃₆	96%	2%	2%	84%	14%	2%	2%
[ɪ] ₁₆₂₅	93%	4%	3%	80%	17%	3%	2%
[eɪ] ₃₃₉	76%	18%	6%	6%	50%	44%	3%
[ɛ] ₅₈₉	70%	13%	17%	11%	52%	37%	7%
[u] ₄₉₂	1%	1%	98%	83%	16%	1%	3%
[ʊ] ₁₄₈	0%	3%	97%	74%	22%	4%	4%
[oʊ] ₄₆₉	1%	4%	95%	13%	74%	13%	17%
[ɔ] ₆₀₀	3%	19%	78%	6%	52%	42%	38%
[æ] ₈₄₇	52%	41%	7%	0%	7%	93%	1%
[ɑ] ₆₀₅	11%	65%	24%	1%	7%	92%	4%
[ə] ₂₁₀₆	29%	44%	27%	6%	40%	54%	14%
[ɚ] ₁₅₂	20%	10%	70%	5%	74%	21%	53%
[ʌ] ₁₅₅	12%	38%	50%	15%	44%	41%	42%
[aɪ] ₂₃₀	95%	3%	2%	15%	13%	72%	2%
[aʊ] ₅₈	2%	7%	91%	5%	19%	76%	22%
[ɔɪ] ₂₃	9%	4%	87%	9%	69%	22%	22%

(5) Patterns exhibited in Table II

The front-back dimension

- a. English high/mid front and back vowels and diphthongs are mostly adapted with the same backness specification in SM, ranging from 70% for [ɛ] to 98% for [u].
- b. English [æ] is likely to be adapted as either a front (52%) or central vowel (41%) in SM, whereas English [ɑ] is more likely to be adapted as a central vowel in SM (65%) and is matched with a back vowel at 24%.
- c. English mid central schwa tends to be matched with a central vowel (44%), but this tendency is not as strong as the front and back matches in the high/mid vowels and diphthongs since the combined front and back vowel matches for schwa reaches 56% (29% for front plus 27% for back), which indicates much variation in the adaptation of schwa.
- d. The other two English mid central vowels tend to be matched with a back vowel in SM: 50% for [ʌ] and a strong 70% for [ɚ].

The height dimension

- e. High and low vowels have a strong tendency to remain high and low respectively in SM, ranging from 74% for [ʊ] to 93% for [æ].
- f. With the exception of [oʊ] and [ə], which tend to stay as mid (74%), English mid vowels tend to be matched with either a mid or low vowel in SM, with a mid vowel match hovering around 40-52%.

Rounding mismatch

- g. A rounding mismatch very rarely occurs for English unrounded front vowels, high back rounded vowels, and low vowels.
- h. Back rounded mid vowels and diphthongs, i.e. [oʊ], [ɔ], [aʊ], and [ɔɪ], and the schwa are sometimes matched with an unrounded one (14% to 22%).
- i. A rounding mismatch occurs most frequently for [ə] (53%), [ʌ] (42%), and [ɔ] (38%).

Based on these exhibited patterns, the following generalizations obtain:

(6) Generalizations

- a. In terms of the front-back dimension, English non-central high/mid vowels and diphthongs are mostly matched in backness in SM, whereas the SM matches for English central vowels and low vowels vary to a larger extent.
- b. In terms of the height dimension, English high and low vowels tend to be retained as high and low respectively in SM, whereas matches for English mid vowels mostly vary between mid and low in SM.
- c. The match between mid and low vowels and that between mid and high vowels are tolerated to various degrees, but a match between high and low vowels rarely occurs, ranging from 0% for [æ] to 5% for [aʊ], although with a slightly higher 15% high-vowel match for [aɪ].
- d. A rounding mismatch rarely occurs for English unrounded front and low vowels in the adaptation process, whereas mid back rounded vowels, mid central vowels, and back diphthongs can be matched with an unrounded correspondent in SM.

What can we then conclude from the variation patterns in the dictionary corpus? The general patterns identified in the previous studies are supported; that is, (i) vowel backness is more faithfully replicated than height and rounding; (ii) deviation in height is tolerated but minimal; (iii) central vowels behave as if they are unspecified for and/or ambiguous between front and back. However, this dictionary corpus study reveals some interesting detailed variation patterns in which some vowels are much more faithfully

replicated while some others are more likely to deviate in backness, height, and/or rounding. Specifically, the answers to the questions raised in §1 are given in (7)-(10).

- (7) In terms of the front-back dimension, what vowels tend to have more faithful matches and what vowels tend to have more variable matches?
Low vowels and mid central vowels have more variable matches than high/mid non-central vowels.
- (8) In terms of the height dimension, what vowels tend to have more faithful matches and what vowels tend to have more variable matches? Is there further evidence that deviation in height is minimal?
 - a. High and low vowels are mostly faithfully matched in height, whereas mid vowels have more variable matches, with preferences for mid and low matches.
 - b. A high to low match and vice versa are indeed rare, supporting the minimal deviation restriction on height mismatches.
- (9) In terms of the rounding dimension, what vowels tend to tolerate a rounding mismatch and what vowels tend not to?
 - a. Rounding mismatches occur less frequently than height deviation in general, and there exhibits an asymmetry between unrounded and rounded vowels, between central and non-central vowels, and between high/low and mid vowels.
 - b. Rounding mismatches are restricted to mid back rounded and mid central unrounded vowels, and the back low rounded diphthong.
 - c. Non-central unrounded vowels and high/low monophthong vowels are rarely matched with a rounded vowel.
- (10) Is there further evidence that central vowels are unspecified for and/or ambiguous between front and back?
 - a. Mid central vowels exhibit highest degrees of variation in matches of front, central and back vowels, suggesting that they are not specified for backness or their backness quality is not salient.
 - b. The SM low central vowel is a common match for either a front or back low vowel in English, showing its ambiguous status in backness grouping and categorization.

In sum, we have seen quantitative details in the vowel adaptation patterns in SM loanwords based on the dictionary corpus. Although the general variation patterns identified in the previous studies are supported, this study has uncovered the interesting fact that not all non-central vowels have the same variation patterns, and some types of

vowels tend to be more variably matched in terms of certain vowel quality while some others tend not to.

3. Discussion and concluding remarks

One question raised by the patterns found in the dictionary corpus is this: Why are there asymmetrical variation patterns among different types of vowels? The data show that the more peripheral the English vowel is, the less deviation and variation there is in the SM matches: (i) Tense high/mid vowels show less backness variation in SM matches than the corresponding lax ones, and the high vowels show less such variation than mid vowels; e.g., [i] is mostly faithfully matched, [ɪ] is slightly less so, [eɪ] is more variable, and [ɛ] is even more variable; (ii) high and low vowels show much less deviation in height than mid vowels; (iii) mid central vowels have most variable matches in height, backness, and/or rounding. The fact that vowels with better perceptual contrasts and saliency (e.g. peripheral vowels, tense vowels) are adapted more faithfully while vowels with relatively poor perceptual contrasts and saliency (e.g. mid central vowels, mid vowels, lax vowels) have more variable matches seems to suggest that perceptual factors play a crucial role in the variation patterns of SM loanword vowel adaptation.

There have been heated debates regarding how loanwords are adapted and processed. The phonetics approach (Peperkamp and Dupoux 2003, Peperkamp 2005) argues that adaptation results from misperception and is processed at the phonetic level. In the phonology approach (Paradis & LaCharité 1997, LaCharité and Paradis 2005), the input to the adaptation process is based on the phonology of the source language, and loanword adaptation follows category preservation/proximity principles where segment matching is based on phonological categories. In the combined perception-phonology approach (e.g. Silverman 1992, Yip 1993, 2002, 2006, Steriade 2001, Kenstowicz 2003, Kang 2003), the input to the adaptation process is based on how the borrowers perceive the acoustic signals of the source language, and the perception-based input is modified/adapted by the borrowing language's phonological grammar.

The implications of this study, together with the previous ones, for theories of loanword phonology are: (i) The variability of vowel adaptation in SM loanwords casts doubt on the strict form of phonological category preservation/proximity principles (LaCharité and Paradis 2005) and argues against a purely perceptual misperception account (Peperkamp and Dupoux 2003, Peperkamp 2005); (ii) the fact that non-peripheral vowels, such as mid and central vowels, exhibit more variation in matches and/or ambiguity for categorization while peripheral vowels are more faithfully replicated suggests that the input to the adaptation process is more likely to be based on auditory perception; (iii) the inviolability of SM phonotactics and allophonic distributions reflects the dominant phonological force and supports theories of loanword adaptation that incorporate phonological grammar (Paradis and LaCharité 1997, LaCharité and Paradis 2005, Yip 2006, Smith 2006ab, among others); (iv) the variation in vowel adaptation and

the prioritized matching in favor of some aspects of foreign inputs support a ranked set of loanword-specific constraints (Yip 2002, 2006, Smith 2006ab, Lin to appear.)

There are still larger issues in loanword phonology that remain to be determined. First, what is the nature of the input to loanword adaptation and processing? Is the input phonetic in nature or phonological or a combination of both? Although this study seems to suggest that the input is more likely to be based on auditory perception, an analysis in which the input combines phonetic and phonological properties could also work. Second, how do we formally model variation patterns in loanword adaptation and processing? Some recent work on modeling variation and frequency-based data/patterns (e.g. Coetzee 2006 and references therein) may help lead to a more refined formal analysis of the SM vowel adaptation data.

This study may also have broader implications for feature theory. That some features are more important than others in the adaptation process and minimal deviation in the less important features is tolerated suggests that not all vowel features are equally salient perceptually or of the same weight phonologically. The variable matching for a mid central vowel and the less stringent matching in height and rounding could point to a feature theory in which the front-back dimension is primary for vowel quality and the height and rounding dimensions are secondary, and a central vowel is unspecified for or ambiguous between front and back. Studies in other domains, such as imperfect puns and perceptual errors, also seem to indicate that some vowel features are less faithfully retained than others (Miao 2006, 154). For example, Zwicky and Zwicky (1986) observes that imperfect puns in English more frequently tolerate deviation in height and tenseness, which, like this study, may suggest that certain vocalic features are perceptually less salient and/or phonologically secondary. However, the prediction that vowel height could be phonological secondary seems to run counter to the typological patterns in which all languages have height contrasts but some lack backness contrasts, and languages tend to have more levels of contrasts in vowel height than backness (see Lin to appear). It could be that some combinations of the phonetics and phonology of the individual languages and some universal aspects of vowel features play a role in the asymmetrical behavior of vowel features, and I leave it open for future research.

Several larger questions with regard to the nature/properties of vowel features and feature theory then remain to be answered. First, why is that vowel height or vowel rounding is less salient or less important than vowel backness in the SM loanword adaptation process? This is in contrast to the fact that for consonants, manner features are more faithfully retained than place and voicing features (Steriade 2001, Miao 2006). Second, what phonetic and/or phonological factors influence the asymmetrical behavior of vowel features in different languages and/or universally. Third, what phonetic and/or psycholinguistic experiments can be conducted to test any asymmetrical behavior of features and gain a better understanding of the underlying causes?

As far as SM loanword phonology is concerned, future studies need to (i) examine a wider range of corpora to neutralize personal idiosyncrasies in transliteration; (ii)

investigate what factors can potentially affect patterns of vowel quality matching and to what extent, (iii) consider factors such as actual acoustic similarity, competing choices between consonant and vowel faithfulness, restrictions on syllable types and written characters, and possible influence by orthography, (iv) determine between which type of English (American, British, English spoken by Chinese) and which variety of SM (in China, Taiwan, or overseas communities) acoustic values/vowel quality should be compared, (v) conduct statistics analysis and provide a formal model that better reflects the quantitative distribution, and (vi) examine prosodic adaptation, e.g., how stress is adapted into tone.

In conclusion, this quantitative study of a dictionary corpus confirms the general vowel adaptation patterns found in the previous studies but provides more details on what types of vowels are more faithfully adapted than other ones. The above discussion also demonstrates the areas in which such studies can made contributions to and how future studies may provide insights into SM loanword phonology in particular and phonological theory in general.

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Speech Errors of Tone in Taiwanese

Joyce H.-C. Liu H. Samuel Wang

Tsing Hua University Yuan Ze University

In this study, we analyze tone errors of Taiwanese spontaneous speech to tackle three issues. The first is to make a comparison between segmental errors and tone errors in Taiwanese to see if these two kinds of errors behave similarly. The second is to investigate the role of language-specific tone rules in the occurrence of tone errors. Taiwanese, with a unique and complex tone sandhi phenomenon, provides a good ground to examine this issue. The third issue is to investigate the mechanism of Taiwanese tone sandhi phenomenon. Consider the first issue. The results showed that tone errors and segmental errors have similarities as well as differences. Second, our study showed that language-specific tone rules play an important role in the occurrence of tone errors. Moreover, regarding the mechanism of the tone sandhi phenomenon, our results seemed to support the allomorph-selection model better.

0. Introduction

Analysis on speech errors provides different evidence to investigate the grammar of speech production, the reality of phonological rules as well as processes, and the psychological reality of phonological units, syllable structures, etc.. However, most of the previous studies on speech errors deal with Indo-European languages such as Dutch, German, and English. There are much fewer research studies on non-Indo-European languages which have different language systems such as Thai (Gandour 1977), Arabic (Hassan and Issam 1987), and Chinese (Shen 1993, Chen 1999, Wan 1999, 2007a, b). Moreover, most of the phonological studies focus on consonants and vowels, i.e. segmental errors. Researches on suprasegmental errors such as tonal errors are practically rather scant due to this Indo-European bias. Accordingly, this study of tone errors in Taiwanese not only contributes to the study of tone, but also provides one more set of data of non-Indo-European languages to the study of speech errors.

1. Literature Review

Compared with studies on other phonological components such as consonants and vowels, the study on tone is really scarce. There are only one study on Thai (Gandour 1977) and some on Mandarin (Wan 1999, 2007a, b). Gandour (1977) is the first one to show that lexical tone, like other phonological components, also has errors. His study on tone errors of Standard Thai produced by Phuket Thai bidialectals showed that tone errors behave similarly to segmental errors. First of all, tone errors do not occur

randomly. Instead, they are context-conditioned, which means that we can find the interference source of an error in the utterance. Like segmental errors, tone errors can be analyzed properly according to the direction of the error source in the context. Regarding the directionality, perseverations exceed anticipations in Thai tone errors in a ratio of about 2 to 1. This pattern is opposite to that of segmental errors found in other studies (Fromkin 1973, Cohen 1973, Nootboom 1973) which show that anticipations outnumber perseverations. Moreover, Gandour found that in addition to context factors, the factor of language-specific tone rules also plays a role in the occurrence of tone errors. Nevertheless, context is still the major factor.

Wan made a series study on Mandarin phonological errors, including segmental errors and tone errors (Wan 1999, 2007a, b). She had the same conclusion as Gandour that tone errors and segmental errors behave similarly regarding the directionality and error source. However, concerning dialectal interference and the influence of language-specific tone rules, Wan had different claims from Gandour. Wan's study on Mandarin showed that there is little dialectal interference and no influence of language-specific tone rule on the occurrence of tone errors in Mandarin.

2. Purpose of Study

There are three purposes in this study. The first purpose is to make a comparison between tone errors and segmental errors collected from the same corpus. Gandour and Wan concluded that tone errors behave similarly to segmental errors in that both are mainly context-conditioned and can be accounted for by the directionality of error source. Regarding the term 'context-conditioned' used in segmental errors, there are several meanings. First, segmental errors do not occur at random (Fromkin 1973, Gandour 1977, Wan 1999). Most of the time, we can find the source of interference in the utterance. Second, some context factors constrain or facilitate the occurrence of segmental errors such as distance and phonological similarity between the target and the source words. Cohen (1973) and Nootboom (1973) found that the distance between the error and the source words in segmental errors are mainly within seven syllables. In addition, the number of errors and the distance between the error and the source words bear an inverse relationship, the longer the distance between the error and the source, the fewer the tokens. Moreover, in segmental errors, the target and source words usually have phonological similarity, such as similar syllable structure, stress pattern, or same segmental components (Boomer and Laver 1973, Nootboom 1973, Wan 1999). In this study we will make a comparison between tone errors and segmental errors via the three aspects to see if they have similar behaviors, i.e. the directionality of error source, the distance between the error and the source words (hereafter the E-S distance) and the phonological similarity between the target and source words (hereafter the T-S similarity).

The second purpose is to investigate the factor of language-specific tone rules on tone errors. Gandour (1977) found that the factor of language-specific tone rules

contribute to some tone errors in Thai while Wan (1999) mentioned that there is no influence of the Mandarin tone sandhi rule on tone errors. Hence, the influence of language-specific factors is not so clear and it needs further research to show if language-specific tone rules are a factor contributing to tone errors. Actually, compared with Standard Thai and Mandarin, Taiwanese provides a better ground to investigate the influence of language-specific rules on tone errors. In Standard Thai, there is no language-specific tone rule per se. The influence of language-specific tone rules Gandour found is due to the dialectal interference of Phuket Thai, which is the subjects' mother tongue.

As to Mandarin, although both Mandarin and Taiwanese are sub-languages of Chinese and both have tone sandhi phenomenon, the tone sandhi phenomenon in these two languages are essentially different. First, in Mandarin, there is only one tone sandhi rule applying to one tone while the tone sandhi phenomenon in Taiwanese is composed of a set of tone sandhi rules applying to every tone. Second, the Mandarin tone sandhi rule applies according to the word following the target in the utterance. Hence, the environment of rule application is also a context-conditioned factor. However, the tone sandhi phenomenon in Taiwanese is much more complicated. Every tone has two realizations, occurring on the surface according to the position of the target in the utterance which is syntactically defined and irrelevant to the segments surrounding the target. Consequently, different from the tone sandhi rule in Mandarin, the tone sandhi rules in Taiwanese are not context-conditioned. Accordingly, due to the unique and complex tone sandhi phenomenon, Taiwanese is a good candidate to investigate the issue whether language-specific tone sandhi rules are a factor contributing to the occurrence of tone errors or not. Moreover, the mechanism of Taiwanese tone sandhi phenomenon is still under debate. Hence we would like to assess different models accounting for this phenomenon based on our error data.

3. Tonal System In Taiwanese

Taiwanese is a dialect of Southern Min spoken in Taiwan. There are seven tones in Taiwanese, including five long tones and two short tones. Every tone has two realizations. One is called "citation tone" and the other is called "sandhi tone", as illustrated in Table 1. The notation of the tone value adopts Chao's (1930) five-point system, in which '5' indicating the highest pitch, '3' middle and '1' lowest.

The citation tone occurs in isolation as well as boundary position of a tone group while the sandhi tone occurs in a non-boundary position of a tone group. The tone group is a syntactically defined phrase (see Chen 1987, for detailed discussion on tone grouping and tone sandhi environments). Basically, a lexical item appears with sandhi tone when followed by another lexicon which is within a tone group. Take the word [si11] 'four' for example. When it occurs alone, it appears with the realization [si11]. When it is followed by another lexical item such as [tsap5] 'ten', it appears with the sandhi tone as [si53-tsap5] 'forty'

Table 1 Tone inventory of Taiwanese

Citation tone	Sandhi tone	Gloss
si55	si33-kua55	'poem'
si53	si55-kau53	'dead dog'
si11	si53-tsap5	'forty'
si33	si11-biə33	'temple'
si13	si33-tsit3	'quit job'
sik3	sik5-tsui53	'color'
sik5	sik1-sai33	'know'

The mechanism of the tone sandhi phenomenon in Taiwanese is still under debate. Traditionally, it is assumed that these two tone realizations bear a generative relation of rule application (Wang 1967, Cheng 1968). The basic idea of this rule-application model is that the base tone, i.e. the citation tone, is stored in the lexicon as an underlying form. The sandhi tone is derived from the base tone via the application of a set of tone sandhi rules, which are formulated in (1). The left side of the arrow indicates base tones while the right side of the arrow indicates sandhi tones. Notice that the derivation is unidirectional. Only the sandhi tone can be derived from the citation tone but not vice versa.

- (1) 55 → 33
 13 → 33
 53 → 55
 11 → 53
 33 → 11
 5 → 1
 3 → 5

However, later studies (Hsieh 1970, Wang 1983, Tsay and Myers 1996) casted strong doubt on the psychological reality of the formulated tone sandhi rules as well as the derivation process. Those experiments were conducted by asking subjects to generate the sandhi tone of a given citation tone.

Hsieh's (1970) experiment results showed 100% accuracy rate of the citation tones on the one hand and on the other hand, low accuracy rates of sandhi tones, along with low proportions of wrong application as well as high proportions of non-application of the tone sandhi rules. Meanwhile, different tone sandhi rules exhibit different degrees of accuracy rate. Based on the experiment results, Hsieh (1970) argued against the psychological reality of the rule-derivation model and further proposed an alternative model to account for the tone sandhi phenomenon. The basic ideas are that all surface

forms of a lexical item exist in the mental lexicon and the appearance of the surface tone depends on the selection of the allomorphs according to the position of this lexical item in an utterance. Hence, different from the derivation model, there are no so-called tone sandhi rules as well as rule-application process in the list hypothesis.

Wang (1983) also showed non-application errors of sandhi tones and inconsistency of the accuracy rates among different tone sandhi rules. Moreover, the results showed that the accuracy of sandhi tones can be improved via practice, supporting Hsieh's claim that familiarity plays a role in the selection process. Tsay and Myers (1996) argued that Taiwanese tone sandhi phenomenon is an example of lexical phrasal phonology. Both citation form and sandhi form of a lexical item co-exist in the mental lexicon. The occurrence of a given tone on the surface is a process of allomorph selection rather than allomorph generation. Though there are differences among those researchers' viewpoints, the main idea of them is that the occurrence of the surface tone of a lexical item is a process of selection or analogy rather than a process of rule derivation. Hence, we give this alternative model a general name as the allomorph model.

4. Methodology

In this study, speech errors, also called slips of the tongue, are defined as one-time errors in speech production planning. An intended utterance, which is usually a word but can also be a phrase or even a proposition, is mispronounced due to something going wrong in the planning process. Hence, errors such as repetition or repairment due to change of the topic or hesitation are excluded. Most of the time, the speakers are aware of these tongue slips made by themselves and will correct them right away. If the speakers do not notice or correct the errors, the listeners will remind them or make a correction on the errors. The data source of this study is recordings of Taiwanese spontaneous speech collected from radio programs. Most of the programs were conducted by a host and a hostess. They were native speakers of Taiwanese. In addition to the hosts and hostesses, the subjects also included different invited guests.

Errors of tone are classified based on the nature of the errors. Basically, our tone error data can be classified as the following five categories: phonological context errors, tone sandhi errors, non-context errors, lexical blends and language-mixing errors. Phonological context errors are errors in which we can find the error source in the utterance. If the source word precedes the error, it is a perseveratory error. If the source word follows the error, it is an anticipatory error. A phonological error can also be bidirectional when possible source words are found both before and after the error. An example of context errors is (2). In each of the following examples, the utterance is phonetically transcribed. The first line represents the phonetic transcription, the second line is a word-by-word gloss and the third line is an English translation of the intended utterance. The target word (intended utterance) is boldfaced. The source word (source of interference) is underlined. The error is boldfaced and underlined. Following the format and diacritics of CHILDES (MacWhinney 1995), the marker [//] indicates a marker of

repairment. The word before the marker [/] is the misarticulated error and the word after it is the correction. The marker {} indicates the boundary of the utterance which is repaired if it contains more than one word. The marker [*] indicates an error without correction. Moreover, the tone value of initial and final particles is marked as 0.

- (2) u11 he55 {tsok5 se53 tiau53}[/] tsok5 se53 tiau13 e33 hui53-kŋ53
 have that very tiny CL very tiny CL DE vessel
 ‘There are very tiny blood vessels.’

In (2) the target tone [13] in [tiau13] ‘a classifier’ is mis-uttered as the tone [53]. There are two possible interfering sources. One is the word [se53] ‘tiny’ preceding the error and the other is the following word [hui53-kŋ53] ‘vessel’. Hence this case is an anticipatory/perseveratory (hereafter A/P) error.

Tone sandhi errors specifically categorize tone errors in which there is a tone sandhi relationship between the error tone and target tone. The error is either the citation form or the sandhi form of the target. Non-context errors are errors in which we can not find the source in the utterance. Tone sandhi errors can be counted as non-context errors broadly because as mentioned previously, the realization of citation tone or sandhi tone are irrelevant to the surrounding segments in the utterance. However, we separate them from non-context errors for they are essentially different. Regarding non-context errors, we can neither find the source in the utterance nor find a possible source outside the context. As to the tone sandhi errors, we can find the error source though it is not in the context and we can give a reasonable explanation accounting for this kind of errors. Accordingly, we separate these two kinds of errors. Examples of tone sandhi errors and non-context errors are in (3) and (4), respectively.

(3) Tone sandhi errors

- {lai33 po11} [/] lai33 po53 tɕit5 ɕiu55 kua55
 come broadcast come broadcast this CL song
 ‘Let’s play this song.’

(4) Non-context error

- tɕiam33-tui53 ba32 kha55 iu11 e33 po55-hun55 [*] lai33 su55ioŋ33
 focus meat more tender DE part come use
 ‘Only use the more tender part (of the mango in cooking).’
 (intended target: po11-hun33)

In (3), the target tone [53] in the verb [po53] ‘broadcast’ is substituted by the tone [11]. On the one hand, the tone [11] is the corresponding citation tone of the sandhi tone [53]. On the other hand, there is no other syllable with the tone [11] in the utterance. Hence, this error is classified as a tone sandhi error, in which the sandhi tone is replaced

by the citation tone. In (4), the target tones [11] and [33] in the word [po11-hun33] are articulated as [55-55]. Since we can neither find a source in the utterance with the tone pattern [55-55] nor find other possible intervening source, we count it as a non-context error.

The last two error categories involving tone errors on the surface are lexical blends and language mixings. These two kinds of errors are lexical errors rather than pure phonological errors. A lexical blend involving tone error is a lexical error maintaining the syllable structure of the target word but substituting the tone with that of the source word. A language-mixing error involving tone is an erroneous combination of syllable structure of the target word and the tone of the Mandarin counterpart, which is a kind of bilingual interference. Examples of lexical blends and language-mixings are (5) and (6), respectively.

(5) gua55 u11 ka53 li55 koŋ33 [//] koŋ55-kue53 ten11-ue33.
 I have with you talk talked telephone
 ‘I had talked to you on the telephone.’

(6) lan55 e33 ten53 [//] ten11-ue33 ci11 koŋ53 ji33 ...
 we DE electric telephone is zero two
 ‘Our telephone number is zero two ...’

In (5), the error is a lexical blend of the target [koŋ55] ‘talk’ and the intervening source [thoŋ33] ‘contact’. Both are verbs related to making a phone call and both verbs are used by this host frequently. As a result, the phonological similarity (both have the same rhyme [oŋ]) as well as the semantic relatedness of these two words contribute to this error. In (6), it is a language-mixing error of the target word [ten11] ‘electric’ and its Mandarin counterpart [tien53].

5. Analysis of Tone Errors

A corpus of 159 tone errors are collected in our data. They are classified into six categories according to the factors causing the errors, as shown in Table 2.

Table 2 Classification of tone errors

Category	Type I Options	Type II T. sandhi	Type III Context	Type IV Non-cont.	Type V Lex. ble.	Type VI Lg. mixing	Total
Tokens	83	33	19	5	5	14	159
%	52.2%	20.8%	11.9%	3.1%	3.1%	8.8%	100%

Note: “T. sandhi” stands for tone-sadhi errors, “Non-cont.” for non-context errors, “Lex. ble.” for lexical blends, and “Lg. mixing” for language-mixing errors.

Type I ‘Options’ contains errors with more than one possible analysis, mainly analytical ambiguity between context errors and tone sandhi errors. In order not to distort the data by unconscious bias, we tentatively put those errors in this category ‘Options’. It is clear that Type I ‘Options’ has the most error tokens, with a proportion more than 50%. This high proportion of ambiguity cases causes complexity in further analysis of tone errors and difficulty in hypothesis testing.

This table answers our second question clearly concerning the role of language-specific factor in the occurrence of tone errors. We can investigate this issue via two types of errors, i.e. Type I ‘Optional errors’ and Type II ‘Tone sandhi errors’. Type II are errors of substitution between citation tones and sandhi tones. Hence, they are errors due to the influence of Taiwanese tone sandhi rules. If we only consider clear error tokens, then tone sandhi errors contain the most tokens, more than 40% (33 out of 76). As to Type I, though most of the errors can be analyzed as tone sandhi errors or context errors and we can not make a clear-cut distinction among these errors, it still implies that the tone sandhi rules play a role on the occurrence of tone errors. Accordingly, our data clearly show that the factor of language-specific tone rules definitely play a role in the occurrence of tone errors. In the following sections, we will make different analyses based on Table 2 to tackle our questions.

6. Comparison Between Tone Errors and Segmental Errors

According to Gandour (1977) and Wan (2007b), phonological tone errors behave similarly to segmental errors. In this section, we will make a comparison between tone errors and segmental errors to see if they behave similarly. The segmental errors adopted for comparison are collected from the same corpus. Since the comparison is between phonological errors, we only include phonological tone errors, and exclude data of lexical blends and language-mixing errors as well as optional errors involving lexical factors. Consequently, the errors included for comparison are only substitution errors of single segment or tone. There are 119 segmental errors and 81 tone errors adopted for comparison. The tone errors include 65 option errors in Type I and 16 context errors in Type III.

For easiness of comparison between tone errors and segmental errors, we tentatively treat those ambiguous tone errors in Type I as context errors (hereafter TI errors) but do not combine them with clear context tone errors in Type III (hereafter TIII errors). We make a comparison between these two types of tone errors and segmental errors to see if they have similar behaviors in some context factors. The comparison is conducted from three perspectives: directionality, the distance between the error and the source words (hereafter the E-S distance), and phonological similarity between the target and the source words (hereafter the T-S similarity).

Directionality

Table 3 shows the frequency of tone errors as well as segmental errors based on the direction of the error source.

Table 3 Frequency of phonological errors based on directionality

Direction Phonological errors	Per.	Ant.	A/P	Total
Segmental errors	24 (20%)	74 (62%)	21 (18%)	119
TI errors	28 (54%)	19 (29%)	19 (17%)	65
TIII errors	7 (44%)	3 (31%)	7 (25%)	16

Note: 'Per.' stands for Perseveratory errors, 'Ant.' for Anticipatory errors, and 'A/P' for Anticipatory/Perseveratory errors.

It is clear to see that tone errors, both TI errors and TIII errors, have different distribution patterns from that of segmental errors regarding the directionality of the error source. The former has more perseverations than anticipations while the latter has the opposite distribution. The pattern of perseverations exceeding anticipations in tone errors is consistent with the findings of Gandour (1977) and Wan (2007b). However, the pattern of segmental errors with more anticipations is contrary to Wan's (2007b) finding in Mandarin, in which both segmental and tonal errors have more perseverations than anticipations. But this pattern is consistent with the findings of most studies of segmental errors in Indo-European languages (Cohen 1973, Nooteboom 1973, Fromkin 1973, Berg 1987). In a word, regarding the directionality of the error source, tone errors behave different from segmental errors in Taiwanese.

The E-S Distance

The E-S distance indicates the span between the error and the source words, counted by syllables. If the error and the source are next to each other, the E-S distance is one syllable. Take an example in TI errors for illustration. In (7), the error is the word [kəŋ53] 'broad' and the source word is the word [te53] 'short'. Hence, the E-S distance is four syllables

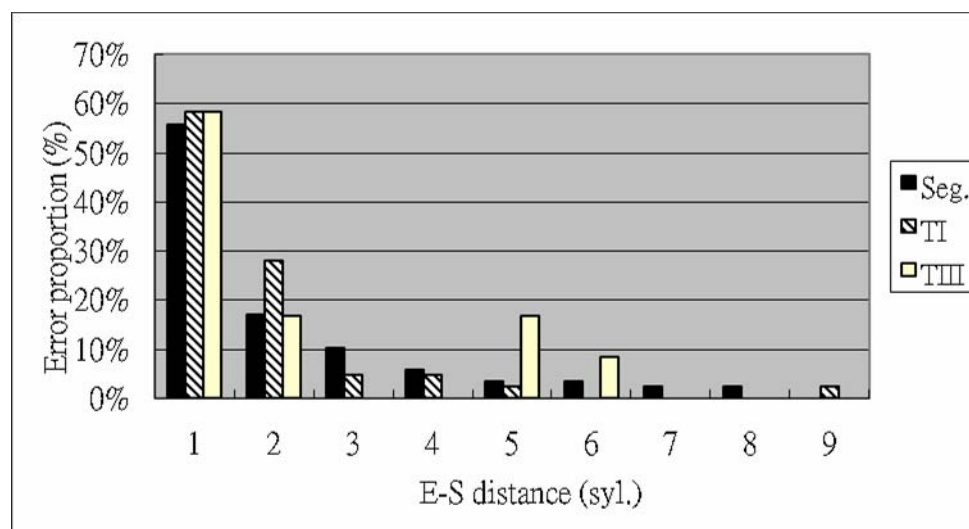
(7) in33-ui11 **kəŋ53**-kə11 [//] **kəŋ55**-kə11 ne0, te55-**te53** ɕi33-kan55, ...
 because broadcast broadcast PART short time
 'Because the time of advertisement is quite short, ...'

A frequency distribution of the E-S distance is shown in Table 4 and Figure 1. It only includes errors with one source word and errors with two source words in which both source words are equally distant from the error. Hence the tokens of segmental errors, TI and TIII errors are 88 errors, 43 errors, and 12 errors, respectively.

Table 4 Frequency of phonological errors based on the E-S distance (1)

Distance (syl.)	1	2	3	4	5	6	7	8	9
Tokens									
Segmental errors	49	15	9	5	3	3	2	2	0
TI errors	24	13	2	2	1	0	0	0	1
TIII errors	7	2	0	0	2	1	0	0	0

Figure 1: Frequency of phonological errors based on the E-S distance (2)



In Figure 1, it shows clearly that segmental and tone errors behave similarly from the perspective of the E-S distance. First, errors with the E-S distance of 1 syllable have the highest ratio, more than 50%. That is, more than half of the phonological errors are caused due to the influence of the adjoining syllable. Moreover, the average E-S distance of segmental, TI and TIII errors are 2.2 syllables, 1.8 syllables and 2.3 syllables, respectively. They are similar to that of segmental errors found in Cohen (1973), Nootboom (1973) and Wan (2007a, b), which are 2.1, 2.2 and 2.2 syllables, respectively.

Second, the proportion of error tokens is in reverse-proportion to the E-S distance. The longer the distance is, the fewer the errors occur. Third, the E-S distance of most errors does not exceed seven syllables. This finding provides an argument for the syllable as a unit in phonemic programming. Nootboom (1973) suggested that the finding of the E-S distances usually within seven syllables can be explained by the limit span of the working memory span, which contains about seven units (Miller 1962). Thus, the finding can be interpreted as an argument for the syllable as a basic unit in the phonemic programming stage of speech planning.

The distribution patterns indicate that distance is a factor constraining the occurrence of phonological errors, both segmental and tonal.

The T-S Similarity

Next, consider the factor of T-S similarity. The T-S similarity is calculated by comparing the target and the source words based on the four phonological components of a lexicon, i.e. onset(O), vowel(V), coda(C) and tone(T). Each component is represented by a number with the value of 1 or 0. If the target and the source have one identical component, then the similarity is 1 point on that component, otherwise the value is 0. Therefore, the similarity factor is encoded by four numbers in sequence. The four numbers in sequence represent the sameness or difference between the target and the source words concerning the four phonological components onset, vowel, coda and tone (OVCT) respectively. The degree of similarity is the sum of the four numbers, ranging from 0 to 4.

Some examples in Table 5 illustrate the calculation of the T-S similarity. The first column of 'Error' indicates the error words. The second and third columns indicate the intended target and the error source, respectively. The similarity is calculated by comparing the target column and the source column.

Table 5 Similarity between the target and the source

Error	Target	Source	Similarity OVCT	Similarity degree
tsu13	su13	tsai33	0000	0
pau55	kau55	pa53	0100	1
k ^h en55	ts ^h en55	k ^h a55	0001	1
kaŋ55	kan55	kaŋ55	1101	3

Take the first item in Table 5 as an illustration. The error is [tsu13], of which the target is [su13] and the error source is [tsai33]. There is no identical component between the target [su13] and the source [tsai33]. Therefore the similarity coding of OVCT is '0000'. The T-S similarity degree, i.e. the sum of the four numbers, is 0. In the second item, the target [kau55] and the source [pa53] have a common vowel [a]. Accordingly, the similarity coding of OVCT similarity is '0100', of which the second number '1' indicates the similarity of vowel between the target and the source words. The T-S similarity degree is 1. Likewise, the similarity coding of the third item is '0001' because the target [tshen55] and the source [kha55] have the same tone. The T-S similarity degree is 1. Hence, if an error has a similarity degree more than 0, it means that the target and the source words share some phonological similarity.

Table 6 lists the frequency distribution of segmental and tone errors with different similarity degrees. Only errors with one source word are included for the analysis of T-S similarity.

Table 6 Frequency distribution of the T-S similarity degree

Sim. degree Error category	0	1	2	3	4	Total
Segmental errors	27 (32%)	40 (47%)	15 (18%)	0 (0%)	0 (0%)	85
TI errors	23 (59%)	15 (38%)	0 (0%)	0 (0%)	0 (0%)	23
TIII errors	5 (50%)	4 (40%)	1 (10%)	0 (0%)	0 (0%)	10

Table 6 shows that tone errors behave differently from segmental errors with regard to the factor of T-S similarity. In segmental errors, there are about 30% of tokens with a T-S similarity degree of 0. However, in tone errors, there are 50% of TIII errors and nearly 60% of TI errors with a T-S similarity degree of 0. Given two words with CVC structure, the probability of no similarity between these two words is 0.52. Given two words with CV structure, the probability of no similarity between these two words is 0.62. Hence, an expected chance probability that two words have a T-S similarity degree of 0 is around 50% to 60%. The proportion of both groups of tone errors with a T-S similarity degree of 0 happens to be within this range. It indicates that the proportion of tone errors with a T-S similarity degree more than 0 is merely a proportion of chance but the proportion of segmental errors with a T-S similarity degree more than 0 is higher than expected by chance. Consequently, the different distribution between segmental errors and tone errors indicates that the context factor of phonological similarity is indeed a factor facilitating the occurrence of segmental errors but it is not a factor facilitating the occurrence of tone errors.

7. Analysis of Tone Errors With the Tone Sandhi Approach

In the previous section, we tentatively treat TI errors as context errors to make a comparison between tone errors and segmental errors. The results show that TI errors behave similarly to TIII errors. It implies that it is proper to classify all TI errors as context errors like TIII errors. However, as mentioned previously, TI errors can also be analyzed as tone sandhi errors properly. In this section we treat TI errors as tone sandhi errors alternatively like Type TII ‘tone sandhi errors’ (hereafter TII errors) and investigate which model related to the tone sandhi mechanism can account for those speech errors properly.

TI and TII errors in our study can be further divided into two kinds of errors, i.e. citation-tone errors and sandhi-tone errors, according to the form of the target. A citation-tone error is an error in which the target is a citation tone while the error is the sandhi tone of the target, like (8). In (8), the error tone [55] is the sandhi tone of the target tone [53]. A sandhi-tone error is the opposite. The target is a sandhi tone which is substituted by its citation tone, like (9). In (9), the error tone [32] is the citation tone of the target tone [53]. The frequency of both kinds of errors is given in Table 7.

(8) citation-tone error

tak1-e33 ka33 hue33-ɕioŋ55 [//] hue33-ɕioŋ53 khi11-lai11, ...
 everyone with recall recall raise
 ‘Everyone recalled (this experience) ...’

(9) sandhi-tone error

ke53-tat1 {tɕhit5 pa32} [//] tɕhit5 pa53 ban33 ne33 bi55-kim55
 value seven hundred seven hundred ten-thousand DE US dollar
 ‘(The whole life of a person is) valued at seven million US dollars.’

Table 7 Results of tone sandhi errors

Errors Tokens	Citation-tone error	Sandhi-tone error	Total
TI errors	24 (46%)	28 (54%)	52
TII errors	19 (59%)	13 (41%)	31
Total	43 (51%)	41 (49%)	84

Table 7 shows that citation-tone errors and sandhi-tone errors are roughly the same in number. Both are around half of the errors. Nevertheless, there is some difference between TI and TII errors with regard to the proportion of errors. In TI errors, sandhi-tone errors outnumber citation-tone errors while in TII errors, citation-tone errors exceed sandhi-tone errors. We further discuss the mechanism of the tone sandhi phenomenon to see how these errors are resulted.

As mentioned previously, there are mainly two models in the literature accounting for the tone sandhi phenomenon. One is the rule-application model and the other is the allomorph model. According to the former, only the sandhi tone can be derived from the citation tone, but not vice versa. A theoretical implication of this model is that since citation tones are underlying tones, there should be few citation tone errors and there should be much more sandhi tone errors than citation tone errors. As to the allomorph model, both citation tone and sandhi tone are stored in the mental lexicon. The appearance of the surface tone is a process of selection or analogy according to the syntactic position of the given word in the utterance. Consequently, errors occurring on the selection might result in wrong selection of citation form for sandhi tone or vice versa. Hence, the allomorph model predicts that errors on citation tone or sandhi tone are both possible. The tokens of citation-tone errors and sandhi-tone errors are about the same. Accordingly, it seems to support for the allomorph model

8. Conclusion

The comparison between phonological tone errors and segmental errors show similarities as well as differences. On the one hand, both kinds of errors show similar distribution patterns with regard to the context factor of distance between the error and

the source words. It indicates that the E-S distance is a factor constraining the occurrence of errors. On the other hand, phonological tone errors and segmental errors behave differently with regard to the context factors of directionality and phonological similarities between the target and the source words.

Next, regarding the factor of language-specific tone phenomenon in the occurrence of tone errors, our study shows that it not only plays a role but probably is also a more important role than context factors in accounting for Taiwanese tone errors. As to the third question concerning the mechanism of Taiwanese tone sandhi phenomenon, our data seems to provide supporting argument for the allomorph model. Based on this model, tone sandhi errors should be treated as lexical errors instead of phonological errors. If we treat tone sandhi errors as lexical errors, then in Taiwanese most tone errors are resulted from lexical errors rather than context-conditioned phonological errors.

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The Effects of Tonal Information on Lexical Activation in Mandarin

Nick Poss, Tsun-Hui Hung, and Udo Will
The Ohio State University

Recent research about the role of lexical tone in Chinese word recognition has arrived at varying conclusions. It remains unclear how tone is represented in the mental lexicon and how tone constrains the activation of lexical candidates. In a set of priming experiments, we manipulated the effect of tonal information on lexical processing by comparing the response times to prime and target syllables that share no segmental content but that either match or mismatch in lexical tone. In two experimental paradigms, shadowing and lexical decision, subjects consistently responded more slowly to target words that were preceded by a prime that contained a matching lexical tone. We argue that our results suggest a group activation of words with the same lexical tone that then compete during lexical selection. Our findings support the view that tones constrain lexical activation, but differently than reported in previous studies.

0. Introduction

The role of tonal information in perceptual processing and in spoken and visual word recognition of Chinese has become a prominent topic in recent research. However, it remains to be seen how tonal information is represented in the mental lexicon or how tonal information constrains lexical activation. For example, is tonal information processed early during lexical activation, similar to segmental information, or is it processed only after lexical retrieval (Cutler, 1986)? Conflicting results are found in current studies. In a priming study with a lexical decision task, Lee (2007) found that monosyllabic Mandarin words differing only in tone (i.e. segmentally identical, but tonally distinct) failed to cause the speeded responses typical of segmental form priming. For example, he found that hearing *lou2* ‘hall’ speeded identification of the identical word *lou2*. Hearing *lou3* ‘hug,’ however, did not speed responses to *lou2*, even though they are segmentally the same. He argues, in line with previous research (Cutler & Otake, 1999; Cutler and Donselaar, 2001; Cooper, Cutler, & Wales, 2002), that this is evidence for the online use of tonal information to constrain lexical activation. The difference in tone allows the subjects to quickly rule out incompatible candidates despite the similarity in segmental content. In a follow-up mediated priming experiment, Lee reduced the ISI from 250ms to 50ms and found that the minimal tone pairs did produce speeded responses. The facilitation of response times at a shorter ISI suggests that the processing

of tonal information may take place relatively late in lexical activation compared to that of segmental information.

In contrast, Yip (2001), in a shadowing study of Cantonese, found facilitation for segmentally identical monosyllabic words that have different tones. For example, hearing the prime /cho3/ resulted in faster responses to the target word /cho2/ compared to a prime that was unrelated in both segments and tone, such as /gwa1/. This leads him to conclude that Cantonese speakers are more sensitive to segmental information than suprasegmental information. He also found facilitation when the rime and tone of the prime and target syllables matched, but he attributes this to the effect of the rime and not the tone. Yip's findings differ from the findings of Lee, Cutler, and others. Is this difference specific to Cantonese or are the diverging results related to the difference in experimental task: shadowing in Yip's study versus lexical decision in Lee's? To address these questions and gain a better understanding of the effect of tone on lexical activation, we conducted a set of priming experiments with speakers of Mandarin. We manipulated the effects of tonal information by using primes and targets that were segmentally unrelated but that either matched or mismatch in lexical tone. We also compared the effects for words and pronounceable nonwords (syllables that follow the phonotactics of Mandarin, but have no meaning). This allowed us to test whether any effects observed for words were related to lexical or extra-lexical processing. Two experimental paradigms were employed (shadowing and lexical decision) to compare the effect of task on response time.

1. Experiment 1

The first experiment we performed was a shadowing experiment in which participants were asked to listen to a sequence of prime and target stimuli and then repeat the target as quickly and accurately as possible. Fourteen native Chinese speakers participated in this experiment (7 male). No participant reported any history of speech or hearing disabilities. Participants came from various regions in China, but they spoke Mandarin at home or school.

The target stimuli consisted 46 Mandarin words and 48 pronounceable nonwords. These were preceded by the prime syllables whose onset and rhyme segments were not related to those of the targets (*i.e.*, no segmental match). Each prime/target pair was presented twice, once with matching and once with non-matching tones. For example, the target syllable *ba* with Mandarin tone 3 (*ba*3 'to hold') was once preceded by prime syllable *mo*3 'to wipe' (tone match condition) and once by prime syllable *mo*1 'to touch' (tone non-match condition; see Fig.1). The time interval between the end of the prime and the beginning of the target was 250 ms.

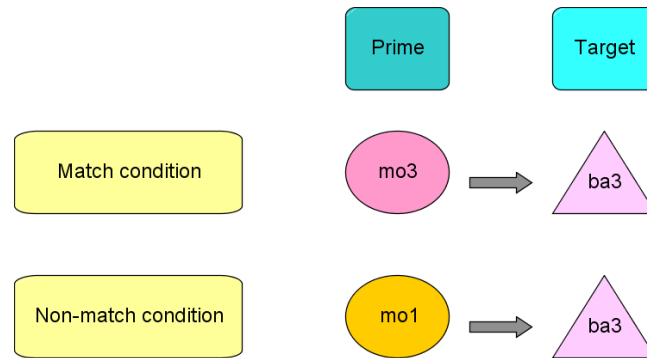


Figure 1.

An example of the match and non-match conditions. Only the lexical tone of the prime changes between the two presentations.

All tone/syllable combinations occurred only once, either as primes or as targets. The prime target sequences were arranged in two lists so that no prime or target syllable appeared more than once in a list. Items in each list were presented in randomized order and the sequence of the list was randomized across subjects.

Stimulus presentation was controlled by DMDX (K.I. Forster, Arizona State University) and participants listened to the stimuli sequences via headphones. They were instructed to ignore the first syllable of a stimulus pair and repeat the second syllable as quickly and accurately as possible. Vocalized responses and reaction times were recorded onto disk and after the experiments voice onset times were checked and if necessary corrected with CheckVocal (A. Protopapas). Reaction times were calculated from the target sound offsets to account for variable target durations.

Statistical analysis shows a significant effect of the tone matching condition for words but not for non-words. In the by-subject ANOVA we obtained $F(2,13)=5.33$; $p=0.038$ for words and $F(2,13)=2.72$; $p=0.123$ for nonwords. The mean difference between the matching and non-matching condition was 10.01 ms for words and 9.08 ms for non-words. The by-item analysis did not show a significant effect $F(2,47)=3.46$; $p=0.07$ for nonwords and $F(2,5)=3.11$; $p=0.08$ for words. The mean difference between the matching and non-matching condition was 9 ms and 8.6 ms for nonwords and words, respectively). The mean RT difference between words and nonwords was 30.72 ms in the matching and 31.69 ms in the nonmatching condition and is highly significant.

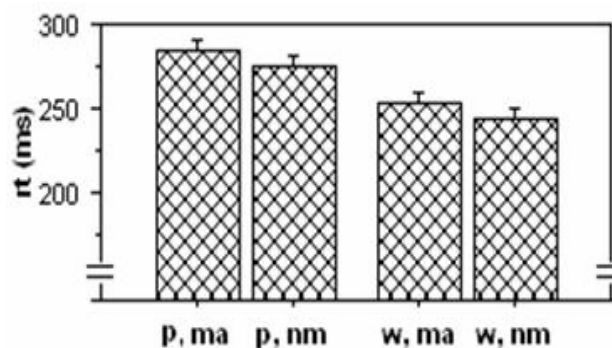


Figure 2.

Response time (rt) means and standard error for pronounceable nonwords (p) and words (w) compared for the match (ma) and non-match (nm) conditions in Experiment 1

Primes with matching tone and unrelated segments lead to a significant delay in the response to word targets but not to non-word targets. The lack of a significant effect for nonwords suggests that the delay maybe related to lexical processing rather than general auditory processing. The delay can be understood as inhibition in the case of tone match between primes and targets, and supports the view that tonal information plays a role in word recognition. In previous studies, inhibition in form priming has been taken as evidence of competition between activated lexical candidates (Slowiaczek & Hamburger, 1992; Monsell & Hirsh, 1998; Dufour & Peereman, 2003a/2003b). While these studies have looked at the influence of segmental information on lexical activation, we suggest that in our case it is possible that the tonal information creates a group activation of potential candidates that compete in selection.

2. Experiment 2

In order to assess the effect of the experimental task on the results from the first experiment, we used the same materials in a lexical decision task. Nineteen native Chinese speakers participated in this experiment (8 male). Prime and target stimuli were exactly the same as the Experiment 1, and stimulus presentation was similar to Experiment 1. All tone/syllable combination occurred only once, either as primes or as targets. The prime target sequences were arranged in two lists so that no prime or target syllable appeared more than once in a list. Items in each list were presented in randomized order and the sequence of the list was randomized across subjects. Stimulus presentation was controlled by DMDX (K.I. Forster, Arizona State University) and participants listened to the stimuli sequences via headphones. The participants were instructed to decide as quickly and accurately as possible whether the target sounds they heard were words or not by pressing a “Yes” or “No” button on a computer keyboard in

front of them. Reaction times were again calculated from the target sound offsets to account for variable target durations.

Again, we found a significant effect in the tone matching condition for words but not for nonwords. With the by-subject ANOVA we obtained $F(2,18)=7.64$; $p=0.013$ for words and $F(2,18)=1.04$; $p=0.32$ for nonwords. The mean difference between the matching and the nonmatching condition was 17.38 ms for words and -10.76 ms for nonwords. There was no significant difference between the overall reaction time for words and nonwords (-2.4 ms). The by-item analysis did not show significant effects ($F<1$ for both words and nonwords).

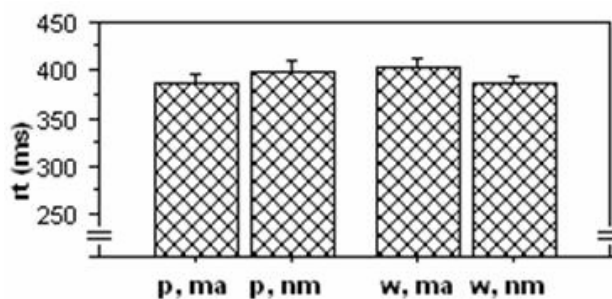


Figure 3.

Mean response times (rt) and standard errors for pronounceable nonwords (p) and words (w) compared for the match (ma) and non-match (nm) conditions in Experiment 2

The results of Experiment 2 are consistent with the results from Experiment 1. Again, inhibition was found for responses to words with primes that matched in tone, and no significant effect was for nonwords. This supports the view that independent of task, tone affects lexical processing and potentially activates a group of lexical candidates with the same tone that compete in selection.

Differences in the results between the two experiments demonstrate that task does have an effect on how subjects respond. In Experiment 1, there was a significant difference between the overall response times for nonwords versus words, perhaps related to the difficulty of pronouncing novel syllables. In the lexical decision task of Experiment 2, this difference in response times between words and nonwords does not appear since targets are not vocalized. The overall response time in Experiment 1 was faster by 184.5ms than that in Experiment 2, suggesting an additional effect of the task on responses. It is possible that the judgment of lexical status in the decision task requires additional processing time. These differences, however, do not interfere with the consistent inhibition found for the tone matching primes in the two experiments.

3. Discussion

Both of our experiments were designed to test the influence of tone on lexical selection. We manipulated the effect by using monosyllabic primes and targets that did not share any segmental phonology (i.e. consonants and vowels). Despite the different tasks performed by the subjects, a significant inhibition was found when words were primed by syllables that contained a matching tone. While the lack of significance in the by-item analysis must be addressed in future experiments, the significant by-subject effect is reinforced through replication in the two experiments. An effect was found for words only, not for nonwords, which supports the view that the observed effect is related to lexical processing. In line with previous studies of form priming, we view the inhibitory effect of primes with matching tones as indicative of lexical competition. We interpret this as a potential group activation of words with the same lexical tone that then compete during lexical selection. Unlike Yip (2001), we find that tone does affect lexical processing. This effect differs from the one described by Lee (2007) and others in which tone constrains lexical activation by inhibiting the activation of lexical candidates that shared the same segmental content but not the same tone.

While future experiments will be needed to better understand the sources of variance in our study and how the group activation of words based on shared tone might work, it is also true that behavioral studies cannot provide a complete understanding of lexical processing. Already, we have evidence from a series of EEG tests where stimuli that evoked similar response times in shadowing tasks evoke different ERPs. In a previous priming experiment (Will & Poss, 2008), matching and non-matching primes consisting of pitch contours without segmental content caused subjects to respond more quickly to words and non-words than primes consisting of unpitched noise. Despite these similar behavioral responses to both prime types, the ERPs show significant differences following matching and non-matching primes. Also, the differences show up early in the time course of the response, supporting the view that lexical tone is processed early in speech recognition. EEG versions of the experiment presented here are also underway to see if the differences found in the behavioral tests are reflected in the activity of the brain. Such methods will improve our understanding of how tone is processed and how it is represented in the mental lexicon.

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Filled Pauses in L2 Chinese: A Comparison of Native and Non-Native Speakers

Chen-huei Wu

University of Illinois at Urbana-Champaign

The aim of this paper is to determine whether native and non-native speech can be predicted on the basis of temporal measurements of filled pauses by training a Classification and Regression Tree (Breiman et al. 1984). On the basis of the present results, several conclusions can be drawn: First, distinguishing between native and non-native speech can increase in accuracy based on temporal measurements of FPs. Among these variables, the rate of speech appears to be the best predictor. Second, this study suggests that information from the FPs ‘uh’ and ‘um’ is a useful predictor of fluency in further differentiating native/non-native speakers. Third, the classification can be accurately predicted with a small set of variables.

1. Introduction

“Fluency” is frequently used to describe the distinction between native and non-native language performance. The native speaker is capable of speaking smoothly and effectively, while the non-native speaker may not. The notion of fluency consists of multiple dimensions, including good oral command of phonetics and phonology, vocabulary and grammar, and the ability to talk at length with little or no disfluencies, such as filled pauses, silences, repairs, repetitions, etc.

In natural production of speech, fluency is not the opposite of disfluency. Some disfluencies may impede the flow of speech. In the natural speech produced by native speakers, disfluencies affect up to 10% of the words and an overall 1/3 of the utterances (Shriberg 2001). It is normal to have disfluencies in native speech. In Zhao and Jurafsky’s (2005) study, native Mandarin speakers use more demonstrative pronouns e.g., *zhege* ‘this’ and *nage* ‘that’ as lexical fillers (hereafter, LFs) than filled pauses (hereafter, FPs) ‘uh’ and ‘um’. In second language acquisition (hereafter, SLA), researchers have shown that the inaccurate L2 production of suprasegmentals, such as stress timing, peak alignment, speech rate, pause frequency and pause duration might contribute to foreign accents more than inaccurate L2 segmental production (Anderson-Hsieh et al. 1992; Koster and Koet 1993; Munro, 1995; Trofiovimich and Baker 2006).

This observation raises the question about what actually distinguishes native speakers from non-native speakers. Different levels of fluency are not categorical distinctions, but continuous scales. The distinction between native and non-native speakers lies in the different status along the line of continuous degrees of fluency. In this

paper, three research questions will be addressed: 1) What are the similarities and differences of FPs and LFs between heritage and L2 learners? 2) Is the behavior of heritage learners more like native speakers or L2 learners? 3) Are there any specific patterns for heritage or L2 learners?

Clark and Fox Tree (2002) have proposed that the filled pauses ‘uh’ and ‘um’ have semantic distinctions on speech delay, that is, ‘uh’ and ‘um’ indicate short and long delays in speech, respectively. Therefore, filled pauses are treated as linguistic events, not like coughing, laughter in speech, which can not reflect the fluency of speech. The aim of this research is to determine whether fluency can be predicted on the basis of temporal measurements of filled pauses in speech, that is, the normalized frequency of FPs, mean length of FPs, normalized duration of FPs and rate of speech.

The goal of this study will be pursued by training a Classification and Regression Tree (Breiman et al. 1984, abbreviated as CART, hereafter) to distinguish native speakers from non-native speakers of Mandarin with a set of quantitative measurements of FP in their spontaneous speech in a classroom setting. In addition, the analysis will try to determine the contribution of the various quantitative variables to fluency and the thresholds of these variables to separate native and non-native speakers.

This paper is organized as follows. Section 2 briefly discusses the literature related to the definition of filled pauses, and the assessment of second language learners’ fluency. Section 3 presents the data collection and the methodology conducted in this study. Section 4 shows the results and discussion. Section 5 will present a discussion.

2. Literature Review

2.1 Heritage speakers & Fluency in SLA studies

Until recently, researchers in SLA have investigated language learning development in heritage speakers (Polinsky 1997; Montrul 2002, 2004, forthcoming; Au et al. 2002). Heritage speakers are adult early bilinguals of minority languages. They might be the children of first generation immigrants or had moved to a L2 country at various ages during childhood. Under these conditions, the heritage language might not be completely acquired due to the fact that children of first generation immigrants have strong desires to fit into the new society. Therefore, the heritage language used at home might gradually be dominated by the majority language of the new society.

The competence and performance of heritage speakers varies to diverse degrees due to incomplete L1 acquisition (Polinsky 1997; Montrul 2002). Generally speaking, they have good speaking and listening abilities, and native-like levels of pronunciation and fluency. Due to the age effect, many characteristics of adult L2 acquisition have been identified, such as L1 transfer, incomplete attainment and fossilization. An interesting question is raised here as to whether heritage speakers perform more like native speakers or adult L2 learners.

Au et al. (2002) investigated voice onset time (hereafter, VOT) of stops /p, t, k, b, d, g/ and the lenition of voiced stops /b, d, g/ between two vowels in Spanish heritage

speakers defined as overhearing the language in childhood and minimal speaking experience. The result shows that the Spanish heritage speakers produced native-like VOT that are shorter in duration than the late L2 learners. Also, they produced lenited voiced stops more often than late L2 learners.

Most SLA phonology research focuses on segmental accuracy (vowels and consonants) as a function of the onset age of L2 acquisition or the length of residence. Few studies have investigated the suprasegmentals, such as stress assignment, peak alignment, frequency and length of pauses, and speech rate (Munro 1995; Trofovich and Baker 2006). Trofovich and Baker (2006) examined five suprasegmentals (stress timing, peak alignment, speech rate, pause frequency, and pause duration) and their effects on the production of adult Korean L2 learners of English and how each contributed to fluency and foreign accents. The findings show that the amount of L2 experience influenced the production of stress timing while the onset age of intensive L2 exposure influenced the others (peak alignment, speech rate, pause frequency, and pause duration). Moreover, pause duration and speech rate contributed more than others (stress timing, peak alignment) to foreign accents.

Hence, the hypothesis of the current study is that the heritage learners will behave more like native speakers, which means they use fewer FPs and more LPs than L2 learners and pause at appropriate phrase boundaries. Late L2 learners are expected to produce the most FPs among the three groups, seldom use LFs and pause at inappropriate positions and break the phrase boundaries.

2.2 Disfluencies: FPs and LFs

‘Uh’ and ‘um’ are called *filled pauses*, as opposed to silent pauses. Also, ‘uh’ and ‘um’ have been viewed as a symptom when trouble is detected in the process of producing speech (Levelt 1989) or as a non-linguistic signal when speakers are unable to produce the required words (Goffman 1981). In this perspective of ‘filled pauses as non-linguistic elements’, ‘uh’ and ‘um’ have been grouped with unfilled pauses or non-linguistic events such as laughter and coughing.

In other studies, filled pauses have been grouped as “fillers” with linguistic events, such as discourse markers ‘you know’ and ‘well’. Clark and Fox Tree (2002) have proposed that ‘uh’ and ‘um’ are English words, which are planned for, formulated, and produced as parts of utterances just as other words are. In their ‘filler-as-word hypothesis’, ‘uh’ and ‘um’ are interjections with basic meanings (Clark and Fox Tree 2002: 79):

- (a) Uh: “used to announce the initiation, at t (‘uh’), of what is expected to be a minor delay in speaking”
- (b) Um: “used to announce the initiation, at t (‘um’), of what is expected to be a major delay in speaking”

In other words, producing *uh* itself indicates a brief delay, and *um*, a longer delay in the flow of speech. They are not non-linguistic events, which can reflect the fluency of speech.

In general, oral fluency is viewed as an important criterion for distinguishing between native and non-native language performance. Mohle (1984) suggested that the difference between natives and non-natives tends to be the frequency of hesitation rather than the presence of hesitation in speech. Cucchiarini et al. (1999) have demonstrated that it is possible to predict the fluency rating of L2 read speech on the basis of automatically calculated temporal measurements of speech quality such as speech rate, articulation rate, number and length of pauses, number of disfluencies, mean length of runs, and the phonation/time ratio. In their experiment, read speech of 20 native and 60 non-native Dutch speakers was evaluated by expert raters, including phoneticians, teachers of Dutch as a second language, and speech therapists. Based on the literature on temporal variables in L2 (Grosjean 1980; Towell et al. 1996), the following measures were investigated (Cucchiarini et al. 1999: 993-994):

- (a) *ros* = rate of speech = # phonemes/total duration of speech including sentence-internal pauses
- (b) *ptr* = phonation/time ratio = 100% x total duration of speech without pauses/total duration of speech including sentence-internal pauses
- (c) *art* = articulation rate = # phonemes/total duration of speech without pauses
- (d) *#p* = # of silent pauses = # of sentence-internal pauses of no less than 0.2 s
- (e) *tdp* = total duration of all sentence-internal pauses of no less than 0.2 s
- (f) *mlp* = mean length of pauses = mean length of all sentence-internal pauses of no less than 0.2 s
- (g) *mlr* = mean length of runs = average number of phonemes occurring between unfilled pauses of no less than 0.2 s
- (h) *#fp* = # filled pauses = # of *uh*, *er*, *mm*, etc.
- (i) *#dy* = # dysfluencies = # of repetitions, restarts, repairs

These variables can be divided into three groups: speech rate, frequency effect, and duration. The results of their study suggest that: (i) all the variables are strongly related with the fluency ratings, with the exception of *mlp*; (ii) for fluency, the frequency of pauses is more relevant than their length. In other words, natives and non-natives differ more from one another in terms of pause frequency as opposed to pause length; (iii) rate of speech appears to be the best predictor for fluency rating because it incorporates the rate at which the speakers articulate the sounds and the number of pauses they make.

Cucchiarini et al. (2002) have further explored the relationship between temporal measures and perceived fluency in spontaneous speech. Due to the fact that pauses are more frequent in spontaneous speech than in read speech, the variables that do not

contain information about the frequency of pauses have almost no relationship with fluency.

Although much work related to FPs in English has been done, seldom have empirical studies in Mandarin spontaneous speech been carried out. Tseng (2003, 2006) focuses on repairs and repetitions in Mandarin spontaneous speech. Zhao and Jurafsky (2005) have reported a descriptive study of Mandarin FPs. Their research was based on the data from the LDC 98-HUM5 Mandarin corpus of telephone conversations, in which the FPs ‘uh’ and ‘um’ are hand-labeled. The result shows that Mandarin speakers intensively use demonstrative *zhege* ‘this’ and *nage* ‘that’ as major types of FPs. The difference between demonstratives *zhege/nage* and ‘uh’/ ‘um’ as FPs lies in their distribution in different syntactic contexts. Demonstratives are more frequently used in a nominal-searching environment, while ‘uh’ and ‘um’ are more likely to be used at clause-initial positions.

In Zhao and Jurafsky’s (2005) study, native Mandarin speakers use more demonstrative pronouns as fillers than the FPs ‘uh’ and ‘um’. This suggests that the occurrences of FPs ‘uh’ and ‘um’ are not frequent in Mandarin spontaneous speech. Compared with the occurrence of ‘um’ and ‘uh’ in the CallHome English corpus, ‘um’ occurs 7.15 times per 1000 words; ‘uh’, appears 7.1 times per 1000 words. In the 98HUB Mandarin corpus, ‘um’ appears 1.46 times per 1000 words; ‘uh’ appears 2.55 times per 1000 words.

In sum, FPs ‘uh’ and ‘um’ as linguistic events in speech can be an indicator of fluency. The current study trains CART based on temporal measurements, normalized frequency of non-lexicalized FPs ‘uh’ and ‘um’, mean length of FPs, normalized duration of FPs and rate of speech to differentiate between native and non-native speakers whose language performance differs on the scale of fluency.¹ In addition, we try to use minimum variables to reach high accuracy in the classification.

3. Methodology

Speech data in a Chinese as a second-language corpus has been videotaped in third-year and fourth-year Chinese classes at UIUC from 2004 till the present. There are two speech formats in the corpus: one is called “Variety Show” and the other is called “Debate” (Shih 2006).

In the “Variety Show” format, there are 4 main sessions: opening, talk show, formal speech and comments. Students are asked to play roles, such as a chair of the whole show, the talk show host, or the formal speech speakers. Basically, the main part is the talk show: the host prepares several topics in advance and chooses students from the audience to come to the stage and answer the questions. The answers from students are spontaneous speech, while speech from the host may be prepared. Therefore, the speech style is casual, like a dialog or general conversation.

¹ ‘uh’ and ‘um’ were put in the same category to calculate variables..

In the “Debate” format, students are divided into two sides, the “positive” and “negative” sides. A specific topic is given in advance. Some of them prepare a formal speech to express their positions on this topic; others prepare questions to ask the opposing side. Since students can prepare their speeches beforehand, some of them just read their draft out aloud. In this case, disfluencies in this style speech may be reduced. Overall, the speech style of Debate is more formal than that of Variety Show.

Based on the background information of students, they can be grouped into four types as seen in the table:

TABLE 1. BACKGROUND INFORMATION OF STUDENTS

BACKGROUND INFORMATION	NUMBERS	LABELS
1 Students whose native language is English or Korean	9	Non-native
2 Students whose native language is Chinese, but who are born in the United States.	4	
3 Students whose native language is Chinese, but who arrived in the states for the first time during middle school or high school (early immersion students of English).	12	Native
4 Student whose native language is Chinese, but who arrived in the states for the first time after the age of 18 (late immersion students of English)		

In this study, the data produced by three Chinese instructors and twelve heritage students in group (3) and (4) and nine non-native speakers in group (1) are used. In the four hours of speech material, “Variety Show” takes up one hour, and “Debate” takes up three hours.

Four hours of speech material was orthographically transcribed in traditional Chinese characters by transcribers in Taiwan and checked by the author. In the transcription, special indications were used to indicate disfluencies or non-speech events:

- (a) FPs: ‘uh’ is transcribed as <呃>, <哦> and ‘um’ as <嗯>.
- (b) speaker noise: laughter, clapping, coughing, and other loud noise, transcribed as <LAUGH>, <CLAP>, <COUGH>, and <NOISE>, respectively.
- (c) unclear or overlapped speech is transcribed as <SKIP>.

The speech material was also segmented with Praat and the duration of FPs was extracted from the manual label. Previous studies (Grosjean. 1980; Towell et al. 1996;

Cucchiarini et al. 1999, 2002) have shown a number of quantitative variables related to Fluency. Four variables with slightly different definitions were used in this study²:

TABLE 2. DEFINITION OF QUANTITATIVE MEASUREMENTS

NAMES	DEFINITIONS
Normalized frequency of FPs	total # of FPs / total # of syllables
Mean length of FPs	sum (duration) of FPs / total # of FPs
Normalized duration of FPs	sum (duration of FPs) / total speech time
Rate of Speech	total # of syllables / total speech time (seconds)

These definitions were employed to train CART using the method of cross validation. The frequency of FPs was normalized by the total number of syllables. Also, the total duration of FPs produced by each speaker was normalized relative to his/her total speech time. Rate of speech was calculated using the total number of syllables against total speech time. The total syllable and total speech time include utterance of internal FPs.

4. Results and Discussion

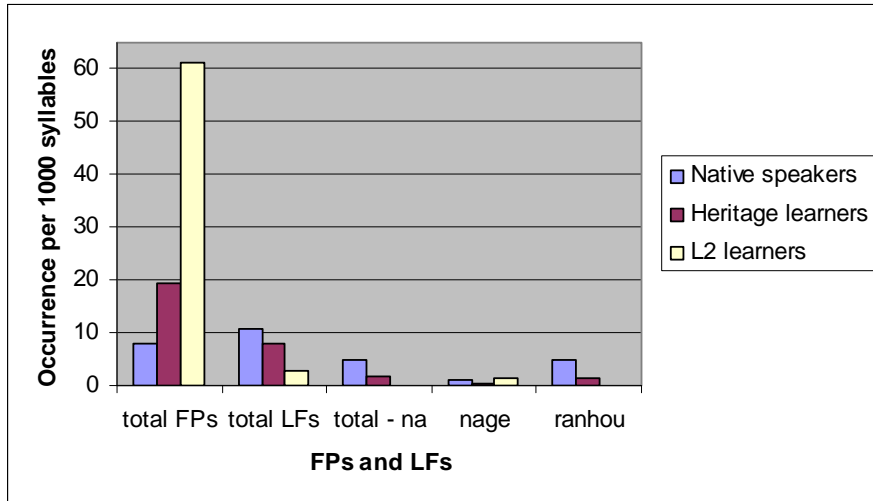
Table 3 shows the total FPs and each LF used out of 1000 syllables in each group's speech production. Figure 1 demonstrates that L2 learners use the most FPs; the native speakers used the fewest FPs and heritage learners are somewhere between native speakers and L2 learners. In contrast to the production of FPs, native speakers used the most LFs, L2 learners used the fewest LFs and the heritage speakers are somewhere between these two groups. For LFs, native speakers used three of them, *na* 'then', *nage* 'that' and *ranhou* 'and then' while L2 learners only used *nage* 'that' in their speech when they had trouble retrieving lexical items. Heritage learners used LFs *na* 'then' and *ranhou* 'and then' in their speech, but less than native speakers did.

TABLE 3. OCCURRENCE OF FPs AND LFs PER 1000 SYLLABLES

	Total FPs	<i>na</i>	<i>nage</i>	<i>ranhou</i>	Total LFs	Total syllables
Native speakers	7.94	4.69	1.08	4.87	10.65	5539
Heritage learners	19.25	1.86	0.51	1.35	7.94	11843
L2 learners	61.22	0	1.52	0	2.71	7906

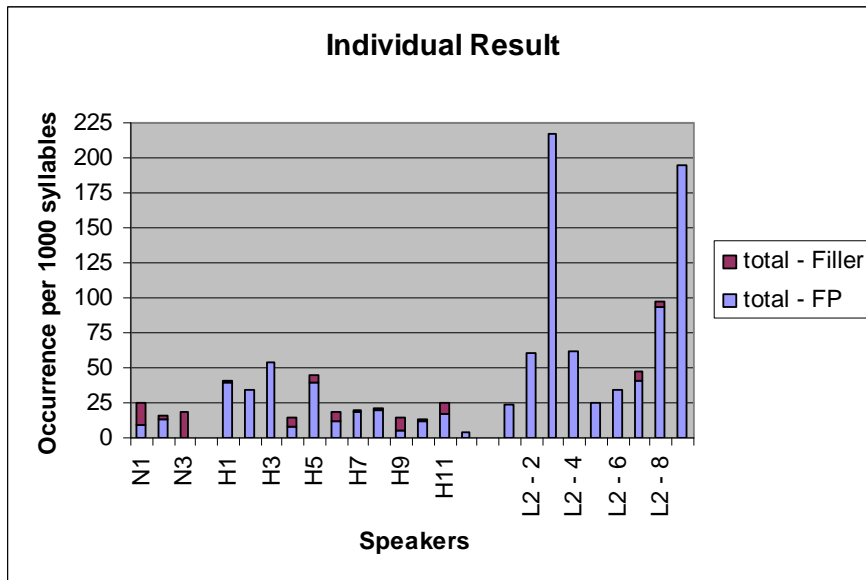
² Grosjean (1980) used syllables to calculate variables, while Cucchiarini *et al.* (1999, 2002) used phonemes instead.

FIGURE 1. OCCURRENCE OF FPs AND LFs PER 1000 SYLLABLES



In Figure 2, we can see the trend that heritage learners produced more FPs and LFs than native speakers, and L2 learners produced more than heritage learners. Some patterns of heritage learners are more like L2 learners, such as H1/H2 – L5, H3 – L2/L4 (they only produced FPs and had similar frequency) and H5 – L7 (they produced fewer LFs and more FPs and had similar frequency as well). Others are more like native speakers, such as H4/H6/H9 – N2 and H11 – N1.

FIGURE 2. OCCURRENCE OF FPs AND LFs PER 1000 SYLLABLES



N = native speaker; H = heritage speaker; L2 = L2 learner

The result here confirmed the findings in Zhao and Jurafsky (2005), which reported that native Mandarin speakers tend to use demonstrative *zhege* ‘this’ and *nage* ‘that’ as major types of FPs. In addition, we found that the performance of heritage learners is more native-like and L2 learners are less fluent than heritage speakers. The level of fluency of heritage learners is somewhere between native speakers and L2 learners. The findings in the current study are in line with previous literature (Au et. al. 2002; Trofovovich and Baker, 2006).

Based on the result above, in the training of CART, the heritage learners and native speaker were grouped into the label of native; L2 learners were labeled as non-native.

Table 4 shows the occurrence of FPs per 1000 words produced by native and non-native speakers. As we can see, the occurrence of the FP ‘uh’ produced by non-natives is five times more frequent than that by natives, while ‘um’ of non-native speakers is 1.5 times more frequent than that of native speakers. Both natives and non-natives produce more ‘uh’ than ‘um’.

TABLE 4. OCCURRENCE OF FILLED PAUSES PER 1000 WORDS

FPs	Native	Non-native
uh	10.88	54.27
um	4.02	6.76
Total	14.90	61.04

Table 5 shows the average of each variable, and boxplots in Figure 3-6 present the distribution of each variable. Normalized frequency and normalized duration of FPs show that non-native speakers have more FPs in their speech. Also, non-native speakers have longer lengths of FPs than native speakers do. For rates of speech, the native speaks faster (3.77 syllables per second) than the non-native (2.74 syllables per second).

TABLE 5. AVERAGE VALUE OF ALL VARIABLES

Variables	Native	Non-native
Normalized Frequency FPs (%)	1.78	7.84
Mean length of FPs (ms)	245.73	298.98
Normalized duration of FPs (%)	1.66	6.07
Rate of speech (seconds)	3.77	2.74

As we can see, between the native and the non-native, the distribution of normalized frequency of FPs and normalized duration of FPs (Figure 3 and Figure 5) have similar patterns, the distribution in the non-native is more scattered than that in the native. These two variables show similar information for FPs; normalized frequency is calculated by the number of FPs relative to total syllables, and normalized duration of

FPs reflects the time information. The distribution of the mean length of FPs (Figure 5) and rates of speech (Figure 6) in the native is more scattered than that in the non-native. The mean length of FPs in the non-native group is around 300 ms, while the ranges of the native is from 180-350 ms. For rates of speech, the non-native groups average around 2.7 syllables per second, while the native ranges from 2.6 to 4.75 syllables per second.

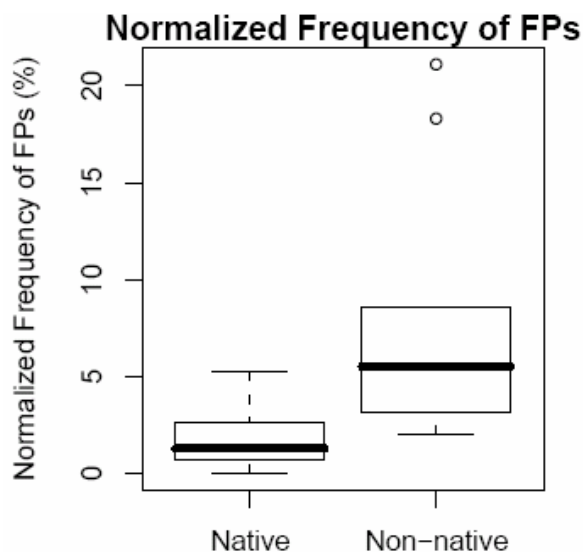


FIGURE 3. NORMALIZED FREQUENCY OF FPs

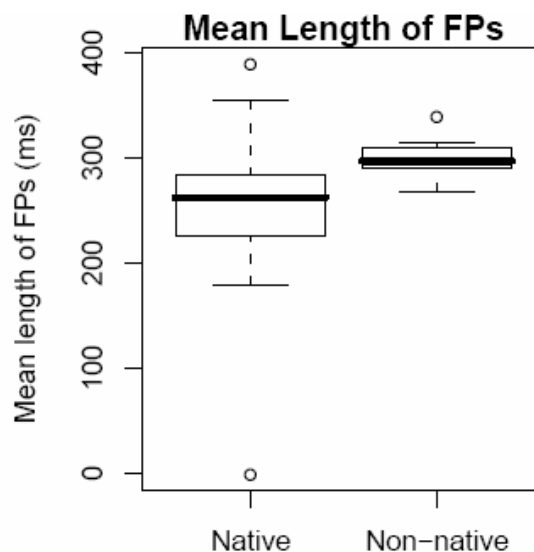


FIGURE 4. MEAN LENGTH OF FPs

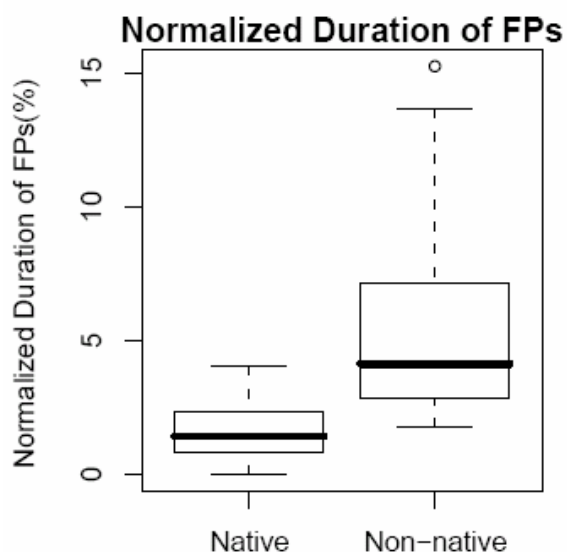


FIGURE 5. NORMALIZED DURATION OF FPs

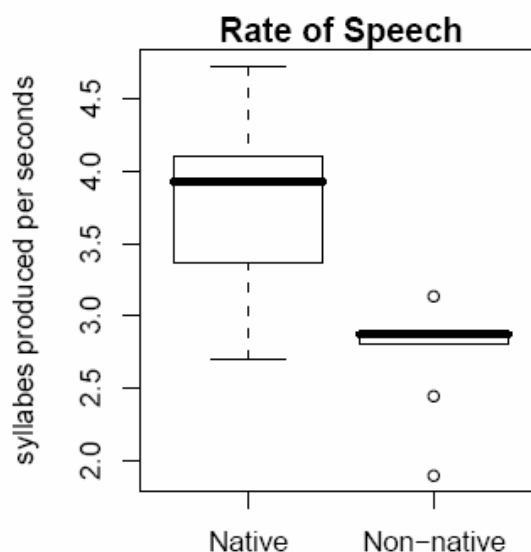


FIGURE 6. RATE OF SPEECH

CART were trained using variables listed in Table 2 in two ways: CART trees were created for each of these variables and the whole set of variables to compare the performance of each variable and the whole set. In Figure 7, when the speech rate is smaller than 3.14054, the speaker was identified as a non-native speaker (labeled as L2 in the tree); when the speech rate is bigger than 3.14054, the speaker is classified as a native speaker.

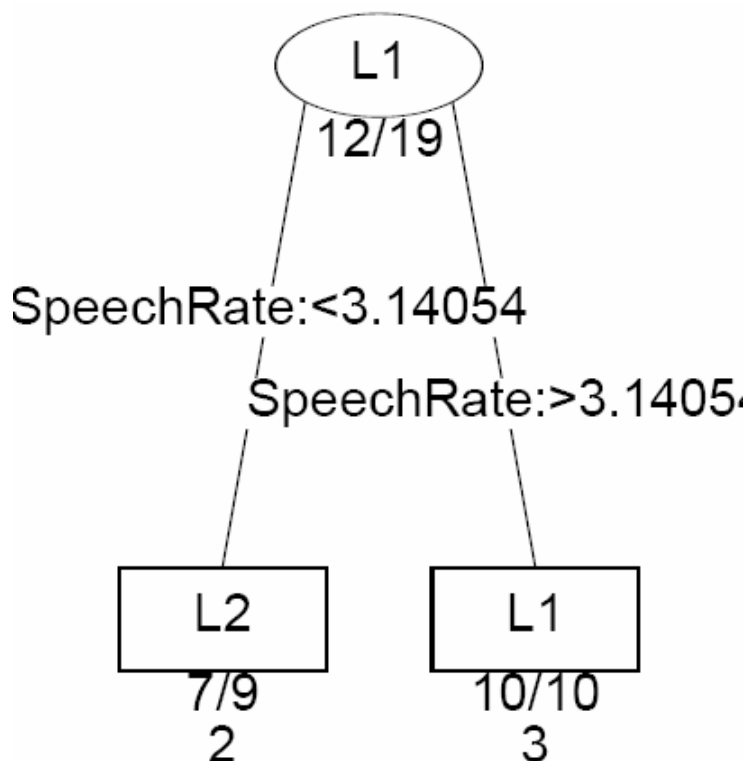


FIGURE 7. PREDICTING SPEAKER CLASSIFICATION

The system was evaluated by precision, recall, and the F-score as defined in the following way:

TABLE 6. DEFINITION OF PRECISION, RECALL AND F-SCORE

NAMES	DEFINITIONS
native speaker precision	# of correct-native prediction / # of predicted native
native speaker recall	# of correct-native prediction / # of actual native
native speaker F-score	2 x precision x recall / (precision +recall)
non-native speaker precision	# of correct-non-naïve prediction / # of predicted non-native
non-native speaker recal	# of correct-non-native prediction / # of actual non-native
F-score non-native	2 x precision x recall / (precision +recall)

The results of the performance for each variable and the whole set of variables are shown in Table 7.

TABLE 7. PRECISION, RECALL AND F-SCORE

	Native speakers			Non-native speakers		
Baseline	.625			.375		
Evaluation	precision	recall	F-score	precision	recall	F-score
Normalized Frequency of FPs	.750	.800	.754	.600	.500	.507
Mean Length of FPs	.783	.800	.779	.600	.600	.567
Normalized Duration of FPs	.600	.800	.686	.680	.380	.480
Rate of speech	.950	.867	.891	.867	.900	.853
All variables	1	.867	.920	.867	.900	.853

The baseline (.625 for the native and .375 for the non-native) represents the probability that the majority of the speakers in the data are native speakers. Among the performances of each variable, *rate of speech* has the best predictive power for identifying native (F-score: .891) and non-native speakers (F-score: .853), while normalized duration of FPs has the least ability to distinguish the native (F-score .686) and the non-native (F-score: .480). The performance of normalized frequency of FPs and mean length of FPs by themselves reaches the F-score above .750 for predicting the native, while the performance for predicting the non-native is not as good as the prediction of the native.

When all the variables are combined, the result shows excellent performance (F-score: .920) for recognizing the native, while the performance for identifying the non-native is the same as using the variable ‘rate of speech’ by itself.

These results show that the variable *rate of speech* is the best quantitative predictor for classifying the native and non-native. Variables *normalized frequency of FPs* and *mean duration of FPs* are also useful (to a less degree) in the task, which improves the F-score of predicting the native. In previous studies (Cucchiari et al. 1999,

2002), they had reported that variables contain information about the frequency of FPs such as *rate of speech*, *phonation/time ratio*, *number of silent pauses per minute*, *duration of silent pauses per minute* and *mean length of runs* are particularly related to fluency in spontaneous speech, but not *articulation rate* and *mean length of silent pauses*. Our results show that the variable *rate of speech*, *normalized frequency of FPs* and *mean length of FPs* are good quantitative predictors, among which the latter two improve the F-score for predicting the native. Rate of speech is a complex variable which incorporates two aspects of frequency of FPs (total number of syllables including FPs) and the time information of FPs (Cucchiari et al. 1999).

In our observation, perhaps frequency of FPs of non-native speakers is underestimated because non-natives produce fewer filled pauses in the “Debate” speech format. Some students just read their draft for the speech aloud. Therefore, the production of speech was not entirely spontaneous.

5. Conclusion

On the basis of the present results, conclusions can be drawn: first, overall, heritage learners are orally more fluent than L2 learners. Some of them used fewer FPs and LPs than L2 learners, just as native speakers did, while some of them use as many FPs as L2 learners did. Second, the behavior of heritage learners is at a degree between native speakers and L2 learners, but they are near the native level. Third, the performance for distinguishing between the native and the non-native can reach excellent accuracy based on temporal measurement, normalized frequency of FPs, mean length of FPs, and rate of speech. Among these variables, rate of speech appears to be the best predictor. Fourth, this study suggests that information about FPs ‘uh’ and ‘um’ can accurately predict fluency thus differentiating between native/non-native speakers. Fifth, the classification can be accurately predicted with a small set of variables.

A potential further study of this current paper is to train the system to recognize the fluency rating of speakers instead of the native and non-native labels using more factors pertaining to other disfluencies such as repairs, repetitions, lexicalized fillers, prolongation and silent pauses, sentence length, lexical choice and grammar.

It is possible that some non-native speakers have achieved native-like oral fluency and that it is not necessary for native speakers to produce fluent speech. Since the system was trained to recognize labels of the native and non-native instead of fluency rating, it is reasonable that the system treats native-like performance produced by non-native speakers as natives. We believe that the system will be improved with the feature sets we propose in the study if the system is trained to recognize the speaker’s fluency rating.

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Temporal Cues of Discourse Boundaries in L1/L2 Mandarin Speech

Chunsheng Yang
The Ohio State University

This paper investigated the temporal cues of discourse boundaries in L1 and L2 Mandarin speech. Spontaneous speech in this study was elicited by asking subjects to retell a short non-verbal film, the *Pear Story* (Chafe 1980), after watching. The findings of the study are that 1) for L1 Mandarin speech, final syllable lengthening is a salient cue of prosodic boundaries and the pre-boundary syllable was lengthened the most; but the syllable lengthening does not reflect the discourse hierarchy. In addition, silent pause is another cue in L1 Mandarin speech and can reflect the discourse hierarchy; 2) for advanced American learners, final syllable lengthening is not a salient cue of prosodic boundaries, whereas silent pause duration is a salient temporal cue in L2 speech and can reflect the discourse hierarchy of L2 speech.

1. Introduction

Previous studies on L2 speech production and perception were mostly conducted on segmental levels, e.g. vowels and consonants. Recent years have witnessed the increase of studies on prosody, especially on the tonal phenomenon. Most prosodic studies on Mandarin Chinese were concentrated on tonal aspects, such as production and perception of Mandarin tones (Bent 2005), and perceptual training given to American listeners on Mandarin tones (Jongman and Wang et al., 2006; Sereno and Wang 2007, among others). By contrast, little study was conducted beyond the tonal prosody. However, as has been shown in some studies (Mareuil & Vieru-Dimulescu, 2005), prosody is more likely to lead to the perception of foreign accent than segmental deviations.

The present research investigates the temporal cues of discourse boundaries in L1 and L2 Mandarin Chinese speech. Specifically, the following questions are addressed:

- (1) Are there temporal cues at various discourse boundaries in the speech of advanced American learners of Mandarin Chinese?
- (2) If so, can the temporal cues reflect the discourse hierarchy?
- (3) What is the difference in the above aspects between American learners and native Mandarin speakers?

2. Literature Review

Silent pause and pre-boundary lengthening are frequently suggested to be the most likely candidates for segmenting discourse (see Fon (2004) for a literature review on cues of prosodic boundaries in languages other than Mandarin Chinese).

2.1. Prosodic Boundary Cues in Mandarin

Shen (1992) used famous utterances of standing ambiguity in literary Beijing Mandarin to demonstrate that both silent pause and final syllable lengthening are robust cues in signaling sentential boundary locations. Tseng (2002) examined Taiwan Mandarin read speech and showed that pause is a major cue for prosodic structure in Mandarin spontaneous speech. Fon and Johnson (2004) examined the timing in Taiwan Mandarin spontaneous narratives and argued that the degree of syllable onset interval (SOI), the interval between the onset of one syllable and that of the next, which is essentially a combined measure of final lengthening and pause, is a good indicator for the structural organization of a discourse, namely, within a unit, the degree of lengthening reflects its positioning; the closer an SOI is to the end of a unit, the more likely it is to be lengthened. Across different units, the degree of lengthening can also reflect their hierarchical relationship, since final lengthening is proportional to the level of structural hierarchy. Liu and Li (2003) examined a corpus of Mandarin read speech and found that pause, pre-boundary syllable lengthening, F0 reset (F0 register), and F0 range are major cues of boundaries in Mandarin spontaneous speech. Yang and Wang (2002) examined the acoustic cues of hierarchical prosodic boundaries by investigating a large corpus of read Mandarin speech and found that pre-boundary lengthening is the acoustic correlate of weak boundary, pitch reset is that of medium boundary, and silence is that of strong boundary. In addition, the acoustic correlates of lower boundaries can also occur on larger boundaries, but the acoustic correlates of larger boundaries usually do not occur on lower boundaries.

Fon (2002) conducted a cross-linguistic study on syntactic and discourse boundaries cues in multi-lingual spontaneous speech (Taiwan Mandarin, Peking Mandarin, Japanese and English) and found that: in English, the structural boundaries are indicated by initial and final syllables and SOI lengthening. However, the two effects have different sources. Final lengthening is mainly due to the final lengthening effect while initial lengthening is incurred by pitch accents. The two lengthening effects have different scopes. The lengthening effect incurred by pitch accents is more focused on syllables than on SOI lengthening, while that incurred by boundary is more effective on SOI than on syllable lengthening. Discourse hierarch is indicated by degree of final SOI lengthening and initial syllable and SOI lengthening. But in Mandarin, the final lengthening effect is at work at P0¹ and P1 for syllables, but only at P0 for SOIs.

¹ P-1, P0 and P1 are syllables before or after the boundaries. P-1 is the second last syllable in a clause, P0 is the last syllable in the utterance whereas P1 is the first syllable after the boundary.

Discourse boundary strength is reflected only by SOIs. The following two tables illustrate the difference in cues of prosodic boundaries between Mandarin Chinese and English, adapted from Fon (2002, 129-132).

Table 1: Cues of Prosodic Boundaries in English and Mandarin Chinese

	English	Mandarin
Duration		
Syllable		
Final lengthening at P0	Yes	Yes
Final lengthening at P-1	No	Yes
Initial lengthening at P1	Yes	No
SOI (syllable onset interval)		
Final lengthening at P0	Yes	Yes
Initial lengthening at P1	Yes	No

Table 2: Prosodic Cues indexing Discourse Hierarchy in English and Mandarin Chinese

	English	Mandarin
Duration		
Syllable		
Final lengthening at P0	No	No.
Initial lengthening at P1	DSP 2 > DSP 1, 0	--
SOI (syllable onset interval)		
Final lengthening at P0	DSP2 > DSP1, 0	DSP2>DSP1> DSP0
Initial lengthening at P1	DSP2 > DSP1, 0	--

2.2. Problems in Previous Studies

Even though previous studies on Mandarin Chinese have found that final lengthening and silent pause are cues of discourse structure in Mandarin Chinese, the previous studies were conducted within different frameworks (Chinese ToBI, Mandarin ToBI, or mere impressionistic observation). Moreover, both read speech and spontaneous speech were used in previous studies. However, read speech is different from spontaneous speech in that the written script in read speech might eliminate the use of some cues in spontaneous speech, as has been argued in literature that spontaneous speech is a better source for researching discourse structure (Lee, 2005). Thus the present study only used spontaneous speech.

Meanwhile, as Fon (2002) has found, there are cross-linguistic differences in the prosodic cues of discourse structures. However, no previous studies have investigated the

effects of L2 prosodic cues in segmenting discourse and whether there are any differences between L1 and L2 cues and, if any, whether such differences in cues may contribute to the perception of foreign accent. The present study focuses on the first two questions. The third question will be left for future study.

3. Methodology

3.1. Subjects

Four male native Mandarin speakers and four male advanced American learners Mandarin Chinese participated in this study. The four advanced American learners are master or doctoral students at Chinese department. The four native Mandarin speakers are all from North China and all speak Standard Mandarin Chinese.

3.2. Materials

Spontaneous speech was elicited by playing a short film without spoken language, *The Pear Story* (Chafe, 1980), which can be downloaded for free. As mentioned in Fon (2002), to choose such as a soundless film has two advantages: 1) The film does not provide an explicit structure and viewers have to infer and reconstruct the structure of the film according to their understanding; 2) This movie was filmed to provide a relatively cultural-free story for discourse analysis studies, thus it is a good stimuli for this study as well.

3.3. Procedure

Subjects were given experiment instructions in English or Mandarin Chinese before watching the speechless film, *The Pear Story*. Subjects were told to retell the movie as if they were telling a friend who has never seen the movie. However, it would not matter even if they could not remember some details, for the purpose of eliciting their natural speech. All the recordings were done in the recording studio at the College of Humanities, the Ohio State University. The recordings were saved as wav. files, ready for data analysis in Praat.

3.4. Discourse Labeling

Drawing on Fon (2002), Fon and Johnson (2004) and Fon (2004), the present study labeled clauses as basic units. A clause is defined as having at least one main verb. All the utterances by the 8 subjects were segmented into clauses. The relationship between pairs of adjacent clauses was determined by using the guidelines outlined in Grosz and Sidner's (1986) computational psycholinguistic discourse framework. Discourse segment purpose (DSP) is defined as an intention that the speaker tries to convey to the hearer (Grosz and Sidner 1986). Three levels of discourse disjuncture were labeled, namely no discourse disjuncture (DSP0), low discourse disjuncture (DSP1), and high discourse disjuncture (DSP2).

Fon's original definition of DSP0, DSP1 and DSP2 merely considered the relationship between two adjacent clauses without putting them in the large context, e.g. the discourse level. The model proposed by Grosz and Sidner (1986) is a more comprehensive model, taking into account both the relationship between two adjacent clauses and the relationships of clauses with the whole discourse. In order to keep the same spirit of Grosz and Sidner and also make the discourse encoding simplistic, DSP0, DSP1 and DSP2 are defined as follows.

DSP2 refers to the relationship between two groups of clauses, each of which targets at a specific discourse purpose. Then DSP1 and DSP0 refer to the disjuncture between clauses within a DSP2: specifically DSP1 refers to the disjuncture between two related independent clauses, whereas DSP0 refers to the disjuncture between two minor clauses which are interrupted by only a clausal boundary. The relationships between DSP0, DSP1, DSP2 can be schematized as follows:

[()_{DSP0} ()_{DSP1} ()_{DSP0}]_{DSP2} [()_{DSP0} ()_{DSP1} ()_{DSP1} ()]
 One example of DSP encoding is shown as below:

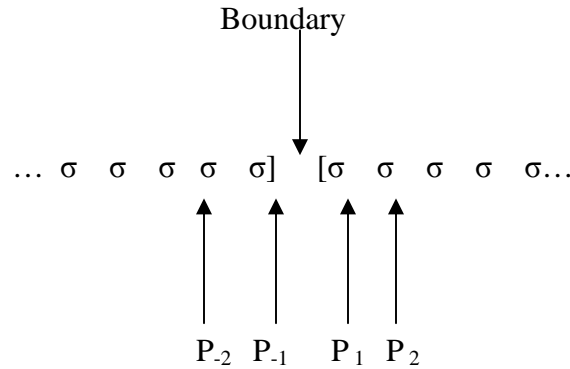
他把帽子拾起来，转回身又去找那个少年，
 {[Ta ba maozi shi qilai]_{DSP1}[zhuanhuishen you qu zhao neige shaonian]_{DSP0}
 {[He picked up the hat]_{DSP1}[turned back and walked to the young man]_{DSP0}
 把帽子还给他。那个少年很感激，送给了
 [Ba maozi huangei ta]_{DSP2} {[Neige shaonian hen ganji]_{DSP1} [songgei le
 [gave him the hat]]_{DSP2} {[The young man was thankful]_{DSP1} [gave
 他三个梨...
 ta sange li...}
 him three pears...}]

I believe that the encoding in this manner better reflects the arrangement of clauses within a discourse and more conforms to Grosz and Sidner's proposal (1986) than Fon (2002).

3.5. Measurements

Measurements were conducted on the two syllables before and after the boundaries. However, due to the nature of spontaneous speech, there are many fillers (e.g. *ranhou* "then"), hesitations and disfluency. If these syllables happen to be those to be measured, they were skipped and measurements were done on syllables after them (in most cases *ranhou* was used at the beginning of a clause).

Syllable duration, syllable onset interval (SOI) and silent pause duration were measured on the chosen positions across the boundaries. The following figure adapted from Fon (2004) illustrates the way how the measurement positions for syllable duration, SOI and silent pause duration were chosen.



4. Data Analysis and Discussions

The purpose of this study is to examine whether there is any difference in temporal cues of prosodic boundaries between L1 and L2 Mandarin speech. Thus, statistical analysis is mainly conducted on each group respectively.

4.1. Syllable Duration

The following Table 3 shows the syllable duration for native Mandarin speakers and American learners.

Table 3: Syllable duration for Native Mandarin speakers and American learners (ms)

	Min	Median	Mean	Max
Native Chinese	0.04156	0.15837	0.16896	0.57516
Amercn learner	0.03919	0.17824	0.19436	0.77118

Before conducting ANOVA analysis on each group, an overall analysis of variance (ANOVA) was conducted on the syllable duration data. The ANOVA results show that: 1) there are main effects for native language ($F=5.408$, $p\text{-value}=0.020$), and position ($F=3.349$, $p\text{-value}=0.018$); 2) no significant is found on disjuncture level; 3) there are interaction effects between native language and position ($F=5.362$, $p\text{-value}=0.001$). Post-hoc Bonferroni test was conducted on position and it showed that the differences between P-2 and P-1, between P-2 and P1, between P-2 and P2, between P-1 and P1 and P-1 and P2 are significant ($p\text{-values}$ are 0.000,0.001,0.001, 0.000, 0.000).

Thus we can conclude that both syllable before the boundaries are lengthened and the last syllable is lengthened the most in both groups of speakers. However, syllable durations are not significantly different across disjuncture levels (DSP0, DSP1, and DSP2).

4.1.1. Native Mandarin Chinese Speakers

Analysis of Variance on syllable duration data of native Mandarin Chinese speakers shows that there is main effect of position at DSP1 and DSP2 ($P\text{-value} = 0.00$

and 0.00 respectively). The follow-up post-hoc test results show that :1) at DSP1, P-2 and P-1, P-2 and P1, P-2 and P2, P-1 and P1 and P-1 and P2 are significantly different in syllable duration (p -values are 0.000, 0.013, 0.047, 0.000 and 0.000 respectively); however, syllable duration for P1 and P2 are not significantly different; 2) at DSP2, P-2 and P1, P-2 and P2, P-1 and P1 and P-1 and P2 are significantly different in syllable duration (p -values are 0.000, 0.000, and 0.000 respectively); however the difference between P-2 and P-1 is only marginally significant (p -value=0.053); P1 and P2 are not significantly different.

Across syllable position, ANOVA shows that there is no significant difference for the syllable duration at the same position across disjuncture levels, which might suggest that even though there is final lengthening, the degree of lengthening does not index/reflect the discourse structure.

In summary, for the speech of native Mandarin Chinese speakers, we can see clearly the final lengthening of P-2 and P-1 and P-1 is lengthened the most. However, syllable duration across position does not seem to reflect the discourse disjuncture levels. The relationship between syllable position and disjuncture level can be seen clearly in Figure 1.

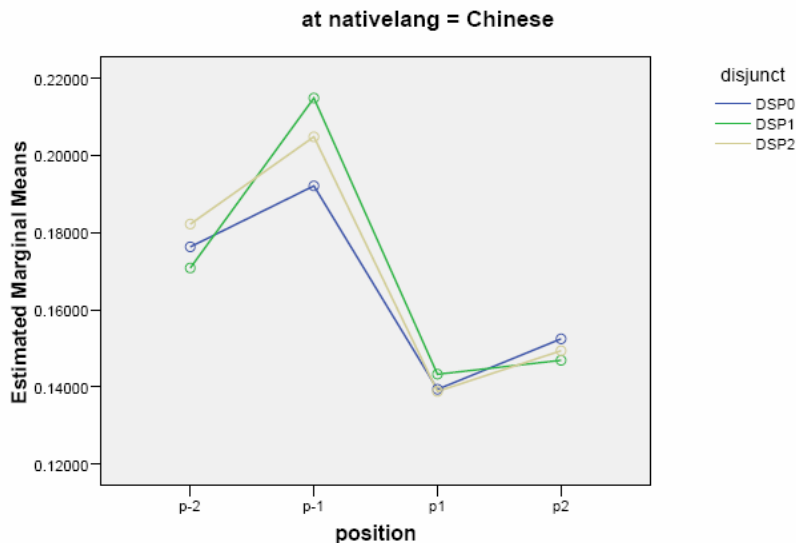


Figure 1: Profile plot of syllable duration of speech of native Mandarin speakers across position and disjuncture level

4. 1. 2. Advanced American Learners

For advanced American learners, ANOVA shows that at DSP0, DSP1 and DSP2, the syllable durations at P-2, P-1, P1 and P2 are not significantly different at all. And apparently the syllable durations across position does not register the discourse disjuncture

level. Figure 2 below shows syllable duration data of advanced American learners across syllable position and across discourse disjuncture level.

From Figure 2 it seems that at DSP0, syllable durations should be significantly different, at least between P-2 and P1. However, the statistical analysis shows that the seemingly greater difference is not significant. The nature of the spontaneous speech might account for this difference, namely American learners tend to lengthen their syllables more while thinking. However, at both DSP1 and DSP2 in the above plot indicates that there is some final lengthening, even though not statistically significant.

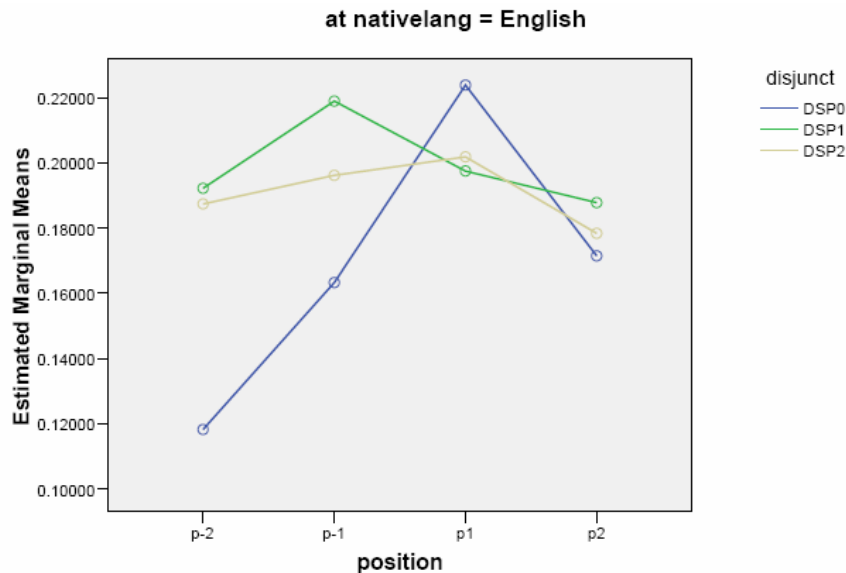


Figure 2: Profile Plot of syllable duration of speech of advanced American learners across syllable position and disjuncture level

4.1.3 Discussion

Incorporating the results in 4.1.1. and 4.1.2, we find that there is no syllable lengthening for the speech of American learners at all disjuncture levels, whereas for native Mandarin Chinese speakers, there is clearly final lengthening at P-2 and P-1 at DSP1 and DSP2 junctures. The findings of native Mandarin speakers conform to what Fon (2002) has found about Mandarin Chinese. However, as for the results from the advanced American learners, it is different from both the cues of English and the cues of Mandarin Chinese that Fon (2002) has found.

4.2. Syllable Onset Interval (SOI)

An overall analysis of variance was conducted on SOI data. The results show that: 1) there is main effect for disjuncture ($F=33.673$, p -value= 0.00) and position ($F=92.210$, p -value=0.00); 2) there is also interaction effect between disjuncture level and position

($F=33.413$, $p\text{-value}=0.00$). Figures 3 and 4 below show the SOI of two groups of speakers.

However, one thing to note that the SOI data differ from syllable duration data primarily at P-1 position because there is nearly no pause in other positions (P-2, P1 and P2), except for after some syllables in the speech of native Mandarin speakers. Thus it is predicted that SOI at P-1 is the longest across different levels. Actually the effect of SOI is roughly the same as that of pause duration. Fon (2002) found that at P-1 in Mandarin Chinese, SOI can reflect the discourse disjuncture level. Similar findings were observed here. But I argue that this effect is more from pause duration than from SOI. Thus no further analysis was conducted on SOI.

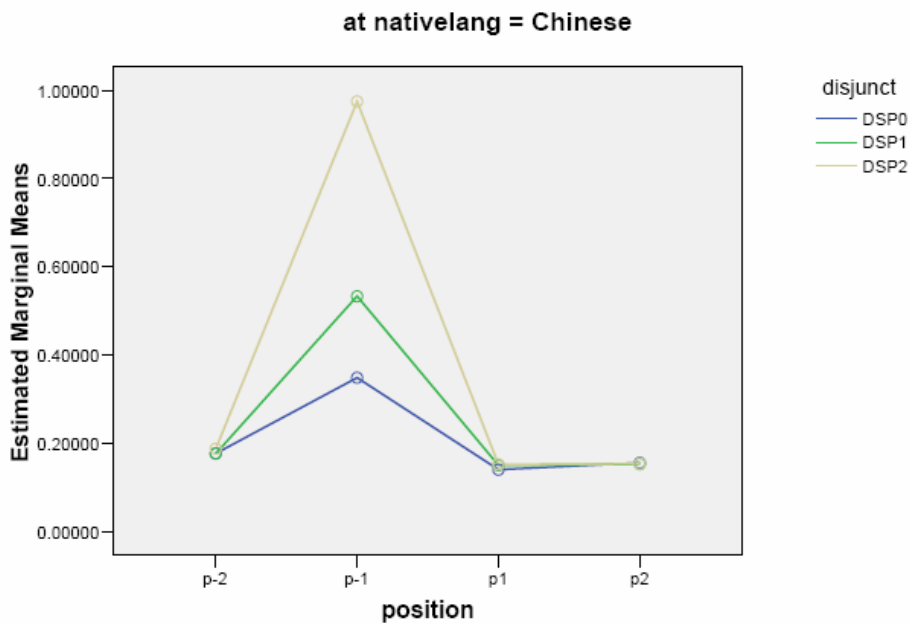


Figure 3: Profile Plot of SOI of speech of native Mandarin speakers across syllable position and disjuncture level

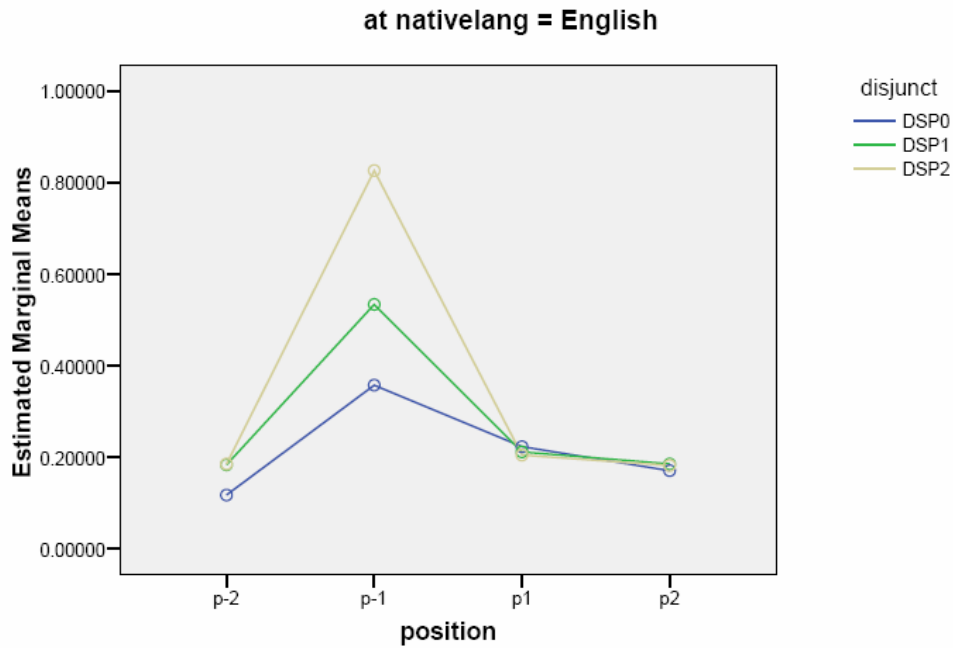


Figure 4: Profile Plot of SOI of speech of advanced American learners across syllable position and disjuncture level

4.3. Silent Pause

Table 4: Pause duration for native Mandarin speakers and American learners (ms)

	Min	Median	Mean	Max
Native Chinese	0.03932	0.54251	0.52238	2.25616
American learner	0.0374	0.5555	0.6227	2.4312

As mentioned above, pause predominantly occurred at prosodic boundaries. Thus the data for pause duration are only concerned with disjuncture level, not with syllable position. From Table 2 we can see that pause duration for American learners is generally longer than that for native Mandarin speakers.

An overall analysis of variance shows that there is significant difference in pause duration between DSP1 and DSP2 across groups (p -value=0.000) and that there is no significant difference between DSP0 and DSP1 in pause duration. The following profile plot illustrates the pause duration across disjuncture levels of two groups.

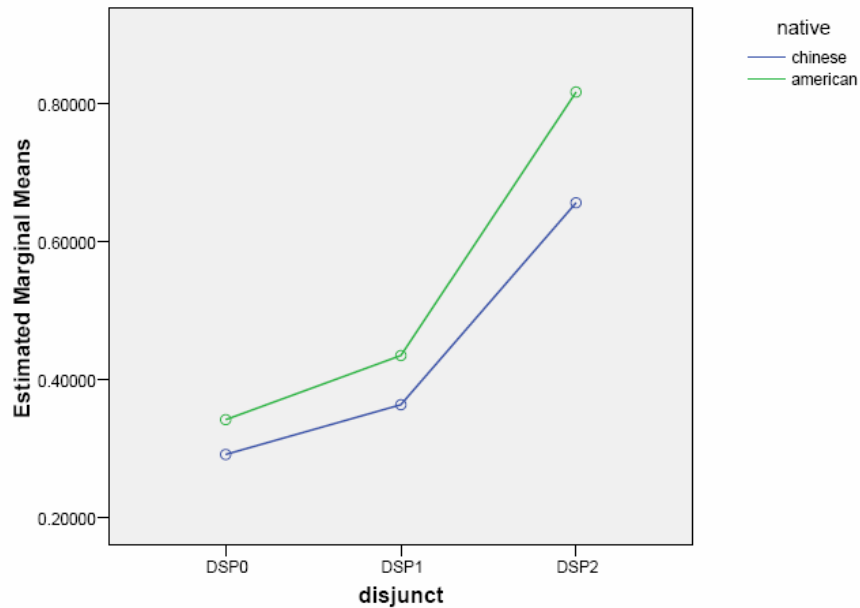


Figure 5: Profile plot of silent pause duration across language group and disjuncture level

Post-hoc tests indicate that for native Mandarin Chinese speakers, pause duration is significantly different between DSP1 and DSP2 (p -value=0.000), whereas for American learners, pause duration is significantly different between DSP0 and DSP1 (p -value=0.000) and DSP1 and DSP2 (p -value=0.000).

Thus the results here suggest that pause duration can reflect the discourse disjuncture levels of the speech by American learners at all three levels, whereas for native Mandarin speakers pause duration can only differentiate DSP1 and DSP2.

One thing to note that according to the criteria laid out previously in the paper, there is only a small number of DSP0, which might be problematic. In addition, as for advanced American learners, they tend to pause longer in their spontaneous speech. It is worth mentioning that Fon (2002) found that SOI is a better indicator of discourse disjuncture level. However, the present analysis shows that pause instead of SOI can reflect discourse disjuncture levels better.

4. 4. Summary

To make convenient comparison, the above findings are summarized in Table 5 and Table 6.

We can see there are many differences in the temporal cues of prosodic boundaries between L1 and L2 Mandarin speech. For native Mandarin speakers, final syllable lengthening is a salient cue of prosodic boundaries and the syllable at P-1 is lengthened the most. But the syllable lengthening does not reflect the discourse disjuncture levels. In addition, silent pause duration at the prosodic boundaries is another cue in L1 Mandarin

speech. Also the pause duration can reflect the discourse disjuncture level between DSP1 and DSP2. For advanced American learners, final syllable lengthening is not a salient cue of prosodic boundaries. However, we do see that there is final syllable lengthening at DSP1 and DSP2, though not statistically significant. And silent pause duration is a salient temporal cue in L2 Mandarin speech, which can reflect the discourse structure at all three levels.

Table 5: Significant pairs of syllable duration: across disjuncture level and native language

	Mandarin speakers	American learners
DSP0	No.	No.
DSP1	P-2 vs. P-1, P-2 vs. P1 P-2 vs. P2, P-1 vs. P1 P-1 vs. P2	No.
DSP2	P-2 vs. P1, P-2 vs. P2 P-1 vs. P1, P-1 vs. P2	No.

Table6: Significant pairs of pause duration: across language group at P-1

	Mandarin speakers	American learners
P-1	DSP1 vs. DSP2	DSP0 vs. DSP1 DSP1 vs. DSP2

As mentioned above, the insignificance of final syllable lengthening in L2 Mandarin speech might be attributed to the fact that the mean syllable duration in L2 Mandarin speech is significantly longer than that in L1 speech. There are many factors which can account for this. The most likely one is that L2 speakers, even though they are advanced learners, still have some difficulty in spontaneous speech, especially in the case of retelling a movie, when they need not only to organize the language, but also to organize the content.

As compared with what Fon (2002) has found about English, it seems that advanced American learners did not transfer the temporal cues in English to their Mandarin at all. However, I argue that, even though L2 learners did not transfer their L1 temporal cues in their Mandarin production, the difference in temporal cues of prosodic boundaries in the above aspects might contribute to the perception of their “foreign accent”, because the difference in the above cues might render L2 Mandarin speech sounding rather different from L1 Mandarin speech, e.g. in terms of melody or temporal arrangement, etc.

5. Conclusion and Implications

The present research complements previous studies at tonal levels by providing a fuller picture of the prosody of Mandarin produced by L2 learners. The difference in temporal cues of prosodic boundaries found in this study suggests that prosodic studies in SLA, instead of focusing on tones and intonation only, should be broadened to incorporate temporal cues of prosodic boundaries so as to better understand the causes for foreign accent and come up with better ways to reduce foreign accent of learners. Also the present study suggests that the difference in temporal cues of prosodic boundaries between L1 and L2 Mandarin speech is likely to account for the foreign accent in L2 speech from a new perspective.

However, the present study has some limitations. One of the potential problems is the criteria of discourse encoding. Though the criteria used here drew on previous studies, some changes have been made and there might be some errors in implementing them, especially considering that only the researcher himself did the encoding due to the time limitation. Also potential problem may lie in the way fillers and disfluencies were treated in deciding on the syllables to be measured. Thus, a more elaborate set of criteria should be set up to encode discourse structure in future study.

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Number Deletion and Classifier Realization in Three Chinese Dialects

Yi-Hsien Liu

University of Southern California

This paper explores the interactions between classifiers and numerals (specifically the numeral ‘one’) in Cantonese, Mandarin, and Taiwanese by looking at bare NP, [Cl-NP], [Poss-Cl/MFK-NP], [RC-Cl/MFK-NP], and [Dem-(Cl)-NP]. We propose that there are three features in Cl—[num]([Sg]/[Pl]), [one], and [def], and the three-way dialectal differences on classifiers and numerals result from the different ways to check [num] feature and the (non)-availability of Cl-raising to D. Cantonese and Mandarin have the ability to incorporate the numeral value ‘one’ and the inherent value ‘one’ (from individualization) into classifiers, whereas Taiwanese can only have inherent value ‘one’ in classifiers. This parameter attributes to the fact that Taiwanese has the obligatory presence of ‘one’ in the indefinite [one-Cl-NP]. Also, we suggest that not all the intermediate projections under D have to be projected. For the nominal constructions that have ambiguous number information, it is possible that NumP or CIP is not projected at all.

1. Background

In recent years, many studies (Cheng&Sybesma 1998, 1999; Li 1996, 1997, 1998, 1999; Tang 1990, 1996, 2001c) have been devoted to exploring the nominal nature of Chinese dialects. Many of them have been focused on the (in)definite interpretation of (Number)-Classifier-Noun [(Num)-Cl-NP] phrases and bare nouns in Cantonese and Mandarin. In Mandarin, bare NPs in postverbal position can be interpreted as indefinite as in (1a), definite in (1b), generic in (1c). In preverbal position, bare NPs can be definite (2a) and generic (2b), but not indefinite as the translation in (2a). [CL-NP] in Mandarin can only have indefinite interpretation as in (1d), and thus always in postverbal position but never in preverbal position (2a). [Num-CL-NP] (with individual interpretations)¹ can

¹ Li (1998) notes that (2c) improves a lot if it is the answer to *how many* questions.

- (i) [San ge baomu] jiu zhaogu ni yige xiaohai a?
threeCL babysitter only care you one child PAR
‘Three babysitters took care of you, only one child?’
- (ii) [San zhi gunzi] gou ni da ta ma?
Three CL sticks enough you hit him Q
‘Are three sticks enough for you to hit him (with)?’

Noticeably, some linguistic clues are found in those acceptable sentences, for example, the adverb *jiu* ‘then’ and *gou* ‘enough’. She argues that these nominals express quantity readings (rather than the existence of indefinite individuals), and that they only project to NumP (rather than to DP).

only be indefinite and always in postverbal not preverbal position in (1e)/(2c). (SFP= sentence final particle)

(1) Mandarin: nominals in postverbal position

- | | |
|--|---|
| a. John mai [shu] qu le. (indef)
John buy book go SFP
'John went to buy a book/books.' | d. Wo xiang mai [ben shu]. (indef)
I would-like buy CL book
'I would like to buy a book/*the book.' |
| b. John he-wan-le [tang]. (def)
John drink-finish-LE soup
'John finished the soup.' | e. Wo kan-dao [san ge xuesheng]. (indef)
I see three CL student
'I saw three students/*these three students.' |
| c. John xihuan kan [shu]. (generic)
John like read book
'John likes to read books.' | |

(2) Mandarin: nominals in preverbal position

- | | |
|---|---|
| a. [(*Zhi) Mao] duzi e le.
(*CL) cat stomach hungry SFP
'The/*A cat is hungry.' | c. *[San ge xuesheng] wo zhidao bei dang le.
Three CL student I know BEI fail SFP
'Three students, I know they fail the subject.' |
| b. [Laoshu] ai chi dami. (generic)
mouse love eat rice
'Mice like to eat rice.' | |

Cantonese differs from Mandarin in that bare NPs cannot express definiteness, preverbal or postverbal; instead, it uses [CL-NP] as shown in (3b)/(4a). To express indefiniteness, Cantonese, like Mandarin, uses bare NPs and [CL-NP] in postverbal position as in (3a)/(3c). As for generic interpretation, Cantonese again patterns like Mandarin, using bare NPs as in (3d)/(4b).

(3) Cantonese: nominals in postverbal position

- | | |
|---|---|
| a. John heoi maai [syu]. (indef)
John go buy book
'John went to buy a book/books.' | d. Ngo zungji taai [syu]. (generic)
I like read book
'I like to read books.' |
| b. John jam-jyun [*(wun) tong] la.
John drink-finish CL soup SFP
'John finished drinking the soup.' | e. Ngo sik-zo [saam go pinggow]. (indef)
I eat-PF three CL apple
'I have eaten three apples/*these three apples.' |
| c. Ngo soeng maai [bun syu] (lei taai).
(indef)
I want buy CL book come read
'I want to buy a book (to read).' | |

(4) Cantonese: nominals in preverbal position

- | | |
|---|--|
| a. [*(Zek) gau] soeng gwo maalou. (def)
CL dog want cross road
'The dog wants to cross the road.' | |
|---|--|

- b. [Gau] zungji sek juk. (generic)
dog like eat meat
'Dogs love to eat meat.'
- c. *[Saam bun syu] ngo soeng maai lei taai. (indef)
Three Cl book I want buy come read
'Three books, I want to buy them to read.'

The three different interpretations of the two languages are summarized as below:

The three interpretations of the Mandarin and Cantonese nominals

	Mandarin					Cantonese				
	Indef	Def		Gen		Indef	Def		Gen	
	Post-V	Pre-V	Post-V	Pre-V	Post-V	Post-V	Pre-V	Post-V	Pre-V	Post-V
Bare+N	+	+	+	+	+	+	-	-	+	+
Cl+N	+	-	-	-	-	+	+	+	-	-
Num+C I+N	+	-	-	-	-	+	-	-	-	-

The present paper includes one more Chinese dialect, Taiwanese (Southern Min), to see the three-way dialectal differences in the interactions between classifiers and numerals. Cheng & Sybesma (2003) has made a simple observation on Taiwanese nominal— it crucially differs from the other Chinese dialects (Mandarin, Cantonese, and Wu) in that Taiwanese does not have [Cl-NP] structure, definites or indefinites. In addition to including one more Chinese dialect, we go beyond the limit of investigating bare NP and [(Num)-CL-NP], consider more data to explore the nature of classifiers, and focus on the interaction between classifiers and numerals (specifically the numeral 'one').

More data related to the different distributions of classifiers and the numeral 'one' in the three dialects are investigated. Specifically, we look at bare NP, [Cl-NP], [Poss-Cl/MFK-NP], [RC-Cl/MFK-NP], and [Dem-(Cl)-NP].² The questions to be asked are as follows: 1) why can Mandarin and Taiwanese have definite bare NP, but not Cantonese? 2) Why can't Mandarin and Taiwanese have definite [Cl-NP] like Cantonese? 3) Why can't Taiwanese (generally) have [Cl-NP] at all?³ 4) Why can classifiers be realized in

² Poss=possessive RC= relative clause Dem=demonstrative MFK= modifier marker
The MFK is *de* in Mandarin, *ge* in Cantonese, and *e* in Taiwanese.

³ Au-Yeung (2005) points out that Cantonese has the following [Cl-NP] phrases, which are derived from one-deletion as in (i). The classifiers are limited to multiples (ones-tens-hundreds-thousands-tens of thousands) or measuring classifiers (meter, catty, hour, day, etc.). Taiwanese has exactly the same phrases in (ii), and this seems to be the counterexamples of Cheng&Sybesma's observation that Taiwanese does not have [Cl-NP] structure in any case. The status of these [Cl-

possessive and relativized constructions in Cantonese, but Mandarin and Taiwanese have to use modifier markers *-de/-e*? 5) Why can Mandarin omit classifiers in [Dem-(Cl)-NP], whereas Cantonese and Taiwanese cannot? The questions show three-way differences. Questions 1), 2), and 4) show that Cantonese is generally more distinct from Mandarin and Taiwanese. Question 5) shows that Cantonese and Taiwanese are the same in terms of classifier realization in the demonstrative construction. Question 3) shows that Taiwanese is different from all the other two languages.

The general question to be asked is — what exactly makes the whole picture on classifiers complex in the three dialects? We adopt the feature-checking analysis (Chomsky 1995), try to solve the puzzle by first exploring the nature of classifiers, and hopefully can provide a unified account for the constructions under investigation in Mandarin, Cantonese, and Taiwanese.

2. More data

2.1 Cantonese vs. Mandarin and Taiwanese

Cantonese differs from Mandarin and Taiwanese in that Cantonese has definite [Cl-NP] and the option to realize Cl in [X-Cl-NP]. (Notice that the modifier marker *ge-* can also substitute Cl in Cantonese.) However, Mandarin and Taiwanese cannot have definite [Cl-NP], but use definite bare NP instead. Also, they can only use modifier markers *de-* and *e-* respectively in [X-Cl-NP]. (Cantonese data from Au-yeung 1997)

NP] phrases, however, is doubtful in that 1) multiples are not classifiers and might sit in Spec NumP according to Ionin & Matushansky (2006); 2) the NP in the structure can only be numeral or ‘more’ in the case of multiples, and ‘more’ or ‘half’ in the case of measuring classifiers.

- (i) a. (jat) maan saam/gei
 one ten-thousand three/more ‘thirteen thousand/ten thousand something’
 b. (jat) baak saam/gei
 one hundred three/more ‘a hundred and thirty/a hundred something’
 c. (jat) jat gei/bun
 One day more/half ‘one day or something/a day and half’
 d. (jat) cek gei/bun
 one meter more/half ‘one meter or something/a meter and half’
- (ii) a. (chi) ban go/gwa
 one ten-thousand five/more ‘fifteen thousand/ ten thousand something’
 b. (chi) pah go/gwa
 one hundred five/more ‘a hundred and fifty/ ten thousand something’
 c. (chi) chhioh gwa/buan
 one meter more/half ‘one foot or something/a meter and half’
 d. (chi) gang gwa/buan
 one day more/half ‘one day or something/a day and half’

Definite CL-N/Definite bare NP

Cantonese	Mandarin	Taiwanese
a. [*(bun2) syu1] hou2hou2 tai2 Cl book very very read 'The book is very readable.'	a. [(<i>*Bei</i>) shui] hen hao he. Cl water very good drink 'The water tastes very good.'	a. [(<i>*Poe</i>) chui] chin ho lim. Cl water very good drink 'The water tastes very good.'
b. nei5 zung6 mei6 maai5 [*(bun2) syu1] you FOC yet buy CL book 'You haven't bought the book yet?'	b. John he-wan-le [(<i>*wan</i>) tang]. John drink-finish-LE Cl soup 'John finished the soup.'	b. Wa chi-oan [(<i>*liap</i>) pinko] a. I eat-finish Cl apple SFP 'I finished the apple.'
	c. wo xiang he [bei shui]. I want drink Cl water 'I want to drink a/* the cup of water.'	

Possessive construction

Cantonese	Mandarin	Taiwanese
[Poss-Cl/ge-NP] Siuming bun2/ge syu1 Siuming Cl/ GE book 'Siuming's book'	[Poss-de-N] Xiaoming de shu Xiaoming DE book 'Xiaoming's book'	[Poss-e-N] Siobeng e su Siobeng E book 'Siobeng's book'

Relativized construction

Cantonese	Mandarin	Taiwanese
[RC-Cl/ge-N] dit3-zo2 lok6 gaai1 bun2/ge syu1 fall-PFV down street Cl/GE book 'The book that fell on the street.'	[RC-de-N] diao-le xia qu de shu fall-PFV down go DE book 'The book that fell on the street.'	[RC-e-N] Lap-lo khi e su Fall-PFV go E book 'The book that fell on the street.'

2.2 Mandarin vs. Cantonese and Taiwanese

Taiwanese classifiers are consistently not present in the constructions in section 2.1. However, classifiers become obligatory in the demonstrative construction like Cantonese. On the other hand, Mandarin can have optional classifier in the demonstrative construction.

Demonstrative construction

Mandarin	Cantonese	Taiwanaese
[Dem-(Cl)-NP] Zhe/na (ben) shu This/that Cl book 'this/that book'	[Dem-*(Cl)-NP] Nei1/go2 *(bun2) syu1 This/that Cl book 'this/that book'	[Dem-*(Cl)-NP] Chit/hit *(pun) su This/that Cl book 'this/that book'

2.3 Taiwanese vs. Mandarin and Cantonese

As observed by Cheng & Sybesma (2003), Taiwanese does not have [Cl-NP] at all. Cantonese and Mandarin can have [Cl-NP] (though Mandarin [Cl-NP] can only have indefinite interpretation.)

CI-NP

Taiwanese	Mandarin	Cantonese
Wa be lim [(*)bei] chui]. I want drink CI water 'I want to drink a cup of water.'	Wo xiang he [bei shui]. I want drink CI water 'I want to drink a/*the cup of water.'	a. [bun2 syu1] hou2hou2 tai2 CI book very very read 'The book is very readable.' b. ngo soeng maa5 [bun2 syu1] I want buy CL book 'I want to buy a book'

We summarize the distributions of classifiers in the constructions under investigation in this paper.

	Structures under investigation				
	Definite bare N	Definite CI-NP	Indefinite CI-NP	X-CI-NP	Dem-NP
Cantonese	No	Yes	Yes	Yes	No
Mandarin	Yes	No	Yes	No	Yes
Taiwanese	Yes	No	No	No	No

3. Feature-based analysis

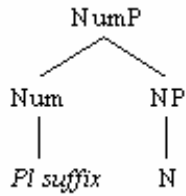
This section is going to propose that the different classifier distributions can be explained in the mechanism of classifier-raising in the spirit of Chomsky's feature-checking (1995), and consequently generate the clustering properties and interpretations. We believe the different behaviors of classifiers and numerals (specifically 'one') in the three dialects result from the (non)-availability of CI-raising and the different ways to check the features under Num. The question that immediately arises is what motivates classifiers to move and what features have to be checked.

3.1 [+def] in D & [+num] in Num

Following the spirit of Ritter (1995) and Li (1999), I propose there is a [+def] feature in D, and a [+num] feature in Num head. In addition, I argue that there is one more feature [+one] under Num in Chinese. A lot of literature (Abney 1987; Longobardi 1994, 1999; Ritter 1991, 1995; etc.) have suggested that D is the head for definiteness, and that definite nominals (e.g. pronouns and proper names) are either base-generated in D or undergo movement to D. In line with Chomsky's feature-checking (1995) mechanism in the Minimalism, it is possible to argue that there is a [+def] feature in D (or [+ref] in Longobardi's term) that needs to be checked and motivates the movement to support the phonologically empty D. However, the moved item, which also has a [+def] feature, might differ from language to language as is going to be discussed in the next section.

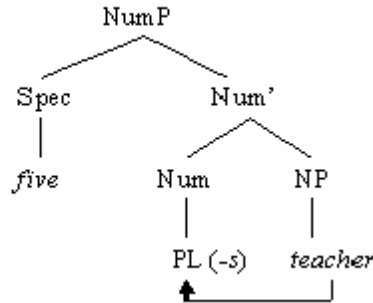
Ritter (1995) investigates the plural pattern of Modern Hebrew and proposes the following structure.

(1)



Li (1999) follows Ritter (1995) and proposes that both English plural marker *-s* and Chinese *men-* originate from the head Num. The two languages differ in that English has an obligatory N-to-Num movement, but Chinese do not due to the block of the Cl head. English can thus have the number in Spec NumP to agree with the N in a Spec-head fashion. Chinese plural marker *-men*, on the other hand, have no choice but attach to D, and leads to the definite interpretation and restricted distribution of *-men*-phrase (Li 1999).

(2) English: *five teachers* (Li 1999:86)



Li (1996, p24) observes that almost all classifiers in Chinese are singular although there are certain classifiers that have plural interpretations such as *qun* ‘group’, *shuang* ‘pair’, *diar* ‘a bit’, and *xie* (general plural Cl).⁴

Crucially, it is the number projection that carries the number information and determines the singularity/plurality value of the nominal. For example, (3a) is singular but (3b) plural.

- (3) a. *yi ge/ben/zhi* N
One Cl
- b. *Liang/ji...ge/ben/zhi* N
Two Cl

⁴ *Diar* and *xie* can only be preceded by ‘one’, not other numerals. It is possible that *diar* and *xie* are lexicalized with numeral *yi* ‘one’ or demonstrative *zhe/na* ‘this/that’ to form the fixed expressions *yi-diar/xie* ‘a bit/little’, *zhe/na-diar* ‘this/that small amount’, and *zhe/na-xie* ‘these/those’. As Li (1996) notes, they behave like English ‘a bit’ and ‘a little’, but there is no ‘two bits’ and ‘two littles’.

Assuming that numerals are in Spec NumP (Ionin & Matushansky 2006), it is not far-fetched at all to assume that there is a [+num] feature ([+Sg/Pl]) in Num head that needs to be checked. How the [+num] feature (specifically [+Sg]) is checked differs among languages, and hence the dialectal differences on the presence of the numeral ‘one’.

We differ from Ritter (1995) and Li (1999) in that we propose one more feature [+one] under Num head. In addition to the explicit number information from numeral (e.g. one, two, thirty-three..), Chinese language has a unique number value ‘one’ encoded in Num head. For example, a nominal without an overt number like [Cl-NP] or [Dem-Cl-NP] encodes number information ‘one’.

(4) Mandarin

Wo xiang mai [ben shu].

I would-like buy CL book

‘I would like to buy a book/*books.’

(5) Cantonese

a. Ngo soeng maai [bun syu] (lei taai).

I want buy CL book come read

‘I want to buy a book/*books (to read).’

b. [Zek gau] soeng gwo maalou.

CL dog want cross road

‘The dog/*the dogs wants to cross the road.’

(6) Mandarin (same in Cantonese)

zhe ben shu

Dem Cl book

‘this book/*these books’

It is possible to think that this inherent ‘one’ value is from classifiers that individualize Chinese mass nouns to countable units one by one (Chierchia 1998). Following Li’s idea (1999) that English nouns have to move to Num head to get plural suffix –s and at the same time agree with the numeral in Spec NumP, we believe there are two reasons why Chinese cannot do so. Syntactically, as Li (1999) mentioned, there is a Cl head in Chinese that blocks the N-Num movement. More importantly, Chinese nouns are not countable because they are mass, and it is the classifiers that are actually counted. Hence, it is not far-fetched at all to move classifiers to Num head because of the [+one] feature, and then the classifiers can agree with the numeral in a Spec-head fashion like English. In this sense, all classifier languages might have the [+one] feature in Num.⁵ Because the

⁵ Whether the [+one] feature exists in every classifier language needs to be further investigated. In addition, we can push it further and claim that English is also a classifier language that has the full-fledged [D Num Cl N] structure like Chinese. English mass nouns also need measuring nouns to count them (e.g. two **cups** of water, three **grains** of

inherent value ‘one’ from classifier individualizing function matches the overt numeral ‘one’ in singular nominals, the overt numeral ‘one’ can have the option to be omitted as will be discussed later.⁶

There might be confusion between the [+Sg] (one of the values in [+num]) and [+one]. Although both are number values in Num, they differ in that [+Sg] only applies in singular nominals while [+one] is an inherent number value that all nominals (singular or plural) share.

We have one more clarification among features under D and Num. Although these features are different in nature, they share one characteristic—all are interpretationally motivated. In the case of [+def] feature, if the nominal is definite and D is phonologically empty, some lexicon item must move to D to support it and check the [+def] feature. If the nominal is interpreted indefinite, the [-def] feature under D does not trigger move-

sand). If the measuring nouns are in Cl, it needs to move to Num because of the [+one] feature to agree with the numerals. When the nouns are count, it moves to Cl and Num, picks up plural suffix –s in Cl (Au-Yeung 2001; Walker 2008) or in Num (Li 1999). The count nouns then can have Spec-head agreement with the numeral in Spec NumP. On the other hand, if all English nouns are mass as claimed by Roy 2005 and Walker 2008, then the phonologically null classifier (NUMBER in Kayne’s term (2003)) will have to move to Num because of the [+one] feature and agree with the numeral in Spec NumP.

⁶ Cheng & Sybesma (1998) notes that Mandarin (or Cantonese) [Cl-N] phrases are not simply phonological reductions of [yi-Cl-N] ‘one Cl +N’. The main reason is that [Cl-N] phrases and [yi-Cl-N] phrases have different distributions. In particular, indefinite [Cl-N] phrases can be interpreted as indefinite nonspecific only while [yi-Cl-N] phrases can be interpreted as specific and nonspecific indefinites. Thus, in contexts where only an indefinite specific interpretation is possible as in i)-iii), [Cl-N] phrases should not be able to surface.

- i) Wo chi-wan-le *(yi)-kuai binggan. (bounded predicate)
I eat-finish-LE one-CL cookie
‘I finished a cookie.’
- ii) Wo ba *(yi)-wan tang he-wan-le. (*ba*-construction)
I BA one-bowl soup drink-finish-LE
‘I finished a (particular) bowl of soup.’
- iii) Wo jiao-guo *(yi)-ge xuesheng hen congming. (secondary predication)
I teach-EXP one-CL student very intelligent
‘I once taught a student who was very intelligent.’

However, Li (1996) showed that [Cl-N] in Mandarin is derived from [yi-Cl-N] although the deletion is conditional. It is subject to the appropriate context in a sentence. Not every position that allows indefinite NP is possible to substitute [yi-Cl-N] to [Cl-N]. For example, in double object structures, only the object adjacent to the verb can appear in the Cl-N form. In addition, stress and frequency play roles in deletion—unstressed [yi-Cl-N] phrases and frequently used [yi-Cl-N] are common to deletion.

ment to support D. D is left unfilled and has to be lexically governed by a head (V or P) (Longobardi 1994; Li 1996, 1997; Cheng & Sybesma 1996, 1999). In the same line, feature checking in Num head is obligatory only when the nominals carry explicit number information. When the nominals have fuzzy or vague number information, it is possible that NumP is not projected, and hence no [+num] or [+one] feature needs to be checked.

3.2 Proposal

Having established that D has [+def] feature (when the nominal is definite) and Num has [+num] and [+one] feature (when the nominal has explicit number information), we now try to answer the following questions. 1) Why can Mandarin and Taiwanese have definite bare NP, but not Cantonese? 2) Why can Cantonese use definite [CI-NP], but not Mandarin? 3) Why is the non-existence of [CI-NP] in Taiwanese? 4) Why can classifiers be present in [X-CI-NP] in Cantonese, but not Mandarin and Taiwanese? 5) Why can Mandarin have the option to use classifiers in [Dem-(CI)-NP], while the classifiers must be realized in Cantonese and Taiwanese?

We propose that the different realizations of classifiers and numerals result from the different ways to check [+num] feature (specifically, [+Sg]) and the (non)-availability of CI-raising to D. In all three dialects, classifiers are [+one] and can move to check the [+one] feature in Num. Cantonese and Mandarin classifiers can be [+Sg] that can check off the [+Sg] in Num head, while Taiwanese classifiers are [-Sg], and [+Sg] feature in Num is checked off by Spec-head relation. That is, **Cantonese and Mandarin have the ability to incorporate the numeral value ‘one’ and the inherent value ‘one’ (from individualization) into classifiers, whereas Taiwanese can only have inherent value ‘one’ in classifiers.** This parameter attributes to the fact that Taiwanese has the obligatory presence of ‘one’ in indefinite [one-CI-NP], but Cantonese and Mandarin can have optional ‘one’ in [(one)-CI-NP]. When it is [+PI] under Num head, all three languages cannot have [+PI] feature in classifiers because [+PI] and [+one] features contradict semantically. The numerals (except for ‘one’) have to check off the [+PI] in Num via Spec-head relation like the Taiwanese singular case. This is why numerals more than ‘one’ has to be present at all time. For the (in)definiteness, Cantonese classifiers can have the option to be either [+def] or [-def] (depending on the interpretation) while Mandarin and Taiwanese classifiers are always [-def]. [+def] feature in Mandarin and Taiwanese is in fact in N (Cheng & Sybesma 1999, Li 1999).

The consequences of this proposal are that Cantonese classifiers can undergo cyclic CI-Num-D movement, and check off the [+Sg] and [+one] in Num head and [+def] in D head when the nominal is definite.⁷

⁷ Li (1996) also proposes that there is a CI-Num movement in Cantonese [CI-NP]. She argues that Cantonese CI has to move to support Num because Num is syntactically empty. However, in Mandarin and Taiwanese, CI does not need to move to Num since Num has already supported by a lexical item (the default number ‘one’ in this case, which undergoes phonological deletion afterwards). Two questions arise. First, if Num is syntactically empty, how does an invisible Num

Mandarin classifiers can move to check [+Sg] and [+one] like Cantonese but no further movement to D because classifiers are [-def]. Taiwanese classifiers can move to Num head to check off [+one] feature in Num, but its [+Sg] feature has to be checked off via Spec-head, and this results in the obligatory presence of ‘one’. Taiwanese classifiers cannot move to D since they are also [-def] like Mandarin. Mandarin and Taiwanese can move N to check off [+def] in D under the condition that no intervening head (e.g. Num or Cl) is present (Li 1999). If some head(s) is(are) projected between N and D, both languages resort to direct insertion of some lexical items with [+def] feature (e.g. demonstratives) in D. We summarize our proposals in the table below. This proposal will make three-way differences, and consequently spell out the different surface forms of the constructions under investigation in the three dialects.

Available features in Cl	Number			(In)definiteness	Consequent Cl-movement
	[+Sg]	[+one]	[+Pl]	[+def]	
Mandarin	✓	✓	N	N	D Num Cl N ↑
Taiwanese	N	✓	N	N	D Num Cl N ↑
Cantonese	✓	✓	N	✓	D Num Cl N ↑ ↑

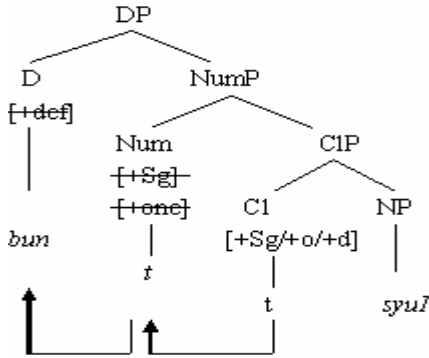
3.3 Toward the solutions

3.3.1 bare NP/[CI-NP]

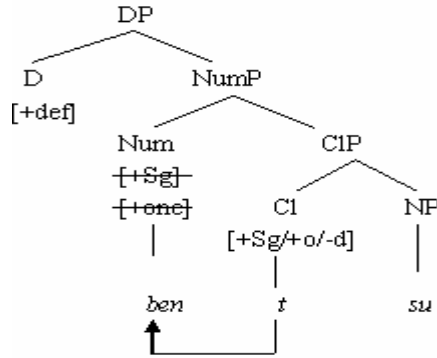
Bare NPs can be definite and indefinite in Mandarin and Taiwanese, but only indefinite in Cantonese. [CI-NP] can be definite and indefinite in Cantonese, indefinite in Mandarin, and non-occurrence in Taiwanese. Mandarin and Taiwanese on one hand and Cantonese on the other hand are in complementary distribution on the definite interpretation of bare NPs and [CI-NP] phrases. While Mandarin and Taiwanese resort to bare NPs to express definiteness, Cantonese cannot have definite bare NP but uses definite [CI-NP], and vice versa. This fact can be accounted for by the present proposal. [CI-NP] phrases in Cantonese and Mandarin are always singular as shown in (4)/(5). As we propose earlier, when number information is clear, NumP has to be projected. The structure is shown in (6). Cantonese classifiers can move to Num to check off the [+Sg] and [+one] in Num, and then moves to D to check off the [+def]. Mandarin and Taiwanese classifiers cannot move to D because their classifiers are [-def]. The derivation crashes because [+def] in D is left unchecked in (7).

head induce movement to support it? Second, numerals are in Spec NumP (Ionin & Mutushansky 2006), and the Num head should encode [Sg/Pl] feature which agrees with Spec NumP (Li 1999). Unless we try to say ‘one’ can also sit in Num head (maybe because it is the only number that agrees with [Sg]), the Num head in Mandarin and Taiwanese cannot be claimed to be lexically filled in Mandarin and Taiwanese.

(6) *Bun syu1* (Cantonese)
 Cl book ‘the book’

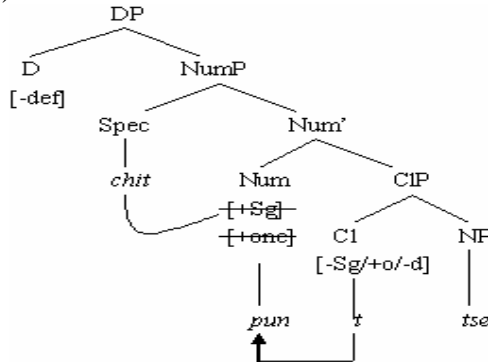


(7) **ben shu* (Mandarin)
 Cl book ‘the book’



The indefinite interpretation of [Cl-NP] is possible in Cantonese and obligatory in Mandarin. In this case, the D has [-def] feature that does not motivate any movement to D. Cantonese and Mandarin classifiers move to Num to check off both [+Sg] and [+one] features in Cl. The unfilled D in both dialects need to be lexically governed, and hence the indefinite interpretation. Our mechanism can also explain why Taiwanese cannot even have indefinite [Cl-NP], but only [‘one’-Cl-NP]. As we propose earlier, Taiwanese classifiers lack the [+Sg] feature. The [+Sg] in Num will be checked off by ‘one’ in Spec NumP as in (8). The presence of ‘one’ is therefore obligatory since the [+Sg] feature in Num will be left unchecked without ‘one’. On the other hand, the presence of ‘one’ in Mandarin and Cantonese indefinite [(one)-Cl-NP] is optional (can undergo phonological deletion) since [+Sg] in Num has been checked by Cl.

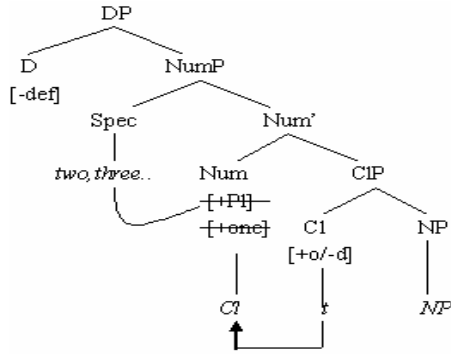
(8) *(*chit*) *pun tse* (Taiwanese)
 (one) Cl book ‘*the book/a book’



The derivation of [Num-Cl-NP] is straightforward after the analysis of [Cl-NP]. Remember that [Num-Cl-NP] can only be indefinite in the three dialects. Since it is indefinite ([-d] in D), there is no movement to D. The [+one] feature in Num is checked off by Cl-raising in all three dialects. Taiwanese checks [+Sg] via Spec-head agreement

in (8) while Cantonese and Mandarin checks [+Sg] via Cl-raising in (6)/(7). When the nominal is plural, the [+Pl] in Num is checked off by the numerals via Spec-head relation in all three dialects in (9) because Cl is [-Pl] in all three dialects.

(9) [Num-Cl-NP]



Unlike Cantonese, Mandarin and Taiwanese can have definite bare NP. Bare NPs, definite or indefinite, are ambiguous between singular and plural readings in (10).

(10)

- a. shu hen-hao kan. (Mandarin; Taiwanese is the same; no definite bare NPs in \ Cantonese)
 Book very-good read
 ‘The book/books are very good (to read).’
- b. wo xiang kan shu. (Mandarin; Cantonese and Taiwanese two are the same.)
 I want read book
 ‘I want to read a book/books.’

If a nominal is ambiguous in number information, NumP does not have to be projected. In the case of bare NPs, the structure can have only one layer of projection DP above NP [D-N] without any intermediate projection. Following our previous proposal that N in Mandarin and Taiwanese can be [+def], the N can move to D since there is no intervening head. Cantonese cannot have N move to check the [+def] feature in D because its [+def] feature is in Cl (or alternatively, its N is [-def]). When bare NPs are interpreted indefinite (D as [-def]), no movement occurs in all three dialects. This leaves an unfilled D that needs to be lexically governed, and hence the possibility of indefinite bare NPs in all three dialects.

3.3.2 [X-Cl/MFK-NP]

This section tries to spell out the possessive and relativized constructions from our feature-checking mechanism. Remember that Cantonese differs from Mandarin and Taiwanese in that classifiers can realize in these two constructions (though it can also use the modifier marker *ge*). However, Mandarin and Taiwanese can only use the modifier markers *de/e*, shown as follows:

Cantonese	Mandarin	Taiwanese
Poss-Cl/ge-N Siuming bun2/ge syu1 Siuming Cl/GE book ‘Siuming’s book’	Poss-de-N Xiaoming de shu Xiaoming DE book ‘Xiaoming’s book’	Poss-e-N Siobeng e su Siobeng E book ‘Siobeng’s book’
RC-Cl/ge-N dit3-zo2 lok6 gaai1 bun2/ge syu1 fall-PFV down street Cl/GE book ‘The book that fell on the street.’	RC-de-N diao-le xia qu de shu fall-PFV down go DE book ‘The book that fell on the street.’	RC-e-N Lap-lo khi e su Fall-PFV go E book ‘The book that fell on the street.’

Since the number information in both relativized and possessive constructions is vague as in (11)/(12), NumP is not projected.⁸

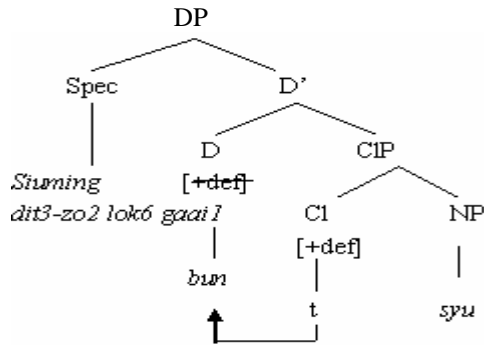
- (11) a. Zhangsan de shu (Mandarin; Taiwanese and Cantonese are the same)
 Zhagnsan DE book ‘Zhangsan’s book(s)’
 b. Siuming bun syu. (Cantonese)
 Siuming Cl book ‘Siuming’s book(s)’
- (12) a. ganggang mai huai-lai de xigua (Mandarin; Taiwanese and Cantonese are the
 just buy come-back DE watermelon \ same)
 b. aamaam maai faan- lai go saigwaa (Cantonese)
 just buy come-back Cl watermelon
 ‘the watermelon(s) that has(have) just been bought ’

The fact that Cantonese can have Cl in both structures is accounted for by the Cl-raising mechanism in (13). Cantonese Cl moves to check the [+def] feature in D while Mandarin and Taiwanese cannot do so because of the lack of corresponding [+def] feature in Cl. This explains the grammaticality of [Poss/RC-Cl-NP] in Cantonese, but the ungrammaticality in Mandarin and Taiwanese.

- (13) a. Siuming bun2 syu1
 Siuming Cl book ‘Siuming’s book(s)’
 b. dit3-zo2 lok6 gaai1 bun2/ge syu1
 fall-PFV down street Cl/GE book ‘The book(s) that fell on the street.’

⁸ However, when number is explicitly expressed as in (i), NumP has to be projected in possessive and relativized constructions.

- (i)
 a. Zhangsan de san ben shu
 Zhangsan DE three Cl book ‘Zhangsan’s three books’
 b. ganggang mai huai-lai de san ke xigua
 just buy come-back DE three Cl watermelon ‘the three watermelons that have just been bought’



To derive Mandarin and Taiwanese possessive and relativized constructions (and also the Cantonese alternative with the modifier marker *ge*), we follow Simpson (2003) and assume that the modifier markers *de/e/ge* are inserted directly in D.⁹ Since D is occupied by the modifier markers at the first place and thus have their [+def] feature checked (or empty D is supported), no further movement is required (N-D movement in Mandarin and Taiwanese; CI-D movement in Cantonese).

3.3.3 [Dem-(Num)-(CI)-NP]

Lu (1984) observes that Mandarin can have bare demonstratives as in (14). On the contrary, we observe that Cantonese and Taiwanese cannot in (15)/(16). The presence of *one* is not required in (14) - (16). When the numeral ‘one’ is present, however, it must be accompanied by a classifier.

⁹ Simpson (2003) adopts Kayne’s idea (1994) that the head noun of the relative clause originates in the IP clause and undergoes raising to the Spec CP, which is selected as the *complement* of a D. He assumes that the Mandarin modifier marker *de* is inserted in D, and that the clitic nature of *de* attracts the remnant IP to Spec DP to phonologically support it. Below is the derivation.

- (i) *diao-le xia qu de shu* (Mandarin)
 Fall-PFV down go DE book
 a. [IP [N book] fall-PFV down]
 b. [DP *de* [CP [IP [NP book] fall-PFV down]]
 c. [DP *de* [CP [NP booki] [IP ti fall-PFV down]]
 d. [DP [IP ti fall-PFV down]k [D *de* [CP [NP booki] tk]]

However, Audrey Li (personal communication) points out that relativized construction in Chinese can be an NP, not always a DP, against the analysis of *e/de* as D. For example, DP is not allowed in this position.

- (i) *wo ba ta dang-zuo [shijie-shang zui da de da shagua]*
 I Ba him treat world-in most big DE big fool
 ‘I treat him as the biggest fool in the world.’

Our proposal will have the same concern since we follow Simpson and insert the modifier marker directly in D.

(14) Mandarin

Zhe ((yi) (ge)) jia duo dian, na ((yi) ge) shao dian.

This one CI plus more a little that one CI minus a little
‘(I want) more this, fewer that.’

(15) Taiwanese

Chit (chi) *(e) ge gwa, hit (chi) *(e) kiam gwa.

This one CI plus a little that one CI minus a little
‘(I want) more this, fewer that.’

(16) Cantonese

Nei1 (jat) *(go3) m4 hou2, go2 (jat) *(go3) sin1 hou2.

This one CI no good that one CI only good
‘This (one) is not good; that (one) is good.’

(14)-(16) are deictic in the sense that they are always uttered with pointing gestures. Consider also (17) and (18).

(17) Mandarin

a. zhe yi ben shu

this one CI book ‘this book’

b. zhe ben shu

this CI book ‘this book’

c. zhe shu

this book ‘this book/these books’

(18)

a. chit (?chi) *(pun) tse (Taiwanese)

this one CI book

b. nei (jat) *(bun) syu (Cantonese)

‘this book/*these books’

It is observed from (14)-(18) that Mandarin can optionally delete classifiers while Taiwanese and Cantonese cannot, whether the nominal is deictic (14-16) or generally referential (17/18). Moreover, we find that when the classifier is not present as in (17c), the nominal is ambiguous between plural and singular interpretations. This ambiguity can be better demonstrated in the following context.

(19) Ni **zhe** **sin** dei cheng yi-xia...

your this/these letter/s must weigh a-bit

....**ta** chao-zhong-le / **liang-feng** dou chao-zhong-le.

it overweight-PRF / two-CL all overweight-PRF

‘This/these letter(s) of yours must be weighted...it is/they are both overweight.’

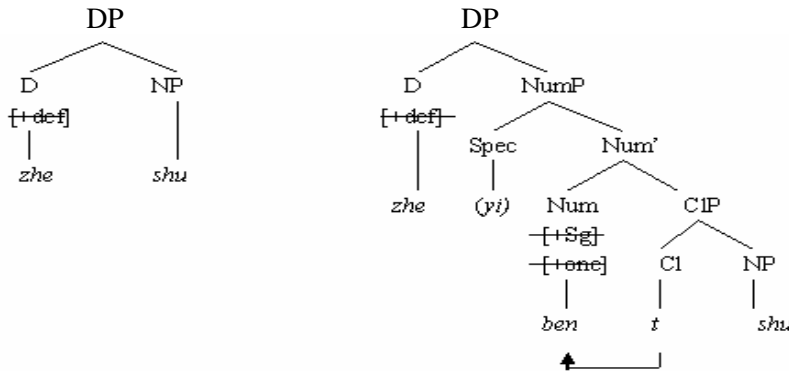
The demonstrative construction with a classifier (17a/b), however, is always singular. Previous literatures (Lu 1984, Li 1996, Au-Yeung 2001) suggest that Mandarin surface [Dem-N] form is derived from [Dem-(one)-CI-N]. Given the different number interpretations of [Dem-N] and [Dem-(one)-CI-N], we have reason to believe that [Dem-N] and [Dem-(one)-CI-N] might have different syntactic structures. Following our previous proposal that nominals that are ambiguous in number information do not project NumP,

the structure of the [Dem-N] form is in fact [D-N]. On the other hand, the [Dem-(one)-CI-N] form has all the intermediate projections (and hence the features in Num head need to be checked). In Mandarin, CI moves to Num to check off both features in Num. [+def] feature in D is checked by the direct insertion of the demonstrative which also has a [+def] value. The structures of [Dem-N] and [Dem-(one)-CI-N] are shown in (20)

In Taiwanese and Cantonese, [Dem-CI-NP] is always singular. Therefore, it has the full-fledged [D-Num-CI-N] structure like (20b). The [+one] feature in Num head will be checked off by the raising of CI to Num. In Cantonese, [+Sg] is also checked off by the movement of CI to Num, but Taiwanese checks off the [+Sg] via Spec-head relation. Our proposal will predict that Taiwanese *chi* ‘one’ has to be present, but it is preferably omitted in the demonstrative case. As pointed out by an anonymous reviewer, it is possible that *chi* is actually not deleted in (18a), but phonologically incorporates to the demonstrative *chit*.

(20)

- a. zhe shu b. zhe (yi) ben shu
 this book ‘this book/these books’ this one CI book ‘this book’



4. Conclusion

Our paper argues that the different classifier realizations among Mandarin, Taiwanese, and Cantonese are based on the different properties of classifiers, which will lead to the (non)-availability of CI-raising to different heads (Num or D). When a nominal is definite, D head carries a [+def] feature that will motivate some lexical item that has a corresponding [+def] feature to move. When the number information in the nominal is explicit, NumP needs to be projected, and [+num] and [+one] features in Num head need to be checked. Cantonese and Mandarin have the ability to incorporate the numeral value ‘one’ and the inherent value ‘one’ into classifiers, whereas Taiwanese can only have the inherent value ‘one’ in classifiers. This explains why ‘one’ must be present all the time and the impossibility of indefinite [CI-NP] structure in Taiwanese, and why ‘one’ is not obligatory in Cantonese and Mandarin. We also argue that Cantonese classifiers carry the [+def] feature that can check off [+def] feature in D, whereas in Mandarin and Taiwanese this [+def] feature is not in CI, but in N. This correctly predicts why Cantonese can have definite [CI-NP], while Mandarin and Taiwanese use definite

bare NPs rather than [CI-NP]. Although we consistently posit that D is projected in every nominal construction, we suggest that not all the intermediate projections have to be projected at any time. For the nominal constructions that have ambiguous number information (e.g. bare NPs, possessives, relativized construction, and Dem-N in Mandarin), it is possible that NumP or CIP is not projected at all.

This paper leaves a lot of room for future research. First, we do not exhaust all the classifier-related structures. Also, it will be interesting to include more diachronic data since classifiers have undergone a long grammaticalization path. Finally, the status of the numeral ‘one’ needs to be further examined.

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Bound Roots in Mandarin Chinese and Comparison With European “Semi-Words”¹

Laura Pirani
*University of Verona*²

Compounding processes are morphologically productive in modern Mandarin Chinese. The process called “root compounding” (Sproat and Shih, 1996) is responsible for the creation of a high percentage new two-syllable words in the modern language. Bound root words look like compounds but the constituting parts are bound morphemes or “bound roots”. They have an intermediate status between affixes and words since they are bound like affixes but they behave like compounds constituents. Similarly, various European languages involve bound roots called “semi-words”. Root compounds in Mandarin and European semi-words are very similar: they have the same morphological structure and they share a similar historical and lexical development. The constituting elements are all bound and they behave more as content words with a lexical meaning. Historically, they derive from old free forms (*i.e.*, Mandarin bound roots from Old Chinese monosyllables, European semi-words from Greek and Latin words) and they are still productively used to form words that are part of a more technical and modern vocabulary. The analysis of Mandarin and European root compounding process shows that bound roots are not affixes but lexical words (*i.e.*, nouns) for three reasons. First, because of their lexical meaning. Secondly, they can attach to other bound roots. And finally, they can be both first and second word constituent, as in compounds (cf. Scalise, 1984; Sproat and Shih, 1996; Packard, 1998). Root compounding is a sign of the presence of morphology in Chinese and of a morphological trigger similar to typologically and genetically non related languages.

0. Introduction

This paper examines a word-formation process in Mandarin Chinese that involves one or two bound roots and compares it to a similar morphological process in European languages. This word-formation process in Mandarin is exemplified by the forms

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² Laura Pirani works now at *Q-go*, Diemen, The Netherlands.

presented in (1) and is claimed to be morphologically productive in the current language (cf. Sproat and Shih, 1996 and Packard, 1998; 2000).

In the following examples as in all this work, Chinese examples are written with characters followed by *pinyin*, then the meaning of the two (or more) words that form the compound and the compound resulting meaning in glosses. Characters are often between square brackets with their grammatical category and bound roots are often marked in bold.

- (1) a. [[电]_N [子]_N]_N (*diàn zǐ*) *electricity particle* ‘electron’
 b. [[磁]_N [带]_N]_N (*cí dài*) *magnetism tape* ‘(magnetic) tape’
 c. [[电]_N [压]_N]_N (*diàn yā*) *electricity press, weigh down* ‘voltage’
 d. [[脑]_N [力]_N]_N (*nǎo lì*) *brain power* ‘intelligence’

Complex words containing bound roots like those in (1) are dubbed “root compounds” by Sproat and Shih (1996) and “bound root words” by Packard (2000).

A similar process is morphologically productive also in Indo-European languages: above all, Romance and Germanic languages combine one or two bound roots and form the so-called “neo-classical compounds” (cf. Ralli (2005)) where the neo-classical bound root(s) is/are dubbed from their Latin or Greek origin. Several examples are presented in (2): the examples (a.- c.) are from a Romance language, Italian and those in (d.³ - f.) are from a Germanic language, English. In these examples neo-classical roots are marked in bold and labelled as nouns since they refer to the category ‘noun’ and they were nouns in the old language.

(2) Italian⁴

- a. [[**Semi**]_N[conduttore]_N]_N ‘semi-conductor’
 b. [[**Macro**]_N[economia]_N]_N ‘macro-economy’
 c. [[**Teo**]_N [**log**]_N ia]_N⁵ ‘theology’

³ Examples d. is taken from V. Waszink (2006). See this study for a recent and insightful discussion on different types of neo-classical compounds.

⁴ The Italian words presented here exist also in English.

⁵ [-ia] is a suffix, thus it is not part of the neo-classical bound root *-log-*. The same is for the suffix *-y* in example (2f.).

English

- d. [[**hydro**]_N[gel]_N]_N *hydr-o-gel*⁶
- e. [[**micro**]_N[wave]_N]_N *micr-o-wave*
- f. [[**neuro**]_N[**log**]_N y]_N *neur-o-log-y*

The examples in (2a., b., d. and e.) present words made up by one bound root at the left hand side of the compound; the compounds in (2c.) and (2f.) are composed by two bound roots, both of Ancient Greek origin.

For all the languages whose examples are illustrated in (1) and (2) (*i.e.*, Mandarin, Italian and English), the most frequent structure encloses two bound roots. Mandarin, Italian and English are also similar as in most words made up by one bound and one free root, the bound root can be both the constituent to the left or to the right. Let's consider some examples in (3) see the different positions of bound roots (in bold).

(3) Mandarin

- a. 住房 (*zhù fang*) *to live house* 'residence'
- b. 国家 (*guó jiā*) *country family* 'nation'

Italian

- c. **Discoteca** 'disco'
- d. **Telecomunicazione** 'telecommunication'

English

- e. **Discography**
- f. **Cardiofitness**

In most Mandarin root-compounds and in most Italian and English neo-classical compounds, the same bound root can be both at the left and at the right hand side. Let's see one example of a productively used bound root in Mandarin (see (4a.) and (4b.)), Italian (see (4c.) and (4d.)) and English (see e. and f.).

⁶ The linking elements *-o-* and *-i-* are used in both neo-classical noun formation and neo-classical adjective formation. These linking elements mark ancient Greek (*-o-*) and Latin (*-i-*) origin. In English and German, the linking element *-o-* is much more frequent than *-i-*. In Romance languages, they are used with the same frequency.

Some neo-classical compounds do not contain a linking element. The absence of a linking element often derives from the fact that *o* and *i* can be deleted before a vowel.

(4) Mandarin: considering bound root 子(*zi*)

- | | | | |
|----|----|--------------------|---------------------------------------|
| a. | 独子 | (<i>dú zǐ</i>) | <i>only child, son</i> ‘only child’ |
| b. | 子宫 | (<i>zǐ gōng</i>) | <i>child, son womb, uterus</i> ‘womb’ |

Italian: considering the bound root *-term-*

- c. Termografo ‘termograph’
- d. Isotermo ‘isoterm’

English: consider bound root *-graph-*

- e. Graphology
- f. Chronograph

However, bound roots distribution does not seem to be free: cases of bound roots used exclusively at the left or at the right hand of root-compounds can be found both in Mandarin, in Italian and in English. In Mandarin, their position is the left-hand side, in Italian and English is the right-hand side. Because of this restriction, these bound roots seem to be more grammatical than lexical elements. Let’s see some examples in (5).

(5) Mandarin

- | | | | |
|----|-----|---------------------------|----------------------------------|
| a. | 飞机 | (<i>fēi jī</i>) | <i>to fly machine</i> ‘airplane’ |
| b. | 工程师 | (<i>gōng chéng shī</i>) | <i>project master</i> ‘engineer’ |
| c. | 住房 | (<i>zhù fang</i>) | <i>to live house</i> ‘residence’ |

Italian

- d. **Semicerchio** ‘semicircle’
- e. **Neodottore** *new doctor* ‘a University student that has recently graduated’

English

- f. **Hypo**allergenic
- g. **Psycho**-socio-analysis

Mandarin bound roots *ji*, *shi* and *fang* in (5a. - c.) mean ‘machine’ ‘master’ and ‘room, house’ respectively and even if on the surface they seem similar to the bound roots presented in (2), they are morphologically different since their behaviour is closer to that of affixes rather than lexical elements. As happens to affixes, they are found either at the left or at the right hand side, they most frequently attach to free roots, they are not used in lexically restricted contexts. In contrast, bound roots in (2) are both at the left and the

right hand side, attach most frequently to other bound roots and are mostly used for the creation of terms concerning science and technology.

Likewise, the Italian and English bound roots *neo-*, *semi-*, *hypo-* and *psycho-* originate from Greek like the other bound roots in (2) but nowadays their behaviour is more similar to that of prefixes: they maintain their original lexical meaning and they are exclusively at the left hand side of a word, they tend not to select bound roots and they are used in diverse (and not only scientific) contexts. In contrast with the examples of bound roots presented in (2), in most of the cases in (5), the prefix tends to select a free (and not to a bound) root. With this respect, recent studies point out that these bound roots forming compounds in European languages (cf. Ralli, 2005) have to be treated either as affixes or as roots, not both.

However, looking at the examples above, it seems that several bound morphemes derived from Ancient languages behave more like affixes while others behave more like roots (especially like nouns). Moreover, it seems a typologically different language, Mandarin Chinese shows a similar usage with respect to bound roots.

This paper will propose a new approach to the study of bound roots in typologically non related languages: all these bound roots (or “semi-words” as they are called in Italian) exist in different languages and they are nowadays productively used. Many of them are roots, many are affixes. The criteria that permit to individuate and distinguish the two types are their historical development, their trigger, their distribution, their morphological selectional properties: roots are relicts of ancient languages, thus have the same structure of the language they originate from (cf. Ralli, 2005), are used for the creation of science terminology, they exclusively select one-syllable words and they are found both as right and left constituents and combine with other bound roots (as for lexical elements). The latter type contains bound roots with the same origin but they grammaticalized and are used in multiple and more numerous contexts as affixes: as all affixes do, they are positionally restricted, they do not have to create a specific vocabulary, they tend to attach to free words and they can select both one- and two-syllable words (cf. (5b.) and (5g.)). The first type of bound roots is involved in a compounding process, the second type in a derivational process.

The questions that arise are:

- i. What criteria in particular are responsible for the distinction of bound roots into those that seem more compositional from those more derivational?
- ii. What are the similarities and the differences between Mandarin Chinese semi-words and European semi-words?

This paper will approach each of these questions in the paragraphs that follow.

1. Functions and Properties of Mandarin Chinese Bound Roots

Bound roots in Mandarin Chinese have been analysed by Sproat and Shih (1996) and by Packard (2000). Sproat and Shih claim that in Mandarin Chinese several nominal roots used in derived words productively form “root compounds”; these roots are bound morphemes that semantically represent “kind” (Carlson (1977)). More precisely, they emphasize that the common Mandarin word related to a root would typically denote the canonical instance of that kind (1996: 58-59); so for instance, the root 蚁(*yǐ*) denotes the ant *kind*, whereas the normal Mandarin word for ‘ant’ 蚂蚁(*mǎ yǐ*) denotes the ‘canonical’ ant and can in general be used to denote most (sub)kinds of ants. One can represent the relationship between 蚁(*yǐ*) and 蚂蚁(*mǎ yǐ*) in terms of an IS-A hierarchy and 蚂蚁(*mǎ yǐ*) is a daughter node; the thick edge to the node around 蚂蚁(*mǎ yǐ*) represents the fact that this node denotes the canonical instance of the kind. Other words in which 蚁(*yǐ*) is the head would also be representable as bearing an IS-A relation to the 蚁(*yǐ*) node, such as 军蚁(*jūn yǐ*) ‘army ant’ or 工蚁(*gōng yǐ*) ‘worker ant’. Other cases, such as 白蚁(*báiyǐ*) (white ant) ‘termite’, bear a less clear IS-A relation to 蚁(*yǐ*) - termites being of course not ants, except perhaps in folk taxonomy. However, this kind of extension is common in compounding - cf., English *polecat*, *cuttlefish*, *sea lion*. They assume that monomorphemic nouns, such as 鸡(*jī*) ‘chicken’, which must be considered to be both roots and words, serve both the functions of kind and canonical instance.

In addition to Sproat and Shih, Packard (2000) investigates the productivity and the use of some bound morphemes that frequently form disyllabic constructions in modern Chinese. More precisely, Sproat and Shih on one side and Packard on the other introduce for Chinese monosyllabic bound morphemes respectively the term of “*non word roots*” and “*bound roots*” and they propose they form “*root compounds*” or “*bound root words*” (generally disyllables with either two bound roots or a bound and a free root). Chinese *bound root words* should be kept distinguished from compound-words: in fact, according to Packard’s (2000) definition, a “compound form” in Chinese has only free roots (generally two, *i.e.*, disyllabic compounds are the most frequent).

In contrast with bound root denotation of kind and disyllabic bound root words denotation of the canonical instance of that kind, compound-words do not denote neither the kind nor the canonical instance of that kind⁷. Moreover, differently from other bound morphemes (*e.g.*, inflectional affixes such as the aspectual particle 了(*le*)), Chinese *bound roots* have a lexical meaning⁸. Examples of productive Chinese *bound roots* are presented in (6).

⁷ Compound-words are called “full-compounds” in Sproat and Shih (1996) opposite to “root-compounds”.

⁸ Cf. also Packard (1998:16, 17): “Also, unlike “typical” affixing languages, Chinese has a large class of morphemes (which we may call ‘bound roots’) that possess certain affixal properties

- (6) a. 头 (*tóu*) ‘head, hair’
 e.g., 头脑 (*tóu nǎo*) *head brain* ‘mind’
- b. 国 (*guó*) ‘country’
 e.g., 国家 (*guó jiā*) *country family* ‘nation’
- c. 师 (*shī*) ‘teacher, master’
 e.g. 工程师 (*gōng chéng shī*) *project master* ‘engineer’
- d. 机 (*jī*) ‘machine’
 e.g. 飞机 (*fēi jī*) *to fly machine* ‘airplane’

However, even though bound roots in (6) can be all treated like compound constituents because of a lexical meaning, I propose that Mandarin bound roots are not all part of the same phenomenon: many bound roots are currently used as right and left constituent in compounds and by attaching to other bound morphemes they change their lexical meaning; in addition, they are used in a more technical and scientific environment. Bound roots showing this behaviour are those in (6a.) and (6b.).

In contrast, there are cases of bound roots like those in (6c.) and (6d.) that tend to have a more fixed position in compounds, to select free morphemes; they tend not to change their meaning according to the context.

To support this hypothesis, the example (7) shows the distribution, the selectional properties and the change of meaning that a bound root like 头 (*tóu*) ‘head, hair’ (in (6a.)) can undergo:

- (7) a. 头路 (*tóu lù*) *tóu class* ‘first class (good etc.)’
 b. 城头 (*chéng tóu*) *city wall tóu* ‘top of the city wall’

The two examples in (7) show the possibility of finding the bound root 头 (*tóu*) both as constituent to the left (see a.) and to the right (see b.); in addition, both in (7a.) and in (7b.), 头 (*tóu*) attaches to a bound morpheme in order to create a new independent word. Finally, in the words in (7), 头 (*tóu*) is not used with its main (and most frequent) meaning of ‘head, head’: in a. it means ‘first’, in b. it means ‘top’. Thus, the bound root 头 (*tóu*) shows a specific distribution (it is not positionally restricted, it can be both on the left and on the right), it has the selectional property [+bound] as it tends to select bound morphemes and it can undergo changes of meaning.

Opposite to 头 (*tóu*), the example (8) presents the different behaviour of the bound root 师 (*shī*) (already seen in (6c.)).

(namely, they are bound and productive in forming words), but encode lexical rather than grammatical information, and furthermore may occur as the component at the right or at the left hand side of a word”.

- (8) a. 老师 (*lǎo shī*) *old teacher, master* ‘teacher’
 b. 工程师 (*gōng chéng shī*) *project teacher, master* ‘engineer’

In compound-words like those in (8), the bound root 师 (*shī*) is the right hand side constituent and select free morphemes (like adjectives, verbs or two-syllable nouns). It always has the meaning of ‘teacher, master’.

All considered, Mandarin Chinese bound roots have to be distinguished into two groups: the first group includes bound roots like 头 (*tóu*), they are less positionally restricted and select bound morphemes; the second group includes bound roots like 师 (*shī*), they are positionally restricted and select free morphemes. I will analyse them in detail in the next paragraph.

2. Two Types of Bound Roots in Mandarin

As illustrated in the previous paragraph, Mandarin bound roots fall into two distinct classes. I propose this distinction on the grounds of three criteria:

- a) The selection by a semi-word of bound/free morphemes;
- b) Their position of a semi-word in a compound;
- c) The change of meaning of a semi-word according to the context.

According to these three morpho-semantic criteria, semi-words can be divided into:

- I. What I call “semi-nouns”: a conspicuous groups of semi-words that select bound morphemes, can be both right and left hand side word constituent, change their meaning according to the context. They are used to create a scientific and technical vocabulary. These semi-words are lexical and not grammatical elements (even if they are bound morphemes) as they behave like nouns. An example of semi-nouns, 子 (*zǐ*) ‘child, son’ is presented in (9).

- (9) a. 量子 (*liàng zǐ*) *quantity particle* ‘quantum’
 b. 电子 (*diàn zǐ*) *electricity particle* ‘electron’
 c. 子音 (*zǐ yīn*) *small element sound* ‘(phonet.) consonant’
 d. 半子 (*bàn zǐ*) *half son* ‘son in law’

- II. What I call “semi-affixes”: a restricted group of semi-words that select free morphemes and are exclusively found as right hand side constituent; they always keep the same meaning. They are not exclusively used for the creation of a technical and scientific vocabulary. An example of semi-affixes, 机 (*jī*) ‘machine’ is presented in (10).

- (10) a. 飞机 (*fēi jī*) *to fly machine* ‘airplane’
 b. 电话机 (*diàn huà jī*) *telephone, phone machine* ‘telephone (set)’

As shown in (9) and (10), semi-nouns are involved in root compounding; semi-affixes are involved in a derivational process.

These two groups of bound roots (or semi-words) share the origin from Old Chinese free nouns. However, even though they have the same origin, it seems they did not have the same development: many semi-words have probably grammaticalized⁹ and are nowadays used more like affixes than like nouns.

Despite this difference, they share a high frequency in morphologically productive processes of the modern language.

Nevertheless, since compounding is morphologically more productive than derivation, semi-affixes are less productively involved in word-formation processes, thus the morphological process that uses semi-nouns is more productive than the one that uses semi-affixes¹⁰.

The presence and the division of bound roots in two groups do not seem to be peculiar of Mandarin Chinese. In the next part, we will examine a similar situation and behaviour in European languages.

3. European Semi-Words

Semi-words are productively involved in European languages compounding. The use of these semi-words have been analysed by Scalise (1994:269-271) with respect to Italian and by Bauer (1983), Warren (1990), Adams (2001) and Baeskow (2004) with respect to English.

Starting from the analysis of Italian semi-words, Scalise calls them “*semi-parole*” and claims they have an uncertain status between “words” and “affixes”. He proposes “*semi-parole*”’s behaviour to be far from affixation and to move near the “word”’s status: this can be supported by the fact that an Italian semi-word can be found both as first and as second word constituent, as happened in compound-forms. Consider the case of *filo* (‘-phil-’)¹¹.

- (11) a. [[Franco] [filo]] ‘Francophile’
 b. [[Filo] [antropo]] ‘philanthrope’

⁹ In this analysis, the term “grammaticalization” refers to a morphological process of semantic change by which a content word (lexical morpheme) changes into a functional word or grammatical affix. The process of grammaticalization includes a phonological reduction and a semantic bleaching. Cf. A. C. Harris (1990).

¹⁰ The least productivity of semi-affixes is confirmed also by the fact that they are a small group compared to semi-nouns.

¹¹ Examples and considerations are taken from Scalise (1994: 269).

A standard affix cannot have such a free behavior: if it is on the base's right hand side it is a suffix, if it is on the base's left hand side, it is a prefix. According to Scalise (1994), the "*semi-parole*" seem to move near the role of compound constituents: consider the parallel between the use of *filo* in (11) and the use of the noun *finestra* 'window' in the compound-forms *ferma-porta* ('door-stop') vs. *porta-finestra* ('French window'): a noun can be both "Word1" (*i.e.*, constituent to the left) and "Word2" (*i.e.*, constituent to the right) in a compound.

I suggest that Scalise's analysis can be extended to other European languages: let's see several examples in (12): a. and b. are from French, c. and d. from Spanish, e. and f. from Dutch and g. and h. from German. Semi-words are in bold.

- (12) a. **Bibliographie** 'bibliography'
 b. **Téléphone** 'telephone'
 c. **Geografía** 'geography'
 d. **Psicología** 'psychology'
 e. **Bibliotheek** 'library'
 f. **Sociologie** 'sociology'
 g. **Grammophon** 'grammophone'
 h. **Voltmeter** 'voltmeter'

In 12 (a.-i.) the semi-word can be both at the right- and at the left hand side and are used with a lexical meaning as happens to compound constituents. Thus, following Scalise (1994) I argue for treating all the cases of European semi-words presented in (12) as lexical forms used as compound constituents.

However, as Bauer (1983) and Baeskow (2004) notice for English neo-classical compounds, there are cases of "hybrid formations" where the resulting disyllabic word is made up by a native morpheme and a neo-classical bound root. In most cases, the native morpheme is a free form. Example (13) presents the cases of *-logy* and *bio-* as semi-words in current American English.

- (13) a. **Hamburgerology**
 b. **Biofeedback**

Considering Baeskow's analysis and the English examples in (13), I propose that Italian shows "hybrid formations" *à la Baeskow* as well: there are neo-classical bound roots that attach to native free morphemes. Let's see the cases of *-teca*, *micro-* and *hypo-*.

- (14) a. [[Panino]_{-bound}[teca]_{+bound}]_{-bound} 'the place where sandwiches (*panini*) are sold'
 b. [[Micro]_{+bound} [elettronica]_{-bound}]_{-bound} 'microelectronics'
 c. [[Hypo]_{+bound} [tensione]_{-bound}]_{-bound} 'hypotension'

The forms in (13) and (14) are different from those in (11) and (12) which are made up by two bound roots. With respect to constructions like those in (13), Baeskow claims that formations with a neo-classical root and a native free morpheme are considered as violating the Level ordering, causing a discrepancy in the hierarchy of MinLex. She proposes that elements such as *micro-* and *tele-* could be “reinterpreted” as class II prefixes, without being recategorized as affixes and can thus combine with free native constituents (be they simple or complex at level 2). Moreover, Warren (1990) and Adams (2001) state that there are certain Greek and Latin formatives that have become or are in the process of becoming affixes in English.

I agree with this proposal for English and adopt it for Italian: I propose that forms like *bio-* or *micro-* are affixes, thus grammatical and not lexical items also because they are positionally restricted and they have developed a meaning which is the same in all contexts. They can be used with native free morphemes as they are second class affixes. They are very productive and semantically transparent. They seem to grammaticalize¹² from the initial status of lexical items.

Opposite, we have bound roots that can be used both as right- and as left-constituent (like *-graph-*) and have the same meaning of the original neo-classical form and are only used with other bound roots. Their meaning can slightly change according to the contexts. For all these reasons, they can be morphologically considered nouns, thus lexical items.

I will discuss these two types of European semi-words in next paragraph.

4. Two Types of Semi-Words in European Languages

As illustrated in the previous paragraph and as proposed for Mandarin bound roots, semi-words in English and Italian can be divided into two groups according to three morpho-semantic aspects:

- a) The selection by a semi-word of bound/free morphemes;
- b) Their position of a semi-word in a compound;
- c) The change of meaning of a semi-word according to the context.

According to these three morpho-semantic criteria, semi-words can be divided into:

1. What I call “semi-nouns”: a large class of semi-words attaching to bound morphemes, both right and left headed; they change their meaning according to the context and they are used to create a scientific and technical vocabulary. Even if they are bound morphemes, these semi-words are lexical and not grammatical since they behave like nouns. Example of semi-nouns are *-fon-* ‘-phon-’ in Italian and *-graph-* from English. They are illustrated in (15).

¹² Cf. footnote 9.

(15) Italian

- a. [[Fono][log]_{+bound} ia] ‘phonology’
- b. [Micro]_{+bound} [fono]] ‘microphone’

English

- c. [[epi]_{+bound} [graph]y] epigraphy
- d. [[grapho][log]_{+bound} y] graphology

2. What I call “semi-affixes”: a smaller class that includes semi-words selecting free morphemes; they are exclusively used as right (prefixes) or at the left hand side constituent (suffixes) and they always keep the same meaning. They differ from semi-nouns as they are exclusively used for the creation of a technical and scientific vocabulary. Examples of semi-affixes from Italian and English are presented in (16). Example (16b.) from Italian exists in English as well. The same for Italian with respect to the English example in (16c.). However, this is not valid for a. and d.: the word that corresponds to *-teca* in Italian does not exist in English¹³ and *-logia* ‘logy’ in Italian is used as a semi-noun¹⁴.

(16) Italian

- a. *-teca* (‘collection’):
it is used in words like [[panino]teca] ‘the place where to buy a sandwich’ (*panino*). The word *panino* is used as a free form. *-teca* is nowadays used as a suffix.
- b. *Neo-* (‘new’):
it is used in words like [neo[laureato]] ‘a student (*laureato*) who has just taken his/her degree’. The word *laureato* is a free form. *Neo-* is nowadays used as a prefix.

English

- c. *Micro-* (‘very small’):
it is used in words like [micro[electronics]], [micro[economics]], [micro[cosm]] [micro[system]] where the words *electronics*, *economics*, *cosmos* and *system* are free forms. *Micro-* is nowadays a prefix.

¹³ This semi-word exists in other Germanic languages like Dutch (*-theek*) and German (*-thek*).

¹⁴ The process of grammaticalization of semi-nouns does not involve the same semi-words in Italian and English.

- d. *-logy* ('study'):
 it is used in words like *Islamology* 'the study of Islam', *Japanology* 'the study of Japan' where the words *Islam* and *Japan* are free forms. *-Logy* is nowadays a suffix.

To conclude, Italian and English semi-nouns are involved in neo-classical root compounding, semi-affixes are involved in derivation with prefixes and affixes. These two groups of semi-words share their origin from Latin and predominantly Ancient Greek free nouns. In spite of the same origin, it seems they do not share the same historical development: several semi-words underwent a process of grammaticalization that made them used as affixes in the modern language.

Despite this difference, they share a high frequency in morphologically productive processes of the modern language. As discussed before, the high frequency and the distinction of semi-words in two groups is not specific of European languages but it characterizes also a typologically and genetically non-related language, Mandarin Chinese.

I will compare Italian and English on one side and Mandarin on the other in the paragraph that follows.

5. Comparison Between Mandarin and European Semi-Words

A comparison between semi-words in Chinese and in European languages was proposed by Packard (1998) who suggests that bound morphemes in Chinese and bound roots in English (which he calls "Latin stems") have similarities. He considers for instance the English [*-log-*] (that has the meaning 'word, text'), both in word- initial (*logogram*, *logorrhoea*) and in -final position (*monologue*, *dialogue*)¹⁵ and claims that it seems to behave like a Chinese bound root. In a later study, he also notices (2000:77) that these bound roots are visible not only in English but also in Italian; in both languages, they are morphemes with a lexical rather than a grammatical identity that cannot occur in a syntactic class slot until they are supplemented with additional morphological material that causes them to be 'completed' as words. For this reason, they are lexical rather than grammatical: in English and in Italian a bound root is clearly distinct from an affix. For instance, the English bound root [*-pathy*] is distinct from the suffix [*-ify*] and similarly the Italian bound root [*-grafia*] '-graph' is distinct from the agentive suffix [*-tore*] '-er' (e.g., *suonatore* 'player').

On the other hand, Packard (1998) also underlines the necessity of tracing a difference between European (Italian and English) and Chinese bound roots. First, unlike Italian, Mandarin bound roots may, and in fact do, form words by combining with other bound roots. Second, unlike bound roots in both Italian and English, Mandarin bound roots generally are less positionally restricted, *i.e.*, they may in general occur as either

¹⁵ Cf. Packard (1998: 16, 17).

the first or second constituent of a word whereas in English and Italian a given bound root is generally restricted to occurring as either a left- or right- hand word constituent, but not both. Following Packard's ideas, we could not claim that Mandarin bound roots shows the same behaviour of English and Italian semi-words.

Nevertheless, on the basis of the data discussed above, I propose a different idea: Mandarin bound roots and European semi-words are similar also with respect to their possibility of combining with other bound roots and with respect to their position in the compound. Let's see some cases in (17): the Italian data in (17a.) and (17b.) falsify Packard's first claim and the examples in (17c.), (17d.) and (17e.) falsify his second claim¹⁶. Semi-words are labelled as sW.

(17) a. [[geo]_{sW} [logia]_{sW}]_N 'geology'

b. [[teo]_{sW} [crazia]_{sW}]_N 'theocracy'

Considering [-logo-] '[-log-]'

c. Grafologo/logopedista 'graphologist' / 'logopedist'

Considering [-grafo-]

d. Calligrafia grafologia 'calligraphy' / 'graphology'

Considering [-morpho-] '[-morph-]'

e. Morfologia/antropomorfo 'morphology' / 'anthropomorphous'

The examples a. and b. in (17) present two cases of combination of two semi-words in Italian (and English); (17c. - e.) show that semi-words in Italian (and English) can occur both as a left- or right- hand word constituent. Thus, Mandarin bound roots are similar to English and Italian semi-words.

All considered and in the light of the latest observations, I propose that European "semi-words" resemble Mandarin bound roots on the basis of five similarities:

1. both derive from an old language: Chinese bound roots derive from Old Chinese monosyllabic roots, European bound roots derive from Greek and Latin roots.

¹⁶ See also their correspondent translated words in English in the glosses of the examples in (17).

2. both are still productively used: however, nowadays they are not independent (*i.e.*, free) but they are bound forms that productively create new independent (*i.e.*, free) words;
3. Sproat and Shih's proposal for Chinese bound roots can be adopted also for European neo-classical roots: according to their analysis, bound roots denote KINDS and root compounds denote the canonical instance of a kind. One can represent the relationship between a semi-word and a root compound containing this semi-word in terms of an IS-A hierarchy and the compound is a daughter node; the thick edge to the node the compound represents the fact that this node denotes the canonical instance of the kind. Other words in which the same semi-word is the head would also be representable as bearing an IS-A relation to the semi-word node;
4. two groups of semi-words have to be distinguished on the basis of morphological and semantic criteria: a group that is closer to the derivational usage ("semi-affixes"), a group that is closer to a compositional process ("semi-nouns"). With the first usage, both Mandarin and European semi-words are affixes derived from the grammaticalization of original nouns, are positionally restricted and select only certain semantic and morphological features. With the second usage, semi-words behave more like content words with a lexical meaning (*i.e.*, like nouns in nominal compounds).
5. both the original old meaning of European semi-words and that of Mandarin "semi-nouns" can change according to new contexts and in order to form a more technical vocabulary.

To conclude, Mandarin Chinese productively uses bound roots as both nouns and affixes for the creation of new words in the modern lexicon. Moreover, Chinese shares the morphological properties of these elements and the trigger of the morphological process they are involved in with several European languages.

6. Concluding Remarks

This paper investigates a word-formation process in typologically and genetically non related languages, Mandarin Chinese and European languages.

This word-formation process involves forms that are made up at least by a bound root that have been analysed as root compounds by Sproat and Shih (1996) or bound root words by Packard (2000) with respect to Chinese and as neo-classical compounds by Ralli (2005) or as "semi-parole" by Scalise (1994) with respect to English and Italian.

In this work I proposed a different analysis and I argued for treating all of them as similar even if they are used in typologically non-related languages. The reasons for this similarity are several: they all have an old origin, Italian and English "semi-words" derive from Latin and Greek, Mandarin bound roots derive from old Chinese monosyllabic free

forms. They all were free in the past and used as bound morphemes in the current language in order to create a new and often scientific vocabulary. In addition, in most cases, these semi-words undergo a change of meaning according to the contexts. Moreover, in both cases, semi-words do not constitute a close and unique class of words but have to be divided into two sub-classes on the basis of their position, the selectional property [+bound] and their change of meaning in a compound according to the context. More precisely, I claimed for distinguishing within the class of semi-words a class of semi-nouns, that are lexical elements that even as bound morphemes behave like compound constituents and a class of semi-affixes that are the result of a grammaticalization process which involved several semi-nouns; both in Mandarin and in Italian and English semi-words original semi-nouns shifted from lexical to grammatical elements, the former still used in compounding processes, the latter used in derivational. The reasons of this distinction and the usages of the two types are the same for Mandarin Chinese and for European languages probably because these semi-words have the same structure, the same distribution, the same trigger and both derive from previous stages of the language. Semi-affixes are less morphologically productive than semi-nouns.

Finally, as Sproat and Shih (1996) point out, the common Mandarin word related a root would typically denote the canonical instance of that kind. This analysis was elaborated for Chinese, but it seems to be good also for Italian and English semi-words.

The analysis of root compounding presented in this work aims to confirm that a productive morphological process exists in Mandarin Chinese and to describe in detail the morphologically different elements that take part to this phenomenon. In addition it proposes several similarities between Chinese and typologically non related languages like English and Italian.

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Historical and Dialectal Variants of Chinese General Classifiers --- On the Criteria of General Classifiers

Lianqing Wang
Defense Language Institute

It is widely accepted that *gè* is a general classifier in modern Chinese meaning it can categorize most objects while a specific classifier is not available, and it can replace most specific classifiers without causing any ambiguity. However, the *gè* is not always the general classifiers in the history and/or in all dialects. This paper examines the historical and dialectal variations in Chinese with a focus on the criteria for being a general classifier in classifier languages. The author argues that to be qualified as a long-last general classifier, the classifier in question must meet two basic criteria, i.e., originating in objects closely related to human being daily activity and being able to be used for human being.

1. Introduction

Classifier is an outstanding linguistic feature of Chinese, other Sino-Tibetan languages and many other languages spoken in Southeast Asia. In all the classifier languages, a general classifier is often found. As a general classifier, it can be used in case a specific classifier is not available. Among difference general classifiers, some can last a long time in a language, while others cannot. Therefore a question why has been raised. This paper aims at providing an explanation based on the historical and the dialectal variants in Chinese.

2. Historical Variants

In the history of Chinese language, we found several variants of general classifiers. The most significant one is *gè*. There had been three different characters, 个, 個 and 箇 for the same classifier *ge* in different historical period of Chinese language. Many scholars treat the three characters as free-variations for one single classifier (Wang Li 1958; Liu 1965; etc.). The study by Hong (1961), however, points out that they are not the same in origin. Hong claims that the three characters have two origins which divide the three into two groups: (a) 个 and (b) 個 and 箇. Scholars seem to agree on the origins of the two *ges* in group (b): 箇 originates in the word *zhu* 竹 'bamboo' and develops from a specific classifier for bamboo into a general classifier for almost everything. On the other hand, 個 was homophony of *jiè* 界 and 介 (i, e., later 个) and was created around the Han period as stated in many previous studies (cf. Hong 1961).

个 appeared earlier than 個 and 箇. According to Wang (1994), 个 was a classifier as early as in oracle inscriptions, a variant of 丰. According to Guo (1962), it means shell or jade used in counting. Wang lists it as an example of what he calls proto-classifiers, which did not form a classifier system yet. As the earliest classifiers in proto-Chinese, it did not function as a general classifier in the Wei-Jin period when classifiers in Chinese had formed a comprehensive system with more than one hundred specific classifiers; instead, classifier *méi* was the general classifier. In the *Er Shi Wu Shi (History of 25 Dynasties)*, *gè* appears only 68 times, while *mei* is used for more than 394 times.

The *méi* as a general classifier did not last long, however. It had been gradually replaced by *gè* in less than 500 years. According to some studies, in the Song dynasty, the rate of usage of classifier *méi* and *gè* is 1:8. In the *Yuán Chuán Qǔ (Collection of Opera in Yuan Dynasty)*, *méi* only appears 39 times, while *gè* appeared as many as 1039 times. In modern Chinese, *mei* is only a seldom used specific classifier for stamp or coin.

2. Dialectal Variants

In modern Chinese, *ge* is used as general classifier in most dialects and it has been used for more than 1,500 years. However, there are a few variant general classifiers in several other dialects. In these dialects, *ge* is not general classifier, at least not a dominate one. Based on the studies available to us so far, these dialects include Gàn (Tongcheng), Xiāng (Changsha) and Mǐn (Haikou), as detailed below.

In modern southern Mǐn 閩 (Haikou 海口) dialect, the most popular general classifier is not *gè*, but *mo* (*méi* 枚 in Mandarin), which was the general classifier in the Weijin Nanbei period.

The following are examples of objects, which use *méi* as classifiers in Haikou:

人，山，嶺，洞，小河，湖，江，海，塘，水庫，井，糞池，溝，廁所，牛欄，豬圈，餐館，碗，鍋，棍子，電視機，收音機，冰箱，枕頭，香蕉，菠蘿，黃瓜，西瓜，辣椒，番茄，馬，牛，豬，狗，老虎，蛇，魚，蜈蚣，蝨子，蝙蝠，蒼蠅。（Tu: 2005）

In modern Gan 贛 (Tōng Chéng 通城) dialect, the general classifier is neither *ge* nor *méi*, but *zhī* 隻, which is a specific classifier in modern Mandarin and other dialects.

The following are examples of items which use *zhī* as classifiers in Tōng Chéng :

星，山，嶺，洞，小河，湖，江，海，塘，水庫，井，糞池，溝；屋，廁所，牛欄，豬圈，餐館，牆，臺階，碗，鍋，棍子，毛巾，麻袋；汽車，火車，坦克，飛機，電視機，收音機，冰箱，電線杆，馬達；汗衫，胸罩，皮帶，枕頭，撲克，紙牌，棋子，故事，藍球，足球；竹，樹，杜，李，香蕉，菠蘿，黃瓜，西瓜

，辣椒，番茄；嘴巴，門牙，酒窩，下巴，骨頭，大腿，屁股，小腿肚，舌頭，豬唇；馬，牛，豬，狗，老虎，蛇，魚，蜈蚣，蝨子，蝙蝠，螞蟻。（Wan: 2003）

In this dialect, it is specially necessary to use *zhī* in addressing such as for 姑爺，叔叔，姑媽，姨媽，兒子，老妹，招郎崽（上門女婿），小夥子，孫女。

In the Xiang 湘 (Changsha 長沙) dialect, ‘隻’, phonetically, *za*, is the general classifier. Even though *gè* is also used as general classifier, *gè* is not as popular as *zhi*. Among the 439 items collected in the *Xiandai Hanyu 800 Ci* (800 Words in Modern Chinese), 235 items can use *zhī* as general classifier.

Another interesting phenomenon of general classifier in this dialect is that in addition to the *zhī* and *gè*, several sub-dialects in Xiang dialect use *lì* 粒, *tóu* 頭 and *zhi* 只 at the same time when they use *zhi* 隻, meaning that there are more than one general classifiers in the dialect (Luo 2000).

In addition to the three dialects which general classifiers are not *gè*, we see another sub-general-classifiers in some dialects. In Guangzhou dialect, for example, among the 439 objects listed in the *Xiandai Hanyu 800 Ci*, 105 items can use classifier *zhī*, which is only 31 less than that of Tong Cheng dialect reported in Li, 1991. We cannot treat *zhi* in Guangzhou as a general classifier. We may, however, use a sub-general classifier to name the *zhi* in Guangzhou, as well as the *tóu* and *lì* in Xiang dialect. It is true that *zhī* in Guangzhou and *lì* and *tóu* in Xiang dialect cannot be used for all the objects in the said dialect. As we all know, even in modern Mandarin, *gè*, as a well-accepted general classifier, cannot be used for many objects either.

3. Discussion

Among the variety of general classifiers in modern Chinese dialects we mentioned in this paper, we can see some common features.

First, all these general classifiers originate in a specific name of tree, plant or animal. While *gè* 箇, *méi* 枚 and *lì* 粒 are all names for tree or plant, *zhī* 隻 and *tou* 头 relate to animal.

Second, to be qualified as a long-last general classifier, the said classifier should be able to categorize human being, the most important object in the universe. One of the possible reasons why *méi* could not stand long for general classifier in Mandarin after Wei-Jin period is that *méi* cannot be used for human being in that period. On the other hand, *méi* as a general classifier in the modern Min dialect, it can be used for a specific human being such as uncle and brother, it can also be used for human being in general such as women and men. This is an indication that to be qualified as a general classifier, one criterion is whether it can be used for human being.

Third, the variants of general classifiers discussed in this paper are all spoken in southern China. At the same time, we do not see any similar general classifiers in the dialects spoken in the central part China such as Wu dialect in the eastern China and Jin

dialect in the north (Shanxi). This may suggest that the variation of general classifiers in Chinese is an area feature of southern China, where Xiang, Min, Gan and Yue dialects are spoken.

4. Concluding Remark

The cross-dialectal and historical examination of the general classifiers in Chinese may provide some evidence to the study of the relationship among classifiers in Chinese and that in this area such as the Sino-Tibetan languages. By identifying whether some general classifiers among languages are related, if yes, in what way, we may provide evidence to establish the genetic and typological relation among languages in question, which has long been debated.

Along with this suggestion, it is interesting to note here at the end of this study that many general classifiers in other classifier languages in Sino-Tibetan languages have shared the feature of general classifiers in Chinese we discussed above, i.e., many general classifiers in these language also originate in the objects which closely related to human being (Wang: 1985 for Miao language; Wei: 1979 for Zhuang language, etc.). More study is needed to provide a comprehensive conclusion.

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Complicating the Oversimplification: Chinese Numeral Classifiers and True Measures¹

Chak-Lam Colum Yip
University of Washington

This paper provides evidence that true measures and sortal/mensural classifiers come with different morphosyntactic features, which result in variations in surface syntax. It is argued that each true measure has an [u individual] feature which gets valued by the [i individual] feature in the Num head. Although true measures occupy the classifier head, they cannot appear sentence-initially without a preceding numeral, and they do not individuate and mark definiteness. The case of true measures therefore serves as an argument against the CIP analysis put forth by Cheng and Sybesma (1999), which assumes that all numeral classifiers can perform the functions of D.

1. Introduction

The noun phrase structure of Chinese has been studied quite extensively in recent years. Previous works (Cheng and Sybesma 1999, 2005, Li 1998, Tang 1990, 2005, 2007, Simpson 2005, among others) generally agree that a classifier is hosted by its own functional head which selects an NP complement. In Chinese, numeral classifiers can be split into two types: sortal and mensural classifiers. A sortal classifier as in (1a) ‘individuates whatever it refers to in terms of the kind of entity that it is; a mensural classifier as in (1b) ‘individuates in terms of quantity’. (Lyons 1977: 463)

Mandarin

- (1) a. *yi tiao xiangjiao*
one CL banana
‘one banana’
b. *yi tong shui*
one CL water
‘one bucket of water’

¹ This paper was presented at the 20th NACCL under the title of “Complicating the oversimplification: Chinese numeral classifiers and measure words”. Since the term “measure word” has been used loosely in the literature, I decided to follow Chao (1968) in referring to words like *gongjin* and *mi* as ‘true measures’, a type of classifiers as distinct from sortal and mensural classifiers.

However, Aikhenvald (2000: 115) has observed that almost all languages (with or without numeral classifiers) have quantifying expressions, for example:

- (2) English: *Three stacks of books* (Aikhenvald 2000: 115)
 Hungarian: *egy csepp méz* ‘one drop of honey’ (Aikhenvald 2000: 115)
 Vietnamese: *một cân ru’õ’i cho* ‘one and a half pounds of dog (meat)’ (Löbel 2000)

In a classifier language, quantifying expressions may also behave differently from other numeral classifiers, as shown in the Vietnamese data in (3). The numeral classifier in (3b) appears in the slot adjacent to the noun, whereas the quantifying expression *cân* in (3a) does not.

Vietnamese

- (3) a. *một cân ru’õ’i cho*
 one pound half.of dog
 ‘one and a half pounds of dog (meat)’
 b. *một con cho ru’õ’i*
 one CL:animal dog half
 ‘one and a half dogs’ (Löbel 2000)

With this in mind, I therefore propose that quantifying expressions in Chinese also exhibit syntactic patterns not found in sortal and mensural classifier constructions. Following the terminology developed in Chao (1968), I will henceforth use the term ‘true measures’ to refer to quantifying expressions in Chinese. For our purposes, I define ‘true measures’ as words which represent a unit of measure like dimensions (weight, height, and length), length of time, etc. Examples of true measures include *jin* ‘catty’, *gongjin* ‘kilogram’, *mi* ‘meter’, *limi* ‘centimeter’, etc.

2. Syntactic Differences Between True Measures and Sortal/Mensural Classifiers

Despite the surface similarities, true measures and sortal/mensural classifiers differ in several ways. First, although a classifier-noun sequence can occur in a post-verbal position as in (4a), a true measure-noun sequence gives rise to ungrammaticality as exemplified in (4b). However, (4b) can be fixed by inserting a numeral before the true measure, resulting in the grammatical (4c).²

² I use the following abbreviations in this paper: CL=Classifier, TM=True Measure, Dem=Demonstrative, NEG=Negative, DE=de(modifying marker), PERF=Perfective, N=Noun, V=Verb.

Mandarin

- (4) a. wo xiang mai ba dao.
 I want buy CL knife
 'I want to buy a knife'.
 b. wo xiang zou *li lu.
 I want walk TM road
 'I want to walk a mile.'
 c. wo xiang zou yi li lu.
 I want walk one TM road.
 'I want to walk one mile'

Second, it is well-known in the literature that Cantonese classifiers mark definiteness³ (see Cheng and Sybesma 1998). (5a) shows a classifier-noun sequence in the sentence initial position. In Cantonese, when the classifier occurs in this position, it must be definite in reference. However, when a true measure appears in the sentence-initial position in Cantonese as in (5b), the sentence is not licensed.

Cantonese

- (5) a. bui1 caa4 hou2 jit6
 CL tea very hot
 'The tea is very hot'
 b. *cek3 dei6 hou2 gwai3
 TM land very expensive
 'The square feet of land is very expensive'

Third, classifiers can appear directly after a demonstrative and the insertion of a numeral between the demonstrative and the classifier is completely optional (see 6a). However, in (6b) we see that the Dem-TM sequence is not licensed by the grammar. Again, the ungrammatical example can be saved by adding a numeral before the true measure, as in (6c).

³ Cheng and Sybesma (1998) argue that the functional head Cl is determiner-like and a D layer needs not be projected. However, in this work I follow the Cl-to-D movement analysis put forth in Simpson (2005). According to Simpson, Cantonese classifiers can be [+definite] because Cl moves to D in this language. I feel that this analysis better fits the standard assumption that nominal arguments across languages should be DPs. Please see Simpson (2005) for more arguments against the CIP proposal (Cheng and Sybesma 1998).

Mandarin

- (6) a. na (san) ba dao hen fengli
 Dem (three) CL knife very sharp
 ‘That knife is very sharp.’ (without numeral)
 ‘Those three knives are very sharp.’ (with numeral)
- b. *na li lu hen nan zou
 Dem TM road very difficult walk
 ‘That mile is hard to walk.’
- c. na san li lu hen nan zou
 Dem three TM road very difficult walk
 ‘Those three miles are hard to walk.’

Lastly, most classifiers in Chinese can reduplicate to create the “each/every” meaning, as in (7a). Since the function of classifiers is to individuate, it can be argued that the reduplication intensifies the individuation. In (7b) we see that the reduplication of a true measure immediately renders the sentence ungrammatical.⁴

Mandarin

- (7) a. zheli de dao, ba ba dou hen fengli.
 Here DE knife CL CL dou very sharp
 ‘Every one of the knives here is very sharp.’
- b. zhe chengshi de lu, *li li dou hen pingtan.
 Dem city DE road TM TM dou very flat
 ‘Every mile of the road in this city is very flat.’

To sum up, we have shown that true measures do not appear post-verbally, do not mark definiteness, cannot appear directly after a demonstrative, and do not reduplicate.

3. The Syntax of True Measures

3.1 Numeral-True Measure Sequences as Adjuncts?

If we assume that true measures are not numeral classifiers and they appear in a different position in the tree, we have to decide what the syntactic relationship between the true

⁴ In fact, I hold a more radical view in assuming that all sortal/mensural classifiers can reduplicate. However, reduplication of classifiers that are not actively used in daily speech creates odd-sounding expressions and is therefore avoided. For example, classifiers only used in idioms or literal, old-style, bookish expressions cannot be reduplicated.

- (i) yi xian xiwang
 one ray hope
 ‘A ray of hope.’
- (ii)* xian xian xiwang

measure and the noun may be. As observed in Tang (1996), the numeral-true measure sequence sometimes appears in the modifier position. Compare (8a) with (8b):

Mandarin

- (8) a. *san gongjin rou*
 three TM meat
 ‘Three kilogram of meat’
 b. *san gongjin de rou*
 three TM DE meat
 ‘Three kilogram of meat’
 c. *yi bao san gongjin*(de) rou*
 one CL three TM DE meat
 ‘One pack of meat that weighs 3kg.’

When *rou* is only preceded by *san gongjin*, both (8a) and (8b) are possible. However, *de* becomes obligatory when the classifier *bao* selects its complement. In that case, only (8b) can be the complement of *bao*. One may postulate that all numeral-true measure sequences are always adjoined to NPs, whereas classifiers are always heads. However, topicalization tests (9b-c) show that *yi gongjin* in a nominal like (9a) cannot be an adjunct:

Mandarin

- (9) a. *wo yao yi gongjin mi*
 I want one kilogram rice
 ‘I want one kilogram of rice’
 b. *mi wo yao yi gongjin pro.*
 rice I want one kilogram
 ‘Rice, I want one kilogram.’
 c. *mi wo yao yi gongjin de pro.*
 rice I want one kilogram DE
 ‘Rice, I want one kilogram./Rice, I want the kind that weighs one kilogram’

Out of (9b-c), only (9b) is the logical output of topicalization. Even though (9c) is perfectly grammatical, it creates a second reading which means that there exists a kind of rice that weighs one kilogram and the speaker only wants that particular kind. Furthermore, all modifiers (*de* or *de-less*⁵) **must** occur with *de* in sentence-final position.

⁵ Paul (2004) argues that *de-less* modification is possible at the level of the syntax. Please refer to the paper for more on the matter.

Mandarin

- (10) a. wo yao mu zhuozi!
 I want wooden table
 ‘I want a wooden table!’
 b. zhuozi, wo yao mu de!
 Table I want wooden DE
 ‘Table, I want a wooden one!’

Since (9b), the logical output of topicalization, does not contain a sentence-final *de*, the possibility that numeral-true measure sequences are adjuncts appears to be dwindling. Instead, the fact that in (8c) *bao* only selects (8b) and not (8a) as its complement suggests that *bao* in (8c) and *gongjin* in (8a) are both numeral classifiers. However, since the syntax only allows one classifier within a DP, the grammar does not license (8a) as the complement of *bao*. Therefore, it does seem that true measures and sortal/mensural classifiers occupy the same position in the tree.

3.2 Towards a Solution

The differences between true measures and sortal/mensural classifiers can be summed up in the following chart:

(11)

	Sortal/Mensural classifiers (CL)	True Measure (TM)
a.	V-CL-N V-Num-CL-N wo xiang mai (yi) ba dao. I want buy (one) CL knife ‘I want to buy (one)/a knife.’	*V-TM-N V-Num-TM-N wo xiang zou *li lu. I want walk TM road ‘I want to walk a mile.’
b.	CL-N bui1 caa4 hou2 jit6 CL tea very hot ‘The tea is very hot’	*TM-N *cek3 dei6 hou2 gwai3 (Cantonese) TM land very expensive ‘The square feet of land is very expensive’
c.	Dem-CL-N Dem-Num-CL-N na (san) ba dao hen fengli Dem (three) CL knife very sharp ‘That knife is very sharp.’ or ‘Those three knives are very sharp.’	*Dem-TM-N Dem-Num-TM-N na (yi) li lu hen nan zou Dem (one)TM road very difficult walk ‘That (one) mile is hard to walk.’

d.	CL-CL zheli de dao, ba ba dou hen Here DE knife CL CL dou very fengli. Sharp 'Every one of the knives here is very sharp.'	*TM-TM zhe chengshi de lu, *li li dou Dem city DE road TM TM dou hen pingtan. very flat 'Every mile of the road in this city is very flat.'
----	---	--

From (11), it seems that true measures have to be preceded by numerals, while CI-NP sequences can occur alone. Nonetheless, this assumption too is not true when we run into an example like the following:

Mandarin

- (12) mei gongjin rou dou hen gui
Every kilogram meat DOU very expensive
'Every kilogram of meat is very expensive.'

If the function of classifiers is to individuate, then one possible explanation is that true measures do not individuate in our cognitive system. This explanation seems quite logical since a classifier like *li* in *san li tang* 'three candies' picks out three individuated candies out of the world of possible candies, while a true measure like *mi* in *san mi lu* 'three miles' assigns the measurement the numeral specifies to the noun. Furthermore, notice that *san mi lu* 'three miles' refer to a three-mile-long road, not three individuated roads which are one-mile-long each.

At this stage, there is one important issue we have to consider given the syntactic differences of true measures and sortal/mensural classifiers. If true measures are a distinct type of classifiers, what modifications are needed in order for the grammar to fit them into the CI head but still produce the surface differences mentioned above? The solution can be a quick fix. Since true measures and sortal/mensural classifiers occupy the same position in the tree, the differences must lie in their morphosyntactic features when they enter into the numeration.

I propose that true measures come with an [u individual] feature which needs to be valued. The corresponding [i individual] feature can be found in quantifiers like *mei* 'every/each' or numerals. Failure to value the [u individual] feature results in ungrammaticality, as shown in (13):

Mandarin

(6)b. na *li lu hen nan zou
 [u individual]
 Dem TM road very difficult walk
 ‘That one mile is hard to walk.’

Mandarin

(7)b. zhe chengshi de lu, *li li dou hen pingtan.
 [u individual] [u individual]
 Dem city DE road TM TM dou very flat
 ‘Every mile of the road in this city is very flat.’

Since there is not a matching [i individual] feature for the [u individual] feature in each example, the derivation crashes.

4. Implications

Our analysis of true measures provides arguments against Cheng and Sybesma (1999)’s CIP hypothesis. One of the major reasons why a CIP (as opposed to a DP) is proposed in Cheng and Sybesma (1999) is due to the existence of the following Cantonese construction in (14):

Cantonese

(15) bui1 caa4 hou2 jit6
 CL tea very hot
 ‘The tea is very hot’

Cheng and Sybesma (1999) argue that an example like (14) shows that classifiers in Chinese denote definiteness, individuation, and number, which are the functions of determiners in languages with overt Ds like English. Therefore, following their train of thought, argument nominals in Chinese should be represented as CIPs. However, the CIP analysis does not predict the ungrammaticality of (15):

Cantonese

(16) *sing1 seoi2 hou2 cung5
 TM water very heavy
 ‘*The liter of water is very heavy.’

If our analysis is on the right track, true measures are numeral classifiers that cannot appear in the sentence-initial position. The derivation crashes as the [u individual] feature in true measures fails to be valued. Therefore, we see that not all classifiers can be in sentence-initial position and perform the functions of D, as suggested in Cheng and Sybesma (1999). Hence, our analysis gives fairly solid arguments against the CIP analysis.

5. Conclusion

This paper provides evidence that true measures and sortal/mensural classifiers come with different morphosyntactic features which result in variations in surface syntax. It is argued that each true measure has an [u individual] feature which gets valued by the [i individual] feature in the Num head. Although true measures occupy the classifier head, they cannot appear sentence-initially without a preceding numeral, and they do not individuate and mark definiteness. The case of true measures therefore serves as an argument against the CIP analysis put forth by Cheng and Sybesma (1999), which assumes that all numeral classifiers can perform the functions of D.

Appendix A: Dialectal Differences

In this paper, I argue that true measures cannot appear sentence-initially and be definite in reading. Some counterexamples, however, can be found in Cantonese.

Cantonese

- (1) bong6 min6baau1 faat3 zo2 mou1
 TM? CL? bread grow PERF mold
 ‘The loaf of bread is molded’
 Literal: ‘*The pound of bread is molded’

In here, *bong6* is both sentence-initial and definite. The literal meaning of the sentence should be ‘the pound of bread is molded’. However, in Hong Kong Cantonese, *bong6* when used with *min6baau1* ‘bread’ doesn’t necessarily mean ‘pound’. The person who says (1) might not even know the actual weight of the bread. *bong6* ‘pound’ in (1) is used so excessively in Cantonese that now it can mean ‘bag’ or ‘loaf’ when used with bread in daily speech. Frequent usage sometimes bleaches its true measure status and turns it into a classifier. Thus, *bong6* can have two copies in the lexicon in Cantonese – a mensural classifier copy and a true measure copy.

Cantonese

- (2) bong6 bun3 juk6 m4 gau3 so2jau5 jan4 sik6
 TM half meat NEG enough every one eat
 ‘A pound and a half of meat is not enough for everyone to eat’

In (2), *bong6* appears sentence-initially but it is not definite. I argue that *bong6* in (2) is still a true measure. It has been observed across languages that the numeral ‘one’ always behaves differently from other numerals. Here, the numeral ‘one’ is probably deleted at PF and the cause of this deletion is left for further research. However, this explanation is warranted because *bong6* in (2) is not [+definite], as we would expect. Following Simpson (2005), Num-Cl-N sequences are indefinite because the Num head blocks the movement from the Cl head to the D head (Head Movement Constraint). I therefore believe that the movement from Cl-to-D is still blocked in (2) and the deletion of the numeral ‘one’ only happens later at PF.

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Markedness and Second Language Acquisition of Word Order in Mandarin Chinese

Lingxia Jin
University of Arizona

The study explores the difficulties of native English speakers in acquiring the Chinese word order, aiming to relate it to the markedness theories. According to the Differential Markedness Hypothesis (DMH), the degrees of learner difficulty in second language acquisition can be predicted according to the degrees of typological markedness between learners' first language (L1) and their second language (L2). The study employs a grammaticality judgment task in which English Chinese learners were asked to judge four categories of sentence types in Chinese: topic comment, pro-drop, locative inversion, and canonical SVO order. Results show that subjects demonstrate a similar pattern of error rates among those four sentences: all learners have higher degrees of learning difficulty in topic-comment and pro-drop sentences, but lower degrees of difficulty in locative inversion and canonical SVO sentences. The study mostly supports the hypothesis, suggesting the instructional importance of realizing the typological markedness relations between the L1 and the L2.

0. Introduction

Chinese has a more flexible word order compared with English. Li & Thompson (1981) state that Chinese has no basic word order since it is a language claimed to be more discourse-oriented; the word order variation is related to variations not only in major constituents but also in modifiers and pragmatic factors (p.26). As a result, word order variation in Mandarin Chinese poses a great challenge to English learners who learn Chinese as a foreign/second language in that English is more rigidly fixed in its SVO order.

There is a growing body of literature (Hu 1992; Li 1996; Li 1999, among others) focusing on second language acquisition of Chinese word order. Hu (1992) investigated Chinese learners of English and English learners of Chinese in terms of cohesive devices in their second language writing and found that due to the interference of their L1, English speakers have more difficulty in using topic-comment constructions as a cohesive device while Chinese speakers have more difficulty in using lexical devices such as English articles and pronouns. Li (1999) explored the relationship between word order acquisition, proficiency level, and pragmatic context by using two different tasks

and 11 word order categories. However, learners' achievement in the two tasks was surprisingly low, which did not reveal very much insight into learners' acquisition of word order related to discourse appropriateness. Among the 5 hypotheses, Li found that "semantic characteristics of the categories and the influence from the learners' L1 were two major factors affecting the acquisition" (p. 54). She implied that the differences between L1 and L2 would cause learning difficulty. Li was actually adopting a CA (Contrastive Analysis) point of view proposed by Lado (1957) in that structural differences between L1 and L2 will lead to learning difficulty. However, markedness theories predict it is not necessarily the structural differences that will lead to difficulty but the differences in markedness relations will do.

1. The Markedness Theory

The markedness theory has been extensively explored and applied in various fields of linguistic studies such as phonology, morphology, semantics, and syntax since last century. Greenberg (1966) assigns the designations "marked" and "unmarked" to opposing structural entities that exhibit a consistently asymmetric relationship in term of distribution and/or syntagmatic structure and or paradigmatic complexity. The one of the two entities that is consistently more widely distributed and/or simpler is called "unmarked"; its complement is the 'marked" members of the opposition. An important point to help understand the concept of markedness is "[m]arkedness relations are not fixed, but rather depend on the language-internal evaluation of the terms of an opposition" (Battistella 1990:4); a marked form as opposed to a different form from within a language might be an unmarked as opposed to a third form or a marked form in one language can be unmarked in another. For example, in Russian, the nominative case is unmarked and the other cases marked, while in English, the objective case is unmarked and the nominative is marked.

The notion of markedness can be applied within a particular language or between languages. "Universal markedness relations are defined independent of individual languages. Language-particular values are those assigned on the basis of the facts of an individual language system" (Battistella 1990:61). The Differential Markedness Hypothesis (DMH) proposed by Eckman (1977) indicates the markedness relations cross-linguistically. Markedness is defined as follows by Eckman (1977):

Markedness: A phenomenon A in some language is more marked than B if the presence of A in a language implies the presence of B; but the presence of B does not imply the presence of A.

Given this previous definition, Eckman (1977) proposes the Markedness Differential Hypothesis (p. 321):

- (a) Those areas of the target language which differ from the native language and are more marked than the native language will be difficult.
- (b) The relative degree of difficulty of the areas of the target language which are more marked than the native language will correspond to the relative degree of markedness.
- (c) Those areas of the target language which are different from the native language, but are not more marked than the native language will not be difficult.

The proposal “centers around the notions of typological markedness and implicational relations”. As a result, “the notion of ‘degree of difficulty’ corresponds to the notion of ‘typologically marked’ (p. 320). Eckman (1977) gives the following example to illustrate the theory. There are languages (e.g. Arabic, Greek, etc..) in which passive sentences occur without expressed agents (see example 1a below), but do not with expressed agents (example 1b).

- (1) a. The door was closed.
b. The door was closed by the janitor.

There are languages (e.g. English, French, Japanese) that have both types of passive sentences. However, there are apparently no languages which have passives with agents without also having agents. Therefore, the presence of passives with agents implies the presence of passives without agents, but the reverse is not true. Thus, sentences like b are more marked than sentences like a. Based on Eckman (1977), typological markedness also implies to refer to the cross-linguistic frequency of a feature in an unbiased sample; markedness means cross-linguistically rare or rarer, while unmarked means cross-linguistically frequent or more frequent. This notion is essential for the current study.

2. Design of the Current Study

Though there is a growing body of literature in second language acquisition of Chinese, very few empirical studies have applied the markedness theories to the field analysis. Thus, the purpose of the current study is to explore the difficulties of native English speaking learners, in acquiring Chinese as a second language and how it is related to the markedness theories, in particular, the typological markedness hypothesis. Secondly, in order to gain more insights into how L1 -L2 structural relationship takes a part in the acquisition process, the current study employs four different sentences closely related to the SVO structure by employing a grammaticality judgment task since learners tend to use a canonical word order in translation tasks and thus demonstrates less knowledge on word order variations in L2 (Li 1999).

2.1 Word Order Categories Covered by the Present Study

Four types of sentences are tested based on the SVO order and syntactic relations between Chinese and English: 1) pro-drop, 2) topic comment, 3) locative inversion, and 4) canonical SVO order. These four types are chosen because they demonstrate an interesting pattern in markedness relations: topic-comment sentences are structurally similar in English and Chinese but differ in frequency of distribution/use; pro-drop is a unique feature in Chinese; locative inversion and SVO sentences are both present in English and Chinese and they demonstrate a similar degree of frequency/use. The majority of the sentences are simple sentences due to learners' proficiency level in this study and in order to eliminate any interference of secondary elements such as adverbials and modifiers since their word order can also be varied in Chinese and may cause difficulty in judging.

1) Topic Comment

It is well known that Chinese is a topic-prominent language (Li & Thompson 1981). "The term 'prominence' refers to the role that a linguistic notion or relation plays in the structure of a language. If structure A plays an important role in the construction of sentences in a language, then the language is said to be 'A prominent'" (Li 1996: 30). Xie (1992: 69) reports on a survey using data from the oral narration of Chinese and English native speakers. He concludes that the difference between Chinese and English narratives in terms of using topic-comment features is statistically significant. Such observations have provided grounds for the well-established and widely-accepted claim that Chinese is a "more discourse-oriented" language and topic is such a dominant feature in Chinese compared with English.

Hu (1992) also comments that "topic-comment sentences in Chinese are productive". Word order in English is also sensitive to the status of topic, the general tendency being to place the topic in the initial position" (p. 80). For example, we can have a topic comment sentence in both Chinese and English with the topic NP at the sentence initial position.

- (2) Chuanghu ta da po le.
Window he break PERF
"The window, he broke it." (From Hu 1992)

However, Hu (1992) further notes English does not use word order to code topic as consistently as in Chinese. For instance, Bates & MacWhinney (1982) indicate that when agents compete with topic for the initial position, more often than not, it is the agent that takes the priority and occurs at the sentence initial position. (3) below is an example:

- (3) Tom bought *a book* yesterday. But someone has borrowed *it*.

Undoubtedly, ‘a book’ is the topic since it occurs in both sentences but ‘Tom’ is not present in the second sentence. However, it is not coded at the beginning of either sentence. In the second sentence of the above example, ‘someone’ is the agent, not definite, nor a topic, but still occupies the first position of the sentence. Thus, “English marks the definiteness of a noun phrase more consistently with the lexical devices, such as definite and indefinite articles and pronouns. Since definite noun phrases are more likely to be topics in discourse, the status of topic is coded by lexical devices as well as word order in English” but Chinese more consistently codes topic with word order (Hu 1992: 73-74).

Furthermore, Li (1996) further comments that Chinese is a topic-prominent language but English is a subject-prominent language. Li (1996) notes that even the topic occurs in the sentence initial position, native English may consider it incorrect due to its uncommon usage (p. 53). For instance,

- (4) The book I bought here.
Shu wo zai zhe'r mai de.

Li (1996) notes that the above example sounds like unacceptable to English speakers because they tend to consider it as a relative clause. To summarize both Li (1996) and Hu (1992), we can conclude Chinese demonstrate a much higher frequency to code topic at the sentence initial position. Since Chinese is categorized as a topic-prominent language, it is expected that the notion of topic is utilized in the construction of sentences to a greater degree than in other non topic-prominent languages. Though English has a similar structure of topic comment sentences, the frequency of topic-comment sentences is much lower (some native speakers may consider a correct topic-comment sentence as unacceptable as is shown above), as a subject-prominent language. As Li (1996) comments “Topic is an essential unit in Chinese sentences, but only a peripheral phenomenon in English” (p.19). Furthermore, topic-prominent languages are well known for their so called double-subject constructions, which only occur in very casual spoken register in English (Li 1996: 32). In this sense, it is safe to claim that topic-comment sentences with double NPs at sentence initial positions are more marked to in English and to English Chinese learners because they are cross-linguistically rarer than subject-initial sentences. For English Chinese learners, the learning difficulty is predicted in acquiring this language feature.

2) Pro-Drop: Null Subjects

Due to the significance of topic in Chinese, the notion of subject is then, not as important in the construction of Chinese sentences as it is in English. Many Chinese sentences do not even have a subject. As Song (2005) observes, pro-drop is both very common in modern Chinese and old Chinese. He further notes “Chinese is a subject pro-drop language in that subject of a clause need not be overt. Thus a Chinese speaker has

the choice of using either a null subject or an overt pronoun in the subject position of a sentence” (p.233). For instance,

- (5) *Ta kanjian yige nuhaizi, Ø/ta daizhe yiding xiaohongmao.*
 He see one-classifier girl. Ø/she wear one-classifier small red hat.
 He saw a girl; she is wearing a red hat.’

In English, a subject-prominent language, an expletive subject such as *it* or *there* is required when the logical subject of a sentence does occur in preverbal position. In Chinese, however, this never occurs because sentences without subjects are very common (Li 1996:31). As White (1986:319) also states that English is a non pro-drop language that requires a subject in surface structure but pro-drop languages allow missing subjects. For another example, in the following sentence, there is no need for a subject in the sentence in Chinese, but the English sentence requires a subject even when it is an empty category or a dummy subject.

- (6) e Xia yu le.
 Drop rain PERF
 ‘It is raining.’
 * is raining.

According to the concept of typological markedness, pro-drop means presence of non pro-drop feature (as in Chinese); but non pro-drop does not mean the presence of pro-drop (such as in English). As a result, pro-drop feature is a more typologically marked than non pro-drop parameter. Thus, to English Chinese learners, learning difficulty of the more marked feature is anticipated.

3) Locative Inversion

Locative inversion applies to cases of inversion with the locative PP in the preverbal and the theme NP in the postverbal position. As Pan (1996) notes “Locative inversion is generally associated with unaccusative verbs or passivized verbs” (p.409). On the basis of Chicheŵa and English data, that locative inversion applies under the following conditions (Bresnan and Kanerva 1989, cited in Pan 1996:409):

- a. The argument structure of the verb is: <theme, location>
- b. The theme phrase bears a discourse function *focus*.

These conditions also apply to Chinese (Tan 1991, cited in Pan 1996:409). For example:

- (7) Menkou zhan –zhe yige ren.
Door stand ZHE one CL person
“At the door is standing a man.”
- (8) Chunzili lai –le san ge ren.
Village-inside come PERF three CL person.
‘To this village came three person.’
- (9) Qiangshang *bei* John ke –le henduo zi.
Wall-on by carve PERF many words.
On the wall was carved many words by John.

Li (1996) also points out certain verbs allow locative inversion structure such as existential verbs such as *you* ‘exist/there be’, verbs of positions such as *zuo* ‘sit’, *gua* ‘hang’ or verbs of motion such as *lai* ‘come’ and *zou* ‘leave’ (p. 35). Though Pan (1996) points out in Chinese non-passivized transitive verbs can also occur in locative inversion as in *zhuo shang fang le yiben shu* ‘on the table is placed a book’ (passive is required in English sentences of this type), which is more marked in English as opposed to Chinese, but it is not included in the current study. In this case, the distribution of locative inversion in existential verbs, verbs of motion, verbs of positions is similar in both Chinese and English, so this feature is not typologically marked to English Chinese learners. Learning difficulty is not anticipated.

4) SVO Order

The SVO is considered to be the canonical order in Chinese by many researchers, teachers, and students. According to Li (1996), it is regarded as “the canonical clause type in Chinese in the sense that it is closest to our mental representation of the verb-controlled clause patterns, i.e., one based exclusively on syntactic and semantic consideration without being tempered with by the informational and discursal consideration” (Tsao 1990:67). SVO order is the also the canonical order with a high frequency of distribution/use. Thus, the Chinese SVO is typologically unmarked to English Chinese learners. Not much difficulty would be expected in acquiring this order.

2.2 Research Questions and Hypothesis

- 1) Do learners demonstrate levels of difficulty in L2 acquisition when L1 word order is more restricted but L2 word order is varied?
- 2) How does the difficulty level (if there is) relate to the markedness relations between L1 and L2?

The basic hypothesis is the different typological markedness relations correspond to the different degrees of acquisition difficulty.

2.3 Experiment and Subjects

The current study adopts a grammaticality judgment task combined with a survey on students' language learning habits and background. The subjects are asked to accomplish a grammatical judgment task. Tasks are completed as take-home projects. Subjects are instructed to judge based on their intuition with no reference to any textbooks or dictionaries. To avoid possible confusion in understanding caused by new vocabularies, all the vocabularies are from the textbooks or course materials they are using at the time of the experiment. In addition, English glosses of each test sentence are provided after the Chinese sentences to be judged with difficult vocabulary underlined in both the Chinese sentences and the English glosses so that subjects can have a better understanding on what the words mean. Furthermore, sentences use simple structures as much as possible without too many adjuncts or modifiers in order to get a more accurate result.

There are two factors involved in the current study: L2 proficiency level and syntactic features (word order variations). Due to a lack of subjects, there are 17 participants, divided into two groups (beginner level and intermediate level) of English speaking students (adult L2 learners) who are learning a Chinese as a second language at the time of experiment at a North American university. The beginner level (n=9) has learned Mandarin Chinese for 3-4 semesters (mostly 3 semesters with 1-2 for 4 semesters); the intermediate level (n=8) has learned Chinese as a second language for at least 3 years (3-5 years). All the students learn the language in the formal educational settings though they differ in ways of practicing Chinese such as listening to Chinese music, watching movies, or talking with native language partners after class according to the survey of their language learning background. Four categories of sentences (topic comment with double-subject constructions, pro-drop, locative inversion, and SVO) are tested in this study: 6 sentences for each category, and 8 filler items; in total, there are 32 sentences in the grammaticality judgment test. Since some students are more familiar with the traditional characters while others traditional characters, both traditional and simplified-character versions are provided for students to freely choose from on their own.

3. Results and Discussion

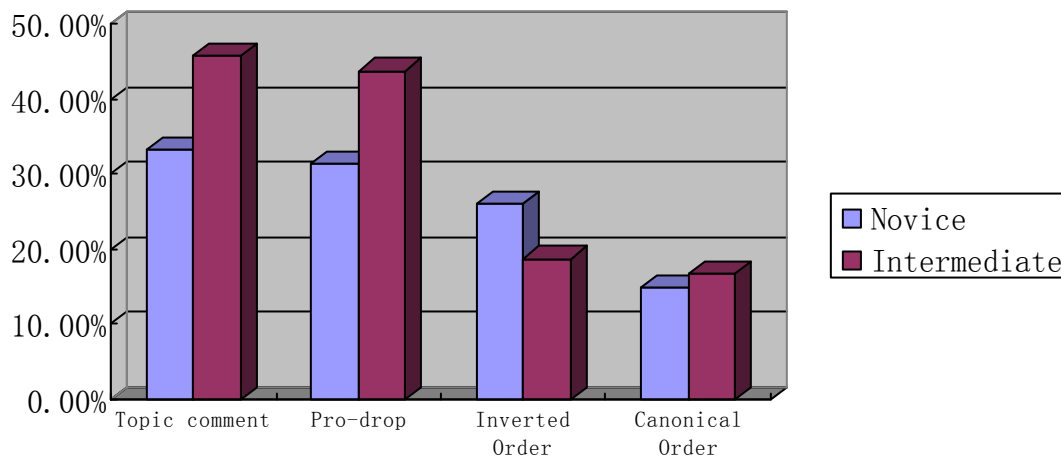
Error rates are counted and recorded for each subject for each category. A two-way ANOVA reveals that there is no interaction between proficiency and syntactic types ($p > .05$), i.e., both groups demonstrate a similar pattern of error rates in the four syntactic categories. The main effect of proficiency level is not significant ($p > .05$), indicating proficiency does not play a major role. It is not surprising since the proficiency level of these two groups is not very different, though it would be worthy of future investigation to add the advanced level group. The main effect of syntactic features is significant ($p < .05$). That means, subjects respond to different types of syntactic structures in significantly different ways: with 'topic comment' the highest in error rate, 'pro-drop' the

second, ‘inverted order’ the third, and ‘canonical order’ the lowest. The pattern shows a tendency that subjects have more difficulty in acquiring the ‘topic comment’ and the ‘pro-drop’ sentence types, but much less difficulty in ‘locative inversion’ and ‘canonical SVO order’ sentence types (see Fig. I & Fig. II). Planned comparisons reveal there is no significant difference between topic-comment sentences and pro-drop sentences, and no significant difference between the locative inversion and SVO sentences either.

Fig. I. Mean of error rates in chart

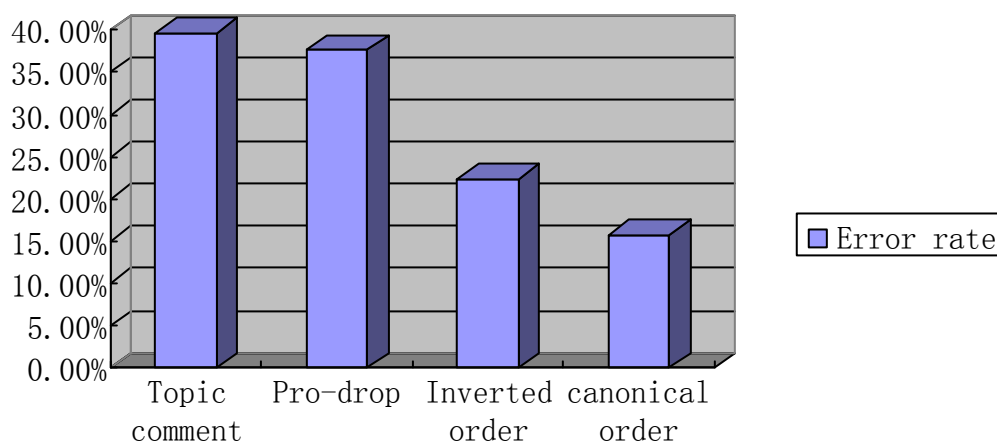
Error rate	Novice (%) (n=9)	Intermediate (%) (n=8)	Average (%)	(%)
1.Pro-drop	31.48	43.75	37.62	Average of 1,2 38.7
2.Topic comment	33.33	45.83	39.58	
3.Inverted order	26.11	18.75	22.41	Average of 3,4 19.08
4.Canonical order	14.81	16.67	15.74	

Fig. II. Mean of error rates in graph



Since there is no significant difference in error rates between the two groups, we can merge the two groups together and see the overall tendency as follows (Fig.III).

Fig. III. Mean of error rates in graph (both groups merged)



Planned comparisons reveal no significant differences between topic-comment sentences and pro-drop sentences which are both more marked in English and to English Chinese learners and no significant differences between inverted order (locative inversion) sentences and the SVO sentences, which are both not more or less marked to English Chinese learners. The results support the hypotheses made according to the typological markedness relations, i.e., the degree of learning difficulty is correlated with the degree of markedness relations. However, if we adopt the CA (Contrastive Analysis) Hypothesis, only the difficulty caused by pro-drop sentences will be predicted since English does not have such a syntactic feature. i.e., the structural differences will lead to learner difficulty; however, the difficulty of English speakers' learning topic-comment sentences cannot be explained since both L1 and L2 have a similar structure. The difficulty in this case is caused by the different distribution of this feature in the two languages, i.e., the typological markedness relations. The results indicate that L1-L2 relationship matters in second language acquisition, according to the markedness relations, it is supported that the English Chinese learners have more difficulty in acquiring the Chinese topic-comment structure because the feature is less common in subjects' L1 (i.e., English). Though it is not tested in the current study, we can predict that Chinese English learners will not have so much difficulty in acquiring the English topic-comment sentences because it is less marked in Chinese than in English.

4. Conclusion and Implications

The current study aims to trigger more discussions in this field instead of making generalizations since it is based on a small sample size. Though limited in generalizability, the findings have practical significance because both groups demonstrate a consistent pattern and they warrant further research. Future studies in second language acquisition of Chinese word order could include structural forms that are less marked for

in L1 since both structures in this study (topic comment and pro-drop) are more marked in English (L1) in order to achieve better comparison results. The findings call for instructional awareness and efforts in positive input to acquire a typologically marked form. Another indication in the current study is that it includes both correct and incorrect sentences for each category, and these incorrect sentences may have influenced the test results though it can be neutralized since each category has the same number of correct sentences and incorrect sentences. However, subjects present more accuracy in judging the wrong sentences in one category (e.g. SVO) and demonstrate less accuracy in judging the incorrect sentences in another category (such as pro-drop sentences). Future studies may consider using all correct sentences mixed with filler items for more accurate results. Finally, due to the inherent limitation of grammaticality judgment tasks and translation tasks, it is worth investigating a better task type or combining with a second task type for second language word order studies.

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The Acquisition of Chinese Shape Classifiers By L2 Adult Learners

Neal Szu-Yen Liang
The University of Texas at Arlington

Historically, much attention has been given to the acquisition and the development of Chinese classifiers by L1 children. Little, if any, is known about how non-native adult speakers of Chinese acquire this linguistic feature. To that end, the current study aims to explore the acquisition of eight shape classifiers denoting one-, two- and three-dimensional objects by adult speakers of English and Korean with various Chinese proficiency levels. Their task was to match ten objects made of clay with one of eight phrases that best describes the denoted object. The findings show that 1) a positive relationship exists between subjects' Chinese levels and their performance in this task; 2) Korean subjects minimally outperformed their English counterparts ONLY at certain stages; 3) 2-dimensional classifiers are best learned followed by 1-dimensional and then 3-dimensional classifiers. Pedagogical implications based on these results are suggested.

1. Introduction

When learning a new language, linguistic features that are obligatory in the target language but not present in the source language tend to be a source of difficulties for learners' progress. For example, for Chinese learners of English, linguistic features such as tense conjugation, mass-count distinction, using definite articles are the root of errors even after knowing other grammatical rules perfectly for years. One such feature in Mandarin Chinese, the classifier (henceforward CL) system, falls into the category described above for speakers of Indo-European languages. Not only do L2 learners need to memorize the semantics of classifiers, they also need to understand the underlying principles of selecting correct classifiers that varies depending on the contexts. Such guiding principles are intuitive to native speakers but are not so explicable, nor so easily predictable, to L2 learners.

The following example illustrates such a Number + Classifier + Noun construction. It is obligatory that a classifier be inserted between a Number and Noun in modern Mandarin Chinese, e.g. 三隻雞 *sān zhī jī* 'three chickens':

三	隻	雞
sān	zhī	jī
Num	CL	N
Three	animal-like-thing	chicken
'three chickens'		

The classifier 隻 *zhī* here is used when denoting most animal-like things. Likewise, a classifier 張 *zhāng* is used when the referents are objects with a flat surface. Thus, 'three tables' is 三張桌子 *sān zhāng zhuōzi*, 'three paintings' is 三張畫 *sān zhāng huà*, 'three faces' is 三張臉 *sān zhāng liǎn* and so on. However, 張 *zhāng* also collocates with 'bow' 弓 *gōng*, 'mouth' 嘴 *zuǐ*, 'Chinese zither' 琴 *qín* and other items that do not have a characteristic of flatness inherently. While some of these collocations can be explained away by historical developments within classifier systems, others do not have a good explanation; therefore, speakers simply have to memorize such constructions by rote. Not all native speakers can give a clear explanation with much confidence, but they all have no problem using it. So, how do L2 adult learners of Chinese cope with such somewhat confusing and unpredictable phenomenon and to what extent do their learning patterns in this area differ from that of the development of L1 child learners?

To that end, the current study aims to describe, analyze and explain the acquisition of Chinese classifiers by L2 adult learners. Inspired by Hu (1993), Fang (1985) and others' studies, the present study employs a comprehension experiment to investigate the development and acquisition of Chinese classifiers denoting nouns of different shapes by fifty eight adult L2 learners of Mandarin Chinese. This study will explore 1) the relationship between subjects' performance on this task with their Chinese Proficiency Level; 2) the relative order of acquisition of different classifiers; 3) the extent to which native speakers of Korean and English differ in terms of acquiring Chinese classifiers; 4) whether subjects' progression patterns show similar trend across different types of shape classifiers or certain classifiers have unusual patter.

The motivation of the current study is to extend the scope of the current literature which emphasizes 1) the nature and construction of classifier systems across language families of the world and 2) the phenomena of classifier acquisition by L1 children learners. Particularly, the current literature provides ample data and findings about how L1 children acquire Chinese classifiers, but one can hardly find studies that deal with such phenomenon exhibited by L2 adult learners of Chinese. It is envisioned that the results of this study would thus have a pedagogical contribution to the field of second language acquisition, particularly to that of Chinese language acquisition.

The three major components in this article are: 1) a literature review that contains previous research relevant to the current study; 2) a second part familiarizing readers with the subjects, materials, procedures and coding/scoring involved in this experiment; 3) a third section providing the results and their implications.

2. Literature Review

Researchers believe that linguistic classifications ‘may be reflexes of basic cognitive categories’ (Adams and Conklin 1973: 1). Such an idea motivates the current study which explores the relationship between linguistic categorization and human cognitive categorization. In this section, studies about how both L1 and L2 learners acquire this linguistic feature will be discussed.

2.1. L1 Acquisition of Chinese Classifiers

Studies concerning L1 children’s acquisition of Chinese classifiers examine children’s understanding of different aspects of the classifiers and the developmental progress at various ages. These studies have yielded somewhat similar results in certain aspects while somewhat different findings in other aspects are reported as well. In terms of methodology, two types of studies are found: Erbaugh’s (1982, 1984, 1986) longitudinal approach and the experimental approach by others (e.g. Fang 1985; Loke and Harrison 1986; Chang 1983; Carpenter 1991; Loke 1991; Hu 1993a, b). They usually concern issues such as a) the emergence order of classifiers denoting different semantic domains; b) the relation between L1 children’s cognitive development and their classifier acquisition, and c) the process of acquisition. Some of the common findings include that a) L1 children have a solid knowledge of the basic syntactic structure of classifiers at a very early age; b) their acquisition of classifier vocabulary is very much delayed compared to noun acquisition; c) although the findings of the order of Chinese classifier acquisition are different, it is very common that children over-generalize the general classifier 個 *gè* as a ‘syntactic place-holder’ (cf. Fang 1985, Hu 1993a); and d) they are very conservative in using classifiers.

In analyzing how children acquire noun classifier systems, Erbaugh (1984) finds that shape plays a more influential and stable role in sorting than function. Later on, Erbaugh (1986) further specifies her findings of both developmental and historical trends regarding acquisition of Chinese classifiers by L1 children. They can be summarized as follows:

1. Valued items before common ones, both before conventionalized sets.
2. Discrete, countable, portable concrete objects before large immovable ones.
3. Measures before special nouns classifiers.
4. Unique reference before prototypical.
5. Abstraction by extension specially rigid, horizontal length, before on a plane. Small size more prominent and earlier than shape, though roundness and squareness become common. Large size unmarked.
6. Classifier with number before demonstrative, near before far. Both before the pro-form.

In terms of shape classifiers, data from Erbaugh (1986) and Fang (1985) show that children acquire classifiers denoting one dimension or length first, then two dimensions or flatness and three dimensions or roundness last. One of the critics of Erbaugh's work focuses on the inadequate number of subjects which thus makes the findings less representative. In contrast, others' findings show different results. For example, Hu (1993a) suggests that the order of shape classifiers acquisition is two dimensions first, one dimension second and finally three dimensions. Still another inconclusive result by Loke and Harrison (1986) shows that the order of shape classifiers acquisition is three dimensions first, then one dimension and lastly two dimensions. Their findings are also more in agreement with the perceptual saliency order of Clark (1977) and Andersen (1978), which states that three dimensions and smallness were most perceptually salient to children. In summary, no final conclusion has been drawn regarding the acquisition order of shape classifiers by L1 children.

The literature so far discussed focuses on L1 speakers' use of classifiers. We do not know whether, or the degree to which, the above findings can apply to L2 adult learners of Chinese classifiers acquisition. The following section briefly summarizes a study relevant to this area.

2.2. L2 Acquisition of Chinese Classifiers

Polio's (1994) work provided some insight into how L2 adult learners acquire Chinese classifiers. Her 21 English and 21 Japanese adult speakers learning Chinese in Taiwan first viewed a short film that contains narratives of invisible referents. They were then asked to tell the story in the film to a native speaker of Chinese. The tester then examined their use of classifiers and found that a) NNSs had no problem using a classifier in obligatory contexts; b) they often included too many classifiers which makes it ungrammatical; c) they did use special classifiers, but only occasionally; d) they were able to self-correct the mistakes; e) there were a few cases where NNSs used unacceptable special classifiers.

These findings answered some questions regarding how L2 learners of Chinese develop their understanding and using of Chinese classifier systems, however, much remains unexplored. As Polio herself points out "there is much potential for research in examining how second language learners classify referents in relation to how first language learners classify referents" (Polio 1994: 63). Based on the literature reviewed thus far, the current research is motivated in order to bring some insight into the understanding of how L2 learners acquire Chinese classifiers and potentially provide pedagogical benefits to both teachers and L2 adult learners of Chinese.

3. Methodology

In this section, the subjects involved in this study will first be introduced, followed by the materials and methods/procedures for eliciting data. Finally, I present a detailed explanation of data coding and scoring for analysis purposes.

3.1. Subjects

There were two major groups of subjects in this study: L2 adult learners of Chinese and adult native speakers of Chinese. The use of Chinese classifiers by the first group is the source of data analysis while that of the second group's serves as a control for the conventional use of classifiers.

There were 58 L2 Adult Learners of Chinese, henceforward NNSs, participated in this experiment. They were divided into three groups according to their Chinese proficiency level, henceforth CPL, with the Advanced level in Group I, the Intermediate level in Group II and the Novice level in Group III. Factors determining the subjects' placement include highest academic level achieved in learning Chinese, length of time studying Chinese, NNSs' assessment and others. Detailed explanation in this regard is given in Section 2.3.

In order to determine whether there is any difference in Chinese classifier acquisition between subjects whose native language is a classifier language and those whose native language is not, native speakers of Korean and English were recruited in this study. Since Korean is a classifier language and English is not, it is predicted that Korean subjects should perform better than their English counterparts when learning Chinese classifiers. The numbers of Korean and English speakers recruited are the same. The following table shows the numbers for the two groups with three Chinese proficiency levels.

	Novice	Intermediate	Advanced	Total
Korean	9	8	12	29
English	12	9	8	29
Total	21	17	20	58

Table 3.1: Distribution of NNS by 1st language and CPL

The criteria for selecting subjects of L2 learners were that the subject must:

1. be 18 or above;
2. be a speaker whose first language is not Chinese;
3. be a speaker whose first language is either Korean or English;
4. have studied Mandarin Chinese for at least one semester;
5. be able to count numbers at least from zero to ten in Mandarin Chinese;
6. have no known visual impairment;

If any one criterion described above was not met, he or she was excluded from further participation of the experiment. Also, a questionnaire was designed to gather subjects' information to determine their qualification for the experiment. There are other questions in the questionnaire that ask for subjects' personal, academic and social life,

such as highest education, numbers of Chinese speaking friends, length of time living in a Chinese-speaking community and others that might be factors of determining their CPL. The recruitment of the subjects for this study was done mostly in Taiwan with only 4 exceptions which were done in the US. Those tested in Taiwan were students of Chinese summer programs offered by either Taiwan Normal University or Furen University. They were approached randomly and agreed to take part in the test voluntarily. The test lasted between 30 to 45 minutes and was conducted individually whenever the time allowed. Occasionally, there were groups of 2 or 3 subjects taking the test at the same time due to the time constraints. In such cases, subjects were instructed not to share their responses or be influenced by others' presence.

For the second group, ten adult native-speakers of Chinese, henceforward NSs, were recruited locally in the US. Their home language had to be Mandarin Chinese for them to be qualified for this experiment. Those speak other dialects, such as Cantonese or Hakka, at home will not be considered. All of them have received at least college education in Mandarin Chinese in their homeland. The use of Chinese classifiers by these adult NSs serves as the control data for this study. The test was held at the NSs' home and the instruction was given in Chinese.

Due to the differences in language use between speakers from mainland China and Taiwan, the selection criteria here excludes those speakers from the former area. There are at least two reasons for such exclusion: 1) with fewer variables to consider, the data would be more controlled and uniformed if they were drawn from one group of subjects with similar background; 2) since most of the NNSs were recruited in Taiwan, it justifies the selection of only NSs from Taiwan. This makes the comparison between the NNS and NS groups more compatible and meaningful.

3.2. Materials and Procedures

The study employs a comprehension experiment designed to elicit subjects' understanding of eight shape classifiers. This section describes the selection of these classifiers, the objects created for and the procedures of the experiment.

Inspired by Fang (1985), Hu (1993) and others, the goal of this experiment is to investigate NNSs' ability in understanding classifiers denoting various shapes, sizes, and textures, with more emphasis on shapes. The types of shapes can be divided into one dimension (條 *tiáo* and 根 *gēn*, for rigidity), two dimensions (片 *piàn* and 張 *zhāng* for flatness), and three dimensions (顆 *kē*, 糰 *tuán* and 粒 *lì* for roundness, and 塊 *kuài* for cube). There are subtle differences between classifiers within each dimension group which will be explained next.

In the one-dimensional group, 條 *tiáo* and 根 *gēn* differ in rigidity. For example, 條 *tiáo* co-occurs with flexible objects such as 繩子 *shéngzi* 'rope' while 根 *gēn* collocates with objects that are more rigid such as 香蕉 *xiāngjiāo* 'banana'. In the two-dimensional group, 片 *piàn* denotes objects of irregular shape while 張 *zhāng* denotes

objects with square or rectangular shapes. For instance, 一片樹葉 *yípiànshù yè* ‘a leaf’ vs. 一張紙 *yìzhāngzhǐ* ‘a piece of paper’ in which a leaf is irregular in shape while a piece of paper usually has a square or rectangular shape. For three dimensions, 顆 *kē* and 粒 *lì* are usually used with more solid and round objects whereas 糰 *tuán* co-occurs with objects that are mushy or squishy. Furthermore, 顆 *kē* denotes things that are bigger than those denoted by 粒 *lì*. Lastly, 塊 *kuài* denotes objects with a cubic shape. Thus, typical objects denoted by 顆 *kē*, 粒 *lì*, 糰 *tuán*, and 塊 *kuài* are 西瓜 *xīguā* ‘watermelon’ (big and round), 花生米 *huāshēngmǐ* ‘peanut’ (small and round), 麵糰 *miàntuán* ‘dough’ (round and mushy) and 蛋糕 *dàngāo* ‘cake’ (cubic). The goal of selecting these objects is to reveal whether the subjects understand the subtle differences among these classifiers in denoting objects with different shapes, sizes and textures. The differences between these classifiers and typical objects belonging to that group are listed in the following table:

Shape	Classifier	Salient Feature	Typical Objects
One-Dimension	條 <i>tiáo</i>	slender, flexible, bendable	snake, worm, rope, river, road, ...
	根 <i>gēn</i>	rigid	banana, cigarette, stick, match...
Two-Dimensional	片 <i>piàn</i>	thin with irregular edges	leaf, land...
	張 <i>zhāng</i>	thin with regular edges	paper, ticket, picture, face, table....
Three-Dimensional	糰 <i>tuán</i>	round & irregular shapes; squishy	dough, cloud, animal dropping,...
	顆 <i>kē</i>	round & bigger	basketball, watermelon, rock, planet,...
	粒 <i>lì</i>	round & smaller	rice, sesame, sand, grain, marble,...
	塊 <i>kuài</i>	cubical	Ice cube, brick, cake, nugget,...

Table 3.2: Classifiers by dimensions with salient feature and typical objects they denote

With these eight classifiers selected, ten corresponding objects made of children’s modeling clay were created. Eight of these ten objects were each made to fit one and only one characteristic denoted by the eight classifiers discussed above. For example, to represent a typical object denoted by the classifier 塊 *kuài*, a cubical object similar to a sugar cube was made. Of these ten objects, two were made as foils with random irregular shapes and dimensions which prevented subjects from guessing the answers by eliminating the objects already selected.

Other characteristics of these objects such as color, weight, and texture were kept minimally different. Subjects were told that these objects all have a same name: 黏土 *niántǔ* ‘clay’, despite having different shapes and sizes. Each object was assigned a number written on a small card which was placed directly above the assigned object.

Next, eight phrases were presented to the subjects and they were asked to match each phrase with one and only one object based on the classifier presented in each phrase. Following are two example phrases:

一 條 黏土()
yí tiáo niántǔ
 one CL-long-slender clay

一 張 黏土()
Yí zhāng niántǔ
 one CL-flat clay

Only the Chinese phrases and the pronunciation of each character, if unknown to the subjects, were provided in the actual test. The semantic gloss of each character is presented here only for explanation purposes. The only variable for all these eight phrases is the use of different classifiers. The correct selection depends on the subjects’ understanding of the classifiers provided and the ability to link such understanding to the salient physical features each object exhibits. After the selection was made by writing down the corresponding number in the parenthesis, the subjects were asked to rate their level of confidence about their selections. The scale ranges from 1 to 5 with 1 being least confident and 5 being most positive about the choice.

Subjects were allowed to answer the questions in a random order and there was no time limit for the entire test.

3.3. Coding and Scoring

The raw data were coded before data analysis. This section explains how both nominal and ordinal data were coded and the criteria and schemes involved. I will first describe the coding process for data extracted from the Background Survey. Next, I present the data coding and scoring procedures for the actual experiment.

Coding for subject background data was done by creating a spreadsheet file. It includes the following characteristics of each subject:

- (1) Gender
- (2) Age
- (3) Birthplace
- (4) First Language
- (5) Other Language(s) Learned

- (6) Length of Time Studying Chinese
- (7) Time First Studied Chinese
- (8) Hours of Studying Chinese per Week
- (9) Parents' First Language
- (10) Length of Time Living in a Chinese-speaking Community
- (11) Self-appraisal of Current Chinese Level
- (12) Frequency of Using Chinese Daily.

Each subject was given an ID with a combination of 3 alphabet letters and 3 digits. For example, in an ID of L2EF01, L2 stands for the subject being a L2 learner of Chinese; E stands for the subject's first language as 'English'; F represents subject's gender as 'Female'; 01 represents the sequential number randomly assigned to each subject within their own group.

The NNS group was further divided into 3 subgroups: Novice, Intermediate and Advanced learners of Chinese. Criteria involved in determining the subjects' CPL include the above listed criteria from (6) to (12). Under each criterion, each subject was assigned a number of either 1, 2, or 3 based on the following schemes.

For criterion (6) Length of Time Studying Chinese, the dividing points, based on natural gaps, are 12 months and 24 months. Therefore, those subjects with less than 12 months' length of time studying Chinese received 1 point. Those between 12 and 24 months received 2 points and those with 24 months or more received 3 points. With such dividing points, there are 26 subjects received 1 point, 13 of them received 2 points and the rest of 19 subjects received 3 points. The point each subject received under this criterion was classified as INDEX 1 as seen in Table 3.3. This and 6 other INDEX points will be totaled as the final points to determine the subjects' CPL.

Code	LnthTmStdChns(Mth)	Index 1	TmFrstStdyChns	Index 2
L2EF01	10	1	12.63	2
L2EF02	36	6	34.90	3

Table 3.3: Sample Coding for NNS's Length of Time Studying Chinese & Time First Studied Chinese

The INDEX 2 resulted from the criterion (7) Time First Studied Chinese. The longer ago a subject began studying Chinese, the greater point of 1, 2, or 3 will be assigned to that subject. The dividing points here are 12 months and 36 months. As such, those began studying Chinese less than 12 months ago received 1 point, those between 12 to 36 months received 2 points and those started 36 months or earlier received 3 points. Of the 58 subjects, 18 of them received 1 point, 23 subjects received 2 points and 17 subjects received 3 points.

For the INDEX 3, the criterion (8) Hours Studied per Week was calculated. Those who studied less than 10 hours per week received 1 point, those between 10 and 20 hours

received 2 points, those have more than 20 hours received 3 points. As a result, 25 subjects received 1 point, 17 subjects received 2 points and 16 subjects got 3 points.

For the INDEX 4, more weight was given to the criterion (9) Parent's First Language. Those with a parent whose first language is Chinese received 3 points and others received 0 points. These extra points were added because I felt, upon speaking with them, could speak Chinese very well, or at least could understand my Chinese perfectly. Although they might not have taken many Chinese courses, it is apparent that their parents have a great impact on their CPL. With such assumption, 6 subjects received 3 points.

Code	HrsStdied/wk	Index 3	PrntChns?	Index 4	LngthLvngC-C (Mth)	Index 5
L2EF01	10	1	N	0	12	3
L2EM01	28	3	Y	3	10	2

Table 3.4: Sample Coding for NNS's Hours Studied/Week, Parental Lang & Length of Time Living in Chinese Community

The criterion (10) Length of Time Living in a Chinese-speaking Community provides the baseline for the INDEX 5. Those who have or had lived in Chinese-speaking community for less than 5 months received 1 point, those between 5 to 11 months received 2 points, and those for 12 or more months received 3 points. Following this standard, there are 22 subjects received 1 point, 21 received 2 points and 15 received 3 points.

For the INDEX 6, I examined criterion (11) Self-appraisal of Current Chinese Level in which three levels were reported: Novice, Intermediate, and Advanced. Assuming the assessment of their own CPL was fair and accurate, those assessed as Novice received 2 points, those as Intermediate received 4 points and 6 points for those reported as Advanced. Again, the decision to give more weight to this criterion is solely subjective based on personal observation: the subjects tend to underestimate their Chinese levels so that they can avoid potential embarrassment if their testing scores did not come out as desired. For those who reported as Intermediate or better, they tend to have a certain degree of confidence in their Chinese levels and thus should deserve more points. At the end, there were 23 Novice, 24 Intermediate and 11 Advanced subjects.

For the INDEX 7, I divided the group by examining criterion (12) Frequency of Using Chinese Daily which is also a self-report of the subjects' judgment on their daily Chinese usage frequency. There are four levels: those who reported as 'Occasionally' received 1 point, those as 'Sometimes' received 2 points, those as 'Very Often' received 3 points and those as 'All the Time' received 4 points. The distribution of such allocation is as follows: 15 subjects reported as 'Occasionally', 20 as 'Sometimes', 17 as 'Very Often', and 6 as 'All the Time'.

LIANG: L2 ACQUISITION OF CHINESE CLASSIFIERS

Code	Chinese Level	Index 6	HwOftnSpkChns	Index 7	Final Point	CPL
L2EF01	Intermediate	4	Very Often	3	15	2
L2EF02	Advanced	6	Very Often	3	22	3

Table 3.5: Sample Coding for NNS's Chinese Level, Frequency Using Chinese & CPL

Finally, with the INDEX 1 to 7 tabulated and accounted for, the scores from each INDEX were tallied as the Final Point for each subject. The final points range from 8 to 25. They were further roughly and evenly divided into three groups based on the following dividing points: those scored 13 or less points received 1 point as true NOVICE, those scored between 13 and 18 received 2 points as true INTERMEDIATE, and those scored 18 or more points received 3 points as true ADVANCED learners. With such dividing points, there are 20 novice, 18 intermediate and 20 advanced learners.

The coding, scoring and organization of the data are explained in this section. The data are stored in a spreadsheet file with several columns. The first column is the subjects' ID based on the unique information for each subject explained earlier.

ID	1-1D1	1-C	1-S	2-2D1	2-C	2-S
L2EF01	8	5	0	10	4	8
L2EF02	1	4	10	10	4	8

Table 3.6: Sample Coding of NNS Responses on the First Two Questions

There are eight questions in the experiment and each question has three columns created to store three types of information. The first column is named '1-1D1' which contains the original answers given by the subjects. The first '1' stands for 'Question #1'; '1D1' stands for '1-Dimensional Classifier Type #1'. Therefore, with such a naming convention, one knows that the column '6-2D2' contains subjects' selection that reflects their understanding/knowledge of a classifier appearing in Question #6 which is used to denote 2-dimensional objects Type #2. The following Table 3.7 shows the eight classifiers with their corresponding Chinese character/Pinyin, dimension-type category and the ordinal numbers assigned to them in the actual experiment.

LIANG: L2 ACQUISITION OF CHINESE CLASSIFIERS

Question No.	Character/Pinyin	Dimension-Type	Assigned No.
1	條/ <i>tiáo</i>	1-1	1
2	張/ <i>zhāng</i>	2-1	10
3	糰/ <i>tuán</i>	3-1	2
4	根/ <i>gēn</i>	1-2	8
5	塊/ <i>kuài</i>	3-2	9
6	片/ <i>piàn</i>	2-2	7
7	顆/ <i>kē</i>	3-3	6
8	粒/ <i>lì</i>	3-4	3
∅	∅	3-5	4
∅	∅	3-6	5

Table 3.7: CL Categorization and Assigned Number

The second column created for each question has to do with subjects' confidence levels regarding their selections. This confidence levels range from '1' being 'Absolutely Do Not Know' to '5' being 'Absolutely Sure'. The names for these columns are given using the following method. In column '2-C', '2' stands for the number 2 question; 'C' stands for their 'Confidence Level', as seen in Table 3.8.

ID	1-1D1	1-C	1-S	2-2D1	2-C	2-S
L2EF01	8	5	0	7	4	2
L2EF02	1	4	10	10	4	8

Table 3.8: Sample Coding of NNS Confidence Level and Sample Scoring

The third column contains subjects' scores for a particular question asked in the experiment, as seen in Table 3.8, the subject L2EF01 gets a score of 10 for the question No. 2. The derivation of the scores for all of the subjects' eight questions is somewhat complicated and will be discussed in more details now.

To determine this score, it was necessary to reference L1 subjects' selections for each question. Ten L1 subjects participated in this research experiments and their answers were transferred and coded. Based on these L1 subjects' selections, a decision was made as to how many points any given selection is worth. For example, for 1-1D1, all of the L1 subjects' selection is '1'. That gives this selection '1' a 10-point score and all other nine possible selections will be worth 0 points. Therefore, as seen in Table 3.8, L2EF02's selection was 1 and 10 points were given. For subject L2EF01, her selection was 8 and she therefore received 0 points.

For another example with column 2-2D1 in Table 3.8 there are 8 out of 10 L1 subjects who selected No. 10 while the other two subjects chose No. 7 as their correct

answer. No other selection was made for this question by the L1 subjects. Therefore, for L2 subjects' selections of 2-2D1, if their selection is No. 10, they will receive a score of 8 points, e.g. L2EF02's score; they receive 2 points if their selection is No. 7, e.g. L2EF01's score; and they receive 0 point if their selections are any of the other eight possible selections.

Finally, as seen in Table 3.9, two columns were created to sum up the subjects' total points and their score percentage of total possible points. The names for these two columns are 'Final Point' and 'Percentage' respectively.

With the subjects' background and test results recorded, coded and scored, further analysis of their performance is presented and explained in the next section.

ID	Final Point	Percentage
L2EM02	23	31
L2EM03	18	24

Table 3.9: Sample Scoring of NNS Final Point and Percentage of Possible Score

4. Result and Analysis

This section presents the result and a series of statistical analyses of the coded data drawn from the experiment by the L2 subjects. The aims are to organize and describe the data so they become informative and eventually provide implications as to how a Chinese teacher should approach students with different backgrounds when teaching different types of Chinese shape classifiers.

4.1. Correlation between CPL and Performance

In Figure 4.1, the scattered plot shows the relationship between the subject's CPL and their experiment scores. Clearly, there is a positive relationship observed between these two variables. The higher Chinese proficiency levels they have, the better they perform. This trend is similar to the trend found in the literature that L1 children's performance correlates positively with their ages and cognitive development. The pedagogical implication we can draw from this result is that teachers should teach classifiers to beginners with greater efforts than to advanced learners.

Next, when the subject group is divided into two subgroups, English and Korean, the previously observed trend remains with some variation. As seen in Figure 4.2, it shows that 1) Korean Novice and Advanced subjects do better than their English counterparts, but the difference is quite minimal; 2) English Intermediate subjects unexpectedly outperformed their Korean counterparts. Since Korean is a classifier language and English is not, one would logically assume that Korean subjects should perform much better throughout the 3 levels. However, the data show otherwise. Not only did Korean intermediate subjects perform worse than their English counterparts, the other two groups outperformed their English counterparts only minimally. The differences

were not significant: between novice Korean and English groups, the p-value was 0.4615; between advanced Korean and English groups, the p-value was 0.6452. For the intermediate Korean and English groups, the difference was quite significant with a p-value of 0.0027.

The cause(s) of this rather counterintuitive result remain to be discovered. One can assume that the fact that Korean subjects did not progress as much during intermediate stage was caused by the overconfidence of their ability in learning this linguistic feature. Since Korean is also a classifier language, perhaps they did not put in as much effort as their English counterparts did. On the other hand, the English subjects viewed it as a challenging task since only measure words, but not classifiers are found in English. Hence, it required extra time and effort in this area for them and consequently they not only caught up with their Korean counterparts but also outperformed them at the intermediate stage.

The implication one can draw from this result is that teachers should pay different amount of attention to students at various stages with different backgrounds. At novice and advanced stages, English students would need more attention. At the intermediate stage, it is the Korean students who need an extra push when learning Chinese classifiers.

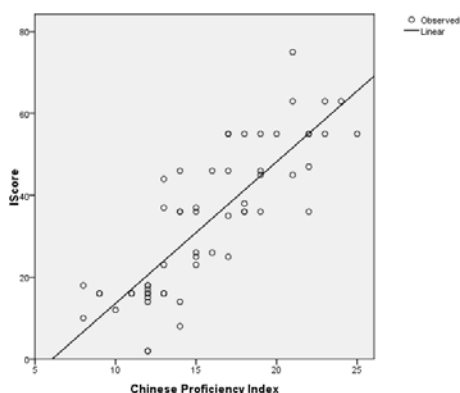


Figure 4.1: Correlation between CPL and Test Performance

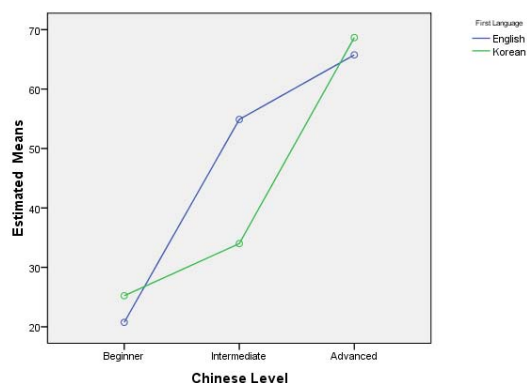


Figure 4.2: Estimated Means of NNS Performance Grouped by CPL

4.2. The Emergence Order

The emergence order of these three types of classifiers is the next issue to be explored. As seen in the Figure 3.3, 2-dimensional CLs are best learned by L2 learners followed by 1-dimensional and then 3-dimensional CLs. Notice the difference between 2-dimensional and 1-dimensional CLs is smaller than the difference between 1-dimensional and 3-dimensional CLs. This phenomenon is even clearer when only Korean subjects were examined. In Figure 3.4, Korean subjects' performances on 2-dimensional and 1-dimensional CLs were relatively similar to their performance on 3-dimensional CLs.

When comparing the emergence order found in this study with those reported in L1 literature, one study has a similar result to the current study. Other studies on the emergence order show inconclusive results. For example, Erbaugh (1984) reported that emergence order for L1 children is 1-dimensional first followed by 2-dimensional and then finally 3-dimensional classifiers. On the other hand, Loke & Harrison's (1986) study claimed that 3-dimensional CLs were first learned followed by 1-dimensional and then 2-dimensional CLs. In yet another study, Hu (1993) showed that the emergence order is 2-dimensional first followed by 1-dimensional and then 3-dimensional CLs, which is similar to the current study's result.

The discrepancy might be due to the fact that the methodology designed and employed and the selection of subjects were quite different in these studies. For example, in Erbaugh's study, her sample size is rather small, only 4 children were included and their ages were relatively young as well (1;2 to 3;1). Based on findings by other studies, even by age three, children use very few special classifiers. With this limited subject pool, comparing results from this study to other studies is then not so compatible. Also, her methodology is the only one that is longitudinal. This factor is very likely the source that contributed the discrepancies.

In Loke & Harrison's study, on the other hand, their subjects' ages were older than the previous study and the sample size was greater as well. However, in their analysis, they considered the classifier 個 *ge* not just a general CL but also a 3-dimensional CL. They argued that in addition to being the classifier for humans and abstract entities, 個 *ge* 'can classify or reclassify *only* 3-dimensional objects since its classification of 1-dimensional and 2-dimensional objects would normally considered unacceptable or inappropriate by Mandarin speakers' (Loke & Harrison, 1986: 126). Consequently, it's not surprising to see their results showed that 3-dimensional CLs were learned first followed by 1-dimensional and then by 2-dimensional CLs.

In yet another format, Hu's sample size and method were more comparable to the current study. There were 24 subject L1 children in her experiment in which subjects' understandings of three types of dimension shape CLs was examined. With a similar methodology and sample size employed to the current study, her findings, not surprisingly, were more similar to mine than the others.

If the mean scores were grouped by NNSs' native languages, as seen in Figure 4.4, the above discussed emergence order is even clearer with English group than with Korean group. The chart can be summarized as 1). English L2 subjects performed better on 2D CLs but slightly poorer on 1D & 3D CLs than Korean subjects did; and 2). For both groups, 2-D CLs were best learned then 1-D and then 3-D CLs. The implications are that 1). teachers should assist English students more when learning 1-D & 3-D CLs and more with Korean students when teaching 2-D CLs; and 2) teachers should put more efforts on teaching 3-D CLs, followed by 1-D and then 2-D CLs.

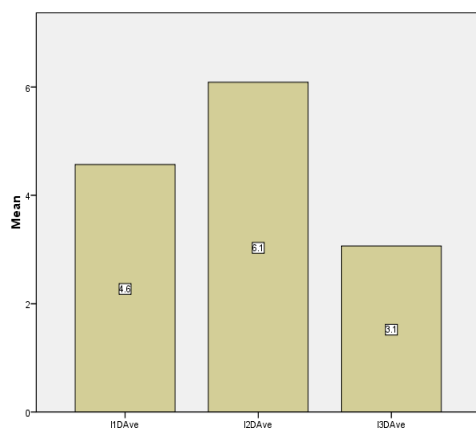


Figure 4.3: NNS Mean Scores Grouped by CL Dimension

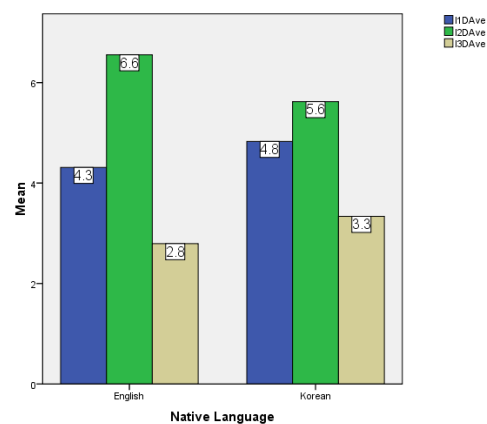


Figure 4.4: NNS Mean Scores Grouped by CL Dimension and 1st Language

4.3. Progression Patterns of Different Shape Classifiers

Finally, if we look at how subjects with different Chinese levels perform on different shapes of classifiers, something unusual appears. As can be seen in Figure 3.5, the progression of learning 1-D and 3-D CLs is pretty straightforward: the performance increases as their CPL advances. However, the progression of learning 2-D CLs is not so logical. The performance progressed initially as they moved from novice to intermediate stages. However, such progress turned downward as their CPL advanced from intermediate to advanced level. The cause(s) of such rather illogical phenomena and the conditions under which this downward U-shaped curve might occur remains to be investigated.

There are many studies that showed learners exhibit this kind of U-shaped learning pattern when learning other types of linguistic units. For instance, Abrahamsson (2003) investigated the relation between consonant deletion and vowel epenthesis in the development of word-final codas in Chinese-Swedish interlanguage. He found that his subjects' acquisition of Swedish codas 'exhibited relatively high accuracy rates at early stages, lower accuracy rates at later stages, and again high accuracy rates at more advanced stage'. Unfortunately, possible causes of this phenomenon were not provided. One of my ongoing research goals is to examine more closely these CLs and test them against other extralinguistic factors that might contribute to causes of these phenomena. Hopefully, this effect can provide suggestion as to what can be done by teachers to assist students to better learn the 2-D CLs.

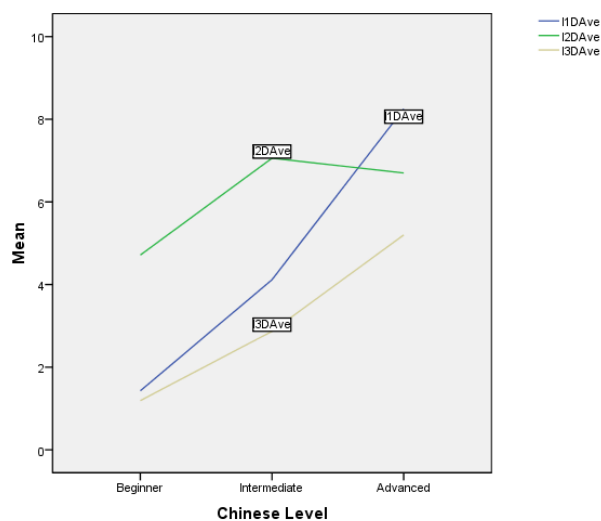


Figure 4.5: Correlation b/t NNS Performance and CPL Grouped by CL Dimension

5. Summary and Conclusion

Classifiers are said to have a close correlation with the ecological-Cultural environment of the speech community (Denny, 1976). This correlation is made clear by looking at the relationship between nouns and classifiers: ‘nouns have more to do with what is out there in the world, and classifiers more to do with how humans interact with the world (Denny 1976)’. The current research aims to provide some insight into how L2 adult learners of Chinese acquire Chinese shape classifiers and suggests approaches that language teachers should be aware of when teaching this linguistic feature to students with different L1 background. Based on research methodology used in L1 acquisition of Chinese classifiers, the results of this study show that 1) there is a strong positive correlation between subjects’ performance on Chinese shape classifiers comprehension test and their Chinese proficiency levels; 2) contrary to the prediction, Korean subjects outperformed their English counterparts only minimally at novice and advanced levels and were outperformed by their English counterparts at intermediate stage; 3) 2-dimensional classifiers were best learned by both subject groups followed by 1-dimensional and then 3-dimensional classifiers; 4) subjects showed an increasing progression as they advance from novice to advanced level when learning 1- and 3-dimensional classifiers. However, when learning 2-dimensional classifiers, their progress showed a reversed U-shaped progression pattern. The results from this study shed some light on how L2 adult learners of Chinese acquire Chinese shape classifiers which is relatively scantily discussed in the literature. Other types of experiments, such as classifier production test, and considering extralinguistic factors in identifying learners’ strength and weakness in learning this linguistic feature will be reported in my ongoing research projects.

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How Chinese Native Speakers Handle Written Style Material in Reading and its Application in Second Language Acquisition

Yongfang Zhang
The University of Akron

In this paper, a new approach was employed to investigate the relationship between written Chinese and spoken Chinese. In a pilot study, how Chinese native speakers handle written style materials was investigated and compared with Chinese L2 learners. Preliminary findings reveal that both groups are aware of the variation of written levels in different genres. However, the written elements selected by Chinese native speakers include low frequency content words, content words related to the text theme, as well as idioms and poetic sentences. In addition, native speakers can interpret the written elements through their strong vocabulary knowledge, lexical network, and ability to apply their schema in reading. In contrast, L2 learners select more function words, classical words and idioms as written elements, and they lack the ability to interpret. The findings bear direct application on linguistic research and second language acquisition, and call for further research.

0. Introduction

There are many researches on the relationship between spoken language and written language in English. However, such research is rare in Chinese (Zhang and Yang 1994). As Zhang and Yang (1994) and Zhang (2000) pointed out, many researches in Chinese only analyzed a single or a few features, and a systematic study of spoken Chinese and written Chinese is still missing. In addition, many analyses were relied on the researchers' personal judgment and thus the reliability of their findings is questionable. Moreover, many findings were obtained from small scale corpus, and are hard to be generalized.

This paper aims to propose a new reception approach for investigating the relationship between spoken Chinese and written Chinese from the analyses of how Chinese native speakers handle written materials. In a pilot study, I investigated how Chinese native speakers rated different genres in terms of written levels, what elements in texts they picked as written elements, why they categorized the elements into written, and how they interpreted the written elements. In addition, this research can also benefit Chinese second language (L2) acquisition. When we can understand how Chinese native speakers handle the written materials, we can guide Chinese L2 learners towards a

conscious and effective learning of both spoken and written Chinese. Therefore, this pilot study also investigated how advanced-level Chinese L2 learners handle written Chinese.

In this article, I will first review the findings in spoken language and written language in general, and summarize the limited research on Chinese. Then I will describe my pilot study on how Chinese native speakers handle written materials in reading, followed by the description of my investigation on how Chinese L2 learners handle written materials in reading and the comparison between the two groups of subjects. In the final section, I will draw my conclusions and point out the applications of my preliminary study in Chinese linguistic research and second language acquisition.

1. Research in General

There are many researches on the relationship between spoken language and written language in general. Spoken language and written language share common core such as similar sentence patterns (Blankenship 1962) and are related closely from historical perspective. In addition, many genres can have both spoken feature and written feature (Tannen 1982). Therefore, most researchers treat them as a continuum instead of a dichotomy (Tannen 1982). Scholes (1999) treated spoken language and written language as variant ways of coding a single underlying language, though they have some differences. Georgakopoulou and Goutsos (1997) pointed out that there are varying degrees of variations and some are technology-mediated.

Researchers have also analyzed the differences between spoken language and written language. According to Tannen (1982: xi), the difference between spoken language and written language is “broadly interdisciplinary”. With the linguistics as the core, it encompasses anthropology, psychology and literature. The spoken language and written language are also different in terms of interaction to linguistic context, information density (Tannen 1982), formality and purpose of language (Biber 1988). Basically, the previous studies on spoken language and written language can be categorized into two groups. The first group, which is symbolized as the Producing Group, refers to the researches focusing on the process of generating the two variations of the language (spoken and written). The second group, Product Group, focuses on the product and the reception of spoken and written language.

Producing Group. Researchers have found that spoken language uses phonics, and thus is done through paralinguistic channels with emotional or interpersonal dynamics, while written language uses graphs and thus uses both content and verbal channels (Gumperz et al. 1984; Kay 1977; Tannen 1982). Related to this aspect, spoken language is temporal and evanescent while written language is spatial and stable (Chafe 1982; Li and Thompson 1982). From the receiver’s respect, listener uses ears as sensory organ and relies on memory to retain information, while reader uses eyes as sensory organ and can halt reading and turn back to earlier passages (Jahandarie 1999). In most cases, spoken language is produced impromptu while written language is planned

(Georgakopoulou and Goutsos 1997; Stubbs 1980). Chafe (1982) has found that the information flow in spoken language is from one idea to the next at a rate of one every two seconds while in written language there is plenty time to move and integrate a succession of ideas into single linguistic whole. Therefore, researchers (Chafe 1982; Georgakopoulou and Goutsos 1997; Stubbs 1980) claimed that written language is decontextualized and thus detached, while spoken language is context-bound and thus involved. The speaker interacts with listener and has more interpersonal involvement, while during writing there is only one-way information flow from the writer to the reader (no turn taking) and the reader is detached from the process (Chafe 1982; Gumperz and Gumperz 1981; Kay 1977; Tannen 1982). Vygotsky (1962) described spoken language as dialogue while written language as monologue.

Product Group. As a result of the differences in the producing process, spoken language and written language also show differences in terms of product. Spoken language uses simple structures and is condensed like telegraph (Li and Thompson 1982), while written language uses more complicated structures and thus is more complex, elaborate and explicit (Georgakopoulou and Goutsos 1997; Stubbs 1980). In addition, spoken language has more redundancy and is fragmented with loose structure, while written language is more integrated with complete structure (Chafe 1982; Christensen 1994; Zhang and Yang 1994; Zhang 2000). Moreover, spoken language and written language show difference in dimensions such as phonology, lexicon, syntax and discourse. While spoken language uses prosodic devices which is evanescent and requires more short term memory, written language uses punctuation which is permanent and thus requires diverse types of memory (Halliday 1989; Jahadarie 1999). Compared to spoken language, written language uses more attributive adjectives (Blankenship 1962) and has varied vocabulary, and fewer words referred to speaker (Devito 1966). Written language uses more subordinative clauses and devices (Chafe 1982). In addition, verbs are tended to be used more in oral discourse while nouns to be used more in written discourse (Blankenship 1962; Halliday 1989). However, Halliday (1989) proposed to use the degree of density as the criteria: written language is lexically dense with simple grammar while spoken language is grammatically dense with simple vocabulary.

2. Research in Chinese

Most Chinese scholars treat spoken Chinese and written Chinese as *yuti* 语体 ‘two register variations’ (Liu 2005). Register is defined as the language used by communicators in specific contexts to complete different communicative purposes. Therefore, it is a functional variation of the general language and the variation reflects on linguistics (Wang 1987). Influencing factors in register include communicational motivation, purpose, settings, producer agents, and linguistic expression. The differences in these factors define subtypes of spoken Chinese and written Chinese. A most cited categorization was proposed by Wang (1987). According to him, spoken Chinese is

divided into *suiyi tanhua* 随意谈话 ‘causal talk’ and *renzhen tanhua* 认真谈话 ‘serious talk’, while written Chinese is divided into *kexue yuti* 科学语体 ‘scientific register’, *yishu yuti* 艺术语体 ‘literate register’, *zhenglun yuti* 政论语体 ‘political argument register’ and *gongwen shiwu yuti* 公文事物语体 ‘official document register’. Another categorization is to divide spoken and written Chinese into *pingshi yuti* 平实语体 ‘vernacular’ and *yishu yuti* 艺术语体 ‘elegant style’.

Most Chinese discourses are stretched in the continuum between the spoken polar and the written polar. Spoken Chinese discourse can have written language features while written Chinese discourse can also have spoken features. In *A grammar of spoken Chinese*, Chao (1968) listed different types of spoken discourses from artificial to authentic, in regarding to genre, context (formal vs informal) and preparation (planned vs unplanned). These types covered spoken Chinese with different degree of formality and written features, and thus implied the integration between spoken Chinese and written Chinese. According to Chao (1968: 18), the most artificial spoken Chinese is “monologues read stiffly from manuscript” while the most authentic one is “things said in response to some situation or to something in the stream of consciousness”. More artificial spoken language discourses have more written features. Chao (1968) also indicated that the difference between spoken and written Chinese is also related to formality of the setting.

Different register variations show both similarities and differences in linguistics and pragmatics with linguistics as the core. As variations of the same language, spoken Chinese and written Chinese share common core which is legible to and used by the majority people using Chinese. According to Gu and Zhou (1989), common core includes fundamental grammar and vocabularies with high frequency. The most often examined differences in linguistic features are in the dimension of lexicon. Chao (1968: 18) pointed out that “different types of discourse make more difference in sentence structure and in the expressive elements than in other aspects of grammar”. Generally, the majority vocabulary in Chinese can be used in all kinds of variations. However, some vocabulary can only be used in certain register. Spoken Chinese has small range of lexicon. It often uses high frequency words, dialect words, slang, proverbs and *xiehouyu* 歇后语 ‘a two-part allegorical saying’. It seldom uses classical Chinese expressions. In contrast, written Chinese has a varied vocabulary. It uses classical Chinese (Li and Thompson 1982), idioms, more attributive adjectives, and fewer words referred to speaker and listeners.

3. Investigation on Chinese Native Speakers

In this section, I will describe my investigation on how Chinese native speakers handle written materials in reading. Specifically, I investigate their ratings of different genres in terms of written levels, their selections of written elements in texts, their reasons to categorize items into written, and their interpretation of the written elements. Due to the preliminary characteristics of the pilot study and the small number of subjects

in some part of research, the findings are very tentative and the generalization is not suggested beyond this study. Further studies must be done for the generalization.

Pilot Study. The pilot study was conducted as a grounded survey of 160 Chinese native speakers following the interview of 13 different Chinese native speakers during the summer of 2007. All subjects were college students. First, 13 subjects were asked to read 5 short news articles and rate the written levels of each article. Then, they were asked to read a long prose and rate the written level, underline the written style elements and interpret the written elements in spoken language. They were also asked to provide reasons why they categorized the underlined elements to written Chinese.

The following extensive study surveyed 160 new subjects. First, the 160 subjects were asked to rate the written levels of different genres. The genres were divided into three categories: newspaper articles, novels and internet articles in blogs. Newspaper articles included articles on current affairs, sports, entertainments, living and editorial sections. The online versions of all these genres were also included. Novels included classic novels, contemporary novels, modern novels and foreign novels translated into Chinese. Internet articles in blogs included celebrity blogs, vernacular blogs and blogs written by classmates. Then, they were asked to read the highest rated news article elected by the previous 13 subjects and underline the written style linguistic elements.

All texts were selected from the Chinese L2 textbooks for intermediate to advanced level. The five short news articles have 100, 135, 118, 105, and 104 characters, with an average of 112.4 characters per article. Throughout the study, the subjects were asked to rate using a 7-point scale where 1 means “the most spoken” and 7 means “the most written”. 7-point scale is used because it has a clear middle point. In addition, between the middle and end points there are just two choices, which capture variations in opinions without presenting too many choices or too few.

Rating of Genres. The ratings have shown that these Chinese native speakers are aware of the variations of registers in different genres. The 160 Chinese native speakers rated current affair news the genre with the highest written style (6.04). The next highest was classical novel ($s=5.94$). The newspaper articles on sports, entertainment, living and editorial sections were rated to be 3.97, 3.23, 2.87 and 4.68, respectively; the contemporary novels, modern novel and translated foreign novels were rated to be 4.62, 3.97 and 4.63, respectively; the articles in celebrity blogs, vernacular blogs and classmate blogs were rated to be 4.08, 3.11, and 2.42 respectively; the online articles on current affairs, sports, entertainment, living and editorial were rated to be 5.52, 3.61, 2.97, 2.78 and 3.92 respectively.

My observations agree with Biber (1988) and Georgakopoulou and Goutsos (1997). Biber (1988) has proposed that variations between spoken and written languages are related to purpose of the language. Among the three types of blogs, the celebrity blog has highest level of written style. My explanation is that the celebrity’s blogs are oriented

to attract more attentions and they intentionally use more written style to be elegant. Georgakopoulou and Goutsos (1997) have asserted that some variations are technology-mediated. The finding that the ratings of written style of online newspaper articles follow the same order of paper based newspaper articles, yet to lower level of written style, implies the differences in written level varied by media.

Among the novels, classical novel is rated most written, followed by translated foreign novel and contemporary novel, and then modern novel. This agrees with the observations of Li and Thompson (1982) that classical Chinese is used in written Chinese only. In addition, this also implies that the subjects believe that only the best novels in the history can survive and still be widely welcomed today, and tend to consider them more elegant and thus written.

Short News Articles. The ratings by 13 native speakers have demonstrated that different texts belonging to the same genre can have variations of registers. Five short news articles were rated to be 5.5, 3.92, 4.69, 4.19, and 4.11, respectively. In addition, these speakers rated news more written since most ratings were above the mid-point 4 in the 7-point scale. Moreover, the written level not related to the length of the article since the article with the most characters was rated the least written while the article with the fewest characters was rated the most written. However, the real factors were not investigated in this study.

The low occurrence frequency content words endow the article more written style than function words. As shown in the grounded survey of 160 new subjects, more content words and phrases were considered as written elements. The content words which were picked by more than 1/3 subjects include 竣工 *jungong* '(project) be completed' (f=136, p=85%), 交付 *jiaofu* 'submit' (f=130, p=81.25%), 兼有 *jianyou* 'also have' (f=115, p=71.88%), 库容 *kurong* 'storage capacity' (f=113, p=70.63%), 效益 *xiaoyi* 'profit' (f=105, p=65.63%), 综合 *zonghe* 'comprehensive, synthetical' (f=102, p=63.75%), 典礼 *dianli* 'ceremony' (f=92, p=57.5%), 使用 *shiyong* 'use' (f=87, p=54.38%), 日前 *riqian* 'the other day, a few days ago' (f=85, p=53.13%), 调节 *tiaojie* 'adjust' (f=80, p=50%), 位于 *weiyu* 'be located, be situated' (f=65, p=40.63%), 正式 *zhengshi* 'formally' (f=60, p=37.5%). Here *f* is defined as the number of subjects considering the word as a written element, while *p* is the ratio of the *f* value over the number of subjects (160). In contrast, only two functions words were picked by more than 15% subjects (*p*>15%). One is the conjunction word 并 *bing* 'and' (f=46, p=28.75%), and the other is an auxiliary verb 可 *ke* 'can' (f=26, p=16.25%).

In addition, all of the selected content words are low frequency Chinese words as none of them are included in *Xiandai hanyu pinlü cidian* 现代汉语频率词典 'A Frequency Dictionary of Modern Chinese'. The observations agree with previous findings that written Chinese has bigger range of lexicon while the spoken Chinese is often limited to the high frequency words (Chao 1968). A small corpus study on written

words in two dictionaries (Li 1998; Lü 1994) reveals that some bi-character words tend to become one character in written Chinese, such as 可以 *keyi* ‘can’, 应该 *yinggai* ‘should’, 比较 *bijiao* ‘comparatively’, 本来 *benlai* ‘originally’, 因为 *yinwei* ‘because’ are used in spoken Chinese while 可, 应, 较, 本 and 因 are used in formal written style. However, in my study, 并 *bing* ‘and’ and 可 *ke* ‘can’, the abbreviated forms of bi-character words 并且 *bingqie* and 可以 *keyi*, were picked by small number of subjects. I believe the reason is the high frequency of these two abbreviated words, as both are included in *Xiandai hanyu pinlü cidian* 现代汉语频率词典

Long Prose. 13 Chinese native speakers rated the long prose, *guiyu fanxiang* 鲑鱼返乡 ‘Guiyu’s home return’ to be more written with an average rating of 4.46. Overall, they selected 132 words, idioms and poetic sentences as written style elements, among which 54.5% was selected 1 to 3 times while the rest 45.5% was selected 4 to 11 times. Among the 407 total frequencies of written style elements, 179 (43.98% of the total frequency) is related to the theme of the prose such as terms for hometown, homesick and return to hometown across the words, idioms and poetic sentences. Poetic sentences were picked 50 frequency (12.3%) while idioms were picked 34 (8.35%). None of the words is included in *xiandai hanyu pinlü cidian*.

The approaches to interpret written words reflect native speakers’ strong vocabulary knowledge, lexical network and application of schema in reading. Chinese native speakers provided the following approaches to explain the written style words. (1) correspondence between classical words and today’s words (e.g., explaining 度 *du* ‘spend’ as 过 *guo*, 非 *fei* ‘no’ as 不是 *bushi*, 即 *ji* ‘that is’ as 就 *jiu*), (2) changing one character in the words (e.g., explaining 驱车 *quche* ‘drive the car’ as 开车 *kaiche* ‘drive the car’, 确然 *queran* ‘indeed so’ as 的确 *dique* ‘indeed’, 糅合 *rouhe* ‘mix’ as 结合 *jiehe* ‘combine, link’), (3) extending the abbreviated one character word into bi-character words (e.g., explaining 因 *yin* ‘because’ as 因为 *yinwei*, 已非 *yifei* ‘already not’ as 已经不是 *yijing bushi*), (4) deleting a character in the word (e.g., explaining 苦涩 *kuse* ‘bitter and astringent; agonized’ as 苦 ‘bitter, suffering’, 浓溢 *nongyi* ‘dense and overflow, excessively dense’ as 浓 ‘dense’, 圆周 *yuangzhou* ‘circumference’ as 圆 ‘circle’), (5) deleting rhetoric or cultural portion (e.g., explaining 三丈之内 *sanzhang zhinei* ‘inside three zhang’s distance’ as 离得很近 *lide henjin* ‘very close’, 游子回归 *youzi huigui* ‘return home by man travelling far away from home’ as 回国了 *huiguo le* ‘go back to one’s country’ or 回来了 *huilai le* ‘come back’), (6) using words with similar meaning in the theme (e.g., *xiangtu qingjie* 乡土情结 ‘feeling knot of one’s hometown’ is explained as *lianjia* 恋家 ‘homesick, long for home’).

Native speakers’ categorizing written elements and the expressions used in their interpretation reflect these native speakers’ understanding of the discrepancy between

written Chinese and spoken Chinese. In general, there are three types of reasons. The first reason is that some elements are seldom used in spoken Chinese (e.g., “口语中不常用” ‘not often used in spoken Chinese’, “很少这么用” ‘very rarely used in this way’, “不大用” ‘not frequently used’, “不这么用” ‘not used in this way’, “不会这么说” ‘(people) do not say this way’, “不用说” ‘no need to say’). When explaining the words, the subjects used phrases such as “平常都说” ‘normally (people) all say’, “一般说” ‘in general (people) say’, “大家都说” ‘everybody says’. Some subjects also mentioned that there is no equivalence in spoken Chinese. Examples include “口语中找不到对等的词语”, ‘Could not locate a corresponding word in spoken Chinese’, “口语里没有这个词或者口语里借用了这个词” ‘there is not such as word in spoken Chinese or spoken Chinese borrowed this word (from written Chinese)’. The subjects used such phrases to interpret: “直接说明, 就这么简单” ‘explain directly, and that is simple’, “简单地” ‘simply’.

The second explanation reflects the difficulty in understanding written Chinese. Answers include: “不明白” ‘do not understand’, “不理解” ‘do not understand’, “好像很绕口” ‘seems very unsmooth’. On the contrary, subjects felt that spoken language is not hard to understand, as see in one subject’s explanation “我觉得读起来感觉比较顺, 然后他说的话吧, 你读完以后基本上就能理解, 比较可以体会作者写这篇文章的意思。口语化还比书面语的成分还要多一些。”¹

The third type of explanation reflects the concept that written Chinese is more elegant and specialized, use more classical words, and often used by scholars. Examples include “古文里就有” ‘existed in classical essays’, “古文的表达方法” ‘expressions from classical essays’, “文绉绉的” ‘genteel’, the specialized (e.g., “挺专业” ‘very specialized’), and elegant (“有文采”). 12 subjects categorized poetic sentence into written Chinese. Some subjects elaborated their reasons such as “很少在口语中突然引经据典, 然后引一段诗, 除非那些教授” ‘in spoken Chinese people rarely suddenly use classical sentences and stories, and then quote a paragraph of poem. The only exception is those professors。), “如果平常说话根本不可能出现这样的句子” ‘such sentences will not appear in normal speech at all’, “他(指作者)是知识分子, 他会用一些非常有中国韵味的诗句来表达内心的心情。我觉得这样用非常有文采” ‘he is a scholar. He will use some poetic sentences with deep Chinese aroma to express his feeling. I feel such a use is very elegant’. In their explanation, the subjects used phrases such as “现在意思是” ‘the meaning now is’, “说得比较罗嗦一点” ‘to say a little bit wordy’, “说得没有诗意一点” ‘to say with less poetic flavor’.

¹ The following is a rough translation of the explanation: I feel that my reading of this article comparatively smooth, after reading you can generally understand the author’s speech, you can understand the meaning the author wrote this article. There are more spoken style elements than written style elements in this article.”

In addition to the discrepancy, subjects also noticed the possibility of changing the use of linguistic elements from one variation into another. 10 subjects categorized idioms into written Chinese. Some subjects noticed the use of idioms in spoken language. They felt that idioms originate from written Chinese but if after being used in spoken Chinese often or for a long time, people will feel them more spoken. Their explanations include: “成语还是经常会应用的吧 (在口语中)” ‘idioms are often used (in spoken)’, “遍体鳞伤是口语, 还挺常见的” ‘*bianti linshang* is spoken, and can be seen quite often (in spoken)’, “斩钉截铁, 遍体鳞伤, 都是书面语吧, 但是现在口语都用了” ‘*zanding jietie*, *bianti linshang*, are written language, however, now they are used in spoken language as well’, “我觉得像成语之类的, 有些词用得多了, 就会觉得是口语, 用得少了, 就会觉得是书面语。” ‘I feel that words like idioms, if being used more, people will categorize them into spoken, if being used less, people will categorize them into written’.

To sum up, in this preliminary study, I investigated how Chinese native speakers rated different genres in terms of written levels, what elements in texts they picked as written style elements, why they categorized the elements into written, and how they interpreted the written elements. Findings include: (1) the Chinese native speakers in my pilot study are aware of the variation of register in different genres. News and classical novels are rated very written, (2) in addition to idioms and poetic sentences, low frequency content words and content words related to theme are often considered as written elements, (3) the subjects have strong vocabulary knowledge, lexical network and schema of the text theme, and are able to interpret the written elements.

4. Investigation on Chinese L2 Learners

In this pilot study, 16 advanced-level Chinese L2 learners were surveyed. All these learners have finished at least three years of formal college instruction of Chinese in the United States. These learners were first asked to rate the written levels of genres. Then they were asked to read three of the five short news articles and rate the written levels of each. Finally, they were asked to read *guiyu fanxiang* 鲑鱼返乡 ‘Guiyu’s home return’, rate the written level, underline the written style elements and interpret them. This aims to detect L2 learners’ understanding of and competence in written Chinese.

Rating of Genres. The ratings demonstrated that Chinese L2 learners are also aware of the variations of registers in different genres in the similar manners with native speakers, despite some differences. As illustrated in Figure 1, the ratings by native speaker and L2 learners has very close pattern. The L2 learners rated classical novel, which is the second most written genre by native speakers, to be most written (7.00). The most written genre by native speaker, current affair news, is rated as the third most written by L2 learner. The biggest different rating between the native speaker and L2 learner is about the celebrity blogs. When the L2 learner rated it as the second most

written genre, the native speaker rated the fifth most written genre in Figure 1 with a rating of 4.08, which is slimly over the middle point of the scale.

The newspaper articles on current affairs, sports, entertainment, financial, and editorial sections were rated to be 4.95, 3.89, 3.00, 4.30, and 4.34 respectively; the contemporary novels, modern novel and translated foreign novels were rated to be 4.75, 3.59, and 5.00, respectively; the articles in celebrity blogs, vernacular blogs and classmate blogs were rated to be 5.50, 3.00, and 3.50 respectively; the online articles on current affairs, sports, entertainment, financial and editorial were rated to be 4.84, 3.83, 2.88, 4.67, and 4.00 respectively.

In each categories of writings (news, novels and blogs), the L2 learner showed same opinion as native speakers. Chinese L2 learners also rated the genres in the category of novels in the same order as native speakers: classical novels > translated foreign novels > modern novels > contemporary novels. In the category of news articles, L2 learners also rated the current affair news to be most written, followed by editorial, sports and entertainment news. In the category of blogs, both native speaker and L2 learner rated the celebrity blog is most written. Although the L2 learner rated classmates blogs to be more written than vernacular blog, which is different from native speakers, both of them consider the genres are fairly spoken style as the rates are below 4, the middle points of the scale.

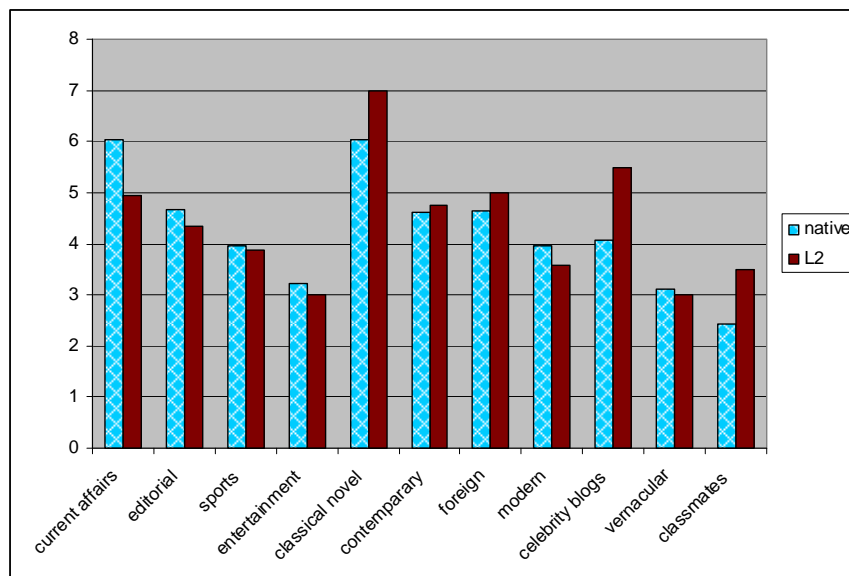


Figure 1. Comparison of written level of different genres as rated by native speaker (the first column) and L2 learners.

Short News Articles. The Chinese L2 learners showed very different opinions on the written elements from the native speakers. When reading the three short news articles, L2 learners picked more single-character abbreviated words, and classical character 为 *wei* ‘be’, as written elements. As showed in Figure 2, the most picked words were 为 (f=8, p=50%), 可 (f=7, p=43.75%), 日前 (f=7, p=43.75%), 位于 (f=7, p=43.75%), 并 (f=6, p=37.5%), 典礼 (f=3, p=18.75%), 效益 (f=3, p=18.65%), 综合 (f=2, p=17.5%), 竣工 (f=2, p=17.5%), 交付 (f=2, p=17.5%) and 兼有 (f=1, p=6.25%). Moreover, some Chinese L2 learners showed difficulties in identifying an element boundary, such as treating “工典礼后” as a phrase in “竣工典礼后” ‘after the celebration of the completion’.

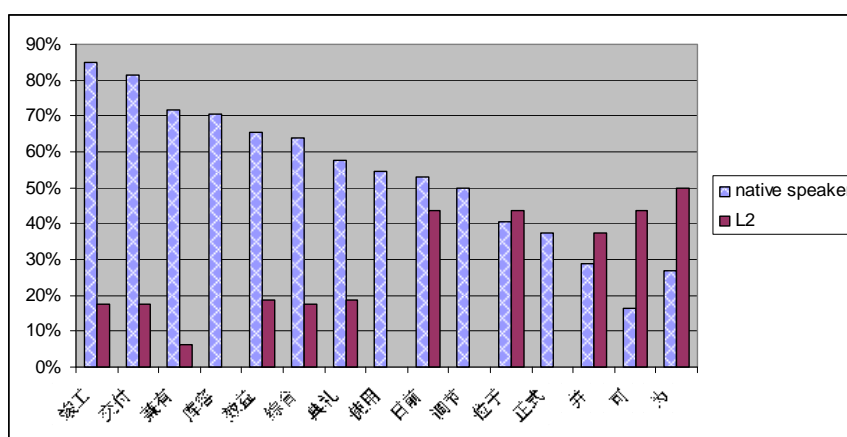


Figure 2. Comparison of the percentage of native speaker (the first column) and L2 learners (the second column) that considered the studied Chinese words as written elements.

Long Prose. Chinese L2 learners rated the long prose *guiyu fanxiang* 鲑鱼返乡 to higher written level than Chinese native speakers. While the native speaker rated the article to be 4.46 in average, the L2 learners rated it to be 5.5 in average. The density of content and vocabulary, and more use of idioms may explain the discrepancy between L2 learners’ higher rating of the long prose than native speakers and their lower rating of the short news articles than native speakers.

Compared to native speakers, L2 learners picked more single-character function words as written elements. Among the total 122 frequency, they picked single-character words 45 times (p=36.89%) including 之 *zhi* ‘of’ (f=5), 而 *er* ‘and’ (f=3), 与 *yu* ‘and’ (f=2), 何 *he* ‘what’ (f=2), 却 *que* ‘however’ (f=2), 即 *ji* ‘that is’ (f=2), 已 *yi* ‘already’ (f=2), 无 *wu* ‘no’ (f=2), and 以 *yi* ‘can’ (f=1). The next highest one was idiom (f=15, p=12.3%), followed by words related to the theme (f=14, p=11.48%). Poetic sentences were only selected twice, which counted 1.64% of the total frequency.

In addition, Chinese L2 speakers showed great difficulties in interpreting the written elements in spoken Chinese. In most cases L2 learners did not provide their

interpretation of the written style elements. Moreover, Chinese L2 learners made some mistakes when identifying the boundary of words or phrases, such as identifying 糅 in 糅合 *rouhe* ‘mix’, 缠缱绻 in 纠缠缱绻 *jiuchan qianquan* ‘fast tangle’, 涩 in 苦涩 *kuse*, 国度 in 回国度假 *huiguo du changjia* ‘return home country for a long vacation’. This type of mistakes indicates the lack of vocabulary knowledge, and more bottom-up reading, while native speakers focus on top-down reading. As native speaker subjects wrote: “阅读时以大义为主”, “一般看文章的时候不会特别关注其中的一些句子, 不会细抠一些句子。” (‘during reading the reader should focus on the gist’ and ‘in general when reading articles, the reader will not pay special attention to some sentences, and will not analyze some sentences in details’).

To sum up, Chinese L2 learners has very similar awareness of the variations of register in different genres. However, they show very different opinion from native speaker about written elements. L2 learns more often considered single-character function words and classical words (including idioms) as written elements. During the survey, the L2 learner also showed some difficulties in interpreting the written elements.

5. Conclusions and Applications

This preliminary research first revealed that different genres have different written style degrees, and both native speakers and advanced level L2 learners are awareness of this variation. News articles on current affairs and classical novels are considered to be very written, while contemporary novels and news articles on sports and entertainment are not very written.

However, native speakers and L2 learners showed very different understanding of written elements and different competence in handling the written elements. Native speakers considered low frequency content words and content words related to text theme, as well as idioms and poetic sentences as written elements. Moreover, the subjects have strong vocabulary knowledge, lexical network and schema of the text theme, and thus are able to interpret the written elements. In contrast, L2 learners considered more single-character function words and classical words as written elements, in addition to idioms. But their ability to interpret the written elements was missing.

This study proposed a new approach for linguistics research. This approach investigates the process of reading, instead of comparison between written style text and spoken style discourse, which is the products of reading. Though the means of survey, interview, and think aloud protocol, the subjects are asked to demonstrate their reading process, such as rating the written level of a text and linguistic elements, and the readers’ interpretation of the written elements. This approach has shown to be effective as it revealed the distinctive opinions about written elements by L2 learner and native speakers. In addition, since more subjects are involved, this approach can also provide more objective and reliable findings than those based on the researchers’ personal judgment.

The findings can also provide some guidance on Chinese second language acquisition. Since the L2 learner has already built the correct awareness about the variation of register in genres, fewer resources should be spent in this aspect. On the other hand, the L2 learner lacks the awareness of content word as the written elements so that more efforts should be focused on learning of the content words. The L2 learner also showed difficulties in understanding the abbreviated form of bi-character words. This means learner need to build up their familiarity of Chinese abbreviations.

The findings can also implement current L2 instruction theory, especially the sequential approach. On the basis of the primacy of the spoken language, some scholars (Walker, 1984; Everson, 1994, 1998, 2002; Everson & Ke, 1997; Ke, 1996, 1998a, 1998b; Ke & Shen, 2003; etc) have proposed a sequential approach in the development of four language skills. Progressing from speaking/listening to reading/writing, rather than dealing with all four skills equally from the beginning. In the sequential approach, reading is introduced after the learners have built up some foundation of spoken Chinese. Moreover, what the students read first is what they have learned in their spoken classes. The strength of this approach is that it can help learners become familiar with Chinese orthography and avoid learners decoding in beginning reading. However, the approach is silent with respect to instructions on how to transition from spoken-style materials to authentic written-style materials. The findings in this preliminary study suggest that genres, together with the lengths of texts, density of content and familiarity of the learners with the text themes should be considered when designing the reading material for the transition. As a result of this study, modern novels will be the most suitable genre for this transition.

This study is preliminary and the findings are tentative and should not be generalized. More research is needed to obtain more convincing findings. However, this study makes the efforts to construct new approach from the language users, and fill the gap in the sequential reading approach in current Chinese L2 reading instruction.

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Modality Effects Revisited: Iconicity in Chinese Sign Language

Marjorie K.M. Chan[†] and Wang Xu

[†]*The Ohio State University*

Tai (2005) argues for the importance of iconicity as a fundamental property of language, illustrating the modality effects of iconicity through the study of a set of iconic devices used in Taiwan Sign Language (TSL). This paper extends Tai's research, in exploring the iconic devices used in another Asian sign language, Chinese Sign Language (CSL). Some preliminary comparisons are made in this paper between CSL and TSL lexical items, based on an examination of the iconic devices used in the CSL and TSL signs, and determining the iconic motivations underlying the signs that are formed. The study provides a glimpse into the prevalence of iconicity in CSL and TSL, a strong trend across sign languages, making iconicity one of the most significant modality differences between sign and speech, with important ramifications for future studies on language structure, language acquisition, language processing, language change, etc. (Quinto-Pozos 2007b).*

0. Introduction

The seminal work of William C. Stokoe and his associates (Stokoe 1960; Stokoe et al. 1965) and the ensuing research by Klima and Bellugi (1979) and their associates have firmly established that signed language is natural language, with a full system of linguistic structures: phonetics, phonology, morphology, syntax, etc.¹ Moreover, as natural language, signed language shares with spoken language such non-effects of modality as conventional vocabularies involving pairings of form and meaning; duality of patterning (i.e., combining of discrete, meaningless components into meaningful units); productivity in the creation of new vocabulary through derivational processes, compounding, and borrowing; syntactic structures involving same parts of speech, embedding structures, and trade-offs between marking of agreement in grammatical relations and freedom in word order; similar acquisition timetables; lateralization in the left hemisphere; etc., as analyzed by Meier (2002).²

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¹ Contra Stokoe, Pulleyblank (2008) argues against treating ASL as a fully independent language.

² Tai (2008), however, offers a few words of caution, noting that these non-effects of modality are only first approximations; his further scrutiny reveals more nuanced differences between the two modalities. See Tai (2008) for details.

The fundamental difference between spoken and signed languages lies in the modality each uses for production and perception. Spoken language makes use of the auditory-vocal modality, whereas signed language utilizes the visual-gestural modality. Despite commonalities between the two modalities, there are some fundamental differences in their properties that are ascribable to modality effects. Iconicity has been singled out as one of the modality effects playing a greater role in signed languages than in spoken languages, and the degree to which it is employed in the former has generated much interest.³

Studying Taiwan Sign Language (TSL), Tai (2005) examines (visual) iconicity in TSL in the context of modality effects on the structural differences between signed and spoken languages, and argues that iconicity is a fundamental property of natural language.⁴ In this paper, we revisit iconicity in signed languages by examining the iconic devices used in another Asian sign language, Chinese Sign Language (CSL), and comparing some of the lexical items in CSL with those in Tai's (2005) study of TSL. This paper will also explore the various iconic motivations that underlie the signs in CSL and TSL that may use similar or different iconic devices. The interrelationship between iconic motivations and iconic devices that emerge in this study will be examined across four distributional patterns.

The paper is organized as follows: Section 1 provides a brief background on the deaf population in China and Taiwan, and on research on CSL and TSL; section 2 outlines the corpora for this study on CSL and TSL; section 3 is on iconicity and a set of seven iconic devices that are used in CSL and TSL; section 4 discusses the temporal ordering of iconic devices; section 5 examines four patterns in the interplay of the selection of iconic motivation and iconic device in corresponding CSL and TSL signs; and section 6 concludes with a few remarks on the pervasiveness of iconicity across signed languages and some implications of this truly striking modality difference between signed and spoken languages.

1. Background

China today has a large population with hearing impairments. As shown in recent statistics from the report prepared by China Disabled Persons' Federation (2006), there are an estimated 20.04 million people with hearing impairments in that country.⁵ The total

³ See Taub (2001), Pietrandrea (2002), Pizzuto & Volterra (2000), Quinto-Pozos (2007a), etc. For example, Quinto-Pozos (2007b:15, citing Liddell 2002) notes, "The degree of iconicity in signed language can be considered a true modality difference between sign and speech: Both have iconicity, but signed languages are much more characterized by visual iconicity than spoken languages are by auditory iconicity."

⁴ Tai (2005) also argues that iconicity, rather than arbitrariness, is a fundamental property of language and offers reasons for the apparent arbitrariness observed in spoken languages. He further makes the bold suggestion that, due to modality effects in the duality of patterning, human language may have evolved from gestures prior to the development of speech. See Tai (2005) for details.

⁵ The 2006 CDPF survey is based on a sampling of 2,526,145 people in 771,797 households, in which 38,370 people have hearing impairment. The estimate of 20.04 million hearing-impaired in China in 2006 is based on statistical extrapolation from the sampling survey. Fairly large discrepancies

population of China at the time (which excludes Hong Kong, Macao, and Taiwan) was 1.30948 billion people. For comparative purposes, Tai (2005:21) gives a figure of 110,000 deaf and hearing-impaired people in Taiwan, based on government census. The overall estimate of the hearing-impaired in China is probably low, as many Chinese may still be unwilling to admit to suffering from major hearing impairments or deafness, since deafness is often viewed negatively in Chinese society.⁶

Chinese Sign Language (CSL) is a term that may be used to refer to a language family with regional varieties that are used in China. The two most important varieties are the Beijing variety and the Shanghai variety, with Shanghai the more prominent. In addition, there is also a Hong Kong variety (which, following current trends, will be referred to as Hong Kong Sign Language (HKSL), to distinguish it from CSL varieties used in the mainland⁷). In this paper, unless stated otherwise, CSL refers specifically to the Shanghai variety. The history of Chinese Sign Language (CSL), broadly construed or limited to the Shanghai variety, is largely unknown. Western research on Chinese Sign Language is also very limited (e.g., Bellugi & Klima 1979, Woll 1984, Callaway 2000). There has been relatively more research done by Chinese linguists themselves. Zhao (1999), for example, discusses the history and features of Chinese Sign Language, while Song (2000) discusses the history of the Chinese deaf community. More recent studies of CSL include Lytle et al. (2005/6).⁸

As in the case of CSL, Taiwan Sign Language (TSL) also has more than one regional variations. Smith (2005:188) divides TSL into two main varieties, with one founded in 1915 in the south in Tainan, and the other in 1917 in the north in Taipei. Furthermore, due to Japanese occupation of Taiwan, Japanese Sign Language (JSL) was also introduced, with the Osaka variety of JSL taught by teachers from Osaka in Tainan, and the Tokyo variety taught by teachers from Tokyo in Taipei. At the same time, the situation accounts for TSL belonging to the JSL language family. Additional sign language contact took place in 1949 when mainland refugees brought CSL with them (among whom included teachers who have taught the Nanjing, Shanghai, Nantong, and other varieties of CSL); and later, Hong Kong visitors and students studying in Taiwan contributed the HKSL variety of CSL

can, therefore, occur. For instance, the 2003 CDPF survey gives an estimate of 20.57 million people with hearing and speech impairments (with no break-downs for each subcategory), compared to the 2006 estimate of 31.31 million, a rather drastic change over a mere three-year period. A national census in the future, with clear definitions of deafness, consistency in collecting methods, etc., is needed to obtain more accurate and reliable statistics.

⁶ The U.S. has also encountered difficulties in collecting reliable, accurate statistical data, as indicated in Mitchell (2005:112) where four constraints are identified: (1) the context of the inquiry, the indicators used to establish group membership, (3) the methods employed to collect indicator data, and (4) the resources available to execute the project.

⁷ Earlier studies on the Hong Kong variety of CSL (e.g., Bellugi & Klima 1979; Fok et al. 1986, etc.) simply refer to that signed language as Chinese Sign Language (CSL).

⁸ For a brief overview of the historical background of CSL, see Xu (2006:9ff).

to the mix. Smith (2005:189) observes that “years of separation have now resulted in numerous differences between TSL, JSL, and CSL, but the basic relationship among them still holds.” Note that Hurlbut’s (2008) survey report on sign language in Taiwan, based on wordlists, found just over 50 percent similarity between TSL and JSL. However, the report was based on only ten subjects, and the JSL signer was from Akita City in Akita Prefecture, Japan, and very likely did not use the Tokyo or Osaka variety of JSL.

Overall, the above shows that TSL is much better documented than CSL. Records of TSL research date back to the late 1950’s (Smith 2005), with more recent studies (e.g., Sasaki (2001, cited in Smith 2005), Myers & Tai 2005, Sasaki 2007, Ann et al. 2007) building upon that collection of TSL research.⁹ Given the paucity of linguistic studies on CSL in general, there have not been detailed comparisons of CSL and TSL, or across CSL varieties.

2. The CSL and TSL Corpus

The corpus for this study consists of a combination of two video databases, one for each of the two sign languages, CSL and TSL. The CSL database is part of a larger project—led by Professor Gong Qunhu (龚群虎) at Fudan University, Shanghai—entitled, “Chinese Deaf People and Linguistic Research on Chinese Sign Language.” The TSL database is also part of a larger project, namely, “A Study of Taiwan Sign Language: Phonology, Morphology, Syntax and Digital Graphic Dictionary,” which is headed by Professor James H-Y Tai (戴浩一) at the National Chung Cheng University in Taiwan.¹⁰ The CSL corpus draws from the Shanghai variety of Chinese Sign Language, a natural sign language that is used on the Chinese mainland, while the TSL corpus represents a naturally-occurring variety of sign language used by deaf communities in Taiwan, one that, for historical reasons, belongs to the Japan Sign Language (JSL) family.

The lexicon in the CSL database is part of Professor Gong’s Swadesh list of 200 words in different varieties of CSL, collected through videorecording in different parts of China. The CSL corpus for the current study is a subset of that Swadesh list, namely, 100 words from the Swadesh list that was modified by Woodward (1993a) for sign language comparison. The TSL database for this study is a corresponding set of 100 words that are in that modified Swadesh list.

3. Iconicity and Iconic Devices

Signed and spoken languages make use of different modalities, or channels of transmission, one visual-gestural and the other auditory-vocal. Meier (2002) offers three ways in which these modalities may differ that may be potential sources for the linguistic

⁹ Also see Miles (2007-08) for an extensive, European-language bibliography of sources on disability and deafness in East Asia.

¹⁰ We are immensely grateful to Professors Gong and Tai for their generosity in providing us with the video clips that are used for this paper. In an earlier comparative study that uses the same set of video data, Xu (2006) proposes a new model for lexical comparisons across sign languages.

differences between these two modes of human language. One pertains to differing properties of the articulators that affect production (e.g., light source is external to the signer vs. sound source is internal to the speaker). A second pertains to differing properties of the sensory and perceptual systems that subservise the comprehension of sign and speech (e.g., signer must be in view of the addressee vs. speaker need not be in view of the addressee; high bandwidth of vision vs. lower bandwidth of audition; visual stimuli generally not categorically perceived vs. categorical perception of speech; etc.). And the third pertains to the two modalities' differing potential for iconic representation and indexical/ostensive identification of referents. Of particular importance to us is the third difference, in the greater potential of the role for iconicity in the visual-gestural modality over that in the auditory-vocal modality. The pervasiveness of iconicity in signed language stems, in part, from the medium, or channel, through which signed language is conveyed in interpersonal communication. The visual-gestural modality has access to three-dimensional space for forming of signs in the language plus the time dimension, hence a quad-dimensional channel for transmission (Meier 2002:11). The auditory-vocal modality, in contrast, is much impoverished, being strictly limited to one dimension, that of temporal space, which is measured uni-dimensionally as a line (cf. Saussure (1916/1983) on the linear character of the sign).

The recognition of the greater role that (visual) iconicity plays in signed languages provides the launching ground for this paper. The study examines the similarities and differences in the use of iconic devices in the CSL and TSL lexicon, and explores the iconic motivations that may underlie the selection of one iconic device over another for the production of a given sign in CSL and TSL.

Taub (2001) considers language, in any modality, to be motivated, contra Saussure's Principle I on the arbitrariness of the linguistic sign (i.e., the arbitrariness in the link between signal (sound pattern) and signification (concept)). Iconic motivation comes from language drawing on structures and associations in the speaker/signer's conceptual system. As elaborated by Taub (2001:231), "Iconicity, a feature of all languages, is based on our ability to associate sensory images with concepts, simplify those images, and create analogues of them using the resources of the language, all the while preserving the essential structure of the original images." In her model for the creation of an iconic sign, Taub (2001:44) offers the following steps: "one *selects* an image to represent, modifies or *schematizes* that image so that it is representable by the language, and chooses appropriate forms to show or *encode* each representable part of the image." Since iconic devices serve as a means to encode the schematic sensory images, Taub proposes ten iconic devices, and illustrates them using American Sign Language (ASL). These devices are: (1) physical entities represent themselves; (2) shape of articulators represents shape of referent; (3) movement of articulator represents movement of referent; (4) a special set of patterns: representation of body parts; (5) shape of articulators' path represents shape of referent; (6) locations in signing space represent locations in mental spaces; (7) size of articulation represents size of referent; (8) number of articulators represents number of referents; (9) temporal ordering of signing represents number of referents; and (10) signing represents signing.

Tai (2005) proposes a different set of iconic devices for the study of TSL, based on the synthesis and simplification of the sets developed by Mandel (1977, cited in Tai 2005) and Taub (2001) that use ASL as the language base. Tai presents eight iconic devices for the study of TSL: (1) direct presentation; (2) number representation; (3) shape representation; (4) size representation; (5) part-for-whole representation; (6) proform representation; (7) temporal order representation; and (8) metonymic/metaphorical representation. Among these eight iconic devices, all but two (the sixth and seventh) deal with the lexical level. We will, therefore, take a closer look at the six iconic devices that are relevant to the present study of the CSL and TSL lexicon. Adding to the six iconic devices is a seventh one for this CSL-TSL lexical comparison, namely, movement representation, which corresponds to Taub's third iconic device, movement of articulator represents movement of referent.

The rest of this section is organized as follows. Section 3.1 studies direct presentation, section 3.2 that of number representation; Section 3.3 shape representation, section 3.4 movement representation, section 3.5 size representation, section 3.6 part-for-whole representation, and section 3.7 metonymic/metaphorical representation. In the following subsections, the presentations of the iconic devices from Tai (2005) are based largely on his descriptions. Overlaps with Taub's set of iconic devices are mentioned where relevant.

3.1. Direct Presentation

Direct presentation involves pointing to an object as a means to name the object. As Tai (personal communication) explains, the device is so-named both to emphasize the function of pointing in generating meaning and to sharpen the contrast with other kinds of representations. This iconic device corresponds to Taub's first iconic device, in which physical entities represent themselves. As Tai (2005) observes, both TSL and ASL name body parts by pointing to them. CSL uses the same iconic device. For example, the CSL and TSL signs NOSE are formed by the signer pointing to his/her own nose (Figures 1 & 2).



Figure 1. CSL NOSE



Figure 2. TSL NOSE

3.2. Number Representation

Number representation is a means to indicate directly the number of referents by the number of fingers. Taub (2001) describes this as “number-for-number iconicity.” The

CSL and TSL signs *THREE* illustrate this iconic device. CSL uses the middle finger, ring finger and little finger (or pinky) to represent the number “three” (Figure 3), while TSL uses the index finger, the middle finger, and the ring finger (Figure 4). There are only two main differences between the two signs: (1) the specific fingers used, and (2) the direction that the hands are facing, namely, towards the signer (CSL) or away from the signer (TSL).

Figure 3. CSL *THREE*Figure 4. TSL *THREE*

3.3. Shape Representation

Shape representation refers to the signer using certain handshapes and hand-forearms to depict particular shape images of the referents. Taub (2001) refers to this device as “shape-for-shape iconicity.” An example is *BIRD* in CSL and TSL. The CSL sign *BIRD* (Figure 5) is a compound sign ($\text{BEAK}^{\wedge}\text{BIRD-FLY}$): the sign starts with using the right hand to represent the shape of a bird’s beak (Figure 5a), and then uses both hands and forearms to represent the shape of a bird’s wings, together with movement representation, in the up-and-down motion to represent the flapping of the wings (Figure 5b).¹¹ In the sign *BIRD* in TSL (Figure 6), the signer uses the right hand to represent the shape of a bird’s beak and left hand to represent the shape of a bird’s wing, with up-and-down movement of the hand through wrist movement to represent the flapping of a bird’s wing.

Shape representation may also involve tracing, in which the signer may trace out the referent’s shape in space. An example of tracing is *MOUNTAIN* in CSL and TSL. In both

¹¹ It is worth noting that the CSL sign *BIRD* appears to be identical to the old form of *BIRD* in ASL, depicted in Frishberg (1975:708-709). This suggests that at least some CSL signs (in the Shanghai variety of CSL at least) have been borrowed from ASL at some earlier stage of sign language contact, potentially allowing for rough dating of the time period for when the borrowing took place. Clearly, much research is needed to study sign language contact between CSL and other unrelated sign languages, as well as that among different CSL varieties, such as HKSL and the Shanghai variety of CSL, given the large number of refugees, including wealthy families and entrepreneurs, from the Shanghai area to Hong Kong in the first half of the twentieth century. For example, CSL *TREE* (Figure 23) appears to be identical to HKSL *TREE* (based on the line drawing in Fok et al. 1986: 179), while TSL *TREE* (Figure 24) and ASL *TREE* (Fok et al. 186:179) are quite similar, differing mainly in fingers side-by-side and touching in TSL versus fingers spread apart in ASL.

cases, the signers move their hands in front of their body, going from one side to the other, with undulating movements to trace the outline of the mountains (Figures 7 & 8). Taub (2001:77-78) refers to this device as “path-for-shape iconicity” since “shape of articulators’ path represents shape of referent.”



Figure 5a. CSL BIRD (BEAK)



Figure 5b. CSL BIRD (BIRD-FLY)



Figure 6. TSL BIRD



Figure 7. CSL MOUNTAIN



Figure 8. TSL MOUNTAIN

3.4. Movement Representation

Movement representation depicts movements of the referent by means of movement of the hands, fingers and/or forearms. This iconic device involves movement iconicity.

Taub (2001:70) notes that this form of iconicity often occurs in conjunction with shape-for-shape iconicity; this is because “when the articulators themselves are configured to represent a referent’s shape, the signer can move that configuration around to represent movement of the referent.” This is already encountered in the second component of the CSL compound sign BIRD (Figure 5b). Another example is CSL and TSL signs WORM (Figures 9 & 10), where a finger—index finger in the case of CSL and little finger in the case of TSL—is used to represent the shape of the worm, and its wiggling movement depicts the image of a worm inching along on the ground. In the CSL sign, the index finger moves away from the signer, and in the TSL sign, the little finger of the right hand moves across from right to left.



Figure 9. CSL WORM



Figure 10. TSL WORM

3.5. Size Representation

Taub (2001) refers to this iconic device as “size of articulation represents size of referent,” and is a case of “size-for-size iconicity.” Tai (2005:27) points out that size representation can “represent both absolute and relative sizes of the referents” and gives as his TSL example the absolute size of a sheet of paper which, if small enough in dimension, can be traced to represent its actual physical size.

Tai further notes that size representation also applies to length representation as well as to distance representation. A pair of CSL examples is LONG and SHORT (Figures 11 & 12). In the sign LONG (Figure 11), the signer moves her hands away from each other to lengthen the distance between the two hands. This contrasts with signing of SHORT (Figure 12), where the signer moves her hands toward each other, along the horizontal axis, thereby visually shrinking the distance between the two hands. A corresponding pair in TSL for LONG and SHORT is given here for comparative purposes (Figures 13 & 14). As one can see, in the TSL sign as well, expanding the distance visually between the hands is used to depict something as being long, and shrinking or reducing that distance serves visually to depict something as being short.



Figure 11. CSL LONG



Figure 12. CSL SHORT



Figure 13. TSL LONG



Figure 14. TSL SHORT

3.6. Part-for-Whole Representation

Tai (2005:27) describes the part-for-whole representation as using the characteristic part of the referent to represent the referent. Tai illustrate using TSL DOG, represented by flapping the two hands on either side of the head to depict a dog flapping its ears. One component of the dog, namely, its head—with its ears flapping—is used to represent the entire dog. (Note that CSL DOG simply depicts the action of shooing away the dog.) The example here is the CSL and TSL signs CAT (Figures 15 & 16), where the head portion of the cat is represented and the focus is on the cat's whiskers. In the case of CSL CAT, the signer first puffs up her cheeks to depict the cheeks of the cat, and, with the middle, ring, and little fingers of the hands representing the whiskers, the hands are moved outwards across the cheeks, thus tracing the cat's whiskers. The palms of the hand face the signer. In the case of TSL CAT, the signer's fingers are extended, with the tip of the index finger in each hand touching the tip of the thumb; in this way, the handshape represents a cat's whiskers. The signer's cheeks correspond to the cat's cheeks, and two hands are placed on the signer's cheeks, where the whiskers are located on the cat; the handshape is then accompanied by a rotating motion. Thus, in these two animal examples, the head is represented to depict some salient characteristics of that animal—the ears flapping in the case of TSL DOG and the cat's whiskers in the case of CSL and TSL CAT.



Figure 15. CSL CAT



Figure 16. TSL CAT

While the CSL and TSL signs CAT (Figures 15 & 16) involve nouns, a pair of examples using verbs is CSL and TSL WALK (Figures 17 and 18). Both CSL and TSL signs depict a person walking. As can be seen in the figures, the person is represented by the depiction of only his/her two legs (part-for-whole representation), which is the important body part that will be doing the “walking.” Both CSL and TSL signers use their index and middle fingers to represent a person’s two legs (which can also be analyzed as involving “shape-for-shape iconicity”). Thus, the index and middle fingers represent the two legs (shape representation); the legs in turn represent the whole person (part-for-whole representation); and the back-and-forth movement of the index and middle finger represents the action of “walking” (movement representation).



Figure 17. CSL WALK

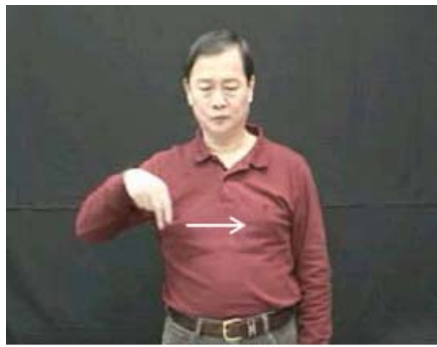


Figure 18. TSL WALK

3.7. Metonymic/Metaphorical Representation

Tai (2005:30) notes that, as in spoken languages, “abstract ideas can be expressed through metonymic and metaphorical representations.” Whereas metonymic devices express abstract concepts by means of association, metaphorical devices express abstract concepts by means of metaphorical mappings. A metonymic example given by Tai is the TSL sign HUNGRY. The signer lightly presses both hands against his stomach to indicate “hungry”—that is, the stomach is depicted concave in shape to represent a person not having eaten for

some time. A CSL example is the sign WOMAN (Figure 19). The signer pinches the earlobe to indicate the earrings that women wear, in associating earrings with women.

For metaphorical devices involving “metaphorical mappings,” a TSL example is the sign MARRY (Figure 20). As Tai (2005:30) explains, the TSL sign uses the thumb to stand for “male” and the pinky to stand for “female”; the thumb and the pinky are then brought together to express the concept, “to marry,” to depict the union of a man and a woman. (The TSL sign DIVORCE involves physically moving those two fingers apart.)



Figure 19. CSL WOMAN



Figure 20. TSL MARRY

In this section, seven iconic devices are exemplified using CSL and TSL. These iconic devices are, by no means, complete or exhaustive. As Tai (2005:31) points out, the iconic devices used in sign languages are based on the following: “(i) our perception of overall shapes, locations, and movements signified by means of hands, arms, and fingers; (ii) our ability to see the structural correspondence between human bodies and animal bodies; and (iii) our ability to represent particular activities with body movements.”

From the CSL and TSL signs presented here, a sign may involve only one iconic device, as in CSL and TSL NOSE (Figures 1 & 2), or it may involve two (or more) iconic device, as in CSL and TSL WORM (Figures 9 & 10), and CSL and TSL WALK (Figures 17 & 18). Moreover, iconic devices may involve simultaneity or sequentiality. The temporal ordering of iconic devices is the topic that will be discussed briefly in the next section.

4. Temporal Ordering of Iconic Devices: Simultaneous versus Sequential

Different iconic devices can be used by themselves, or together, either simultaneously or sequentially. The TSL and CSL signs WORM (Figures 9 & 10) illustrate the use of different iconic devices that are produced simultaneously. The representation of a worm’s shape using the little finger involves shape representation, while the movement of the finger that of movement representation.

Iconic devices can also be used in sequence, and this is particularly relevant in the case of compound signs, such as the CSL sign BIRD (Figure 5). The signer first places the thumb and the index finger in front of the mouth and repeatedly taps the thumb with the index finger to represent a bird’s beak, and then puts her hands and forearms flat out on

both sides of the body, waving them up and down to represent a bird’s wings. We can see in this sign that there is a mixture of different devices used simultaneously and in sequence. The corresponding TSL sign BIRD (Figure 6) involves the simultaneity of iconic devices. The signer uses his right hand to depict the shape of the bird’s beak and, simultaneously, uses his left hand to depict the bird’s wing, accompanied by up-and-down movement of the hand (through wrist movement) to represent the flapping of the bird’s wing.

Having briefly discussed the temporal ordering of iconic devices in sign production, we turn to the final section before the conclusion, to examine the interplay of the selection of iconic motivations and iconic devices in the corresponding signs used in CSL and TSL.

5. Patterns and Selection of Iconic Motivations and Iconic Devices

In section 3, a set of seven iconic devices, six from Tai (2005) and an additional one from Taub (2001) were discussed and illustrated using examples from CSL and TSL. The examples offer a glimpse into the richness and prevalence of iconicity in these two signed languages. Iconicity plays a crucial role in CSL and TSL. All the signs that are presented in section 3 are iconically motivated, realized via the iconic devices that were chosen to form a given sign. Studying across the two signed languages, it can also be seen in section 3 that some signs in CSL and TSL share the same iconic motivation and use the same iconic device, such as CSL and TSL signs NOSE (Figures 1 & 2) and THREE (Figures 3 & 4). However, many of the signs in these two unrelated signed languages may differ in iconic motivation or in iconic device used, or, the corresponding signs in these two unrelated signed languages may differ both in iconic motivation and in their choice of iconic device(s).

Table 1. Iconic Motivation and Iconic Device: Patterns A to D

Parameter	Pattern	A	B	C	D
1. Iconic Motivation		+	+	-	-
2. Iconic Device		+	-	+	-
<i>Examples</i>					
Pattern A:	WORM, KILL _a				
Pattern B:	KILL _b				
Pattern C:	TREE				
Pattern D:	MAN				

The two parameters, *iconic motivation* and *iconic device*, yield four simple combinations with respect to same or different parameters in the corresponding signs in CSL and TSL. As shown in Table 1 above, the result is a set of four possible patterns, A through D, for comparing across two (or more) signed languages. In the table, the plus (+) sign represents ‘same’ while the minus sign (-) represents ‘different’ for selection of iconic

motivation or iconic device. A few examples are given in the table. KILL appears twice due to dialectal differences for this sign in TSL. In general, TSL exhibits few significant, regional differences (Smith 2005:188), probably due to convergence from decades of contact on the island. In the following subsections, the four patterns will be discussed in turn.

5.1. Pattern A: Same Iconic Motivation and Same Iconic Device

For Pattern A, two (or more) signed languages have a common iconic motivation in the choice of image to represent the referent or concept, and a common iconic device by which the referent or concept is depicted. As an example, the same iconic motivation and iconic device are used in CSL and TSL signs MOUNTAIN (Figures 7 & 8). Both CSL and TSL signs are motivated by the image of mountains and their outline, and both utilize shape representation via tracing the outline of the mountains. Another example discussed earlier is CSL and TSL WORM (Figures 9 & 10). The CSL and TSL signs are both motivated by the same iconic image of a small, longish-shaped creature wiggling and inching along the ground, and both adopt the same iconic device, or iconic devices, in this case, as the sign involves not only shape representation (index finger for the worm’s body) but also movement representation (the wiggling of the worm as it inches along the ground).

5.2. Pattern B: Same Iconic Motivation and Different Iconic Device

In Pattern B, the signs in the two signed languages share a common iconic motivation in the choice of image to represent the referent or activity, but different iconic devices are adopted to convey the concept. For example, the CSL and TSL signs KILL are both motivated by the image of killing people by beheading, in making a cut at the neck. However, CSL KILL (Figure 21) chooses to use the part-for-whole representation as its iconic device: the left hand is used to represent a person, with the thumb representing the head, and the bottom of the thumb then representing the neck portion of a person’s body. The action of beheading the person is accomplished using the right hand as a knife. TSL KILL_b (Figure 22), in contrast, adopts direct presentation to depict the action of beheading a person as a means to kill him/her. (TSL KILL_a is similar to CSL KILL in sharing the same iconic motivation and iconic devices; hence, that pair of signs is appropriately placed under Pattern A.)



Figure 21. CSL KILL



Figure 22. TSL KILL_b

5.3. Pattern C: Different Iconic Motivation and Same Iconic Device

In Pattern C, signs from the two signed languages are motivated by different images to represent the referent or activity, but share in using the same method, that is, the same iconic device, to convey the image or concept. A pair of examples is CSL and TSL TREE (Figures 23 & 24). The CSL sign TREE (Figure 23) is motivated by the image of the trunk of the tree; the depiction of the concept uses the iconic device of shape representation via tracing the outline of the trunk of the tree. The TSL sign TREE (Figure 24) is motivated by the image of the entire tree standing tall and erect on the ground. As in the case of the CSL sign, the TSL sign TREE uses the iconic device of shape representation.

Note, however, that despite a shared choice of shape representation in the pair of CSL and TSL signs, the iconic device is actually executed differently in the two signs, in that the tree trunk is traced in the case of CSL, while handshape and positioning are used in TSL to represent the tree. Moreover, because the TSL sign depicts both the trunk and the upper portion of the tree (its branches and leaves), it also takes advantage of the option of adding movement to the branches and leaves, by rotating the wrist back and forth to capture a more dynamic image of the tree. The result is that, although both signs use the same iconic device of shape representation, the actual signs are, in fact, quite different. Our limited corpus yields no examples of a simpler pair of signs to illustrate Pattern B; hence, more research is needed to explore examples of Pattern B and the frequency of occurrences of signs that use precisely the same iconic device but are motivated by different images.



Figure 23. CSL TREE



Figure 24. TSL TREE

5.4. Pattern D: Different Iconic Motivations and Different Devices

Pattern D pertains to signs from two signed languages that are motivated by different images to represent the referent, and also use different methods by which the image is conveyed. It may seem self-evident that the greater is the remoteness of two unrelated signed languages, the greater will be the proportion of lexical items in the two signed languages falling under Pattern D. Nonetheless, empirical evidence is still need for substantiation.

An example of Pattern D in CSL and TSL is the sign MAN (Figures 25 & 26). CSL MAN (Figure 25) is iconically motivated by the image of men's short hair. TSL MAN (Figure 26), on the other hand, is motivated by the social status of men. Hence, the two signs have

different iconic motivations. Given the different iconic motivations, one would not be surprised to find the use of different iconic devices. Whereas CSL uses metonymic representation for MAN, associating men with short hair, TSL uses metaphorical representation for the sign, depicting men as high in social status (i.e., as number 1). Observe that the CSL pair MAN:WOMAN (Figures 25 & 19) is produced using metonymic representation. The corresponding pair in TSL is produced using metaphorical representation: MAN is signed via displaying the thumb (Figure 26) and WOMAN via displaying the little finger (not shown).



Figure 25. CSL MAN



Figure 26. TSL MAN

Having introduced the four patterns, future research can explore which pattern or patterns are more frequent, and potential reasons behind that frequency. In a lexical comparison of two unrelated signed languages, one might predict that Pattern D would be the most common pattern, and Pattern A the least so. However, which of Patterns B and C is likely to be more common in occurrence can only be determined through further research. The current, preliminary study paves the way to more in-depth investigation of the present (or extended) set of iconic devices and their distribution patterns across the lexicon.

6. Concluding Remarks

Over the past half century since the pioneering research of William C. Stokoe and his associates, there have been tremendous linguistic research on the world's signed languages, the oldest dating back to perhaps no more than three centuries (Meier 2002:12). Factors such as the youth of signed languages and the multi-dimensional nature of the visual-gestural modality have contributed to the pervasiveness of iconicity in signed languages. As a result, unrelated signed languages show some lexical similarities that can be attributed to the role played by iconicity. At the same time, signers of unrelated languages with very different lexicons can, nonetheless, communicate more easily with each other than speakers of unrelated languages (Quinto-Pozos 2007b:15). To what extent are signed lexical items, conveyed through iconic motivations and the multi-dimensionality of iconic devices, contributing to the greater intelligibility of signed languages? The present comparative study, using a small set of CSL and TSL lexical items, is a very preliminary step to pave the way towards addressing this and related questions. Much exciting research lies ahead.

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Language Change in Progress: Evidence from Computer-Mediated Communication

Liwei Gao

Defense Language Institute

With its ever increasing popularization, computer-mediated communication (CMC) has become a progressively well documented research area (e.g., Baron 1984, 1998a, 1998b, 2000; Crystal 2006; Danet & Herring 2007; Herring 1996). The linguistic aspects of CMC in the Chinese context have also been examined (e.g., Gao 2006, 2007; Yu *et al* 2001a, 2001b). In this paper, I present an analysis of emergent language usages in CMC in Chinese, which covers the lexical, syntactic, as well as the discourse dimension. Applying the construct of apparent time change (Labov 1963, 1966), I argue that some of the online usages may stay as part of the Chinese language. In other words, the use of Internet expressions in the Chinese CMC may signify language change in progress.

1. Introduction

Since the Internet became available, particularly since the worldwide Internet service was officially launched in the U.S., computer-mediated communication (CMC) has become increasingly widespread throughout the world, partly thanks to the rapid development of the computer technology, especially the networking know-how (Yu *et al* 2001a). In mainland China, since the Internet service started in 1994, it has been developing very rapidly. According to the report by the China Internet Network Information Center (CNNIC) (<http://tech.sina.com.cn/roll/2003-07-21/1559211800.shtml>), as early as October 1997 there were around six hundred and twenty thousand Chinese netizens.¹ And approximately thirty hundred thousand computers were connected with the Internet (<http://tech.sina.com.cn/i/c/2003-07-21/1655211851.shtml>). Also according to CNNIC (<http://tech.163.com/07/0123/15/35HH760S000915BF.html>), in January 2007 there were approximately 137 million netizens in mainland China. Around 59 million computers were connected with the Internet. And China had about 843 thousand web sites. It is apparent from these statistics that there has been tremendous growth of the Internet network in China over recent years.

In addition, the Internet has penetrated various spheres of Chinese people's lives (<http://news.163.com/08/0118/15/42GFQGLT000120GU.html>). When online, Chinese

¹ In mainland China, a 'netizen' is currently defined as a person older than six who surfs the web for at least one hour per week.

netizens often do such things as listening to and downloading music, chatting, watching and downloading movies, reading news, searching for information, playing online games, and emailing. And entertainment is the most important purpose for most online activities. The Internet has been so pervasive in China that the sentence *Shangwang le meiyou?* 上网了没有? 'Have you been online [recently]?' has currently become one of the most commonly uttered greetings when Chinese people, especially city dwellers, meet on the streets (Lü 2002).

The rapid development of Internet communication in mainland China has created huge impact on the Chinese language. Researchers have documented that CMC has helped give rise to a new variety of Chinese, which they generally term the Chinese Internet language (CIL) (Yu *et al* 2001a). According to Yates (1996), a new medium of communication such as the Internet not only draws upon existing linguistic practices, but also generates new forms of practice. This partly explains why there has emerged CIL in China's Internet communication. CIL is not only represented by different lexical usages, but also by unique syntactic, and even discursive features (Gao 2006; Yu *et al* 2001b; Zhang 2007). As for the demographics of the netizens in mainland China, approximately thirty-eight percent are aged between eighteen and twenty-four, most of whom are studying either in senior high schools (31.3%) or at two- or four-year colleges (51.6%) (<http://big5.china.com.cn/chinese/zhuanti/zghlw/923610.htm>). Over ninety percent of netizens are below the age of 35. In other words, Chinese netizens can be roughly categorized as young people.

This paper discusses the impact of the emergence and use of CIL in CMC on the Chinese language. Applying the construct of apparent time change (Labov 1963, 1966) and based on a variety of other considerations, it argues that some of the CIL usages employed by young Chinese netizens in CMC may start to be used by people belonging to other age groups and also outside of the electronic media. In other words, the appearance and use of the CIL may represent a case of language change in progress. In so doing, this paper demonstrates that electronic communication indeed provides rich data for linguistic analysis, which therefore warrants serious attention from linguists.

The paper first provides the theoretical framework that guides the argument for the possible change of the Chinese language prompted by the use of CIL online. It then presents objective linguistic data, viz., online words, sentences, and paragraphs. In the following, the paper discusses what types of CIL usages are likely to be incorporated into the Chinese language. The paper concludes with a highlight of the need for a real time study to corroborate its argument.

2. The Theoretical Framework

This study is primarily guided by the apparent time construct (Labov 1963, 1966). It also takes into consideration other theoretical as well as practical assumptions.

2.1 The Apparent Time Construct

In the study of language variation and change, Labov (1963, 1966) distinguished between apparent time and real time changes. The underlying idea of the apparent time change is that age stratification of linguistic variables can not only reflect change in the individual as he or she moves through life (age grading), but also historical change in the speech community as it moves through time. In other words, some of the variables used by one age group, usually young people, may spread through the entire population and consequently slowly change the language. Using the apparent time construct, Labov (1963, 1966) demonstrated in his study of the social stratification of English in New York City that it is quite possible to analyze language change in progress by comparing the speech of older and younger speakers from the same community. Within this theoretical framework, this study considers the CIL as variables of standard Mandarin Chinese, which are used primarily by young and educated Chinese, as is aforementioned.

Meanwhile, it is worth noting that the disambiguation of age-stratified data (change in apparent time) in linguistic change versus age-grading is a complicated matter. To get an apparent time reflection of language change in progress, the individual's linguistic behavior would have to remain stable throughout his or her life, or at least changes during his or her life course would have to be systematic and regular. In other words, caution should be taken that without real time evidence, it is virtually impossible to determine whether age-stratified patterns of change reflect language change in progress or are simply a matter of age-grading.

2.2 Other Considerations

In the following, the paper discusses other theoretical as well as practical assumptions, which also help to support the argument that the emergence and use of CIL in Chinese CMC indicates language change in progress.

2.2.1 The Prestige of CIL

Given that CIL is used mostly by educated young Chinese and that it is associated with many desirable personal identities such as being modern and being able to keep up with social and technological developments, it is generally considered a prestigious linguistic variety, especially among young people (Gao 2007). The emergence of such a distinctive language variety has significant sociolinguistic implications for the change in Chinese.

As Chambers (1995: 185) puts it, “variability in language often indicates instability” and hence linguistic change. Moreover, according to variationist sociolinguists (e.g., Labov 1972, 2000), the language variety with high social prestige, be it overt or covert prestige, is likely to show its impact upon people's language use and to be emulated by people who seek prestige. If this is true, CIL may exert its influence upon the linguistic behavior of those who do not have access to computer-mediated communication and/or those who do not belong to the young and educated group but wish to.

2.2.2 The Likelihood of Cross-Modality Influence

As is noted in Baron (1984), cross-modality linguistic influence is quite possible. Take English as an example, many instances of usage clearly show that speech and writing, two different modalities of communication, have been influencing each other. In terms of speech affecting writing, there is, for example, written use of contractions like “haven’t.” Concerning writing influencing speech, there is, for example, professorial talk like “But it is now widely recognized that we must make a distinction between the formal objects licensed by a grammar and feature descriptions used to impose constraints on these structures.” Likewise, CIL, language employed in online communication, may also gradually spread to the domain of non-electronic communication, both spoken and written, and consequently lead to the change of the Chinese language.

2.2.3 The Role of Youths in Linguistic Change

As Wardhaugh observes, “the young are usually in the vanguard of most [language] changes” (1998: 202). This observation, which is underpinned by his experience, constitutes another piece of support for the potential impact of CIL on the Chinese language and hence its change. As is mentioned earlier, users of CIL are predominately young people in their late teens or early twenties up until this stage (http://tech.sina.com.cn/focus/cnnic_12/index.shtml). One more piece of supporting evidence is that the electronic language used by young Chinese netizens is usually more dynamic, vivid, and rich in creativity than non-electronic language. Generally speaking, such a vibrant variety of language is contagious; people are not very resistant to the use of such an innovative variety of language.

3. The Data

The data for this study consist of Chinese Internet lexical items, sentential expressions characteristic of Chinese Internet discourse, and paragraphs from the Internet, which feature the use of CIL terms, sentences typical of Chinese Internet discourse, and/or discursive practices typical of China’s Internet communication.

The data were collected primarily from five Internet situations – online BBS’s, chat rooms, Internet literature, personal e-mails, and other posts at public web sites, such as news and advertisements. Among these sources, BBS’s and Internet relay chat rooms were the major ones. To ensure that the data collected and examined are representative of CIL, I gathered them from posts on a variety of topics, including recreation, sports, school life, education, career, politics, marriage life, and economics. In addition, from October 2002 through December 2007, I collected samples of CIL from the five Internet situations on a weekly basis.

3.1 The Lexical Usages

Based on the source code, the Chinese Internet lexicon may be divided into three main categories. They are 1) words solely composed of Chinese characters, 2) words that

only consist of pinyin alphabets, English letters, Arabic numbers, or paralinguistic symbols, and 3) words of mixed sources. Each type may then be further subcategorized. For words that only contain Chinese characters, they can be further divided into those coined in the following different ways:²

- 1) *Jiajie* 假借 ('borrowing'), e.g., *mao* 猫 cat 'modem,' *guanshui* 灌水 irrigate-water 'posting low-quality articles on BBS's'
- 2) *Hecheng* 合成 ('compounding'), e.g., *dianduidian* 点对点 point-face-point 'computer to computer,' *xiezai* 卸载 unload-carry 'download'
- 3) *Fangni* 仿拟 ('analogy'), e.g., *diaoxia* 钓虾 angle-shrimp 'females chasing males' (cf. *diaoyu* 钓鱼 angle-fish 'males chasing females'), *hantuo* 汉托 Chinese-TOEFL 'Chinese TOEFL--HSK' (cf. *tuofu* 托福 hold-happiness 'TOEFL')
- 4) *Yijie* 译借 ('calquing'), e.g., *qiate* 恰特 exactly-special 'chat,' *ku* 酷 cruel 'cool,' *bensan* 笨三 stupid-three 'Pentium III'
- 5) *Bini* 比拟 ('metaphor and personification'), e.g., *daxia* 大虾 big-shrimp 'Internet expert,' *konglong* 恐龙 scary-dragon 'unattractive but extremely active female'
- 6) *Yinbian* 音变 ('phonological fusion'), e.g., *jiangzi* 酱紫 sauce-purple 'this way' (from *zheyangzi* 这样子 this-form-Suffix 'like this'), *biao* 表 watch 'don't' (from *buyao* 不要 no-want 'don't'), *niangzi* 酿紫 brew-purple 'that way' (from *nayangzi* 那样子 that-form-Particle 'like that')
- 7) *Shuoming* 说明 ('explanation'), e.g., *wangchong* 网虫 net-insect 'people very fond of visiting the Internet,' *wangba* 网吧 net-bar 'computer site open to the public'
- 8) *Cisuchongdie* 词素重迭 ('morpheme repetition'), e.g., *piaopiao* 漂漂 beautiful-beautiful 'beautiful,' *huaihuai* 坏坏 bad-bad 'bad'
- 9) *Yinjingzaizao* 音近改造 ('near homophonization'), e.g., *banzhu* 斑竹 speckle-bamboo 'person in charge of a BBS topic,' *junnan* 菌男 germ-male 'unattractive guy'

² As is observed by researchers (e.g., Zhang 2007; Zhu 2008), Chinese netizens often frequently use local varieties of Chinese in online communication, such as the use of *ou* 偶, 'me', a Taiwanese usage, for *wo* 我 'me', and *xiami* 虾米 'what', a southern Fujian usage, for *shenme* 什么 'what'. Since neither the written form nor the meaning of these expressions has changed in CMC, the use of dialects is not treated as a way in which online words are coined.

- 10) *Jiucixinjie* 旧词新解 ('semantic shift'), e.g., *ouxiang* 偶像 idol-picture 'a disgusting person,' *tiancai* 天才 sky-material 'a born dumb person', *danbaizhi* 蛋白质 egg-white-quality 'an idiot and neurotic', *ding* 顶 hold something on one's head 'support', *fubai* 腐败 decay-failure 'eating out or participating in recreational activities'
- 11) *Xizi* 析字 ('word decomposition'), *lanjie* 蓝介 blue-introduce 'awkward' (from *ganga* 尴尬 'awkward'), *zouzha* 走召 walk-summon 'super' (from *chao* 超 'super')

Examples of words that only consist of pinyin alphabets, English letters, Arabic numbers, or paralinguistic symbols are given in 12). In 12), *JS* consists of pinyin alphabets, *E*, *ICQ*, *cookies*, and *banner* are in English, *668* and *886* are in Arabic numbers, and the components of *:-)* and *^0^* are only paralinguistic symbols.

- 12) *JS* ('shrewd businessmen,' from *jianshang* in pinyin), *E* ('electronic'), *ICQ* ('I seek you.'), *cookies* ('small file saved on a computer hard disk'), *banner* ('advertisement that props up across the width of a computer screen'), *668* ('Let's chat.'), *886* ('Bye-bye.'), *:-)* ('smile'), *^0^* ('laugh out loud')

Examples of words of mixed sources are given in 13). In 13), *^B* and *^K* both consist of a paralinguistic symbol and an English letter, *b2b*, *b2c*, *f2f*, and *MP3* are each composed of English letters and an Arabic number, and *BIG5* 码 is a mixture of English letters, an Arabic number, and a Chinese character.

- 13) *^B* ('to say good bye with tears'), *^K* ('to kiss stealthily'), *b2b* ('business to business'), *b2c* ('business to customer'), *f2f* ('face-to-face'), and *BIG5* 码 ('the big 5 code')

3.2 The Sentential Features

One of the most conspicuous features of web sentences is that they are usually relatively short and are used to express meanings in a concise and straightforward manner. It is particularly so in regard to language used in chat rooms and on BBS's. An excerpt from an online chat in 14) below exemplifies this characteristic. Among the ten sentences in this sample, there is only one complex sentence, 如果有机会我一定送花给你 ('If I have a chance, I'll surely send you flowers.'). In addition, eight out of these ten sentences consist of six or fewer words.

- 14) 欢迎进入中华网聊天室!:) (‘Welcome to the chatroom at www.China.com.’)
 A: I think so.
 B: 上网明天能休息。 (‘If I go online, I can take a rest tomorrow.’)
 C: 叹了口气, 不知道哪里不对了。 (‘Sigh. [I] don’t know what’s wrong.’)
 D: 混古起? (‘Excuse me?’)
 D: 你哪的? (‘Where are you from?’)
 E: 在? (‘Preposition, indicating time, place, etc.’)
 F: 如果有机会我一定送花给你。 (‘If I have a chance, I’ll surely send you flowers.’)
 G: 你在吗? (‘Are you there?’)
 H: oh.
 I: 最好有伊妹儿。 (‘[You’d] better have an e-mail.’)

Web sentences also involve novel usages, which are usually represented by 1) a change in sentence word order, 2) the use of sentence-final redundant words, 3) a change in word category, 4) the use of an unusual sense of a word, and 5) the use of bound morphemes as free morphemes. Some examples are given in 15-23) below. The sentences in 15-16) involve a change in sentence word order. The sentences in 17-18) feature the use of semantically superfluous expressions. The sentences in 19-20) represent a change in word category. The sentence in 21) exemplifies the use of a very uncommon sense of a word. And the sentences in 22-23) are characterized with the use of usually bound morphemes as free morphemes.

In 15), the adverbial prepositional phrase *zaitushuguan* 在图书馆 Preposition-picture-book-place ‘in the library’ was moved from before the verb phrase *kanshu* 看书 look-book ‘to read books’ to after it. In 16), the adverbial time phrase *mingnian* 明年 following-year ‘the following year’ was moved from before the verb phrase *qumeiguo* 去美国 go-U.S. ‘to go to the U.S.’ to after it.

- 15) 我 看 书 在 图书馆。
 I look book Preposition library
 ‘I was reading books in the library.’
- 16) 我 去 美国 明 年。
 I go U.S. next year
 ‘I am going to the U.S. the next year.’

In 17), the expression *deshuo* 的说³ Auxiliary-talk ‘say’ is semantically redundant. Similarly, in 18) *diao* 掉 fall ‘Result’ is redundant, although it is true that *sidaole* 死掉了 die-fall-Aspect ‘die’ by itself is a perfectly grammatical usage in Mandarin Chinese.

- 17)– 去 哪儿?
 go where
 ‘— Where are you going?’
 –回 家 的 说。
 return home Auxiliary talk
 ‘— Going home.’

- 18)我 要 高 兴 死 掉 了。
 I will happy die fall Particle
 ‘I’m extremely happy.’

In 19), the noun *dian* 电electricity ‘call’ was used a verb, meaning ‘to call’. And in 20), the proper noun CNN was used as an adjective, meaning “behaving like CNN”.

- 19)有 事 电 我。
 have thing call I
 ‘Call me if you need anything.’
- 20)做 人 不 能 太 CNN。
 do people not Auxiliary too CNN
 ‘A person cannot be like CNN too much.’

In 21), an atypical usage of the expression *feichang* 非常 not-ordinary ‘very; unusual’ in the sense of ‘unusual’ was used.

- 21)她 是 非 常 宝 贝。
 she be unusual treasure
 ‘She is an extremely lovely girl.’

Finally, In sentence 22), the bound morpheme *ju* 巨big ‘extremely’ was used as a free morpheme. Analogously, in 23) the bound morpheme *chao* 超exceed ‘super’ was used as a free morpheme as well.

³ The usage *deshuo* 的说 Auxiliary-talk ‘say’ is a translation of the Japanese sentence-final expression: Object marker + say.

- 22)小 王 巨 怕 辣。
 little Wang gigantic afraid spicy
 ‘Little Wang is extremely afraid of spicy food.’
- 23)这 场 球 赛 超 没 意 思。
 this Classifier ball game super not meaning
 ‘This ball game was extremely boring.’

3.3 The Discursive Level

In many cases, China’s Internet discourse is marked by 1) Chinese-English code-switching, 2) a written spoken style, and 3) a joking style, which is represented by the use of, among other things, overly concise and straightforward language, unusual and sometimes even grotesque homophones, enigmatic folk similes, and other rhetorical devices.

3.3.1 A Bilingual Code

Guo (1999) points out that bilingualism or multilingualism is an inevitable occurrence in the modern society, where people speaking different languages find themselves frequently interacting with each other. It is particularly so with computer-mediated communication, which is itself a product of modern technology that expedites the process of globalization. According to Danet and Herring (2007) and Melchers and Shaw (2003), Internet communication is recurrently characterized by the mixing of two or more languages.

In 24) below is an excerpt from the web novel, *Zuiaishini* <<最爱是你>> ‘My most beloved is you’ by *Meiguitianshi* 玫瑰天使 ‘Rose Angel’ (<http://www.16167.com/wenxue/sanwen/03.htm>). In this excerpt, English items include the expression “bbs” and the greeting “hi.”

- 24) 布谷很少主动给别人打招呼，没人理的时候，她就到bbs上看帖子。那天晚上，布谷心情实在有些压抑，所以见谁给谁打招呼，深夜了，聊天室也没几个人，布谷就遇见了阿民。
 布谷：hi!
 阿民：你好！
 布谷：还没睡？
 阿民：你也是啊。

(‘*Bugu* normally seldom initiates communication with others. When people ignore her, she will read posts on BBS’s. That night *Bugu* felt depressed indeed, so she said hello to whomever she met. It was late in the night and only a few people were still chatting. At this time, *Bugu* met *Amin*.)

Bugu: Hi.

Amin: Hi.

Bugu: Still awake?

Amin: You too.’)

In 25) below is an excerpt from the web novel, *Huodexianggerenyang* <<活得像个人样>> ‘To live like a human being’ by Niepan 涅槃 ‘Nirvana’ (<http://www.16167.com/wenxue/xiaoshuo/huo.htm>), in which the English word “kiss” was employed.

25)很长的一封信,看得我累的不行,大概意思就是她芳心甚悦,情意绵绵,仍想见我一面。最后居然写了个kiss。我觉得很滑稽。琢磨一下她肯定是鼓起全身勇气写了个这么脸红心跳的字句。

(‘A very long letter. I was exhausted reading it. Her main idea is that she was happy and had affection for me too. Also, she would still like to see me one more time. She even ended her mail with the word “kiss.” I felt very funny. I figured that she must have gathered up all her courage to have used this bold expression.’)

3.3.2 A Written Spoken Style

Much CIL discourse features a written spoken style. On the one hand, CIL maintains the characteristic of a written mode. On the other, CIL is marked by an oral style on most informal occasions.

The fact that CIL is partly marked by a written style has at least four reasons: 1) most people still have to use a keyboard to communicate online, 2) that the Internet is a public arena, 3) that most Chinese netizens are educated, and 4) that language used on China’s Internet is first and foremost Putonghua.

Generally speaking, communicating via the Internet is not as fast as people desire. Meanwhile, in China today Internet service is still relatively expensive. Customers are usually charged based on the amount of time that they spend online. In order to offset these limitations, when engaged in electronic communication, people frequently utilize such usages as abbreviated words, subjectless sentences, and single-word sentences. Such practices provide CIL with features of a spoken style. Moreover, cyberspace is essentially a communication arena in which there is few, if any, formal censorship. As a result, when interacting via the Internet, people are likely to use a spoken style, which tends to be more vivid than a written style, to voice their opinions about hot socio-cultural and political issues in China, among other things.

The following dialogues in 26) below, which were gathered from an Internet relay chat room, clearly demonstrate the spoken style of much CIL discourse. More significantly, these expressions are even more concise than the oral language found in daily interaction.

- 26)A: 哪? ('Where are you from?')
 B: 深圳, u? ('Shenzhen. And you?')
 A: 扬州。认识你很高兴! ("Yangzhou. Good to know you!")
 B: me2! ^o^ ('Me too!')
 A: 家? ('Are you at home now?')
 B: 单位。 ('No. At my working unit.')
- A: M or F? ('Are you a male or a female?')
 B: M! 我有事, 走先! 886! ('Male. I need to take care of something. I'm leaving now. Bye-bye!')

The passage in (27) below, which is from the web novel *Yingxiongshidai* <<英雄时代>> 'The age of heroes' by Mikko, is also characterized by an oral style. In this excerpt, the expressions *tamadi* 他妈的 he-mother-Auxiliary 'goddamn' and *zhunaozi* 猪脑子 pig-brain-Suffix 'stupid person,' which are used to swear and to describe a foolish person respectively, are primarily used in spoken discourse, but they were used in this passage. Moreover, the expressions *sa* 仨 three 'three' and *dawan-banshangr* 大晚半晌儿 big-evening-half-period-Rhotacization 'in the dead of the night' are almost used exclusively in spoken discourse, but they also appeared in this excerpt.

- 27)“真他妈的都是猪脑子!”我苦于说不出话,气得一个眼珠乱转。“我又不是有病!大晚半晌儿的,一个人找人家仨持刀的见义勇为?我脑子又没进水!没常识!!”这时去现场的警察走了进来,几个人低声地交谈了一会儿,证实了现场情况和小小的陈述基本一致。(Mikko 2000)

('“Stupid!” I was too upset to be able to talk but just moved one of my eyeballs frantically. “Was I insane? I myself alone fighting against three hooligans with knives in the dead of the night? I'm not that stupid! I don't lack common sense!” At this moment, several policemen walked over, who had been to the crime scene. They whispered for a while and confirmed among themselves that what they found out at the scene was basically consonant with *Xiaoxiao*'s statement.')

3.3.3 A Joking Style

A large proportion of China's Internet discourse features a joking style, which is usually achieved through using overly terse and straightforward language, unusual homophones, enigmatic folk similes, and other metaphorical devices. The following passage from the Holy Writ of Love in 28), which originated in the movie series Chinese Odyssey (Quoted from Klinkner 2003) and is now an integral part of CIL, illustrates this joking style. In this

case, the joking effect lies in the straightforwardness of language use. In the traditionally reserved Chinese culture, such a direct discursive style is striking and even hilarious.

28)曾经有一份真诚的爱情放在我面前
我没有珍惜
等我失去的时候我才后悔莫及
人间最痛苦的是莫过于此
如果上天能够给我一个再来一次的机会
我会对那个女孩子说三个字
我爱你
如果非要在这份爱上加上一个期限
我希望是一万年

(‘Once somebody sincerely loved me, but I didn’t take that love preciously. I started to regret only when it was gone. This is the most miserable thing in life. If God gave me another chance, I’d say three words to that girl, “I LOVE YOU!” If I must place a deadline to this love, I hope it is TEN THOUSAND YEARS.’)

4. Possible Types of Linguistic Changes⁴

Language is constantly in the process of evolution. The change is either caused by language-internal factors (e.g., Anttila 1989), which is exemplified by the first Germanic consonant shift known as Grimm’s Law, a consequence of the language-internal pressure, or various language-external or social forces (e.g., Bright 1997; Labov 2000), exemplified by the simplification of the Chinese writing system in Mainland China (Cheng 1979). According to Weinreich, Labov, and Herzog (1968), language, especially the vocabulary of a language, is closely entwined with diverse social cultural dimensions of the society in which it finds itself. When the society changes, language as a sign that mirrors the reality of that society will also undergo transformation. It is then no wonder that the arrival of the digital age in China, one of whose representations is the beginning of computer-mediated communication, and recent dramatic social, economic, and political changes that have taken place in China should lead to a change in the Chinese language.

4.1 Lexicon⁵

Vocabulary is usually the most active component of a language, which constantly changes to accommodate the needs of speakers. The question then arises: what types of CIL lexicon is likely to stay as an integral component of the Chinese language? Generally

⁴ Gao (2006) specifically examines the impact of English on the Chinese language.

⁵ Elsewhere, Ma (2002) also discusses the spread of the CIL vocabulary to the non-CMC context, particularly people’s everyday life.

speaking, in addition to the words that must be used to refer to new Internet technologies, those that conform to the convention of the Chinese language have the highest possibility of survival, which would include new coinages that follow the rules of Chinese word formation. This would probably cover at least two groups of CIL words: 1) some of those borrowed from foreign languages, such as *zaixian* 在线 at-line ‘online’, and *ku* 酷cruel ‘cool’, and 2) some of those formed by phonological fusion, e.g., *biao* 表 (from 不要) watch ‘don’t’, for borrowing and phonological reduction are two active word formation processes for the Chinese language.

The matter of the fact is that some of the CIL usages have already been used by the general public and beyond the modality of CMC. Two examples (underlined) are given in (29-30) below, which are quoted from Jiao (2003). In (29), the CIL expression *tiezi* 帖子 paste-Suffix ‘online post’ is used, and in (30) *dongdong* 东东 east-east ‘stuff’ is used.

(29)昨天 还 整理 了 网友们 的 帖子。(陆幼青:<<生命的留言>>)
yesterday still sort Aspect web friends Auxiliary Post
‘Yesterday I also sorted out the posts by (my) Internet friends.’

(30)生活中,我为自己的 很多 东东 而 无比 惊喜。
(<<大众电影>>, 2002:18).
life in I for self Auxiliary many east east Conjunction extremely happy
‘In my life, I am extremely pleasantly surprised by so many things I have.’

According to Li (2002), the following passage in (31) appeared in a composition by an elementary school student, which also features the use of many CIL expressions (underlined). In this case, although the use of CIL vocabulary is still confined to adolescents, it has gone beyond the CMC modality.

(31)昨天晚上,我的GG带着他的恐龙GF到我家来吃饭,饭桌上,GG的GF一个劲的向我妈妈PMP,那酱紫真是好PT, 7456,我只吃了几口饭,就到QQ上打铁去了。
(‘Yesterday evening my brother brought his unpleasant-looking girlfriend home for dinner. At the dinner table, this girl kept flattering my mother. Her behavior was so abnormal. I was really fed up with it. I only ate a few mouthfuls before I left to post messages via the caller machine.’)

Furthermore, at least the three CIL expressions given in (32) below have been collected by the *Xiandai hanyu cidian* <<现代汉语词典>> ‘A modern Chinese dictionary’ (Chao and Han *et al* 2005), one of the most authoritative dictionaries on the

modern Chinese language, which marks the official completion of the lexical change prompted by CMC.

- (32) *yimeier* 伊妹儿 her-sister-Rhotacization ‘email’, *ku* 酷 cruel ‘cool’, *heike* 黑客 black-guest ‘hacker’

4.2 Grammar

Compared with lexical items, grammatical categories of a language, including its sentence structures, are more stable and hence less easily subject to change, even though such changes do occur. In the following, the paper discusses two possible types of grammatical changes regarding sentence word order and word category respectively. It should be noted that the discussion here is rather speculative in nature. The discussion is also intended to be illustrative rather than exhaustive.

4.2.1 Word Order

The issue of the Chinese sentence word order has been broadly discussed. According to Greenberg’s Word-order Correlation (1963), the order of all types of modifiers in relation to their heads follows the same order as that of the verb and its direct object. In other words, if the direct object follows the verb, then modifiers of the verb tend to follow the verb. If this is the case, then examples in (15-16), which are given below in (33-34) for convenience’s sake, apparently help to support the argument that Chinese is moving towards more an SVO language, which is different from the suggestion in Li and Thompson (1981) that the Chinese language may be experiencing a transformation from an SVO to an SOV sentence word order.

- 33) 我 看 书 在 图书馆。
I look book Preposition library
‘I was reading books in the library.’

- 34) 我 去 美国 明 年。
I go U.S. tomorrow year
‘I am going to the U.S. the next year.’

4.2.2 Change in Word Category

As a result of the influence from the use of CIL in CMC, the part of speech of some Chinese words may undergo changes. A potential candidate is the use of nouns as adjectives, as is illustrated by the usage of *cai* 菜 vegetable ‘weak; incapable’ in (35) below. For one thing, the use of nouns as adjectives has already been documented in the *Xiandai hanyu cidian* <<现代汉语词典>> ‘A modern Chinese dictionary’ (Chao and

Han *et al.* 2005), as is shown in 36) below, where the noun *yangguang* 阳光 sun ‘healthy and optimistic’ is used as an adjective.

35) 这 个 人 太 菜。
 this Classifier person too vegetable
 ‘This person is too incapable.’

36) 她 是 一 个 阳光 女孩。
 she be one Classifier sun girl
 ‘She’s a very healthy and sanguine girl.’

4.3 Discourse

The discourse structure of a language is even more unlikely to change, which is tightly intertwined with the way of thinking of the people that speak that language. Nevertheless, as is documented in Baron (2000), the styles of English writing have continuously evolved along with the invention of new media of communication. If this is the case with English, then it is not completely out of the question that the Chinese language may also undergo discourse transformation as a result of the new electronic and the word processing medium that are used to produce the language.⁶

5. Concluding Remarks

In light of the apparent-time construct, this paper argues that some CIL usages by young netizens in CMC may spread to other age groups and beyond the CMC modality and consequently lead to changes in the Chinese language. In this sense, some of the CIL usages may represent language change in progress. This being said, as is noted earlier, not all age-related variation is indicative of change in progress. Instead, it may simply be an age-graded variation. That is to say, the applicability of the apparent-time hypothesis should be confirmed by real-time evidence, which may be gathered from a longitudinal study of a population over an extended period of time.

⁶ The distinctive features of Chinese CMC discourse have been documented (e.g., Jin 2000). If these features persist, they may influence the non-CMC discourse structures of Chinese, just as they do with the Chinese lexicon and syntax.

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**Rapper Jin (歐陽靖) and *ABC*:
Acquiring Spoken Cantonese and Transnational Identity
Through Restaurant Culture and Hong Kong TV**

Jennifer W. Jay
University of Alberta

Jin (Jin Au-yeung) is a twenty-five year old Asian American rapper born and reared in Miami, and currently known for his rap song supporting Barack Obama. He sells himself as a transnational Chinese and an Asian American who has carved a successful career in American hip-hop and rap, a cultural medium long dominated by African American artists. Jin's unique style has been throwing one or two Cantonese phrases, or even a stanza, into his mainly English freestyle battling and rap lyrics, but he recently released *ABC*, a CD claimed to be 98% in Cantonese. My primary purpose in this paper is to analyze *ABC*'s ten songs, written and performed by Jin, from two perspectives: his acquisition of Cantonese from his parents and from Hong Kong television, and the construction of his identity as a transnational Chinese in multi-ethnic America.

In the past decade I have been intrigued by a number of Canadian-born heritage students (CBCs) in my Chinese history classes who acquired some proficiency with spoken Cantonese through watching Hong Kong TV at home. Their first spoken language was Cantonese and they could sing the theme songs of television series but could not read or write in Chinese. Mimicking parents and television personalities gave them native pronunciation in Cantonese as well as some insights into the Hong Kong movie/television industry. As their social circle broadened outside the home, they began losing both fluency in Cantonese and interest in their parents' background except for Chinese food. Mostly the parents and grandparents accept the loss of fluency and criticize them as hollow bamboo kids (of Chinese ethnicity but empty of Chinese substance). These individuals identify themselves with other American-born or Canadian-born Chinese as ABCs or CBCs.

At Chinese New Year in February 2007, the Chinese American rapper, Jin (Au-yeung Jin (1982-)), dropped an album titled *ABC* and it became the collective voice of ABCs and CBCs talking back to their families about what they have retained of their ethnic heritage. Jin claims that *ABC* is 98% in Cantonese, but 85% is a more accurate figure. My primary purpose in this paper is to use the album to 1) examine Jin's

acquisition of Cantonese from his parents and from Hong Kong television, and 2) to probe his construction of his identity as a transnational Chinese in multi-ethnic America.

Jin was born in Miami in 1982 and grew up in an African American neighborhood where his parents, immigrants from Hong Kong, struggled to pay the bills in their restaurant business. His hip-hop career began in Miami and he and his family now live in New York City, where Chinatown remains a significant part of his life. In the last few years his performances have taken him to Hong Kong, Japan, and China. Set against the racial tensions of a cultural medium dominated by black American artists, Jin's position in the hip-hop world strengthened through his self-defense and assertion of racial pride as a transnational Chinese and Asian American. His unique style has been throwing in one or two Cantonese phrases, or even a stanza, into his mainly English freestyle battling and rap lyrics. The Cantonese words and phrases have given him an upper hand in the freestyle battling raps, confusing his opponents because they could not understand them and could not respond. One example is seen in his 30-second freestyle competition with Sean Nicholas in 2001, where his verse ends with:

1. my pants are new, my sweater is new,
 don't make fun of Chinese kids fatter than you...
 Nei5faan2 uk1kei2 laa1 (你回家去 / *go home*).¹
 that means take your sorry butt home.²

Rap and hip-hop are often heavily laced with foul language, and Jin's previous albums have seen its share in both Cantonese and English swearing. *ABC* uses clean language to string together ten songs that depict Jin's childhood and young adulthood in Miami. The album is full of phrases that he must have often heard at home, at restaurants, and on Hong Kong television. The following examples can be heard in the background noise of the *ABC* album:

2. Daai6lou2 aa1 (大佬啊 / *oh, guys*)
 Zau2 laa1 (走啦 / *go away*)
 Zau6gam2sin1 laa1 (就這樣吧 / *that's it for now*)
 Zou6mat1je5 aa1 (做甚麼 / *what're you doing/what's happening?*)

¹ The romanization used is yuet6ping3 (Linguistic Society of Hong Kong Cantonese Romanization Scheme, 1993). The grouping is done to keep the rhythm of Jin's rapping. The Chinese character translation of the yuet6ping3 is in Mandarin Chinese. Translations are italicized to better bring out the original spoken lines.

² BET 106& Park, 7th freestyle battling, in 2001.

ABC evolved when Jin jokingly belted out short Cantonese lines at a Hong Kong venue and was asked to come out with an album in Cantonese. Jin has some fluency in Cantonese but he is not able to read and write Chinese, but the fact that he basically wrote the ten songs of ABC in his head and completed the recording in just two days must be counted as a high achievement in linguistic ability. Perhaps the task was easier because ABC is in many ways a long-suppressed response, or talking back at his parents, or responding to first generation immigrants' criticism that ABCs did not speak Chinese or know Chinese culture. ABC seems to be pitching at them, saying 'See, you keep criticizing me for being 'white', but I know more about the Chinese language and culture than you have given me credit for in my whole life.'

The ten songs of the ABC album put the spotlight on the daily life of Jin and his family in Miami, connecting it to the transnational worlds of youth hip-hop and Cantonese movie stars. The first song, 'ABC', has Jin confidently claiming his identity as an ABC with strong roots to the Cantonese language and Hong Kong culture, acquired through Hong Kong television channels that served as his babysitter while his parents toiled at the restaurant.

3. Teng1zyu3aa1 (聽住啊 / listen)
 First name Jin
 Zing6 hai6ngo5 zung1man1meng2 (靖是我中文名 / Jin is my Chinese name.)
 Lap6zi6 jung6yau6 ceng1zi6 (立字還有青字 / it contains the characters 'standing' and 'youthful'.)
 Tai2cing1co2 go3meng2 (看清楚個名 / examine the name clearly).
 Mou4leon4hai6 hau6sang1zai2, waak6si4hai6 lou5beng2 (無論是青年人, 或是老輩 / whether you are youthful or elderly.)
 Do1je6nei5 zi1ci4, zan1hai6 m4 easy (謝謝你支持。真是不 easy / thanks for your support; it has not been easy.)
 Jat1go3ABC, jiu1ziu3 cing1co2 faai3geng3 (一個ABC, 要照清楚塊鏡子 / an ABC must see clearly through the mirror.)
 Nei5dei6 seong2 zi1, ngo5dik1 ying1man1 dim2gaai2 gam2jeng3 (你們想知道, 為甚麼我的中文那麼棒 / you want to know how my Chinese is so good?)
 Hai6m4hai6 ceng2zo2go3 bou3zap6 lou5si1 (是否顧了位補習老師 / did you hire a tutor?)
 Not me...

Chorus:

ABC hai6ngo5 hai6ngo5 (ABC 是我是我 / ABC is me, me)

Waang6tai2 dim6tai2 dou1hai6ngo5 (橫看直看都是我 / no matter which way you look at it, it's me.)

Mou5co3 mou5co3 (沒錯沒錯 / that's right, that's right.) (Jin 2007: ABC)

Jin cautions first generation Chinese against making fun of an ABC's comparatively weak grasp of Chinese language and culture, stating that physical traits still define him as an ethnic Chinese:

4. Dik1gwai2lou2 tai2ngo5 mei6jau6hai6 wong4pei4fu6 (老外看我還不是黃皮膚 / the whites still see me as Chinese with yellow skin) (Jin 2007: ABC).

For Jin, being ABC can still let him be 100% American, 'having the best of both worlds, a balance of who you are, not one more than the other, and you can watch Chinese movie or order from authentic Chinese restaurants; and being in US he can appreciate hip-hop culture' (Liu 2007).

In the second song, 'It's Hip Hop', Jin walks his parents through the history of American hip-hop, taking great pride in himself winning seven consecutive BET 106 & Park freestyle battles and thereby 'wai6hua6jan4 zang1guong1' (為華人爭光 / bringing glory to the Chinese) in the black-dominated hip-hop world. His parents were perplexed and complained to relatives how he could get so obsessed with a seemingly un-Chinese and low-brow African American culture:

5. Tung4can1cik1 waak6peng2you4 king1can1gai2, dou1gong2 m5zi1 go3zai2 gei2si4 bin3zo2 haak1guai2 (和親戚或朋友聊天都說, 不知甚麼時候兒子變成了黑鬼 / whenever socializing with relatives and friends, they always said they didn't know when their son turned into a black man.)

Whenever his parents criticize his hip-hop obsession as indicative of someone without family upbringing (*mou5gaa1gau3* / 沒家教), Jin takes the opportunity to build up his Cantonese vocabulary.

6. Keoi5waa6ngo5 jat1geoi3, ngo5hok6do1 jat1geoi3 (他說我一句, 我學多一句 / whatever words they hurled at me, I would learn those words)

Dong3keoi5 ji5bin1fung1, gai3juk6 jau6ngo5 hing3ceoi3 (當它耳邊風,
繼續有我的興趣 / *I ignored them as passing breeze and continued to
pursue my interest.*)
Ngo5yeng4 loeng5ci3 nei5waa6ngo5 hou3coi2 (我贏兩次你說我運氣好
/ *winning twice, you said I was lucky*)
Yeng4do1 loeng5ci3 nei5go3hau2 jou6jiu1goi2 (贏多兩次你的口就要改
/ *winning twice more, you'd better change your critical tone*)
Yeng4do1 sam3ci3 nei5 gan1bun2 zou6mou5dak1 aau3 (贏多三次你
根本沒話說 / *winning three more times, you are basically silenced.*)
(Jin 2007:It's Hip-hop)

The next song, HK Supertar, plays with the cult of Hong Kong cinema and the paparazzi—a world that Jin peers into through Hong Kong television. There is a subtle use of humor as he introduces Daniel Wu 吳彥祖, an ABC enjoying a successful career as an actor in Hong Kong, China, and Taiwan.

7. Ngo5hai6 Daniel Wu, bin1go3 gau3ngo5 cool cool
(我是 Daniel Wu, 誰比我 cool / *I am Daniel Wu, who is more cool
than me?*)
Ngo5hai6 au1joeng4zing6 zing6, nei5soeng2 zou6 ming4sing1 sing1 (我
是歐陽靖、靖, 你想當明星、星 / *I am Au-yeung Jin; you want to
be a movie star?*)
Mou5co3 mou5co3 ngo5soeng2 zou6go3 (沒錯沒錯我想做個 / *that's
right, that's right, I want to be a*) Hong Kong superstar! (Jin 2007: HK
Superstar)

This song also shows that Jin's bilingual approach lies in mixing together Cantonese and English to create humor and rhyme:

8. Zuk1sing1jai2 (竹筴仔 / *hollow bamboo*)
ABC
That's you and me.
Hong Kong Superstar
Daniel Wu (Jin 2007: HK Superstar)

The fourth song, 'Speak Can't Read', deals with Jin and other ABCs struggling in Chinese language classes, arriving at the stage where they can speak but not read and write in Chinese. It is a continuing, but lighter, take on his earlier, angry song 'Learn Chinese', where he rejects the stereotype image of the Chinese minority as a food deli-

very service. Jin argues that Chinese is fast becoming a global language and the rest of the world had better learn it too (Jin 2004: The Rest is History).

The next song, 'Ape Shall Never' talks about Jin who, like other American teenagers and rappers, must have their own hip-hop dress code and wear specific clothes everyday, much to the consternation of his mother:

9. Ne1jat1gin6 hai6 ngo5ge1, m4sai2 zi2ji3 coeng2 (這一件是我的, 別
想要來搶 / *this one is mine, don't you think you can grab it from me.*)
Zau6syun3 hai6 tong4 jat1gin6 (就算是同一件 / *even though it is the
same item*)
Dou1 (都 / *still it's*)
not the same thing. (Jin: 2007)

The next three songs are focused on the theme of food and restaurant culture. 'Yum Dom Cha' (喝口茶 / *drink some tea*) is a humorous presentation of the ritual of dimsum lunch in a Cantonese restaurant from a child's perspective. The restaurant is a socializing place where parents and grandparents embarrass the children by trading gossip and news about their children's age and marriage:

10. Nei5go3 zai2 gam2daai6go3 naa4? (你的兒子這麼大了 / *how your son
has grown!*)
Go3nei5 gei2si4gaa3 aa3? (女兒甚麼時候要嫁了 / *when did your
daughter get married?*)

The dimsum lunch ritual is noisy but the food is good and hot:

11. Jam2caa4 zing6hai6 dak1go3cou4, zeoi3gan2jiu3 dik1ye5 jit6laat6laat6
san1sin2 ceot1lou4
(吃點心真是吵, 最要緊的便是東西熱辣辣的剛剛出爐 / *going for
dimsum is really noisy, what matters most is that the food is piping hot
and just out of the stove.*)

The song is a parody of food ritual and social practice, as indicated by a child's observation of adults fighting (or pretending to fight) to pay the bill in Chinese restaurants:

12. Dang2 ngo5 jam2maai4 ne1daam6caa4 zau6giu3go3 fo2gei3 maai4daan1
(讓我喝完這口茶就叫伙記結帳 / *let me finish drinking this tea and
I'll ask the waiter to bring the bill.*)

Naa6, ngo5ji4ga1 zau6 heoi3jat1heoi3 sai1sau2gaan1 (哪 . . . 我現在就上洗手間 / *now I am going to the washroom*)
Soeng6ci3 nei5ceng2, gam1ci3 dang2ngo5bei2, cin1kei4 mai5lai4 tong2ngo5zaang1
(上次你請客, 這次讓我給, 千萬別跟我爭 / *last time you paid, so this time let me pay, and don't you fight with me to pay.*)
Jam2caa4 dou1jiu3 wan2gaau1 aai3 (吃點心都跟我吵架... / *you want to fight with me even at dimsum lunch!*) (Jin 2007: Yum Dom Cha)

Next, 'Wai Wai Wun Bean Wai' is a song about dating and Jin's hip-hop friends. He asks a girl out and first poses three questions. Here is the first one:

13. Ne1wai2 siuze2, zo2nei5 saam3fan1zung1 (這位小姐, 給我三分鐘 / *Miss, give me three minutes of your time*)
Man6nei5 sam1go3 man6tai4 zau6wui5 (問妳三個問題, 就會 / *I'll ask you three questions, then*)
leave you alone
Dai6jat1 jau5mou5 naam4pang4jau5 waak6ze2 lo5gung1 (第一, 有沒有男朋友或者老公 / *#1, do you have a boyfriend or husband?*)
Chorus:
Leng3nei5, nei5hau2ma3 (美女, 你好嗎 / *Pretty girl, how are you?*)
Bat1jyu4 bei2ngo5 nei5go3 din6waa2 hou6ma5... (不如給我你的電話號碼 / *why not give me your phone number?*) (Jin 2007)

'Instant Noodles' continues with the theme of dating and adds the practice of eating. Jin offers to cook the best instant noodles for his date in a romantic setting:

14. Dang2ngo5 zyu2 go3min6 (讓我煮個麵 / *let me make you noodles*)
Dang2ngo5 zyu2 go3min6 bei2nei5 sik6 (讓我煮個麵 給你吃 / *let me make you noodles to eat.*) (Jin 2007)

In the ninth song, '1997', Jin ponders the impact of the changeover of Hong Kong in 1997, through a comparative look at his visits there as a child and now as an adult. He chats with his father about his own childhood and immigration to the United States in the 1970s. Jin remarks that three decades later, replicas of Hong Kongs and Chinas now deck the United States where the Chinese can find everything Chinese—food, movies, Chinatown, newspaper, etc. Most poignant is his reminiscence of going to the market with his maternal grandmother:

15. Ngo5gin3faan1 ngo5 ngoi6po4, to1zyu6 keoi5ge1sau2
(我又見了外婆, 拖住她的手 / *I saw Grandma again; I was holding her hand.*)
Hang6gaai1si5 aa2, ngo5bat1lau1 dou1 m4soeng2 heoi3
(逛街市, 我從來不想去 / *going to the food market--I never want to do that.*)
M4sai2 maai5coi3 dou1yiu1 dau1faan1 loeng2go3hyun1
(不用買菜都要兜兩圈 / *even if we don't need to buy food she still wanted to make her rounds.*)
Dik1 si1naai1 gin3dou3 zau6waa6, nei5go3syun1 aa4
(那些太太見到了我就說, 是你的孫兒吧 / *Mrs. So and So who saw me asked, is that your grandson?*)
Mou5co3, go3syun1 zau6hai6ngo5 (沒錯, 孫兒就是我 / *that's right, the grandson is me.*) (Jin 2007)

The last song, 'Wun Lern Chon', articulates Jin's appreciation of his parents' struggle with financial problems while running a small restaurant to put food on the table:

16. Seo1yin4 ngo5dei6 m4hai6 kung6dou3 zou6 hat1yi1, daan6hai6 mui5ci3
gau1zou1 dou1 houci2 zaang1dik1dik1
(雖然我們沒有窮到當乞丐, 但是每次交租都欠一點點 ... /
although we were not as poor as beggars, but every time the rent was due we were a bit short)
Chorus:
Wan2loeng2caan1 sik6, jau5zou6caan1 sik6
(找兩頓飯吃, 有早飯吃 / *working to put food on the table, we can eat breakfast*) ...

As a child he did not value his parents' efforts but now he tells his mom and dad that they are his heroes for teaching him to uphold morality and pride in the midst of poverty:

17. Jyu4guo2nei5 mou5ge (如果你沒有的 / *even if you don't have anything*)
Zau6syun3 zoek3 loeng6haai4 nei5 dou1jiu1 hang6ceot1lai4 mun4hau2
zou6yan4
(就是穿涼鞋你都要走出門外做人 / *and you can only afford to wear sandals, you still have to walk out the door and maintain your integrity as a person.*)

Dik1 mat6zat1 ge1je5 gen1bun2 zou6 m4soei1jiu1han6 (那些物質東西根本就不必羨人 / *those materialistic things--there is no need envy others who have them.*) (Jin 2007).

As someone who grew up in a Cantonese speaking environment, I believe that the above lyrics are constructed from phrases and words of daily life in the family, in restaurants, in America's Chinatowns, and from Hong Kong television. However, it is no small feat for even a native speaker to connect these phrases and place them in new situations and contexts, as Jin did in a creative and clever manner. The bilingual use of English and Cantonese and the repetition of words often generate humor and parody, in addition to enhancing the rhyme or rhythm. Indeed, Jin acknowledges this mimicry of the adult language:

18. Keoi5waa6ngo5 jat1geoi3, ngo5hok6do1 jat1geoi3 (他說我一句, 我學多一句 / *whatever words they hurled at me, I would learn those words.*) (Jin 2007: It's Hip-hop)

Jin is fluent in the Cantonese that is spoken around him, especially in his ability to grasp idioms that escape non-native speakers:

18. Yap6coeng4faai3 sau1dak1 dik1gai1seoi3 (入場票收得一點雞碎 / *the ticket price was just chicken feed.*)
Mou5 lei4gong1 gam2jyun6 dou1lai4 tai2keoi5 (沒雷公那麼遠, 都來看他 / *people from where Thunder God does not reach still came to see him.*)(Jin 2007: It's Hip-hop)

In manipulating and juxtaposing phrases and words to construct meaningful lyrics, Jin's creativity is best at work when dealing with unfamiliar topics in the Cantonese language, such as hip-hop. The following two examples describe the legendary rap artist Kool Herc and Jin's success at the freestyle battles:

19. Cyun4sai3gai3 dai6jat1go3 hiphop zi1cing1 (全世界第一個 hip-hop 知青 / *he was the best hip-hop young man in the whole world.*) (Jin 2007: It's Hip-hop)...
Ngo5zau6jiu1 jou4 BETge1 cat1gai3 toi4zyu2 (我就要做 BET 的七屆台主 / *I was determined to be the winner of the 7th freestyle battle.*) (Jin 2007: It's Hip-hop)

Despite a limited vocabulary, *ABC* serves up vivid images of daily life in the typical Chinese American family of eating, dating, living in America and Hong Kong. Jin brings into focus overlapping worlds in *ABC*, restaurant culture in America, the distant cultural and glamorous world of Hong Kong, and his love of the hip-hop world. In some ways Hong Kong television was an escape for him, and for his parents, and he integrated the two worlds with his rap lyrics in *ABC*. Jin assumes the identity of an ABC in personal life and in his performances: an American-born Chinese whose broader identity is American by virtue of the fact that his primary language abilities and formal education have been American while his ties with his family and Chinese roots are limited by his own Chinese language abilities and cultural knowledge of his ethnic heritage. Perhaps the most engaged audience of the album would be Cantonese parents and other ABCs like Jin himself, who now see that ABCs are not as rootless in Chinese culture and language as their families and the Chinese community at large have observed them. Certainly Jin's parents were totally surprised at the level of Chinese language that allowed him to bring out the album.

To conclude, I contend that Jin acquired his Cantonese from his Cantonese speaking family, the restaurant environment where the family lived, and the Hong Kong television programs that were left running in the family home in Miami during his childhood and youth. Jin's unique identity in the hip-hop world rests on his claim to Asian American and Chinese transnational cultures. For that identity and his music career to further develop in East Asia, he will need to go beyond the familiar topics of restaurant and family, and explore more extensively the culture and history of the region—Hong Kong, China, Japan, and Korea. Jin has expressed deep concerns on national and international issues such as Barrack Obama's campaign, the Virginia Tech massacre, and the Tsunami Disaster.³ In order to produce lyrics for similar global issues in Chinese and to reach higher levels of interaction in the Asian world, he will have to undertake formal language studies in Cantonese and Mandarin. In sum Jin is a highly intelligent, articulate rapper whose lyrics and performance offer exciting research possibilities in Chinese sociolinguistics, the acquisition and retention of heritage language, and Asian American culture.

³ These include 'Open Letter 2 Obama', 'You're Fired' in response to Rosie O'Donnell's comments about 'chingchong', 'Response to Tsunami Song', 'Rain, Rain, Go Away' in tribute of Virginia Tech victims. They are available for viewing on Youtube.

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A Perceptual Dialect Study of Taiwan Mandarin: Language Attitudes in the Era of Political Battle¹

Silvie Liao

University of California, Davis

Due to the political separation of Taiwan and China and the contact with native Taiwanese speakers since 1949, the standard Mandarin in Taiwan has differed from the standard Mandarin in China. Although the government has enforced its “Mandarin Only Policy”, strictly treating Mandarin as the only office language in Taiwan, Taiwan Mandarin has even become more diverse among speakers because of different degrees of contacts with regional dialects and also the conflicts between different ethnic and political groups. Located against this background, this paper has two foresights. First, drawing on Silverstein’s (1996) concept of indexicality, I will discuss how different phonological variants in Taiwan Mandarin can possibly produce indexical relationships between linguistic variants and social or political identity. Second, I will examine the people of Taiwan’s perceptions of two varieties of Taiwan Mandarin: *Taipei qiang* ‘Taipei accent’ and *Taizhong qiang* ‘Taichung accent’. One hundred and fifty-eight students were recruited to listen to four speakers from Taipei and Taichung and rate the voice on twelve traits using a six-point scale rate. Listeners were also asked to answer the region where the speaker is from in a forced-choice question with five choices. The study finds that salient dialect-specific properties are important cues for listeners to identify a speaker’s regional categorization. Besides, the consequence of the contested political ideologies manipulated by two major political parties has resulted in new indexicality of the linguistic features. Different varieties of Taiwan Mandarin index not only the traditional status traits but also the political inclination and cosmopolitanness. Finally, the study demonstrates that perceptual dialectological method can be used to examine how language ideologies are realized in people’s meta-pragmatic comments and how different indexical values can be mingled together.

0. Introduction

After the Nationalist Party (*Kuomintang*, hereafter as KMT) retreated to Taiwan from China after the Communist Party’s victory in the civil war in 1949, the KMT government aggressively enforced its one national language policy, which promoted

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Mandarin as the single official language. Mandarin, also known as *guoyu*, literally ‘national language’, was used in public domains, school instruction, public meetings and official business, while other *bentu fangyen* or ‘local dialects’ such as Taiwanese (or *Taiyu* ‘Taiwan language’), Hakka and aboriginal languages were banned in public and people were punished for speaking those so-called local dialects.

Since the lifting of martial law in 1987, Taiwan has undergone liberalization in many aspects. Democratization in politics especially has had a huge influence on the island’s language policy, language ideology and language use. Since the Democratic Progressive Party (DPP) was legally recognized in 1991, the party has focused on the promotion of the status of the local languages, development of Taiwanese nationalism, and elaboration of the identity of Taiwan. However, as Taiwan has gained democracy with its full-fledged two-party system (the KMT versus the DPP or in folk usage Pan-blue versus Pan-green), language use has become a tool for getting votes in elections (Tse 2000). During the past decade, especially after the DPP took over the presidency in 2000 for the first time, the conflicts between the two parties became more hostile and fierce. Liberalization did not unify Taiwan but actually divided the island. The people on the island were divided into two colors (blue and green) and two ethnic groups by the manipulation of those politicians, especially during the general election campaigns. One linguistic consequence of these political conflicts is that different language use has become an index to ethnic identity and political ideology. Moreover, the phonological variants in the same language have come to contain social meanings and serve as markers for social identity.

For a long time, sociolinguists have been interested in how linguistic differences are evaluated by people. In Labov’s (1966) pioneering New York City study, he asked New Yorkers to evaluate speakers’ job suitability and found there was high correlation between the presence of rhotic /r/ and high-ranking occupations. In a more recent work on the sociolinguistic variable (ING), Labov et al. (2006) found that listeners showed consistent results of their evaluation of the variables regardless of the regions where they reside and that listeners are more sensitive to the marked forms and their response would increase proportionally with the increment in the marked forms. In the past decade, there has been an increasing amount of research on how nonlinguists perceive linguistic variation or dialect boundaries. Dialect boundaries account for the geographical distinctions based on linguistic differences from one region to another (Milroy and Gordon 2003). For example, Preston (1998) examined the dialect boundaries in the United States by asking the respondents to draw map boundaries based on the regional speech areas and instructing the respondents to assign the voices to which they listened to the regions where they thought the voice belonged. This field of research is what Preston (1999) calls “perceptual dialectology”. One of the basic designs of perceptual dialectology is the surveying of language attitudes and evaluations of speakers on judgment scales of different traits by a group of listeners, with the goal of deepening the understanding of language variation and change by understanding how people perceive languages. As

Kristiansen (1998:168) says, “If, ontologically speaking, evaluation precedes variation, there will always be tensions and possible contrasts between what is going on at the level of social identity formation and what is going on at the level of language use “.

Taiwan is an island with language conflicts and struggles because of its historical and political development. The KMT’s linguistic assimilation successfully promoted Mandarin as the “high” language and other local languages as low languages (Tse 2000). Even though the DPP has tried to promote the status of Taiwanese, Mandarin is still the most commonly used and the most highly evaluated language in Taiwan (Feifel 1994). It should be noted that due to the political separation of Taiwan and China and contact with native Taiwanese speakers since 1949, the standard Mandarin in Taiwan differs from the standard Mandarin in China and Taiwan Mandarin has become very diverse among speakers in different regions due to different degrees of contact with local languages. Located against this background, this paper has two foci. First, drawing on Silverstein’s (1996) concept of indexicality, I discuss how different phonological variants in Taiwan Mandarin can produce indexical relationships between linguistic variants and social or political identities. Second, I examine the people of Taiwan’s perceptions of two varieties of Taiwan Mandarin: *Taipei qiang* ‘Taipei accent’ and *Taizhong qiang* ‘Taichung accent’, in order to explore whether different linguistic variants do index certain social or political identities and how language ideology affects the perception of different regional dialects.

1. Overview of the People, Language and Politics in Taiwan

The population of Taiwan consists of four distinct ethnic groups, each with their own languages. The Southern Min people (70% of the total population), who migrated from the coastal Southern Fujian region in the southeast of mainland China several centuries ago, speak Southern Min dialect (i.e. Taiwanese); the Hakka (15% of the total population), who migrated from Guangdong province at about the same time as the Southern Min people, speak Hakka; the Taiwanese aborigines (2% of the population), the original inhabitants in Taiwan for several thousand years speak their own languages that belong not to the Chinese language family, but to the Austronesian language family; and the Mainlanders (12% of the total population), who fled to Taiwan from various provinces in China after the Communist Party’s victory in 1949 over the KMT, speak mostly Mandarin. Among the four groups, those who originated from China (Southern Min, Hakka, and Mainlander) are divided into two subgroups: native Taiwanese (*bensheng ren* or ‘home-province people’) and Mainlanders (*waisheng ren* or ‘external-province people’). The local people in Taiwan have not reached a consensus on the definition of *bensheng ren* ‘home-province people’. Some suggest that only the Southern Min people are ‘home-province-people’; some claim that ‘home-province-people’ includes every ethnic group in Taiwan but Mainlanders, and there are some who believe that all who were born in Taiwan are ‘home-province people’. What is clear is that the *waisheng ren*, ‘external province people’, ruled Taiwan for fifty years after 1945, following the fifty-year colonization of Taiwan by the Japanese government.

After the KMT took over Taiwan from Japan, the government started to “Sinicize” the local people by enforcing a strict Mandarin-only Policy. Japanese, and other local languages were banned and Mandarin was the only official language that people were allowed to speak in public. During the period, Mainlanders who retreated from China were the superior group and other local people were considered the dominated group. Therefore, this ethnic hierarchy also resulted in a linguistic hierarchy in Taiwan: standard Mandarin that was spoken by the Mainlanders was viewed as the dominant or prestigious language, and Taiwanese that was spoken by Southern Mins was considered the dominated or vulgar language (Hsiau 2000).

In 2000, Taiwan’s first postwar opposition party, the DPP, won the presidential election, ending the KMT’s 51-year rule in Taiwan. The victory of the DPP, according to the party, was very significant because it symbolized that Taiwanese people had defeated the Mainlanders’ domination and suppression. Challenging the KMT’s Chinese nationalism and reunification with Mainland China, the DPP promoted local Taiwanese nationalism, emphasized Taiwanese identity, and supported Taiwan independence. The DPP’s platform has created a significant increase in local support and has quickly made the DPP the ruling party ten years after its legal recognition. However, the DPP’s success still did not bring the people in Taiwan to a consensus on what Taiwanese national identity is; on the contrary, the bitter political battle between the DPP and the KMT has divided the island into two colors – blue and green, the colors of the KMT and the DPP, respectively. Pan-blue refers to those who support the blue party and pan-green represents supporters of the green party. Moreover, the green/blue contrast is also reflected in regional divisions. Northern Taiwan, where more Mainlanders reside, is traditionally considered the blue area, while Southern Taiwan, where more Southern Min live, is typically labeled as the green area.

2. New Indexicality and Language Ideology in the Era of Political Battle

Irvine (1989:255) defines language ideology as “the cultural system of ideas about social and linguistic relationships, together with their loading of moral and political interests”. She particularly emphasizes “the political and other interests that structure interactions between cultural conception of language and the social world” (Milroy 2004: 166). Milroy (2004) further suggests that how ideologies work is deeply rooted in specific historical dimensions of political or social circumstances. In Silverstein’s (1992) view, language ideology needs to be understood as a system by which speakers make sense of the indexicality of the language. Indexicality, according to Silverstein (1996), is the link between a linguistic form and social meaning. He divides indexicality into different ranking orders. First-order indexicality invokes a relationship between linguistic forms and social groups which is taken for granted and given by culture. The values of the indexicals are presupposed in the local cultural context. Second-order indexicality refers to how speakers or listeners notice, rationalize or frame their understanding of first-

order indexicality and then establish a new or non-conventionalized social meaning onto the linguistic form in the local historical context.

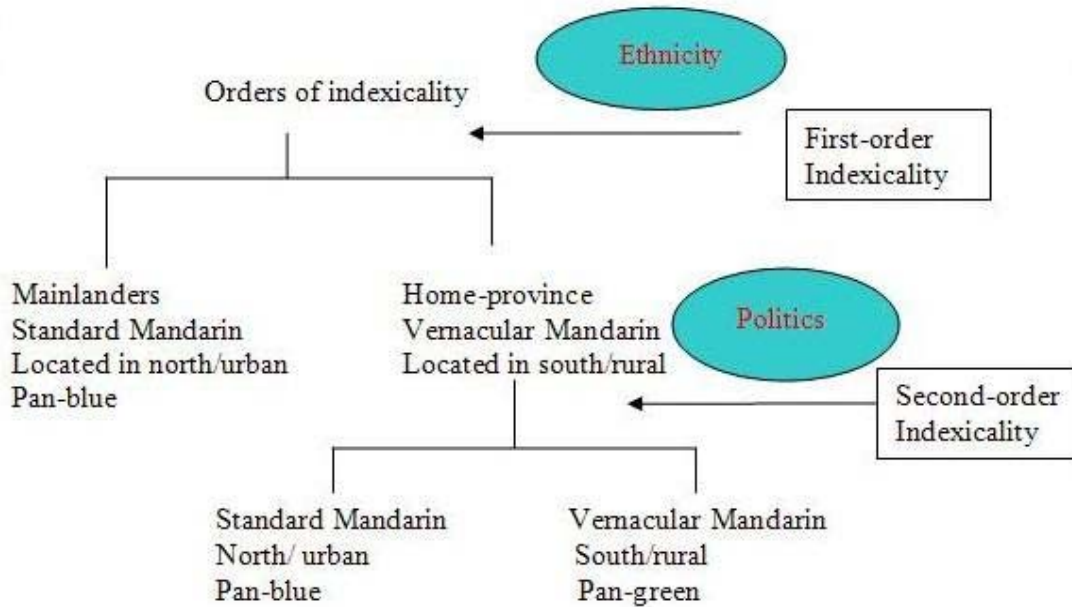


Figure 1. Orders of Indexicality in contemporary Taiwan

Ever since the KMT enforced its Mandarin-only policy, Mandarin was regarded as the only “linguistic capital” (Bourdieu 1991) in Taiwan. The KMT tried to create a unified linguistic market because this standard official language also symbolized the homogenization of the nation, and more importantly, KMT dominance. Nevertheless, even though Mandarin was the only official language and all people in Taiwan had to speak Mandarin, due to language contact with local languages, especially Taiwanese, the native language of the majority population, Taiwan Mandarin varies across different regions and different regional accents show salient features that differ from the so-called standard Mandarin that the KMT government sought to promote. As a result, speaking vernacular Mandarin has been presupposed to index home-province identity and speaking standard Mandarin to index Mainlander identity. This is what Silverstein (1996) calls a first-order indexicality. As mentioned previously, after Taiwan began to liberalize its political system two decades ago, the DPP grew so quickly that it became the ruling party in 2000. This drastic political change has indirectly changed how people perceive others’ language use. It is widely known that the KMT’s political ideology is in favor of reunification with China, while the DPP is in favor of Taiwan independence. The image of the KMT is as a mainlanders’ and Chinese nationalists’ party, whereas the image of the DPP is as the local Taiwanese party. Therefore, speaking vernacular Mandarin or standard Mandarin

has come to indirectly index political alignment. Speaking more standard Mandarin would presuppose indexing Mainlander identity and thus indirectly indexing the speaker's political ideology or orientation toward the KMT because that is the official language the KMT enforced. Speaking with vernacular features, on the other hand, would directly index the local Taiwanese identity and therefore indirectly index the political alignment with the DPP, because the DPP has been trying to promote the status of Taiwanese language and emphasize local Taiwanese identity. This is what Silverstein regards as a second-order indexicality. Figure 1 shows how the orders of indexicality in contemporary Taiwan.

In the following sections, adopting methods from perceptual dialectology, I will discuss how first-order and second-order indexicality and new language ideologies have emerged in this era of political battle by examining people's perceptions of different varieties of Taiwan Mandarin. First, I will discuss the rationale for choosing the two varieties: Taipei accent and Taichung accent, and also describe their linguistic differences. Then, I will discuss the methods of this perceptual dialect study and the results.

3. Comparison of Taipei Accent versus Taichung Accent

Taipei accent and Taichung accent are chosen because of the special status of both regions. Taipei is Taiwan's center of politics, commerce, mass media, and thus, in terms of language use, the official language Mandarin is preferred by most speakers. Moreover, Taipei has a much higher concentration of Mainlanders, whose Mandarin is considered to be more similar to the standard Mandarin in Beijing and is less influenced by the local dialect Taiwanese. Therefore, Taipei accent is generally perceived as the standard Mandarin in Taiwan. On the other hand, Taichung, located in central Taiwan, the third largest city next to Taipei and Kaohsiung, is chosen because it serves as the north-to-south corridor and is also the first major Southern Min (i.e. Taiwanese)/Mandarin region south of Taipei (Hsu 2004). Moreover, researchers have found that people in central Taiwan display some salient phonological variants that are different from people in non-central Taiwan. For example, Fu (1999) finds that people with a Taichung accent use a certain rising tone of T3² (pitch value 324) which is different from the usual realization of low-falling T3 (pitch value 31) by other non-Taichung people. Wu (2003) examines speakers in central Taiwan and suggests that there is a tendency of T4 rising at the intonation-unit-final position. Another noticeable feature that distinguishes Taichung accent from Taipei accent is the substitution of lateral [l] for alveolar approximant rhotic

² Fon and Chiang (1999) analyzed the tonal value and proposed that tone contour in standard Taiwan Mandarin should be T1:44 (high-level); T2:323(dipping); T3: 31(low-falling); T4:42 (high-falling).

[ɾ]³. For example, the pronunciation of ‘person’ by Taichung speaker might be ‘len2’ [lɿn] instead of ‘ren2’ [ɾɿn]. It is already known that the retroflex sounds in standard Taiwan Mandarin are softened considerably compared with the standard Mandarin in Beijing due to the influence of Taiwanese (Kubler 1985). Even though the substitution of [l] for [ɾ] is not a unique feature in Taichung accent, it exists frequently in bilingual speakers of Mandarin and Taiwanese; Taipei speakers have been found to pronounce a more noticeable retroflex [ɾ]. Therefore, I also treat these variants as regional.

4. Methods

4.1. Stimulus Materials

Four Taipei Mandarin speakers and four Taichung Mandarin speakers were recruited through “a friend of a friend”(Milroy 1980). They are all natives of their respective regions and all have graduate college education. Their age ranged from twenty-five to thirty. The speech data were collected by means of reading passage and story elicitation. The reading passage was a transcription of a two- minute authentic speech sample, and the speakers were asked to read it as naturally as possible. In the story elicitation, speakers watched “The Pear Stories” film designed by Chafe (1980) and were asked to summarize what saw. After listening to the speech data and inspecting the spectrograms and pitch range, I excluded the data from the reading passage for their lack of authenticity as natural speech. From the eight speakers, I further selected two speakers, a male and a female, from each region because their speech data revealed clearer and more representative tokens of the regional features. Finally I selected a 30-second stimulus from each speaker that has the least nuisance such as hesitation markers, long pause, or inconsistent speech rate etc. that might affect listeners’ judgment.

4.2 Listeners

One hundred and fifty-eight undergraduate and graduate students were recruited from two national universities in Taipei. Their age range is from twenty to thirty. The 158 listeners, consisting of 75 males and 83 females, are all native Taiwan-born and consider Mandarin as their first language. Among the 158 listeners, 38.6% (n=61) are local Taipei citizens, followed by Taichung citizens (21.5%, n=34). About 40% of the listeners grew up in other cities/counties in northern, southern or eastern Taiwan.

³ It has been suggested that the standard Taiwan Mandarin lose some quality of retroflexion. Therefore, I adopt the alveolar approximant rhotic [ɾ] instead of the retroflex fricative [ʐ] used in Beijing Mandarin to better describe the retroflex r- in Taiwan Mandarin.

4.3 Procedure

Listeners were asked to listen to four speech samples from the four speakers and complete a questionnaire. The five-page questionnaire included questions for each speech sample and one for demographic information.

First, listeners rated the voice on twelve traits using a six-point scale. Then the listeners were asked to speculate about the region where the speaker is from in a forced-choice question with five choices: Taipei, Taichung, Hsinchu, Chiayi and Kaohsiung, cities located from northern Taiwan to southern Taiwan. If applicable, listeners were asked to explain their choice. The purpose of this question was to see if listeners' categorization judgments of where the speakers are from would affect their linguistic attitudes. Next, listeners were asked to check any and all items that applied to the speaker's ethnicity and also to specify the reasons for their choice if applicable. Then they were asked to speculate about the home region (from north, central or south of Taiwan) and community type (from city or country) of the speaker. Lastly, listeners were asked to provide any other comments they had about the speaker. After all the listeners finished the language attitude survey, they were asked to fill out brief background information.

5. Results

5.1. Listeners' Perceptions of Speakers' Background

Although listeners from the same region were generally more successful at recognizing speakers from their own regions, the result does not yield a significant difference in listeners' recognition of speakers by listeners' regions ($p > .05$). In terms of recognizing the Taichung male speaker, listeners from Taipei even show slightly higher accuracy rate than listeners from Taichung (31% correct versus 26% correct). Therefore, listeners' hometown or region may not be the main factor that influences their judgments, and thus their perceptions of the speakers based on their regions will not be discussed.

Regions Speakers	Taipei	Hsinchu	Taichung	Chiayi	Kaohsiung	Total
Taipei female	116	23	8	6	5	158
Taipei male	120	14	6	5	13	158
Taichung female	8	21	87	28	14	158
Taichung male	0	7	40	53	58	158

Table 1. Listener's perceptions of the regions where the four speakers belong

Table 1 shows that listeners generally are more successful in recognizing the two Taipei speakers and the female Taichung speaker than the male Taichung speaker. Moreover, it appears that listeners tend to perceive the male Taichung speaker as one from southern Taiwan ($n=111$). One possible reason may be due to the speaker's frequent tokens of the

substitution of vowels [uo] and [ou] for [ɔ], which are salient features of Mandarin influenced by Taiwanese (Kubler 1985). For example, *ran2hou4* ‘then’ in standard Mandarin is pronounced as *lan2ho4*; *shui3guo3* ‘fruit’ is realized as *shui3go3* in Taiwanese Mandarin. As mentioned earlier, speaking more vernacular Mandarin directly indexes the “southerner”, therefore, it should not be surprising that the majority of listeners recognize the male Taichung speaker as a southerner even though his speech data are rich in phonological features of Taichung accent. On the other hand, although the female Taichung speaker also shows tokens of the substitution of [ou] to [ɔ], such as her pronunciation of *shi2hou4* “the moment” as *shi2ho4*, her frequent tokens of rising T4 in the final position of sentences might have led the listeners to recognize her regional accent because terminal rising tone has been discussed mostly commonly as the “special Taichung accent” by non-linguists in Taiwan. One listener comments on the female Taichung speaker, “tade taizhongqiang haominxian, yiuqishitashuo ‘shang’ deshihou” [her Taichung accent is so obvious, especially when she pronounced *shang4*]. Taking together listeners’ perceptions of both Taichung speakers, the results seem to support previous research that salient dialect-specific properties are important cues for linguistically naïve listeners to pinpoint a speaker’s regional identification (Clopper and Pisoni 2004).

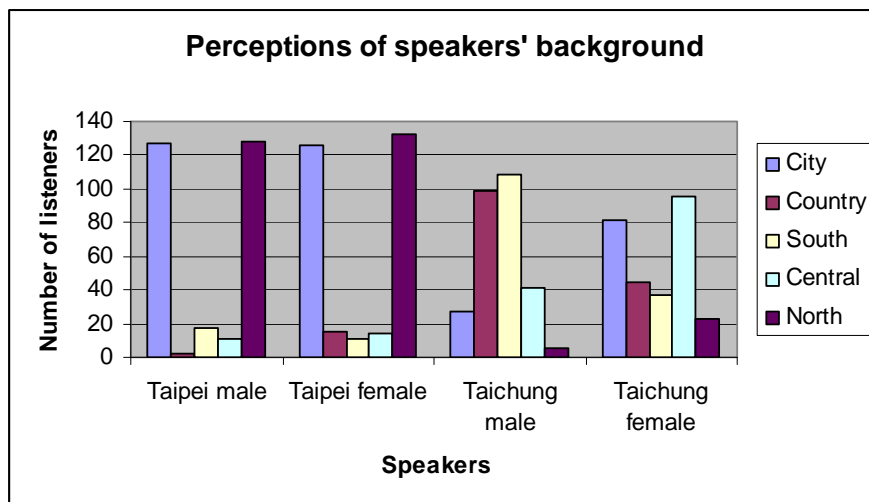


Figure 2. Perceptions of speakers’ background

The majority of the listeners did not have trouble recognizing either Taipei speaker. One listener commented on Taipei accent, “taibeiqiang jiushi meiyou tese” [Taipei accent has no characteristics]. If a person speaks standard Mandarin, that is, the Mandarin that the KMT government brought to Taiwan and is taught in school, they will likely be identified as people from Taipei. Moreover, once listeners recognize that a speaker has a Taipei accent, they also tend to judge the speaker as from the city; on the contrary, if they

identify a speaker as having a southern accent, they naturally judge the person as from the country. From Figure 2 it is clear that both Taipei speakers are judged as from the city by more than 120 listeners, and the female Taichung speaker is judged as from the city by approximately 80 listeners. This may be because Taichung is known as the third biggest city in Taiwan. As for the male Taichung speaker, he is judged both as from the country and from the south because of his accent. One listener made an interesting comment on the male Taichung speaker, “wuojuede taxiang meizuoguo feijide xiangxiaren” [I think he sounds like a countryman who’s never taken a plane]. This suggests that speaking standard Mandarin also indexes urbanity.

Compared with the perceptions of speakers’ regional affiliations and urbanity, listeners show more discrepancy in their identification of speakers’ ethnicity. This demonstrates the complexity of the ethnic situation in Taiwan. Different people have different ideologies about ethnic identity, and many people have double or multiple orientations toward ethnicity. For example, some claim that Taiwanese are Chinese (this is very rare now compared with how it used to be), some suggest that Southern Min are Taiwanese or home-province people are Taiwanese, some believe that Mainlanders are Chinese, and there are many other different double-identities claimed by different people. Table 2 shows the complexities of ethnic identity in Taiwan. Among the four speakers, the Taichung male speaker is identified as Taiwanese and a home-province person by most listeners, followed by the Taichung female, the Taipei female, and last the Taipei male. In addition, 43 % of the listeners consider both Taichung speakers as Southern Min, while fewer than 13 % of the listeners categorize both Taipei speakers as Southern Min.

	Taipei female	Taipei male	Taichung female	Taichung male
Chinese	2	5	2	1
Taiwanese	127	105	140	151
Home-province	50	42	67	80
Mainlander	38	65	3	1
Southern Min	20	13	68	68
Hakka	5	3	53	0
Aborigine	0	0	0	6
Total	158	158	158	158

* Listeners can check all that apply to the speakers

Table 2. Perceptions of speakers’ ethnicity

On the other hand, the Taipei male is identified as a Mainlander by 41% of the listeners and the Taipei female is considered as a Mainlander by 24% of the listeners, whereas the Taichung speakers are rarely regarded as Mainlanders. Taken together, these findings show the linguistic ideology people in Taiwan have toward different accents. Speaking standard Mandarin has become a marker for Mainlander identity. In contrast, the more Taiwanese Mandarin features the speaker has in their speech, the more people would

identify them as belonging to home-province or Southern Min groups. If a person speaks with a heavily accented Mandarin, they may even be regarded as aborigines, the people that have been stereotyped as an undeveloped, rural, minority group. Another interesting finding is that the Taichung male is even identified as aborigine by six listeners. This suggests that listeners may perceive his Mandarin as more vernacular than the Taichung female's Mandarin. However, it should be noted that it is also possible that listeners may be evaluating based on the gender of the speakers, rather than on their language (Cheshire 1998), since it has been suggested that there is a tendency to judge male speakers with regional accents as more non-Standard than their female counterparts. This might explain the divergence of regionality in the listener judgments of the Taichung male in contrast to the Taichung female speaker.

5.2. Listeners' Language Ideology and Their Perceptions of the Speakers

Multivariate regression was chosen for analysis because it allows the researcher to generalize results beyond the small sample size and also provides a rich description of whether there are interactions between speakers' gender, region of origin, listeners' perceptual categorization of the speakers, and their ratings of each speaker. In addition, multivariate analysis allows examination of whether and to what extent different factors have an impact on listeners' judgments of the speakers on twelve traits all at once. The results show that the gender factor is only statistically significant in judging speakers' easygoingness ($p < .05$). This might be due to listeners' perceptions that females are generally more easygoing than males. On the other hand, speakers' regional factor is statistically significant in judging education, income, standard accent, political orientation ($p < .001$), intelligence, and Taiwanese and English language ability ($p < .05$). Listeners' perceptual categorization of the speakers also significantly influences their judgments in rating education, income, accent, political orientation, class ($p < .001$), Taiwanese and English language ability, and also intelligence ($p < .01$). The results suggest that where the listeners identify the speakers are from seems to be the most important factor influencing their ratings. Table 3 shows the mean scores of eight traits for four speakers. It is clear that the Taichung male speaker receives the lowest mean score for standard accent because he is identified most as a southerner, while the Taipei male obtains the highest score for speaking standard Mandarin since he is recognized most as a Mainlander.

Mean								
speaker	education	income	accent	pan_blue	taiwanese	highclass	English	Intelligent
Taipei_female	4.51	3.99	4.52	4.22	3.15	4.44	3.98	4.22
Taipei_male	4.89	4.77	4.85	4.65	3.22	4.64	4.63	4.69
Taichung_female	3.75	3.47	3.30	3.16	4.21	3.92	3.29	3.68
Taichung_male	3.35	3.13	2.72	2.68	4.98	3.58	2.80	3.41

Table 3. Mean ratings of the eight traits judged by listeners

Next, product-moment correlations were performed to see if there are correlations between standardness and other judgment scales. As shown in Table 4, there are highly significant positive correlations between standardness and education, income, political orientation, class, English language ability, and intelligence. There is a high significant negative correlation between standardness and Taiwanese language ability, and there are low correlations between standardness and easygoingness, selfishness, friendliness, and sincerity. The results show that the general language ideology of people in Taiwan is as follows: if a person is judged as speaking Mandarin with a more standard accent, he or she would more likely be considered as highly-educated, high-class, smart, having high-income, belonging to pan-blue, able to speak English and not able to speak Taiwanese. On the contrary, if a person is rated as a Mandarin speaker with a heavier vernacular accent, he or she would be more possibly be viewed as low-educated, low-class, not smart, having low-income, belonging to pan-green, not able to speak English but able to speak Taiwanese. One thing worth noting is that the correlation between accent and political orientation receives the highest coefficient ($r=.737$) among all the traits. This implies that the people in Taiwan are aware of the linguistic differentiation manipulated and emphasized by the politicians. Also the result reflects a linguistic ideology rooted in alignment with different political parties.

Traits	Correlations
High-Educated ↔ low educated	.719**
High-income ↔ low income	.681**
Pan-blue ↔ pan-green	.737**
Speaking Taiwanese ↔ not speaking Taiwanese	-.549**
High- class ↔ low-class	.637**
Speaking English ↔ not speaking English	.690**
Easygoing ↔ not easygoing	-.150**
Selfish ↔ not selfish	.270**
Friendly ↔ not friendly	-.086*
Sincere ↔ not sincere	-.082*
Intelligent ↔ not intelligent	.588**

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Table 4. Correlations between standard accent and eleven traits by listeners

Moreover, previous studies have suggested that people tend to rate speakers with a standard accent more positively in terms of status traits such as education, income, class and intelligence and speakers with a regional accent more positively in sociability traits such as easygoingness, unselfishness, friendliness and sincerity (Ryan and Giles 1982). However, the current study does not support this. Although the Taichung male speaker

receives slightly higher scores in those sociability traits than the Taipei male speaker, there are minimal correlations between accent and the four sociability traits (easygoingness, unselfishness, friendliness and sincerity), which suggests that a person's accent might not be an important factor in evaluating him or her easygoing, friendly, sincere or selfish. One possible explanation is that listeners generally have assumptions about which group typically uses certain linguistic features and they associate the linguistic forms with the objective social attributes (i.e. status traits) of that group. As for the sociability traits, listeners may rate the speaker differently depending on some subjective factors such as whether they like the voice, whether they are from the same region as the speaker, whether they think they have the same political ideology as the speaker, etc. Therefore, it is not surprising that speakers generally agree on their judgments on the speakers in terms of the status traits but there are more individual differences in terms of judging the sociability traits.

6. Discussion

Language attitude is not just established independently of people's perceptions toward different categories or behaviors, but rather, it also includes participants' understanding of the social meanings of the linguistic features along with local history and social settings (Irvine, 2000). Irvine further suggests that sociolinguistic differentiation exists especially when social opposition is salient. The situation in Taiwan provides a good example for the emergence of linguistic differentiation due to social opposition.

The metapragmatic awareness of the listeners in the current study reflects the language ideologies and linguistic differentiation that are constructed in Taiwan. When a person speaks with an accent, the indexical meanings directly associated with this accent are the region of the speaker and their ethnicity. A person is probably a Mainlander from Taipei metropolitan area if he or she speaks with a standard accent. A person is likely to be from Southern Min group in central Taiwan if the speech reveals some linguistic features of Taichung accent. A person may be identified as Southern Min from a southern rural area because of their Taiwanese-influenced Mandarin. Then other indexical values associated with certain regions and linguistic varieties emerge along with the direct indexicality. For example, the listeners rate the speakers they recognize as from Taipei higher in traits associated with Mainlanders and Taipei metropolitans such as pan-blue, high education, high income, high class, and able to speak English. On the contrary, they recognize the Taichung male speaker as from the south, and thus rate him higher in traits associated with Southern Min and southern rural areas such as pan-green, low education, low income, low class, and able to speak Taiwanese.

Another interesting finding is how the listeners notice small linguistic differences and explicitly assign identities and meanings to different linguistic resources they encounter according to their presupposed ideologies. As Bucholtz and Hall (2005:594) summarize how identity relations emerge:

Identity relations emerge in interaction through several indexical processes, including (a) overt mention of identity categories and labels; (b) implicatures and presuppositions regarding one's own or others' identity position; (c) displayed evaluative and epistemic orientations to ongoing talk, as well as interactional footings and participant roles; and (d) the use of linguistic structures and systems that are ideologically associated with specific personas and groups.

The following excerpts are examples of comments the listeners wrote about the four speakers. The examples demonstrate how indexical processes occur through metapragmatic comments:

- (1) (commenting on the Taichung female) yinwei jianhua weiyin you nanburen jianhua de ganjue, xiangshi “ranhou” [because her final tone sounds like a southerner, such as “then”].
- (2) (commenting on the Taichung male) xiangxia, taiwanguoyu koyin [rural, Taiwanese Mandarin accent]
- (3) (commenting on the Taichung female) ta yongle henduo yuzhuci “ranhou” , erqie buhui juanshe [she uses a lot of discourse marker “then” and she can't pronounce retroflex].
- (4) (commenting on the Taipei female) keneng yinwei wojuede ta buhui shuotaiyu, yingai jiaoyu bucuo [maybe it's because I think she can't speak Taiwanese, she should be high-educated].
- (5) (commenting on the Taipei male) zizheng qianyuan [each character has the right tone, the intonation flows smoothly]
- (6) (commenting on the Taipei female) fayin hen biao zhun, qiandiao henxiang taibeiren [the pronunciation is very correct, the accent seems to be a Taipei accent]
- (7) (commenting on the Taipei female) gai juanshe de yin douyou zuodao [she pronounces all the sounds that should be retroflexed]
- (8) (commenting on the Taipei male) shuohua zhuangqiang zuoshi de [his speech is full of prunes and prism]
- (9) (commenting on the Taipei male) ganjue heguo yianmoshui de youqienren, zhuang ABC [I feel like he's a rich person who's studied abroad, pose as an ABC].
- (10) (commenting on the Taichung male) ganjue hen local, henlaoshi, meizixin, ren [r]→[l] (sounds very local, very simple-minded, not confident, person [r]→[l])

We can see from the excerpts that listeners use different indexical processes to associate the speakers with certain identities. For instance, in excerpt (1) the listener overtly labels the speaker as a southerner because of her linguistic features in final tone; similarly, in

excerpt (6) the speaker is overtly categorized as from Taipei because of her correct pronunciation. As in excerpts (3), (5), (7) and (10), although the listeners do not directly put a label on the speakers, they notice the linguistic features that are usually associated with specific groups and thus rate the speakers based on these ideologies. For example, being able to pronounce retroflex sounds and correct tones indexes Mainlanders or Taipei citizen, while the use of too many discourse markers or the loss of retroflexion seems to index southerners. Besides, listeners also evaluate the speakers based on their own presupposed ideologies. Excerpt (2), (4), (8), (9) demonstrate this. In (2), the listener relates Taiwanese Mandarin to rural people; in (4) the listener assumes that the speaker can not speak Taiwanese and therefore belong to the high-educated level because speaking Taiwanese again, indexes rural uneducated people. As for (8), the listener reflects how many non-Taipei people resist the “big Taipei-ism” (Su 2005: 89), which refers to viewing Taipei as the unique center of power, economics, language, education, globalization, and so forth. As a result of this resistance, they also reject the Taipei accent, which has been viewed commonly as standard Taiwan Mandarin. Similarly, the listener in (9) also implies his or her presupposed ideology about the Taipei accent. English proficiency, as well as the previously mentioned broken Taiwanese speaking ability, are two distinctive characteristics with which many young people in Taipei associate themselves. However, the listener describes the speaker as “pose as an ABC” ,which again reflects that non-Taipei people reject the superiority and cosmopolitanism with which the Taipei people identify themselves. “Fake ABC” is a term used by young people in Taiwan to describe those, particularly the northerners, who try to imitate the ABC accent or code-switch to English to show their superiority.

The above-mentioned examples demonstrate that once listeners recognize cues for dialect-specific features, they would impose their presupposed ideologies on the speakers and assign social meanings to those linguistic features. These social meanings do not come out of the blue, but rather, they emerge ideologically through listeners’ understandings of salient social groups, local history, and relevant activities and practices.

7. Conclusion

“To understand why and how a given market, or society, evaluates the language used in a public speech requires one to look at the whole history of language practices in that market” (Sandel 2003:525). How linguistic differentiation was established and how the indexical values of linguistic features were assigned in Taiwan should be understood in Taiwan’s historically political context. As Grillo indicates, “any study of linguistic dominance, linguistic hierarchy and linguistic inequality is inevitably a political study” (Grillo 1989, cited in Hsiao 2000:127). From 1949 until 1987, the KMT was the sole dominant party, and the government strictly enforced their language ideology of Mandarin as the only linguistic capital on the island. Language practices mainly indexed ethnicity. During the last two decades, the dramatic changes in Taiwan’s political situation with the growth and development of the DPP have resulted in the emergence of a new language

ideology and new indexicality. In this study, I have illustrated the consequence of the contested political ideologies manipulated by two parties: 1) different varieties of Taiwan Mandarin are linked to different social meanings and 2) people are assigned with identities and values based on the presupposed ideologies. This study has also demonstrated that the perceptual dialectological method can be used to examine how language ideologies are realized in people's metapragmatic comments and how different indexical values can be mingled together. For example, speaking regional Mandarin can index ethnicity, education, political inclination, Taiwanese or English proficiency, etc.

However, one major critique of employing survey methods to investigate language attitude and ideologies is that surveys do not adequately demonstrate people's durable socio-psychological states (Coupland and Jaworski 1998). Indexical values and language ideologies of certain linguistic features are not all established at once and it is difficult to measure or detect an on-going change in the indexicality or ideologies of linguistic features in the survey-type method because of its pre-designed value judgment forms. Therefore, in addition to the survey results reported here, a full understanding of attitudes toward Taiwan Mandarin requires ethnographic and discourse analytic approaches to examine speakers' assumptions about language, their articulation of their language ideologies and their interpretations of their and other people's language practice.

I conclude this study by revealing the ethnic and political backgrounds of the four speakers. The Taichung female speaker, born in a Southern Min family, speaks Taiwanese to her family and only speaks Mandarin for business. She hates the political conflicts in Taiwan and does not support either the blue or the green party. The Taichung male speaker, whose father is a Southern Min and whose mother is a Mainlander, speaks Mandarin to people from the north and Taiwanese to people from the south. His whole family belongs to pan-blue. The Taipei female speaker, born in a Hakka family, is a newly-wed with a Southern Min husband, and speaks Mandarin mostly. Last, the Taipei male speaker, born in a Southern Min family, speaks Mandarin mostly but would speak Taiwanese to his male friends. He identifies himself with pan-green and supports Taiwan independence.

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Choices in Terms of Address: A Sociolinguistic Study of Chinese and American English Practices

Xizhen Qin
The Ohio State University

Previous studies have shown that similarities and differences exist between Chinese and English on terms of address. Data about usages of terms of address in these studies were obtained from questionnaires. In this study, the usages of address are collected from movies which are considered to better reflect social reality by portraying various interpersonal relationships in different situations. Fifty-six different forms of addresses used in these movies are recorded and analyzed in specific contexts. The findings indicate that besides the determinants of interpersonal relationship, factors in a context including who, when, where, to whom the address form is used and with what kind of intentions also play important role in determining the choice of terms of address, both in Chinese and English.

1. Introduction

Terms of address, defined loosely as words used in a speech event that refer to the addressee of that speech event, can be extremely important conveyors of social information (Parkinson 1985:1). In this article, the term “terms of address” only refers to vocatives, i.e. terms of direct address to call persons (Chao 1956:217), such as names, like *Mary*, titles without a name, like *Sir* and *Doctor*, or any word used to address a person, like *hey* and *man*.

The study of personal address has always been a popular topic within sociolinguistics, because terms of address open communicative acts and set the tone for the interchanges that follow. Also they establish the relative power and distance of speaker and hearer (Wood and Kroger 1991:145).

Notable among other studies, Brown and Ford (1961) proposed the semantic rules governing address in American English based on a varied collection of data. They found that the most common forms of address are the first name (FN) and the title plus last name (TLN) in American English and that status and intimacy between speakers are the two major factors that determine the choice of address. This characteristic was later on expressed as the Invariant Norm of Address (Brown 1965), which is claimed to constitute a culturally universal rule: that the linguistic form used to an inferior in dyads of unequal

status is used in dyads of equal status among intimates, and that the linguistic form used to a superior in dyads of unequal status is used in dyads of equal status among strangers. This invariance has been confirmed for a variety of disparate European and non-European languages (Befu and Norbeck 1958; Brown and Ford 1961; Slobin 1963). Furthermore, Kroger, Cheng and Leong's study claimed that the universal relationship between social power and intimacy can also be extended to Chinese (1979).

Kroger, Wood and Kim (1984) further compared the usage of terms of address in Korean, Greek and Chinese, which revealed substantial cross-cultural consistency.

However, Chinese is far distant from American English linguistically and culturally. Firstly, Chinese is a member of the Sino-Tibetan language family and completely unrelated to Indo-European, to which English and most other European languages belong. Secondly, Chinese culture is one of the oldest surviving cultures which has developed separately for thousands years. In terms of address, the actual usages of addresses in these two societies are expected to vary. On one hand, terms of address reflect interpersonal relationships. In China, that the family is the basis of society is perhaps more true of China than of any other highly developed nation, hence the Chinese have been interested in relationship terms from ancient times until the present (Chen & Shryock 1932:623). However, the U.S. lacks China's long and continuous history, and its population is more ethnically and culturally diverse. On the other hand, terms of address embody rules of politeness and underlying cultural ideology. Address forms are an integral part of polite language use and therefore they figure prominently in several of the strategies described by politeness theory (Brown & Levinson 1987). Since politeness rules vary in different cultures, terms of address will vary accordingly to adapt to different rules.

Chao (1956) provided a detailed description of the conditions of actual use of terms in various interpersonal relations among Chinese people, the grammatical status of the terms of address, and the formal conditions for their occurrence. One outstanding characteristic of Chinese terms of address is it has a much more complicated kinship system than that of American English.

Zhou (1998) investigated how to address non-family members among Chinese and Americans by questionnaire. The findings suggested that great differences exist between the two languages because of the distant cultural tradition and social background. Firstly, kinship terms are extended to non-family members in Chinese while it is rare in American English. Chinese use kinship terms, such as grandpa, grandma, aunt, uncle, brother and sister, to address their parents' friends, their colleagues and friends. However, Americans use general social terms of address to address these non-family members, such as Mr., Ms., Miss or given names. Second, titles are used more often to address superiors by Chinese than by Americans.

Wang (2003) also noticed the differences between these two languages in terms of using titles and kinship terms when addressing people. He ascribed these differences to different sociocultural factors and politeness rules. For example, seniority is regarded

more highly in Chinese than in the U.S. Therefore, age is considered an important factor in determining the choice of terms of address in Chinese. Moreover, it is considered polite to be humble and to show respect to others in Chinese culture while it is standard for most relationships to be regarded as equal in American culture. Therefore, more nonreciprocal exchanges of address are used in Chinese while there are more reciprocal exchanges in English.

To sum up, in terms of the comparison between Chinese and American English, these studies draw the following conclusions:

- 1) The Invariant Norm of Address can be applied in both languages. Status and intimacy are two factors influencing the choice of address, which indicates its substantial cross-cultural consistency.
- 2) The actual usages of terms of address in these two languages vary greatly. The system of terms of address is more complicated in Chinese than that in American English. Major differences are the usage of kinship terms and usage of titles.
- 3) The reasons leading to these differences can be traced to the cultural background, historical development, and social structure.

In the past, investigators have relied largely on questionnaires to obtain data. For example, Zhou (1998) investigated the actual usage of address among Chinese from 27 provinces and among Americans from 35 states by means of questionnaires. Kroger et al. (1979, 1984) designed a Chinese Forms of Address Questionnaire (CFAD) to collect data. Although one can collect a large amount of data in a short time by using a questionnaire, its disadvantages are substantial. First, when being asked which forms of address ought to be used vis-à-vis target persons, respondents usually gave answers based on imaginary situations. Being given only a question or a brief description of a situation, they could only rely on their memory of their own or others' experiences. Thus the responses were very likely unnatural, incomplete, or even inaccurate. Furthermore, if respondents have never had the occasion to address the target person, they may have to give a hypothetical answer. For instance, if they have never had a chance to address their parents' superiors, they would select a form of address for the questionnaire which may not be the one they would actually use in real communication.

Additionally, most studies in the past are formulated according to certain interpersonal relationships. A typical survey would ask how participants address people such as your colleagues or your superiors. Kroger et al (1979) conducted a survey through questionnaires which asked participants to select which forms of address are used vis-à-vis target persons from multiple choices. By doing this, interpersonal relationships become the only factor that determines the choice of term of address while other factors are ignored.

To avoid the potentially unnatural and imaginary responses in a questionnaire, the data of forms of address should be collected from various situations in daily life among different people. In this study, the usages of address are collected from movies because movies reflect social reality by portraying various interpersonal relationships in different situations.

The purpose of this study is (a) to investigate the factors that may influence the choice of terms of address besides interpersonal relationships; and b) to examine the differences between Chinese and Americans regarding the actual usage of address in situation-based contexts. In this way, we hope to measure address exchange from a livelier and more realistic perspective than questionnaires.

2. Data and Method

In this study, I collect the usage of addresses from two Chinese movies, *A Watched Pot Never Boils* and *Crazy Stone*, and two American movies, *Shallow Hal* and *Million Dollar Baby*. All these movies were produced after 2001. They portray the daily lives of people in modern-day U.S. and China. Therefore, terms of address in these movies represent their actual usage in current society.

All terms of address that appear in these movies are recorded as well as the context in which each term of address is used, including the relationship between addresser and addressee; the personal information of the two speakers including their gender, age, profession, the place where the speech event occurred, and other information such as the motivation of the speaker.

There are about 35 different terms of address in the Chinese movies and 21 in the American movies used between family members, friends, colleagues, strangers and so on. The situations cover the most common places people work and live, including interactions at home, workplaces, and other social institutions such as hospitals and restaurants.

In order to compare the results with those of past studies, the method of classifying these terms of address used in these movies follows the format established by Kroger et al. (1984). Based on Brown's Invariant Norm of address, Kroger divided interpersonal relationships into six categories according to equality and intimacy. The six dyadic categories are illustrated in the following chart. These are: (a) unequal intimate dyads: self superordinate; (b) unequal intimate dyads: self subordinate; (c) unequal non-intimate dyads: self superordinate; (d) unequal non-intimate dyads: self subordinate; (e) equal intimate dyads; (f) equal non-intimate dyads (Kroger et al. 1984)..

3. Results and Discussion

The 56 forms of address used in the movies are grouped under the six dyadic categories identified in the following six tables. They are expressed as 1) the relationship between addresser and addressee; 2) the addresser and addressee; 3) actual usage of terms of address in real communications; 4) description of the context in which the term of address is used, including when the term of address is used, where the speech event

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occurs, and other situational information. The six tables depict the forms of address used between each category of dyads in Chinese and English.

Table 1. Terms of address used in the equal and intimate dyad

	Relationship	Addresser/ Addressee	Address form	Description of the context	
C H I N E S E	Friend	His colleague/ Sanbao	FN	His colleague calls him <i>Sanbao</i> at their workplace. Both are security guards, male, in their twenties.	
		His colleague/ Bao Shihong	LN+Kinship term	One colleague who is younger than Bao Shihong calls him <i>Bao ge</i> [Bao Brother] at their workplace or in other situations. They have a very good relationship.	
		Mr. He/ Bao Shihong	Old+LN	Mr. He, a police officer, calls Bao Shihong <i>Lao Bao</i> [old+LN] when Mr. Bao comes to the police station and asks for Mr. He's help for a case. They are well-known alumni and have a very good relationship. Both are in their forties.	
		Bao Shihong/ Mr. He	Nicknames	Same as above. Bao Shihong calls his alumnus <i>He Danaoke</i> [He Big Head] when they meet because Mr. He has a big head.	
	Significant other	Chen Hong/ Liu Hao		LN+title	Chen Hong calls Liu Hao <i>Liu Shifu</i> [Liu Master] at the hospital when Liu comes to visit her. Chen felt sick and Liu brought her to the hospital and assisted her financially. Chen is very grateful to him. They just got to know each other at this time. Both Chen Hong and Liu Hao are in their late twenties. Liu Hao operates a manual cab. Shifu is a general term for blue-collar workers in China.
				LN+kinship term	When Chen Hong and Liu Hao become closer to each other, Chen Hong calls Liu Hao <i>Liu Dage</i> [Liu Brother].
				Full name	Chen Hong calls Liu Hao by his full name when their relationship develops further and they fall in love.
E N G L I S H	Friend	His neighbors, colleagues/Hal	FN	When they greet Hal, they always use his first name, <i>Hal</i> , no matter whether they are male or female, older or younger than Hal.	
		Sally/Walt	Boy	When Walt asks a favor from Sally, "Could you take me for a walk?" "Come on, boy." Walt is a disabled person. Both are in their thirties.	
		Rosemary/ Her friends	Guys	Rosemary addresses his friends when introducing her boy friend to them "Hi, guys, this is..." All these people are in their twenties and have a good relationship.	
	Significant other	Hal/ Rosemary Shanahan		Pet name	Most of the time Hal calls his girl friend Rosemary by this pet name <i>Rosy</i> , at Rosy's home when her parents are present, or with other friends.
				FN	He uses <i>Rosemary</i> to address his girl friend when he apologizes to her in front of Rosy's parents at a party.
				Sweetie	When they are alone or in private, Hal calls Rosemary <i>sweetie</i> .
		Rosy's mother/ Rosy's father	Darling	Rosy's mother calls her husband Darling at the dinner table when only her family members are present.	
	FN	Rosy's mother calls her husband <i>Steve</i> at a party when a lot of people are present.			

NOTES: FN = first name; LN = last name

Table 1 shows the terms of address used in the equal and intimate dyad such as friends, well-known colleagues, alumni and significant others.

In terms of the differences between Chinese and English, it is found that age is an important factor that influences the choice of term of address in Chinese but not in English. For example, first name is used in English between friends or colleagues regardless of age. But in Chinese, to address colleagues or friends who are middle-aged or older, old plus last name is more common and polite. First name is more commonly used between young people. Additionally, kinship terms are used between friends in Chinese but not in English.

As can be seen, the forms of address vary greatly in different contexts, both in Chinese and English. This is due to several factors as follows.

Firstly, the factor of time plays an important role in the choice of terms of address. Note that here time not only refers to physical time but refers to particular situations. As shown in Table 1, three different address forms are used between Liu Hao and Chen Hong. The change of address forms signifies the development of their relationship. In the movie *A Watched Pot Never Boils*, the two persons do not know each other at first but later on they become close friends and get married. At the very beginning of the movie when they just get to know each other, Chen Hong calls Liu Hao as *Liu Shifu* [Liu master]. When they become closer to each other, she calls him *Liu Dage* [Liu brother]. And finally the address form is changed to *Liu Hao* when their relationship develops further. This factor of time suggests that the choice of terms of address is a dynamic phenomenon. One may choose different address forms for the same person at different stages.

Meanwhile, there are various address forms used in the same dyad, and in most cases they are not interchangeable in a certain context of communication because different forms of address convey different meanings. In Table 1, four different forms of address are found between well-known colleagues or friends in Chinese: first name, old plus first name, nickname, first name or last name plus brother. For example, Bao Shihong is addressed as *Lao Bao* [old plus last name] by his well known alumni. Because Mr. Bao is in his forties, old plus last name is used to show respect. But Mr. Bao does not address his former classmate in the same way as *Lao He*, rather he uses *He da naoke* [He big head]. Using a nickname demonstrates their intimacy. Audiences can easily sense the good relationship between them just from this form of address.

It is also important in what location the terms of address are exchanged. In Table 1, Hal usually calls his girlfriend Rosemary Shanahan *Rosy* in public, but *sweetie* in private. Also he uses *Rosemary* to express his sincerity when he is apologizing to her in front of her parents at a party. Another example is the address forms used by Rosemary's mother when addressing her father. As shown in Table 1, she addresses her husband as *Darling* at the dinner table where only family members are present while she calls him *Steve* at a party where a lot of people are present.

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Table 2. Terms of address used in the equal and non-intimate dyad

	Relationship	Addresser/ addressee	Address forms	Description of the context
C H I N E S E	Service person and customer	Marriage agent/ Liu Hao	LN + title	The boss of the marriage agency greets Liu Hao, his customer, by <i>Liu Shifu</i> [Liu Master]. They know each other well.
	Customer and service person	Passenger/ Liu Hao	Profession	A female passenger is calling Liu Hao <i>Sanlunche</i> [Tricycle] from across the street, for she wants to take his manual cab.
	Colleague, relationship not very close	He Wenlan/ Liu Hao	LN + title	Miss He comes to see Liu Hao to ask for a favor and calls him <i>Liu Shifu</i> [Liu Master]. They are co-workers but not quite familiar with each other.
		'Ye Lang'/ He Wenlan	Full name+Title	A man only known by his nickname 'Ye Lang' [wild wolf] is greeting his former colleague He Wenlan after a long separation. He calls her <i>He Wenlan Nvshi</i> [Madam He]. Ye Lang is flaunting his wealth and dallying with Ms. He.
		Secretary/ Manager	LN+Title	The secretary calls Manager Qin <i>Qin Jingli</i> [Manager Qin]. They are at the same company but not very close to each other.
	Patient and doctor	Patient/ Doctor	Profession title	Liu Hao calls a doctor <i>Daifu</i> [Doctor] when they talk at hospital. They do not know to each other.
	Student's parent and teacher	Liu Hao/ His son's instructor	Profession title	Liu Hao calls his son's teacher <i>Laoshi</i> [teacher] at school.
	Strangers	Liu Hao/ Passerby	Ai	Liu Hao greets a female passerby in a park by <i>ai</i> [Hey], because he does not know her name and thought she is the person he is waiting for. Both are in their twenties.
		Passengers	General title	The addresser using <i>Xiansheng</i> is from Hongkong, in his thirties.
		Passengers in a bus	General title	Judged from his accent, the addresser using <i>Tongzhi</i> [comrade] is from Northeast China, at his forties.
			General title	The addresser using <i>Shifu</i> [master] looks like a peasant and he is asking for help. Judged from his accent, he is from north China, in his thirties.
			General title	Judging from his accent, the addresser using <i>Xiongdì</i> [Younger brother] is from Beijing, north China. He is in his thirties. The addressee is a peasant, in his thirties.
			General title	The addresser using <i>Dage</i> [older brother] is making an apology to a passenger because he spilled Cola on him by accident. In another situation, he wants to borrow something from a stranger who is also taking a shower at a public bathroom. He also uses <i>dage</i> to start a conversation. Judging from his accent, the addressee is from North China, in his thirties. The two speakers are in their forties.
Business partner	Land agent/ Xie Qiangli, Head of a factory	Old + LN	The land agent calls the head of a factory <i>Lao Xie</i> [old + LN]. Because the factory is experiencing economic depression, the land agent is persuading him to sell his factory but the head of the factory is unwilling. The head of the factory is in his fifties and the land agent is slightly younger.	
	Police/ Xie Qiangli, head of a factory	LN + title	A policeman calls the head of the factory <i>Xie Changzhang</i> [Head of the factory Xie] when talking about a case with him.	

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E N G L I S H	Patient and doctor	Patient/ Doctor	Doctor	At a hospital. The patient does not know the doctor.	
			Dr. Sayed	At a hospital. The patient knows the doctor.	
	Service person and customer	Shop assistant/ Customer	Miss	The shop assistant is asking a lady whether she needs help.	
				Club assistant and club member	Club assistant/ Club member

Table 2 shows forms of address in the equal but non-intimate dyad. Three forms of address are shared in both languages: title, general address, and combination of last name plus title. In terms of the differences, in Chinese, kinship terms are used widely to address non-family members, like colleagues or strangers. For example, *xiongdì* [younger brother] and *Dage* [older brother] are used as a general term to address strangers. In English, the first name is also used within the non-intimate dyad, which is does not occur in the Chinese movies.

Again, address forms in this category reflect the influence of several factors in a context. One factor which determines the choice of address forms is the speaker's native place. China has seven major dialects and each of these influences the way people speak in different ways. For example, in Table 2, five general terms of address are found in the two Chinese movies: *tongzhi* [comrade], *shifu* [master], *xiansheng* [sir], *xiongdì* [younger brother], and *dage* [older brother]. These different forms reveal the speakers' different native homes.

The speakers' motivation further complicates the choice of terms of address. As shown in Table 2, *Dage* [older brother] is used by a passenger, when he apologizes to another passenger for spilling the cola on him by accident. He also used *Dage* [older brother] to address a stranger when he wanted to borrow something from that person. Here *Dage* [older brother] is used to shorten the distance between people and build up a relationship.

Table 3 indicates how a subordinate addresses their superordinate in the unequal and intimate dyad, such as when children address their parents or employees address their employers when they have a good relationship.

Obviously, address forms among family members in Chinese and English have some similarities. For the present we will limit our discussion to the several factors that create differences in people's choice of address forms.

In Table 3, emotion is recognized as a factor that influences the choice of address. For instance, in the Chinese movie *A Watched Pot Never Boils*, Liu Xiaohao is the stepson of Liu Hao. He does not want to call him Dad because he thinks his stepfather does not love him and he wants to distance himself from him. So he always addresses his stepfather as *Ai* [hey]. But later when he finally discovers that Liu Hao really cares about him and loves him, he changes the address form to *baba* [Dad]. Another example is the form of address used between Bao Shihong and Xie Qianli. Xie is the boss of Bao but they have a very close relationship. Bao usually calls Xie *Lao Xie* [old+LN]. But when

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Bao learns that Xie Qianli sold their factory to the land agent, he is extremely upset, so he uses his boss' full name *Xie Qianli* to scold him.

Table 3. Terms of address used in the unequal and intimate dyad (subordinate to superordinate)

	Relationship	Addresser/ Addressee	Address forms	Description of the context
C H I N E S E	Stepson and stepfather	Liu Xiaohao/ Liu Hao	Ai	In the first half of the movie, Liu Hao's stepson always calls him by <i>ai</i> [hey] because he does not like his stepfather and wants to distance himself from him.
			Kinship term	At the end of the movie, his stepson finally addresses Liu Hao with <i>baba</i> [Dad] because he finds out his stepfather loves him.
		His son's classmate/ Liu Hao	Kinship term	Liu Hao's stepson's classmate visits Liu Hao's home and addresses Liu Hao by <i>Shushu</i> [uncle].
		Liu Xiaohao/ His classmate's grandfather	Kinship term	Liu Xiaohao visits his classmate's home. He says hello to his classmate's grandfather by calling him <i>Yeye</i> [grandpa].
	Employee and employer	Bao Shihong/ Xie Qianli	Old+LN	Bao Shihong is the head security guard in the factory and Xie Qianli is the head of the factory. They have a very good relationship. Bao usually addresses Xie by <i>Lao Xie</i> [Old+LN] at their workplace.
			Full name	Bao Shihong is using <i>Xie Qianli</i> to scold him because he just learnt that he sold their factory to the land agent. Bao Shihong is extremely upset.
		Bao Shihong's subordinate/ Bao Shihong	LN+head	The addressee is the head security guard at a factory. There are several guards in his office. Those who are not quite familiar with Mr. Bao call him <i>Bao tou</i> [LN+head] at their workplace.
LN+brother			San bao is a security guard who gets along well with Mr. Bao, and he always calls Mr. Bao <i>Baoge</i> to show their intimacy. Sanbao is in his twenties, and Mr. Bao is in his thirties.	
	Manager Qin/ Board chairman	LN+title	Manager Qin always calls the board chairman <i>Feng Dong</i> . Manager Qin acts submissively towards the board chairman Feng who is very bossy. They know each other very well.	
E N G L I S H	Family members	Rosemary/ Her father	Kinship term	At home.
	Employee and employer	Hal/ Dave, his boss	FN	Dave is Hal's superior and they are very familiar with each other. This speech event occurs at Dave's office.

The five different address forms used between subordinate and superordinate in Chinese also shows that the choice of address form is determined by a number of factors besides interpersonal relationships. One factor is the degree of intimacy between the subordinate and superordinate. The term *Bao ge* [Bao Brother] means the subordinate has a brother-like relationship with the superordinate, while the term *Bao tou* [Bao head] recognizes the superior position of the superordinate while expressing a friendly

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intimacy. Another factor is the personality of the subordinate and superordinate. For example, Manager Qin always calls his boss as *Feng Dong* [Feng Chairman]. Not only is Chairman Feng very bossy and likes his authority to be acknowledged and respected, but also Manager Qin likes to flatter and caters to his boss's pleasure.

Table 4. Terms of address used in unequal and intimate dyad (superordinate to subordinate)

	Relation-ship	Addresser/ Addressee	Address forms	Description of the context
C H I N E S E	Father and son	Liu Hao/ Liu Xiaohao	FN	Liu Hao always calls his son by his first name <i>Xiaohao</i> .
	Colleague's mother and his son's colleague	Sanbao's mom/ Bao Shihong	Nickname	Sanbao is Bao Shihong's colleague and they have a good relationship. Bao Shihong visits his home and Sanbao's mom greets him using his nickname, <i>Baozi</i> [steamed dumpling]. Mr. Bao is also very familiar with his family members.
	Employer and employee	Xie Qianli/ Bao Shihong	Old+LN	Bao Shihong is the head security guard in the factory and Xie Qianli is the head of the factory. Bao is in his thirties and Xiw is in his fifties. They have very good relationship. They usually call each other <i>Lao Bao</i> and <i>Lao Xie</i> .
		Bao Shihong/ Sanbao	FN	Bao Shihong is the head security guard in the factory and Sanbao is his subordinate. They have a good relationship. Bao Shihong usually calls him by his first name.
E N G L I S H	Parents and child	Rosemary's mom/ Rosemary	Rosy	At home.
			My darling	At home.
E N G L I S H	Employer And employee	Dave/ Hal	Hal	Dave is Hal's superior and they are very familiar with each other. They usually address each other by their first names.
			Man	Dave is Hal's superior. When Dave is comforting Hal for not getting a promotion, Dave says, "Sorry, man," at his office.

Table 4 lists the address forms used in the four movies in the unequal and intimate dyad, such as when parents address their children, or employers address their employees.

In this category there is not much difference in the forms of address among family members between Chinese and English, both use first names and pet names. One minor difference is more endearment address forms are used in English among family members, such as *darling* or *sweetie*.

As for the address forms between employers and employees, two forms are found in Chinese movies: first name and old plus last name. This discrepancy results from the differences in age. Bao Shihong is in his thirties and Sanbao is in his twenties. Therefore, Bao Shihong is addressed as *Lao Bao* [Old+Bao] but Sanbao is addressed by his first name. There are also two forms between employer and employee in English, as shown in Table 4: *Hal* and *Man*. This difference is caused by the situational context. First name is used in normal situations while *man* is used to comfort Hal for not getting a promotion.

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Table 5. Terms of address used in the unequal and non-intimate dyad (subordinate to superordinate)

	Relationship	Addresser/ Addressee	Address forms	Description of the context
C H I N E S E	Employee and employer	Doctor/ The director of the office	Title	The doctor is asking about the director's decision at the hospital by using <i>Zhuren</i> [director] to address his superordinate.
		Staff/ Xie Qianli, the head of the factory	LN+Title	Most of the workers in the factory call the head of the factory <i>Xie Changzhang</i> [Head of factory Xie] at the factory.
	Service person and customer	Doorman/ a VIP customer	LN+Title	The doorman of a night club is greeting a VIP customer. He recognizes and flatters him by calling him <i>Yao Jingli</i> [manager Yao].
E N G L I S H	Boxer and coach	Maggie Fitzgerald/ Frankie Dunn	Title+LN	Mr. Dunn is a boxing coach, in his fifties. Maggie is his female boxer, in her thirties. They also become very close friends later on. In two situations Maggie addresses him by <i>Mr. Dunn</i> : 1. When they met for the first time. 2. When Maggie apologizes to him.
			Title	Whenever they talk about the fight, Maggie calls him <i>boss</i> .
	FN	When their relationship develops, and Maggie finds out that only Frankie can understand and support her. She said, "I got nobody but you, Frankie."		
Employee and employer	Hal/ His boss	Title+LN	Hal visits his boss's home for the first time. Hal addresses his boss as Mr. Shanahan. His boss is also his girlfriend's father.	

When it comes to the unequal and non-intimate dyad, it can be seen that titles are used much more often in both languages when a subordinate addresses a superordinate, as indicated in Table 5.

One interesting point worth noting is the address forms between the boxer and her coach in the movie *Million Dollar Baby*. Again, the factor of context influences the choice of address forms. When they talk about the fights, the female boxer always calls her coach as *boss*. But when they are talking about their personal life, she addresses him by his first name *Frankie*. In two other formal situations she addresses him as *Mr. Dunn*: when she introduces herself to him and when she apologizes to him.

Table 6. Terms of address used in the unequal and non-intimate dyad (superordinate to subordinate)

	Relationship	Addresser/ Addressee	Address forms	Description of the context
C H I N E S E	Teacher--student	Teacher/ Liu Xiaohao	Liu Xiaohao	Liu Xiaohao's teacher is angry because Xiaohao is misbehaving in her class. She does not like Liu Xiaohao because he is the trouble-maker.

Only one example is found in the unequal and non-intimate dyad among these four movies, but there are certainly more examples in actual situations. In this example, the teacher calls the student by his full name, which is common in Chinese society.

4. Conclusion and Future Study

The data clearly indicate that besides interpersonal relationships, context has a substantial effect on the choices of terms of address, both in Chinese and English. A number of factors – such as who, when, where, to whom the form is used, and with what kind of intentions – have a significant influence. Therefore, the choice of term of address cannot be determined without considering the concrete context in which the address forms are used.

Brown and Ford (1961:378) state that speaker may use more than one form of the proper name for the same addressee, sometimes saying TLN, sometimes FN or LN or a nickname, sometimes creating phonetic variants of either FN or the nickname. However, the choice is not arbitrary. For instance, several address forms can be used between friends in Chinese, such as given name, nickname, old plus last name, and last name plus brother. But in most cases, they are not interchangeable. If you address your friend by his nickname in a formal situation, that address form may embarrass him. But it would be appropriate in a private party. Therefore, people use different forms of address to express their intentions. For instance, the husband may address his wife as Jennifer when he is mad at her, whereas under normal circumstances he would call her Jenny. A Chinese man may intentionally use a girl's given name to show their intimacy. How one address another is not static but dynamic and contextualized.

In terms of the limitations, since only four movies are examined to collect the data in this study, it can be argued that more forms of address are actually used in daily life. However, this study does not pretend to be exhaustive, it is an attempt to provide another method in examining the usage of terms of address in communication. An expansive cross-cultural investigation from real life situations among different people is expected in the future.

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Linguistic Convergence and Divergence in Guangzhou (Canton City): Social Variation of Vernacular Written Cantonese*

Jing Yan

The Ohio State University

This paper reports on part of a larger sociolinguistic study based on a written survey conducted on 116 Cantonese-Mandarin bilingual speakers in Guangzhou who are biliterates in Standard Written Chinese (SWC) and Vernacular Written Cantonese (VWC). This paper examines how VWC converges towards, or diverges from, the standard, SWC, across different social groups. A series of VWC variables at different linguistic levels are selected from the survey for a frequency distribution analysis with eight social variables (gender, age, education, income, occupation, SWC and VWC proficiency, and self identity). The findings suggest that the patterns of using VWC by the different social groups vary at the lexical and syntactic levels. Based on the study of the subjects' written responses to the survey, it is predicted that VWC would remain entrenched in the Cantonese-Mandarin community in Guangzhou. Nonetheless, the exact form of the VWC item is unstable and is easily influenced by SWC.

0. Introduction

In China, the written language sanctioned by the national government and taught in the education system is modern Standard Written Chinese (SWC). This written form reflects spoken Mandarin Chinese and is based on the lexicon and grammatical structure of Mandarin Chinese. Cantonese, the lingua franca of the many subvarieties of the Yue dialect group of Chinese, differs significantly from Mandarin Chinese with respect to phonology, lexicon, and syntax. Its written form, Vernacular Written Cantonese (VWC), is enjoying resurgence in recent years in the Guangzhou (Canton City) region, after decades of suppression since the establishment of the People's Republic of China in 1949, against the backdrop of a national language policy, as reflected in the Language Law of 2001. As a "Chinese-character-based" system to record spoken Cantonese, VWC

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From variant a. 来 to variant d. 嚟, we observe a series of ongoing changes in writing VWC lexicon *lai2* “to come” as suggested in Table 1. There are two directions of VWC variation: one is to converge to SWC, another one is to diverge from VWC. The use of 来 indicates the strongest convergence to SWC, whereas 嚟 indicates the strongest divergence from SWC. Therefore, in writing the VWC lexical item *lai2*, the users of 来 tend to lead the convergence to SWC, while the users of 嚟 tend to lead the divergence from SWC.

Given the variation of VWC in different directions, the present study tries to answer the following questions: How does the variation of VWC correlate to different social identities of its users in the Guangzhou community? What are the key social factors that lead VWC to different directions of variation (convergence or divergence)?

1. Methodology

To explore the roles of different social factors in the variation of VWC, a quantitative study based on the Labovian stratified Model is conducted in the present study. This stratified model is pioneered by Labov (1966) in his study of New York City English. Following his approach, stratified social variables (such as region, age, sex, occupation, and etcetera.) are correlated with various quantifiable linguistic variables to analyze the language variation and change and their social context.

A sociolinguistic survey is conducted in the Guangzhou community in 2006. 116 Guangzhou citizens knowledgeable with VWC were recruited through a kind of networking procedure. There are three criteria in selecting subjects. First, since regional identity is one of the independent variables² to be analyzed, all subjects must be Guangzhou citizens. Second, the subjects must be Mandarin-Cantonese biliterates, that is, they are able to write in SWC and VWC. Third, the subjects are 18 years of age or older who are able to understand the written questionnaires in this study. Based on these criteria, three core neighborhoods in Haizhu District (海珠区), Liwan District (荔湾区) and Yuexiu District (越秀区) of Guangzhou city were chosen as the sampling areas.

Producing a personal information datasheet with seventeen items to be answered, the sociodemographic survey yielded a series of information on the participants (gender, age, education, occupation, place of birth, place of family, place of growing-up, family size, duration of residence in Guangzhou, family generation, income, spoken language background, written language background, and self identity). Eight of them are used as the social variables in the present study as shown in Table 2.

Three written tasks were designed to elicit written variables in different levels of language structures – lexical variables (in general), classifier variables, and syntactic variables in the survey. To study the tendency of language variation at different levels of

² Independent variables refer to social variables such as age, gender, social identity. Dependent variables refer to linguistic variables such as lexicon and syntax.

linguistic structures, nineteen sets of VWC lexical variables, twelve sets of VWC classifier variables, and eight sets of VWC syntactic variables, are selected from the Guangzhou survey of VWC literacy practices for statistical analysis as shown in Table 3, Table 4, and Table 5.

Table 2: Sociolinguistic profiles of subjects

VARIABLES	SUBJECTS				
Gender	Female: 65		Male: 51		
Age	18-25: 26	26-35: 59	36-45: 6	46-55: 9	56 and above: 16
Occupation	White-collar: 78		Blue-collar : 19		Other (students and retired): 19
Income	High: 4	Mid-High: 27	Mid-Low: 70	Low and Zero: 15	
Education	Public school: 30		College: 86		
Language Proficiency	1 Best	2	3	4	5 Worst
SWC	13	66	30	6	1
VWC	7	49	43	14	3
Regional identity	Guangzhou: 67		Guangdong: 5		Chinese: 20 Others: 24

Table 3 summarizes four strategies used in representing the VWC lexical items in the survey.

Strategy I: Writing Cantonese words in SWC characters. Most of the written Cantonese words provided by the Cantonese-Mandarin biliterates were represented by standard written Chinese characters in uniquely Cantonese ways. Cantonese writing system is a Chinese-character-based writing system in this sense. For example, 饮胜 *yam3sing3* “to drink a toast” is a written Cantonese word represented by a SWC character 饮 “to drink” which is used as verb only in ancient Chinese but has died out in modern Mandarin³, and a SWC character 胜 *sheng* “to win” whose usage in Mandarin is not the same as in Cantonese. Nevertheless, the ways of rendering SWC characters to write Cantonese vary. They are either the same as Mandarin words in every respect except pronunciation such as 神圣 “sacred” *san4sing3* (Cantonese) / *shen2sheng4* (Mandarin), or they exist in both Mandarin and Cantonese but are used in different varieties such as the case of 饮胜 (Snow 2004: 52).

³ Note, it is not obsolete as a character in modern Chinese though. We can still observe 饮 is used in compounds in Mandarin especially as a noun such as in 饮料 *yin3 liao4* “beverage”.

Table 3: Seven types of written variants in nineteen VWC lexical variables

VARIABLES (N=19)	VARIANTS						
	Strategy I			Strategy II		Strategy III	Strategy IV
	Type1 (n=10)	Type2 (n=17)	Type3 (n=9)	Type4 (n=10)	Type5 (n=2)	Type6 (n=4)	Type7 (n=1)
<i>ye5</i> “Thing”		野		嘢 咗			
<i>me1</i> “what”	么	物也	咩		乜		
<i>faan1</i> “to come back”	返	翻 番					
<i>gam2</i> “so”		今 敢 甘 禁 感	噤	咁		(口+敢)	
<i>jo2</i> “verbal particle”		左	佐	咗		(口+佐)	
<i>m4</i> “negative prefix”		吾	唔				
<i>lak6</i> “smart, clever”			咧	叻			
<i>fan3</i> “sleep, sleepy”		训		瞓			
<i>lai2</i> “to come, arrive”	来	黎		嚟			
<i>mou5</i> “have not”	无				冇		
<i>hai6</i> “to be”	是	系	係	喺		(口+系)	
<i>mai1</i> “don’t”	未	米	咪				
<i>ga2</i> “particle of sound”	嘎	架	咖				
<i>Lau4hei3</i> “annoy”		劳气	唠气				
<i>ge3</i> “possessive”		既		嘅			
<i>ngaam1</i> “right, suitable”		岩		啱			
<i>di1</i> “a little”	点	地		啲			D
<i>Sai1lei6</i> “Capable”	犀利	西利					
<i>Gulhan4</i> “poor, stingy”	孤寒	古寒 姑寒					
Total Tokens	44	82	75	110	48	5	4
	201			158		5	4

Snow (2004) argues that:

When they do not know how to write a word in Cantonese, the strategy most often adopted by Cantonese people—both past and present—is phonetic borrowing, i.e. using a Chinese character that has the same sound when pronounced in Cantonese as the word to be written down. (When borrowing characters in this way, the original meaning of the character is generally ignored.) This strategy works because literate Cantonese speakers know the Cantonese pronunciation of Chinese character. (p54)

To overcome the orthographic gap, modern standard Chinese is borrowed to transliterate Cantonese morpho-syllables, including those borrowed from English (Li 2000). For example, in both Mandarin Chinese and Cantonese, character 核 *wat6* (Cantonese) / *hu2* (Mandarin) means “seed, kernel, core, nut; atom”, and character 突 *dat6* (Cantonese) / *tu1* (Mandarin) means “suddenly, abruptly, unexpectedly”. In Cantonese, the pronunciations of the two characters are similar to the Cantonese word *wat6 dat6* “ugly, disgusting”. These two characters therefore are phonetically borrowed to represent the Cantonese word *wat6 dat6*. Another example is 的士 *dik1 si6* (Cantonese) / *di2 shi4* (Mandarin), a phonetic borrowing word from SWC to VWC to transliterate the English word “taxi”.

In this study, VWC variants using Strategy I are further subcategorized into three types:

Type 1: SWC characters with semantic interference, although they are usually borrowed for their phonetic value⁴. For example, SWC character 返 *fan3* (Mandarin) “return, revert to” is used to represent the Cantonese word *fann1* “to come back”.

Type 2: phonetic borrowing from SWC characters without any semantic interference. For instance, SWC character 翻 *fan1* (Mandarin) “flip over, upset” is used to represent the Cantonese word *fann1* “to come back”.

Type 3: phonetic borrowing from SWC *xingsheng* characters 形声字 with some specific semantic element such as the radicals of 口 “mouth” and 亻 “human, people”. For instance, SWC character 唔 *wu2* (Mandarin) “hold in mouth” is used to represent the Cantonese negative prefix *ng4*.

Strategy II: Writing Cantonese with Cantonese characters. Written Cantonese words are represented by Cantonese dialect characters. For some Cantonese words, Cantonese speakers adopt the strategy of creating new Cantonese-specific characters to represent them because no appropriate SWC Chinese characters can be used. The orthographic forms using Approach II are established forms that have been widely used by Cantonese people. For example, 乜 *mat1* (Cantonese) “what” is a popular Cantonese-

⁴ This type of usage is known as *xundu* 训读 “reading by gloss” as explained in footnote 43.

specific character which is created on the basis of a close SWC character 也 *ye3* (Mandarin) “also” with missing one stroke in the character.

Another common strategy of coining Cantonese dialectal character is through phonetic borrowing of SWC characters marked with certain radicals such as 口 “mouth” radical and 扌 “hand” radical. For example, Cantonese word 嘍 *saai3* (Cantonese) “to waste, all, entirely”, is a phonetic borrowing of Chinese character 徙 *saai2* (Cantonese) / *xi2* (Mandarin) “shift, migrate” marked with 口 “mouth” radical. This strategy is inherited from the traditional strategy of nomenclature *xingsheng* 形声. The vast majority of SWC characters are composed by a semantic element (radical) and a phonetic component. Referred to as pictophonetic (*xingsheng* 形声) in traditional Chinese nomenclature, the left side of the character is usually the semantic element that would suggest the meaning of a character, while the right side is the phonetic element that would indicate its original pronunciation which may or may not represent its modern pronunciation. For those *xingsheng* characters such as 谗 *lam4* (Cantonese), 搵 *wam3* (Cantonese), 睇 *tai2* (Cantonese), which ever appeared in the ancient Chinese text but were no longer used in modern Mandarin Chinese text, we categorized them as written Cantonese coinages through phonetic borrowing.

Usually, the new Cantonese dialect characters are used with combination of the existing elements such as SWC characters to represent Cantonese language. For example, the word 做乜 *jou6 mat1* (Cantonese) “why” is represented by one SWC character 做 “to do” and one new Cantonese dialect character 乜.

The VWC variants using Strategy II, writing Cantonese words in VWC characters, are further subcategorized into two types:

Type 4: Cantonese dialectal coinages through phonetic borrowing of SWC characters marked with certain radicals such as 嘢 *ye5* (Cantonese) “thing” is a phonetic borrowing of Chinese character 野 *ye3* (Mandarin) “field, wildness” marked with 口 “mouth” radical. Type 4 is different from Type 1 in that Type 4 is no longer used in modern Chinese texts written in SWC, although both of Type 4 and Type 1 are using phonetic borrowing strategy.

Type 5: Cantonese dialectal coinages other than Type 4 such as 乜 *mat1* (Cantonese) “what”.

Strategy III: Writing Cantonese in “False Characters”. The written Cantonese words are represented by pseudo characters (假造字 *jia zao zi*). Those pseudo characters are not established orthographic forms but innovative characters. For example, a “character” (香离) is created to represent 癡 in the word 癡线 *chi1sin3* “crazy”. The VWC variants using Strategy III are categorized as *Type 6* in Table 3.

Strategy IV: Writing Cantonese in Romanized letters. The written Cantonese words are represented by Romanized letters, including letters used to record Cantonese pronunciation, and letters rendering English elements borrowed into Cantonese. For example, English letter “T” is used in T恤 *ti1 seut1* “T shirt”, and “D” is used in 慳 D *han1 di1* “miserly, parsimonious, stingy”. The VWC variants using Strategy IV are also categorized as *Type 7* in Table 3.

From *Type 1* to *Type 7*, the ways of representing VWC are less and less SWC-oriented.

Table 4 summarizes four strategies used to substitute SWC classifiers with VWC classifiers.

Strategy I: substituting the given SWC classifier with the same form. In other words, Strategy I involves providing the same orthographic form in VWC as in SWC; hence, no actual “switching” takes place. For example, the same character 把 *ba* is given by 55 subjects to switch the SWC classifier 把 *ba* in the phrase of 一把刀 “one CL knife”.

Strategy II: substituting the given SWC classifier with a different SWC classifier. It is noted that those substituting classifiers are not used with the given nouns in modern Mandarin Chinese. For example, SWC classifier 张 *zhang1* is given by 62 subjects to substitute SWC classifier 把 *ba* in the phrase of 一把刀 *yi ba dao* “one CL knife”. However, in Mandarin Chinese, classifier 张 *zhang1* is not used with 刀 *da*.

Strategy III: creating Cantonese dialectal character to write Cantonese classifier. For example, 嚙 *kou* is a Cantonese coinage which is used to switch the SWC classifier 块 *kuai* in the phrase of 一块石头 *yi kuai shitou* “one CL stone”.

Strategy IV: phonetic borrowing from SWC or using Romanized letters to write Cantonese classifier.⁵ For example, SWC character 旧 *jiu* “old” is phonetically borrowed to switch the SWC classifier 块 *kuai* in the phrase of 一块石头 “one CL stone”, and Romanized letter “P” is used to switch the SWC classifier 棵 in the phrase of 一棵树 “one CL tree”.

⁵ Strategy IV includes both strategies of SWC phonetic borrowing and Romanized letters because the latter is also a kind of phonetic borrowing, and is only used in the case of 一棵树 “one CL tree” (19 tokens) and 一块布 “one CL cloth” (1 token). However, it is suggested to separate the two strategies in the future study for a better understanding of Romanization as a way of creating writing code.

Table 4: Four types of VWC classifier variants in twelve sets of classifier variables

Variables (n=12)	Variants			
	Strategy I (Type 1)	Strategy II (Type 2)	Strategy III (Type 3)	Strategy IV (Type 4)
一把刀	把	张, 板		
一匹马	匹	只, 头		
一服药	服	剂, 包, 煲, 粒 , 贴		济, 斋, 食, 凹 , 执
一顿饭	顿	餐	步	
一辆车子	辆	部, 架, 驾, 台		
一床被子	床	张, 套, 幅, 铺		
一首歌	首	只, 支,		
一棵树	棵	条, 颗, 把	(柯+果)	坡, 婆, 破, 波 , 科, 碌, 朴, po, bo, paul, p
一块布	块	条, 匹, 张, 幅, 件, 卷		忽, D
一面旗	面	支, 块, 只, 枝, 张, 幅, 个		复
一双鞋	双	对, 只		
一块石头	块	粒	(口+旧), 嚙	旧, 够, 快
Total tokens	242	915	65	175

Table 5 summarizes the variants of the eight types of syntactic variables (S1-S8). Considered both sufficient variability and possibility of social variation in the VWC syntactic variables, eight VWC variants in five sets of syntactic variables (S2, S3, S4, S6, and S7) are selected for frequency distribution analysis:

- S2: “比 *bi* sentence” (SWC-oriented) and “过 *guo* sentence” (non-SWC)
- S3: “V+O₁+O₂” (SWC-oriented) and “V+ O₂+ O₁” (Non-SWC)
- S4: “将 *zeong* sentence” (Non-SWC)
- S6: “S+V+O+ negative-complement” (non-SWC) and
“S+V+ negative-complement +O” (SWC-oriented)
- S7: “被 *bei* sentence” (SWC-oriented)

Table 5: the variants of the VWC syntactic variables

Variables	Variants	<u>n</u>	<u>%</u>
S1			
word order of adverbial modifier			
	adv.+ verb	4	3.4
	verb+ adv.	112	96.6
S2			
comparative construction			
	比 <i>bi</i> sentence	38	32.8
	过 <i>guo</i> sentence	76	65.5
	Other	2	1.7
S3			
double-object construction			
	verb+ object 1 + object 2	13	11.2
	verb+ object 2 + object 1	89	76.7
	Other	14	12.1
S4			
disposal construction			
	把 <i>ba</i> sentence	1	0.08
	将 sentence	18	15.5
	Other	107	92.2
S5			
yes-no interrogative construction			
	吗 sentence	3	2.6
	A-NOT-A sentence	108	93.1
	Other	5	5.2
S6			
verb negative-complement construction			
	subject + verb + negative-complement + object	100	86.2
	subject + verb + object + negative-complement	16	13.8
S7			
passive construction			
	被 <i>bei</i> sentence	12	10.3
	Other	104	89.7
S8			
statement construction in perfective aspect			
	S+有+verb	4	3.4
	Other	112	96.6
N=116			

2. Results of Data Analysis

The eight social variables (gender, age, education, income, occupation, SWC and VWC proficiency, and self identity) are tabulated with the selected VWC variables for a frequency distribution analysis. Considered VWC as a written form for a minority language in its own nation, the direction of its variation is mainly explored in the present study through how it is associated with the national standard written form (SWC). Based on the figures and tables created to elaborate on the significant patterns of language changes, the directions of VWC changes, convergence to SWC or divergence from SWC, are explored through interpreting the distribution patterns of the different VWC variables in different social groups. Several conclusions are suggested in this case study of the variation of vernacular written Cantonese in Guangzhou city.

First, in the present study of the variation of VWC lexical variables in the Guangzhou community (Refer to Table 3), seven types of lexical VWC variants are summarized according to the strategies used in representing nineteen sets of written lexical variables. Strategy I (representing VWC lexical items through phonetic borrowing) includes Type 1, Type 2, and Type 3 of written variants. Strategy I is the most common method of writing VWC lexical items in Guangzhou. This situation is similar to the case of Hong Kong written Cantonese⁶. However, in contrast to Hong Kong where Roman letters from English are commonly included in written Cantonese, Roman letters as Strategy IV are rarely used in writing VWC lexical units in Guangzhou. In this sense, the orthographic convention of writing vernacular Cantonese is dominantly Chinese-character-based in Guangzhou.

The literacy of a language requires more than the ability to register lexical units. Grammar should also be taken into account. The present study of Guangzhou VWC includes VWC classifier variables and syntactic variables in addition to the VWC general lexical variables, providing a more comprehensive picture of the VWC variation as suggested in Table 6.

⁶ According to Bauer (1988), there are three important points concerning with the difference between Standard Written Chinese and Hong Kong Written Cantonese on the lexical level: “(1) one variety of non-standard Chinese uses Cantonese words and expressions which are meaningful only to the Cantonese-speaker reader; (2) a second variety is distinguished from the first by its inclusion of English words; (3) both of these varieties of written Chinese by their use of the written forms of Cantonese words are so localized that their intelligibility is restricted to the Hong Kong Cantonese-speaker and stand in sharp contrast to a text written in standard Chinese, the unifying lingua franca for literate-speakers of mutually-unintelligible Chinese ‘dialects’.”

Table 6: VWC vs. SWC: Convergence and Divergence in Writing VWC Lexical variables, Classifier variables, and Syntactic variable in Different Social Groups

X: Divergence with SWC √: Convergence with SWC —: Not Clear

Social Groups	Lexical item	Classifier	Syntax
Female	—	X	X
Male	√	√	√
18-25 years old	—	—	X
26-35 years old	—	—	X
36-55 years old	X	—	√
56 and above	—	—	—
White-collar	X	—	√
Blue-collar	√	√	X
High income	—	√	√
Mid-high income	X	—	X
Mid-low income	—	—	X
Low and zero income	√	X	√
Public school education	√	—	X
College education	X	√	√
Level 1 SWC proficiency	—	—	—
Level 2 SWC proficiency	X	—	—
Level 3 SWC proficiency	—	—	√
Level 4 SWC proficiency	√	—	X
Level 1 VWC proficiency	—	√	—
Level 2 VWC proficiency	X	—	—
Level 3 VWC proficiency	√	—	—
Level 4 VWC proficiency	—	—	—
Guangzhou identity	X	√	—
Guangdong identity	—	—	X
Chinese identity	—	—	√
Other Identity	—	—	—

Table 6 summarizes the tendencies of the VWC variation in lexical variables, classifier variables and syntactic variables. Several social factors are important in the convergence of VWC to SWC. Among those social factors, male is the most influencing one to converge VWC to SWC in writing Cantonese lexical item, classifier and syntax (three √ with the three linguistic levels). The other notable social factors suggested in this study (two √ with the three linguistic levels) include blue-collar, the highest income, the lowest income, and college education. Another direction of VWC variation, divergence

from SWC, is noted clearly (two X with the three linguistic levels) in the female group and middle-income group.

Overall, noted as one of the most important social variables in a sociolinguistic study, gender is found to play an important role in the variation of VWC in Guangzhou community. Age difference is not as notable as gender difference. Nevertheless, at least in the syntactic level, the two youngest age groups (18-25 and 26-35) show a strong tendency of divergence from SWC. Occupation difference is a notable factor in the variation of VWC in current study. The blue-collar group tends to lead the convergence to SWC in lexical level but not syntactic level, whereas white-collar group is an opposite case. Similar situation is found with the educational difference. The group with public school education tends to lead the convergence to SWC at lexical level but not syntactic level, while the group with college education is the opposite. It is noted that the roles of some social factors in the variation of VWC are vague in the present correlation study. Since the variation of a language is a process that never stops unless the language no longer exists, the impact of certain social factors in the process of language change might not be as strong as the others in certain stages of the process.

3. Conclusion

Given the findings in the present variation study of the VWC literacy practices, it is predicted that VWC will continue to survive in the area of Guangzhou. However, whether it will diverge from SWC and become an independent writing system as in the case of Hong Kong suggested by Snow (2004), or it will converge to SWC finally, will depend on the relative strength of the national language policy, and the regional socio-promoters which include the groups and agents who are constructed by various social identities and cultural norms in the local community.

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早期佛經詞義的義素研究 — 與「觀看」意義相關的動詞分析

竺家寧 Chu Chia-ning
National Chengchi University

壹. 前言

傳統訓詁學的詞義研究往往只處理歷時的詞義演化中，所發生的擴大、縮小、轉移諸模式，很少論及在古代漢語共時層面的詞義系統問題。同時，在分析技術上也未能深入一個詞義的內部，探索其深層結構，找出構成這個詞義的諸要素。現代語言學的一些理論和觀念，正好彌補了這方面的不足。詞義場理論 (semantic field) 提供了詞義系統研究的依據，義素分析法 (Sememe analysis) 把傳統的詞義單位區分成了更小的辨義成分。這些觀念、新方法完全可以引入古代漢語的研究上。材料方面，中古漢語中，最能反映當時實際口語，而材料又最為龐大的，就是佛經資料了。佛經保留了大量當時的語言紀錄。古代的譯經者為了更有效地傳播佛法，總是運用社會大眾的口語來進行佛經的翻譯。所用的詞彙，在當時都是耳熟能詳的群眾用語，所以佛經不僅是宗教的、思想義理的、文學的、更是一座豐富的「語料庫」。

在研究材料上需要作比較嚴格的斷代，觀察東漢到西晉的佛經中的同義詞、近義詞、反義詞、類義詞。把他們一組一組的找出來，分析其中的義素。找出各組詞彙意義的共同性和差異性。意義比較時，除了參考各種古代的工具書，如《說文》、《經典釋文》、《慧琳音義》之外，也參考前人的各種註解和訓詁資料。此外，還使用「以經證經」的方法，用大量的佛經句例，從上下文語境之中，觀察該詞的具體含意，包含核心意義和色彩意義。可以進行的途徑，有下面幾個方面：第一是佛經理有許多詞素易序的結構 (AB/BA 替換)，都是同義並列結構。我們可以觀察二詞間的共性和差異性。也可以分析詞素單用時的義素成分。例如：1. 知識 / 識知 2. 熱惱 / 惱熱 等例。第二，我們擬摘出佛經中的同義詞群、類義詞群進行其中所蘊含的義素分析工作。例如：「貢高 / 驕慢」、「哀音 / 哀樂」等。第三，佛經中有大量的新生複合詞，觀察其組成詞素間的語意聯繫。例如：名詞 + 名詞組成的並列結構。例如：殃禍、魂神、宗家、衢路、顏貌 (500 羅云忍辱經) 空無、吾我 (103 佛說 聖法印經)。形容詞 + 形容詞的並列結構例如：清淨、威猛 (500 羅云忍辱經) 清涼、安隱 (118 佛說 鷲掘摩經)。動詞 + 動詞的並列結構，例如：驚怪、往來、消滅、燒煮、布施、毒害 (500 羅云忍辱經) 思念、消除、休息、解脫、分別、思惟、毀壞、別離 (103 佛說 聖法印經)。第四，我們還可以觀察這些中古詞語的歷時演變。特別是「同形義異」的詞。例如「交通」、「感激」在佛經中的意義和今天並不相同，那麼其間的哪項義素發生了調整？嘗試找出其中變化的脈絡。

由於篇幅有限，本文只選擇幾組雙音節動詞做討論，因為詞彙的雙音化，在佛經語料中表現的最明顯。我們可以藉以觀察中古漢語的這項演變。

貳. 「看」與「觀看」

義素		詞條	
		看	觀看
語法意義	[述語]	+	+
	[及物]	+, -	-
概念意義	[目視]	+	+
	[探其究竟]	+	-
	[遊歷欣賞]	-	+

分析:

(一) 就語法功能而言:

1、「看」與「觀看」都為動詞的用法，主要擔任〔述語〕的功用，例如:

時頻婆娑羅王。及諸臣民。聞佛世尊調化毒蛇盛鉢中來。合國人民。皆共往^看。在佛鉢中。蛇見眾人。深生慚愧。〔T04n0200_p0228b17《撰集百緣經》〕

時王太子。字曰善生。將諸親友。遊戲^{觀看}。路逢一人。共輔相子。樗蒲博戲。賭五百金錢。〔T04n0200_p0220c02《撰集百緣經》〕

2、「看」在佛經的用法當中可接賓語，為〔+及物〕的屬性，「觀看」則後面不接賓語，為〔-及物〕的語法屬性。例如:

父答子曰。吾家堂柱。我見有光。汝為施伐。試破共^看。儻有異物。於是大臣。隨其父教。尋為施伐。取破^看之。得經二卷。〔T04n0200_p0233c06《撰集百緣經》〕

時彼城中。有一長者。名曰若達多。財寶無量。奴婢僕使。象馬牛羊。不可稱計。時彼長者。值行^{觀看}。到祇桓中。¹見佛世尊。〔T04n0200_p0226a11《撰集百緣經》〕
有一羅漢比丘。入彼寺中。威儀詳序。甚可^{觀看}。寺主檀越。見其如是。請入浴室為其洗浴。〔T04n0200_p0227c17《撰集百緣經》〕

(二) 就概念意義而言:

1、「看」與「觀看」皆有〔+目視〕的概念，例如:

時有五百群賊。劫掠他物。將欲入彼山林樹間。時彼賊帥。先遣一人。往^看林中無有人不。〔T04n0200_p0256a26《撰集百緣經》〕

時天帝釋。及諸天等。咸來^{觀看}。而問之言。汝造何福。得來生此。光明殊特。倍勝諸天。〔T04n0200_p0230a20《撰集百緣經》〕

¹ p. 226, [13] 值行...到一~~出城遊行致~~聖

2、根據「看」的上下語境觀察，可發現「看」有（+探其究竟）的概念，例如：

太子弘惠縛以相付。太子持兒令梵志縛。自手執繩端。兩兒躡身宛轉父前。哀號呼母曰。天神地祇山樹諸神。一哀告吾母意云。兩兒以惠人。宜急捨彼菓可一相見。哀感二儀。山神愴然。為作大響有若雷震。母時採果。心為忪忪。仰看蒼天不睹雲雨。〔T03n0152_p0009c23《六度集經》〕

上面這個例句中，顯示因為內心感到不安，因此仰看蒼天，探究為何會有大的聲響出現。又例如：

於時大臣。即向父說委曲情理。父答子曰。吾家堂柱。我見有光。汝為施伐。試破看看。儻有異物。於是大臣。隨其父教。尋為施伐。取破看之。得經二卷。〔T04n0200_p0233c06《撰集百緣經》〕

上面這個例句中，顯示因為看見堂柱有光，因而「施伐」，並「取破看之」，探其究竟。又例如：

時有五百群賊。劫掠他物。將欲入彼山林樹間。時彼賊帥。先遣一人。往看林中無有人不。〔T04n0200_p0256a26《撰集百緣經》〕

上面這個例子，顯示派遣一人先前往探其究竟的情形。

3、根據與「觀看」搭配的詞語來看，可發現「觀看」往往與「遊戲」、「遊行」、「出外」、「出城」等詞搭配，說明「觀看」有（+遊歷欣賞）的概念。例如：

乃往過去無量世時。波羅奈國有王。名曰梵摩達多。時王太子。字曰善生。將諸親友。遊戲觀看。路逢一人。共輔相子。樗蒲博戲。賭五百金錢。〔T04n0200_p0220c02《撰集百緣經》〕

生一男兒。骨節羸大。肥壯大力。父母見之。因為立字。名曰大力。年漸長大。勇健多力。無有及者。將諸親友遊行觀看。到尼拘陀樹下。〔T04n0200_p0235c17《撰集百緣經》〕

生一男兒。名曰月光。年漸長大。與須達兒。出外觀看。到僧坊中。見諸比丘勲加誦習。〔T04n0200_p0228c16《撰集百緣經》〕

歸白父王。我於今者。出城觀看。到鹿野苑中。見佛世尊。百福相好。莊嚴其身。〔T04n0200_p0241a05《撰集百緣經》〕

就「看」與「觀看」在所搜尋的佛經資料當中的情形而言，除了《六度集經》的一個例子之外，其餘皆出現在支謙所譯的《撰集百緣經》當中，而不出現在其他的經典，因此初步推測可能與支謙個人譯經所選用的詞彙風格有關。

叁. 「看」、「望」與「顧」的分析

義素		條		
		看	望	顧
語法意義	[述語]	+	+	+
	[主語]	-	+	-
	[及物]	+, -	+, -	-

概念意義	[目視]	+	+	+
	[近距離觀看]	+	-	+, -
	[從高處遠眺]	-	+, -	+, -
	[視野廣]	-	+	+, -
	[向後看]	-	-	+
	[環視]	-	+, -	+

分析:

(一) 就語法功能而言:

1、「望」為動詞的用法，主要擔任（述語）的功用，例如：

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

此烏何緣來見覺之。從昔已來眾烏等類。顧復圍遶無敢近者。今日何故觸犯我身。鹿即起立遙望王軍。四方雲集已來近至。〔T03n0153_p0067c15《菩薩本緣經》〕

2、「望」可擔任（主語），「看」、「顧」則無此用例。例如：

於是復前行。望見叢林山。其地平正。四望清淨。生草柔軟。甘泉盈流。花香茂潔。〔T03n0184_p0470a24《修行本起經》〕

上述這個例子，從上下文的結構觀察，「其地平正」、「生草柔軟」、「甘泉盈流」、「花香茂潔」等皆屬主謂結構關係（即：「其地_主/平正_謂」），而且都是謂語為形容詞的描寫句，因此可以推測「四望清淨」亦屬於謂語為形容詞的描寫句，且「四望」在句子中擔任主語的功能。

3、「望」與「看」都同時具有（+，-及物）的屬性，「顧」則具有（-及物）的屬性，例如：

城中人民。怪其所以。云何比丘頭上戴珠。而行乞食。競來看之。〔T04n0200_p0237c17《撰集百緣經》〕

時頻婆娑羅王。及諸臣民。聞佛世尊調化毒蛇盛鉢中來。合國人民。皆共往看。在佛鉢中。蛇見眾人。深生慚愧。〔T04n0200_p0228b17《撰集百緣經》〕

以上為「看」字的及物與不及物的例子。

今日何故觸犯我身。鹿即起立遙望王軍。〔T03n0153_p0067c15《菩薩本緣經》〕

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

以上為「望」字的及物與不及物的例子。

時婆羅門將其二子速疾發引。是時二子隨路還顧。迴視父面悲號啼哭。〔T03n0153_p0060a23《菩薩本緣經》〕

母子相吞其痛難言。哽咽流淚。迴身四顧。索可以食虎以濟子命都無所見。〔T03n0152_p0002b12《六度集經》〕

以上為「顧」字不及物的例子。

(二) 就概念意義而言:

1、「看」、「望」與「顧」皆有(十目視)的概念, 例如:

遙見祇桓。赤如血色。怪其所以。尋即往看。見一餓鬼。脂肉消盡支節骨立一日一夜。生五百子。〔T04n0200_p0226b21《撰集百緣經》〕

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

2、就詞語搭配的情形來觀察, 「看」有「往看」、「來看」的例子, 「望」則沒有「*往望」²、「*來看」的用法; 「望」有「遙望」、「遠望」的例子, 「看」則沒有「*遙看」、「*遠看」的用法, 可見得「看」有(十近距離觀看)的意思, 「望」則有(一近距離觀看)的義素, 也就是「望」都是用於遠觀的語境當中。例如:

時阿闍世王。遙在樓上。見彼燈明。即大瞋恚。尋即遣人。往看是誰。見功德意然燈供養。〔T04n0200_p0230a13《撰集百緣經》〕

城中人民。怪其所以。云何比丘頭上戴珠。而行乞食。競來看之。〔T04n0200_p0237c17《撰集百緣經》〕

以上為「往看」、「來看」的例子。

時有婆羅門等五百人。欲詣恒水三祠神池。沐浴垢穢。希望神仙。中道乏糧。遙望彼樹。想有流泉。馳趣樹下。了無所見。〔T04n0196_p0157a01《中本起經》〕

佛在舍衛國祇樹給孤獨園。夏安居竟。將諸比丘。欲遊行他國。時頻婆娑羅王。將諸群臣出城。遙望如來。〔T04n0200_p0231a17《撰集百緣經》〕

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

作如是念。可愍道士所願不果。譬如餓鬼遠望清水到已不獲心悶[跳+辟]地。是婆羅門亦復如是。〔T03n0153_p0056b11《菩薩本緣經》〕

以上為「遙望」、「遠望」的例子。

3、由於「望」具有遠距離觀看的義素, 因此其所觀看的視野相對較廣, 故有(十視野廣)的義素。例如:

昔有國王。行射獵於曠澤中。大飢渴疲極。遙望鬱然有屋樹木。即往趣之。〔T04n0206_p0511b08《舊雜譬喻經》〕

上述這個例子, CBETA 電子佛典的斷句如上面所引用。然而此一斷句, 在「大飢渴疲極」一句中, 似乎語意未完, 且「遙望鬱然有屋樹木」, 於文意上亦不易解釋, 因此

² 本文此處「*」號代表作者虛構的詞, 不存在於所搜尋的佛經文獻當中。

筆者認為此處似應斷為：「昔有國王。行射獵於曠澤中。大飢渴。疲極遙望。鬱然有屋、樹木。即往趣之。」意思為：從前有位國王，一天在曠野中打獵，因為飢渴而感到疲憊，疲憊之餘而遙望遠方，所看到的是茂密的樹木與遠處的房屋，於是就朝著這片茂密的樹林與房子的方向走去。其中「鬱然有屋、樹木。」為「遙望」所看見的景象，具有廣濶視野的概念。

於是復前行。望見叢林山。其地平正。四望清淨。生草柔軟。甘泉盈流。花香茂潔。〔T03n0184_p0470a24《修行本起經》〕

「望」用「四」修飾，說明其視角非侷限在狹小的空間當中，並且所望的對象為叢林山之地，所看到的景色是「甘泉盈流。花香茂潔」，皆是廣闊空間的景象。

4、「望」除了具有遠距離觀看的義素之外，另外「望」也有（+從高處遠眺）的義素，例如：

斯有父子之親。豈有嫁娶之道乎。斯王處人君之尊。而為禽獸之行。即引弟退。女登臺望曰。〔T03n0152_p0019b29《六度集經》〕

母獨高處。不念親感。行來欣欣。一身喜樂。高望遠視。猶若鴻鵠。不憂子孫獨遇此酷。〔T03n0154_p0099c20《生經》〕

5、「顧」也有（+從高處遠眺）的概念意義，例如：

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

於王舍城。昇高樓上。四顧視瞻。見城內人節慶聚會。〔T04n0200_p0255b13《撰集百緣經》〕

6、「顧」有（+向後看）的概念意義，例如：

王夫人者。本大國王女。端正無雙。手足柔軟。生長深宮不更寒苦。又復重身懷妊數月。步隨大家舉身皆痛。足底破傷不能復前。疲極在後。時婆羅門還顧罵言。汝今作婢。當如婢法。不可以汝本時之態。〔T03n0152_p0007b23《六度集經》〕

上面這個例子中，「疲極在後」說明王夫人所處位置在婆羅門的身後，而「婆羅門還顧罵言」顯示婆羅門轉身向後看著王夫人並動口罵她。

時婆羅門將其二子速疾發引。是時二子隨路還顧。迴視父面悲號啼哭。〔T03n0153_p0060a23《菩薩本緣經》〕

上面這個例子中，「隨路還顧」與「迴視父面」說明二子當時是沿路向後看。

7、「顧」也有（+環視）的概念意義，例如：

佛以慈力。於五指端。放五色光。照彼蛇身。即得清涼。熱毒消除。心懷喜悅。舉頭四顧。是何福人。能放此光。照我身體。使得清涼。快不可言。〔T04n0200_p0228b02《撰集百緣經》〕

菩薩感思二親本土。出城登山四顧遠望。睹一鐵城中有丈夫。首戴天冠儼然恭坐。〔T03n0152_p0019c21《六度集經》〕

肆. 「顧」與「顧視」

義素		詞條	顧	顧視
語法意義	[述語]		+	+
	[定語]		-	+
	[及物]		-	+, -
概念意義	[目視]		+	+
	[環視]		+, -	+, -
	[向後看]		+, -	-
	[左右觀望]		-	+, -

分析:

(一) 就語法功能而言:

1、「顧」與「顧視」皆為動詞用法，主要擔任〔述語〕的功用，例如:

諸魃湊滿 貪欲慢翰 窗牖顯明 視瞻四顧 於斯闕看

不可得常〔T09n0263_p0076c26《正法華經》〕

時一比丘。疾病困篤。獨自一身。無有等類。無有視者。亦無醫藥衣被飯食。不能起居。惡露自出。身臥其上。四向顧視。無來救濟者。便自歎息。〔T03n0154_p0089b15《生經》〕

2、「顧視」具有擔任〔定語〕的功用，例如:

臣白王言。欲得幾種兵。若干若萬。若至無數。顧視之間。兵即已辦。行陣嚴整。是故名爲典兵臣也。〔T03n0184_p0462c26《修行本起經》〕

3、「顧」具有〔一及物〕的屬性，「顧視」則具有〔+，一及物〕的屬性，例如:

時婆羅門將其二子速疾發引。是時二子隨路還顧。迴視父面悲號啼哭。〔T03n0153_p0060a23《菩薩本緣經》〕

母子相吞其痛難言。哽咽流淚。迴身四顧。索可以食虎以濟子命都無所見。〔T03n0152_p0002b12《六度集經》〕

以上為「顧」字不及物的例子。

佛知瓶沙性素僞豪剛強貢高。欲令速解化王從者儀式。若王瓶沙。顧視從者。似已無異。〔T04n0196_p0152b02《中本起經》〕

太子被震越。柔軟鮮且潔。顧視僧伽梨過佛無差別。於是遂入山。〔T03n0184_p0469a28《修行本起經》〕

昔沙門於山中行道。裏衣解墮地。便左右顧視。徐牽衣衣之。山神出謂道人。此間亦無人民衣墮地。何爲匍匐著衣。〔T04n0206_p0519a05《舊雜譬喻經》〕

時一比丘。疾病困篤。獨自一身。無有等類。無有視者。亦無醫藥衣被飯食。不能起居。惡露自出。身臥其上。四向顧視。無來救濟者。便自歎息。〔T03n0154_p0089b15《生經》〕

以上為「顧視」及物與不及物的例子。

(二) 就概念意義而言：

1、「顧」與「顧視」都有〔+目視〕的概念意義，例如：

熱毒消除。心懷喜悅。舉頭四顧。是何福人。能放此光。照我身體。使得清涼。快不可言。〔T04n0200_p0228b02《撰集百緣經》〕

時一比丘。疾病困篤。獨自一身。無有等類。無有視者。亦無醫藥衣被飯食。不能起居。惡露自出。身臥其上。四向顧視。無來救濟者。便自歎息。〔T03n0154_p0089b15《生經》〕

2、「顧」與「顧視」也都有〔+環視〕的概念意義，例如：

諸魃湊滿 貪欲慢翰 窗牖顯明 視瞻四顧 於斯闕看
不可得常〔T09n0263_p0076c26《正法華經》〕

佛以慈力。於五指端。放五色光。照彼蛇身。即得清涼。熱毒消除。心懷喜悅。舉頭四顧。是何福人。能放此光。照我身體。使得清涼。快不可言。〔T04n0200_p0228b02《撰集百緣經》〕

時鸚鵡王。見佛比丘寂然宴坐。甚懷喜悅。通夜飛翔。遶佛比丘。四向顧視。無諸師子虎狼禽獸及以盜賊觸惱世尊比丘僧不。〔T04n0200_p0231a28《撰集百緣經》〕

頭髮皓白。俯偻而行。四向顧視。語諸親言。汝等當知。我由先身惡口罵辱諸眾僧故。處此生熟藏中。〔T04n0200_p0250c06《撰集百緣經》〕

以上四個例子，就詞語搭配的情形來看，都可以受「四」、「四向」的修飾，說明「顧」與「顧視」都有向四面觀看，亦即〔+環視〕的概念意義。

3、「顧」具有〔+向後看〕的概念意義，「顧視」則具有〔-向後看〕的概念意義，例如：

菩薩睹之愴然心悲。哀念眾生處世憂苦其為無量。母子相吞其痛難言。哽咽流淚。迴身四顧。索可以食虎以濟子命都無所見。〔T03n0152_p0002b12《六度集經》〕

明日迦葉復行請佛。佛言。今隨後到。迦葉反顧。忽不見佛。佛已到北方鬱單曰取自然粳米。迦葉未至。已坐其床。〔T04n0196_p0150c21《中本起經》〕

4、「顧視」具有〔+左右觀望〕的概念意義，「顧」則具有〔-左右觀望〕的概念意義，例如：

執手共坐。以半座坐之。王左右顧視。睹天宮殿黃金白銀水精琉璃珊瑚虎珀車磔真珠以為宮殿。睹之心欣。〔T03n0152_p0022a20《六度集經》〕

龍大歡喜。出水左右顧視。睹佛坐樹下。〔T03n0152_p0042a29《六度集經》〕

以上兩個例子，就詞語搭配的情形觀察，「顧視」可受「左右」修飾，說明「顧視」具有〔+左右觀望〕的概念意義。「顧」在所搜尋的佛經資料裏，則沒有前接「左右」修飾的例子。

伍. 詞素「瞻」的詞群：「瞻視、視瞻、瞻勞、瞻載、瞻仰」

條義素		詞							
		瞻視	視瞻	瞻勞	瞻載	瞻仰	仰瞻	瞻順	瞻睹
語法意義	[動詞]	+	+	+	+	+	+	+	+
	[名詞]	+	+	+	-	-	-	-	-
	[述語]	+	+	+	+	+	+	+	+
	[定語]	+	-	-	-	-	-	-	-
	[賓語]	+	+	+	-	-	-	-	-
	[及物]	+	-	-	+	+, -	+	+	+, -
	[前加否定副詞]	+, -	+, -	-	-	-	-	-	+, -
	[加前綴相]	+, -	-	-	-	-	-	-	-
概念意義	[目視]	+	+	+	+	+	+	+	+
	[探視慰問疾病]	+	+, -	+	-	-	-	-	-
	[懷著敬意]	-	-	-	+	+	-	+	+
	[雙手合掌]	-	-	-	+, -	+	-	+	-
	[施動者為複數]	-	-	-	+	+, -	-	+	-
	[看的對象（具體）]	+	-	+	+	+	-	+	+
	[看的對象（世尊）]	-	-	-	+, -	+	-	+	+
色彩意義	[用於下對上的關係]	-	-	-	+	+	-	+	+

分析:

(一) 就語法功能而言:

1、「瞻視」、「視瞻」、「瞻勞」、「瞻戴」、「瞻仰」、「仰瞻」、「瞻順」、「瞻睹」等都具有〔+動詞〕的屬性，並且都具有擔任〔+述語〕的功能。例如：
時有摩納學志。有所緩急。常馳走趣。有一學志。若有急緩疾病之厄。初不**視瞻**。〔T03n0154_p0089b26《生經》〕
於王舍城。昇高樓上。四顧**視瞻**。見城內人節慶聚會。〔T04n0200_p0255b13《撰集百緣經》〕
因便佯病。困劣著床。其婿**瞻勞**。醫藥療治。竟不肯差。謂其夫言。何須勞意損其醫藥。〔T03n0154_p0076c10《生經》〕
國王君主大力轉輪聖王。各與營從咸悉一心**瞻戴**世尊。意皆愕然怪未曾有。〔T09n0263_p0063c02《正法華經》〕
爾時舍利弗踊躍歡喜。即起合掌**瞻仰**尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕
於是世尊見眾會心。欲為決疑。**仰瞻**上方。時天帝釋尋時來下。化作一小鼠。齧繫魁繩。〔T03n0154_p0076a29《生經》〕
進詣佛前偏袒右肩。禮畢叉手**瞻順**尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕
拔提弗受命而退。即詣佛所。**瞻睹**神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

2、「瞻視」、「視瞻」、「瞻勞」除了〔+動詞〕的屬性之外，也有〔+名詞〕的屬性。「瞻視」的例子如：

時佛世尊。往詣比丘。而問之曰。今得疾病。有**瞻視**醫藥床臥具乎。白曰。孤獨無**瞻視**者。無醫無藥。去家甚遠。離於父母無有兄弟。親里伴侶。無供侍者。〔T03n0154_p0089c20《生經》〕

在這個例句當中，根據下文回答的內容，指明「無瞻視者」、「無醫」、「無藥」，可以推知「有瞻視醫藥床臥具乎」乃是並列結構，意思是：有沒有探望的人、醫治的人、醫治的藥、睡臥的床呢？另外「瞻視」與下文「瞻視者」互相對照，可知省略了「者」，因此使得動詞「瞻視」具有名詞的用法。不過「瞻視」當名詞使用，在所搜尋的佛經資料裏僅有這一個例子。至於「視瞻」、「瞻勞」當名詞用的例子，在搜尋的資料中也都僅有一個例句，如：

儼然正首 尊其**視瞻** 安詳升據〔T09n0263_p0108c02《正法華經》〕

病瘦醫藥 而無僥冀 不從眾人 有所請求 除其**瞻勞** 住廟精舍 欲令眾庶悉解佛道〔T09n0263_p0108c19《正法華經》〕

以上為「瞻視」、「視瞻」、「瞻勞」名詞性的用例，其中「視瞻」當名詞使用時，似指「面貌」的意思而非「觀看」的意思。

3、「瞻視」當名詞用時，可擔任（定語）的功能，亦可擔任（賓語）的功能，但是在所搜尋的佛經資料裏，都僅有一個例子。例如：

時佛世尊。往詣比丘。而問之曰。今得疾病。有**瞻視**醫藥床臥具乎。白曰。孤獨無**瞻視**者。無醫無藥。去家甚遠。離於父母無有兄弟。親里伴侶。無供侍者。〔T03n0154_p0089c20《生經》〕

在這個例句裏，「有**瞻視**醫藥床臥具乎」，「瞻視」擔任賓語；「孤獨無**瞻視**者」，「瞻視」擔任定語。

4、「視瞻」、「瞻勞」當名詞用時，可擔任（賓語）的功能，但是在所搜尋的佛經資料裏，都僅有一個例子。（例子見上述第2點）

5、「瞻視」、「瞻戴」、「仰瞻」、「瞻順」有（+及物）的屬性；「視瞻」、「瞻勞」具有（-及物）的屬性；「瞻仰」、「瞻睹」則具有（+，-及物）的屬性。

「瞻視」、「瞻戴」、「仰瞻」、「瞻順」及物的用法，例子如下：

恭敬沙門婆羅門等。常以淨手施眾生食。口常宣唱與是人衣與是人食及與財寶。愛護是人**瞻視**是人。〔T03n0153_p0055a08《菩薩本緣經》〕

其族姓子。超於興起為佛塔廟。起於建立精舍講堂。超於**瞻視**比丘疾病。而給醫藥供養之具。〔T09n0263_p0117a10《正法華經》〕

顏色和悅猶如秋月。一切人民**瞻戴**是王如父如母如兄如弟。善心視王目如青蓮。〔T03n0153_p0063a17《菩薩本緣經》〕

爾時阿難羅云。俱白佛言。今我等見二千聲聞。學弟子戒心懷忻然。**瞻戴**尊顏。道法正典不可思議。願及是時。〔T09n0263_p0098c20《正法華經》〕

於是世尊見眾會心。欲為決疑。**仰瞻**上方。時天帝釋尋時來下。化作一小鼠。〔T03n0154_p0076a29《生經》〕

於時梵志。**仰瞻**天文。下察地理。〔T03n0154_p0077b10《生經》〕

於是賢者大目捷連。賢者須菩提。賢者摩訶迦旃延。等類同心側立頂戴。**瞻順**光顏目未曾眴。〔T09n0263_p0087a01《正法華經》〕

進詣佛前偏袒右肩。禮畢叉手**瞻順**尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

「視瞻」、「瞻勞」不及物的用例，例子如下：（其中「瞻勞」在所搜尋的佛經資料裏，僅有下面一個例子。）

時有摩納學志。有所緩急。常馳走趣。有一學志。若有急緩疾病之厄。初不**視瞻**。〔T03n0154_p0089b26《生經》〕

於王舍城。昇高樓上。四顧**視瞻**。見城內人節慶聚會。〔T04n0200_p0255b13《撰集百緣經》〕

因便佯病。困劣著床。其婿**瞻勞**。醫藥療治。竟不肯差。謂其夫言。何須勞意損其醫藥。吾病甚重。當得卿所親親獼猴之肝。吾乃活耳。〔T03n0154_p0076c10《生經》〕

「瞻仰」、「瞻睹」及物的用例，例子如下：

爾時舍利弗踊躍歡喜。即起合掌瞻仰尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕

爾時學無學聲聞弟子二千人。皆從座起偏袒右肩到於佛前。一心合掌瞻仰世尊。〔T09n0262_p0029c01《妙法蓮華經》〕

拔提弗受命而退。即詣佛所。瞻睹神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

道逢梵志。名曰優呬。瞻睹尊妙。驚喜交集。〔T04n0196_p0147c28《中本起經》〕

「瞻仰」、「瞻睹」不及物的用例，例子如下：

生老病死苦 以漸悉令滅 真觀清淨觀 廣大智慧觀 悲觀及慈觀

常願常瞻仰〔T09n0262_p0058a17《妙法蓮華經》〕

諸佛現世 甚難得值 久不瞻睹 今日乃覩〔T09n0263_p0091a03《正法華經》〕

6、「瞻視」、「視瞻」、「瞻睹」可前加否定副詞，「瞻勞」、「瞻戴」、「瞻仰」、「仰瞻」、「瞻順」在所搜尋的資料當中則沒有前加否定副詞的例子。「瞻視」、「視瞻」、「瞻睹」前加否定副詞的例子如下（都僅出現一個例子）：

世尊告曰。卿強健時。不瞻視人。不問訊疾病。誰當瞻視卿乎。〔T03n0154_p0089c25《生經》〕

時有摩納學志。有所緩急。常馳走趣。有一學志。若有急緩疾病之厄。初不視瞻。〔T03n0154_p0089b26《生經》〕

諸佛現世 甚難得值 久不瞻睹 今日乃覩〔T09n0263_p0091a03《正法華經》〕

7、「瞻視」可前加詞綴「相」，「視瞻」、「瞻睹」、「瞻勞」、「瞻戴」、「瞻仰」、「仰瞻」、「瞻順」在所搜尋資料當中則沒有加前綴「相」的例子。「瞻視」加前綴「相」的例子如下：

得疾病困篤 孤獨無所依 察子見此已 梵行爲親友 普行子恭敬
展轉相瞻視〔T03n0154_p0089c17《生經》〕

（二）就概念意義而言：

1、「瞻視」、「視瞻」、「瞻勞」、「瞻戴」、「瞻仰」、「仰瞻」、「瞻順」、「瞻睹」等都具用眼睛看的意思，也就是都有（+目視）的義素。

2、就上下文的語境看，「瞻視」、「視瞻」有（+探視慰問疾病）的義素。例如：

世尊告曰。卿強健時。不瞻視人。不問訊疾病。誰當瞻視卿乎。〔T03n0154_p0089c25《生經》〕

時彼城中有一長者。字婆持加。甚大惡性。喜生瞋恚。無有一類與共親善。然於六師生信敬心。於後時間。遇疾困病。無人瞻視飲食醫藥。餘命無幾。〔T04n0200_p0205b22《撰集百緣經》〕

時有摩納學志。有所緩急。常馳走趨。有一學志。若有急緩疾病之厄。初不**視瞻**。〔T03n0154_p0089b26《生經》〕

因便佯病。困劣著床。其婿**瞻勞**。醫藥療治。竟不肯差。〔T03n0154_p0076c10《生經》〕

病瘦醫藥 而無僥冀 不從眾人 有所請求 除其**瞻勞** 住廟精舍 欲令眾庶 悉解佛道〔T09n0263_p0108c19《正法華經》〕

上述五個例子，在語境中都出現「問訊疾病」、「遇疾困病」、「急緩疾病之厄」、「因便佯病。困劣著床」、「病瘦醫藥」的情形，可推知「瞻視」、「視瞻」、「瞻勞」都有探視他人疾病的意思。

3、就上下文的語境看，「瞻戴」、「瞻仰」、「瞻順」、「瞻睹」含有尊敬的意味，亦即（+懷著敬意）觀看。例如：

世尊聖慧。悉知我等行跡志性之所歸趣。乃復舉喻說古世事及始發意。時滿願子稽首佛足卻住一面。歸命世尊。**瞻戴**光顏目未曾眴。〔T09n0263_p0094c07《正法華經》〕

這個例子當中，「稽首佛足」顯示出對世尊的尊敬之心，故而「瞻戴光顏目未曾眴」。其人作伎。眾庶益悅。**瞻戴**光顏。如星中月。驕貴之女。多有財寶。眾藏盈滿。獻致珍異無數億寶。〔T03n0154_p0088b12《生經》〕

在這個例子當中，「人民皆往奉迎」顯示出人民對端正者的尊敬之心。

惟願世尊。孚令我等所願具足。授無上正真。又餘聲聞合二千人。與塵勞俱皆從坐起。偏袒右肩一心叉手。**瞻戴**尊顏我等逮見。〔T09n0263_p0098a04《正法華經》〕

在這個例子當中，「從坐起。偏袒右肩，一心叉手」亦顯示出內心的尊敬。

即從座起整衣服。偏袒右肩右膝著地。一心合掌曲躬恭敬。**瞻仰**尊顏而白佛言。〔T09n0262_p0016b08《妙法蓮華經》〕

即從座起到於佛前。頭面禮足卻住一面。**瞻仰**尊顏目不暫捨。〔T09n0262_p0027b17《妙法蓮華經》〕

在這兩個例子當中，「曲躬恭敬」、「頭面禮足卻住一面」皆顯示出施動者內心的尊敬之意。

進詣佛前偏袒右肩。禮畢叉手**瞻順**尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

於是賢者大目捷連。賢者須菩提。賢者摩訶迦旃延。等類同心側立頂戴。**瞻順**光顏目未曾眴。稽首足下戰戰兢兢。應時各各說斯之頌。〔T09n0263_p0087a01《正法華經》〕

上述兩個例子當中，「禮畢叉手」、「稽首足下」顯示出施動者內心的尊敬之意。

拔提弗受命而退。即詣佛所。**瞻睹**神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

徑詣波羅奈國。未至中間。道逢梵志。名曰優吁。**瞻睹**尊妙。驚喜交集。下在道側。〔T04n0196_p0147c28《中本起經》〕

上述兩個例子當中，「敬心踊躍拱袖進前」、「驚喜交集。下在道側」顯示出施動者的尊敬之意。

4、就所搭配的詞語來看，「瞻戴」、「瞻仰」、「瞻順」往往與「合掌」、「叉手」相配，說明「瞻戴」、「瞻仰」、「瞻順」觀看的姿勢乃是具有〔+雙手合掌〕觀看的概念。例如：

偏袒右肩一心叉手。瞻戴尊顏我等逮見。〔T09n0263_p0098a04《正法華經》〕
時四部眾見七寶塔。在於空虛高大微妙。巍巍無量光耀焯曄。靡所不照。頌宣善哉。歡喜踊躍叉手而立。瞻戴無厭。〔T09n0263_p0102c05《正法華經》〕
爾時舍利弗踊躍歡喜。即起合掌瞻仰尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕
爾時千世界微塵等菩薩摩訶薩。從地踊出者。皆於佛前一心合掌瞻仰尊顏而白佛言。〔T09n0262_p0051c09《妙法蓮華經》〕
進詣佛前偏袒右肩。禮畢叉手瞻順尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

5、就上下文的語境來看，「瞻戴」、「瞻順」的施動者為複數；「瞻仰」的施動者可以是複數，也可以是單數；「瞻視」、「視瞻」、「瞻勞」、「仰瞻」、「瞻睹」皆為單數。例如：

顏色和悅猶如秋月。一切人民瞻戴是王如父如母如兄如弟。善心視王目如青蓮。〔T03n0153_p0063a17《菩薩本緣經》〕
又餘聲聞合二千人。與塵勞俱皆從坐起。偏袒右肩一心叉手。瞻戴尊顏我等逮見。〔T09n0263_p0098a04《正法華經》〕

上述兩個例子，「一切人民」、「餘聲聞合二千人」，說明「瞻戴」的施動者皆為複數。

驚喜踊躍咸從坐起。進詣佛前偏袒右肩。禮畢叉手瞻順尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

於是賢者大目犍連。賢者須菩提。賢者摩訶迦旃延。等類同心側立頂戴。瞻順光顏目未曾眴。稽首足下戰戰兢兢。應時各各說斯之頌。〔T09n0263_p0087a01《正法華經》〕

上述兩個例子，「咸從坐起」以及「賢者大目犍連」、「須菩提」、「摩訶迦旃延」，說明「瞻順」的施動者亦為複數。

爾時大目犍連。須菩提。摩訶迦旃延等。皆悉悚慄。一心合掌瞻仰尊顏。目不暫捨。〔T09n0262_p0020c28《妙法蓮華經》〕

從座而起一心合掌。瞻仰尊顏目不暫捨。〔T09n0262_p0036a12《妙法蓮華經》〕

上述兩個例子，顯示「瞻仰」的施動者可以是複數。

爾時舍利弗踊躍歡喜。即起合掌瞻仰尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕

即從座起到於佛前。頭面禮足卻住一面。**瞻仰**尊顏目不暫捨。〔T09n0262_p0027b17《妙法蓮華經》〕

上述兩個例子，顯示「瞻仰」的施動者也可以是單數。

世尊又問。卿強健時。頗**瞻視**問訊有疾者不。答曰。不也。〔T03n0154_p0089c23《生經》〕

佛為十方一切之救。功德具足。無所乏少。尚**瞻視**之。況我罪福未斷。而不興福耶。〔T03n0154_p0090a01《生經》〕

上述兩個例子，顯示「瞻視」的施動者為單數，其施動者分別為「卿」及「佛」。時舍利弗。論議既勝。名聲遠著於十六大國。智慧博通獨出無侶。後於一時。於王舍城。昇高樓上。四顧**視瞻**。見城內人節慶聚會。〔T04n0200_p0255b13《撰集百緣經》〕時有摩納學志。有所緩急。常馳走趣。有一學志。若有急緩疾病之厄。初不**視瞻**。〔T03n0154_p0089b26《生經》〕

上述兩個例子，顯示「視瞻」的施動者為單數，其施動者分別為「舍利弗」及「一學志」。

數令出入。當圖殺之。吾夫乃休。因便佯病。困劣著床。其婿**瞻勞**。醫藥療治。竟不肯差。〔T03n0154_p0076c10《生經》〕

上述這個例子，顯示「瞻勞」的施動者為單數，其施動者為「其婿」。

於時梵志。**仰瞻**天文。下察地理。知已嗣立。即詣宮門求覲。〔T03n0154_p0077b10《生經》〕

於是世尊見眾會心。欲為決疑。**仰瞻**上方。時天帝釋尋時來下。化作一小鼠。〔T03n0154_p0076a29《生經》〕

上述兩個例子，顯示「仰瞻」的施動者為單數，其施動者分別為「梵志」及「世尊」。拔提弗受命而退。即詣佛所。**瞻睹**神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

道逢梵志。名曰優呬。**瞻睹**尊妙。驚喜交集。下在道側。〔T04n0196_p0147c28《中本起經》〕

上述兩個例子，顯示「瞻睹」的施動者為單數，其施動者分別為「拔提弗」及「優呬」。

6、就受動者（也就是觀看的對象）的角度觀察，可發現「視瞻」、「仰瞻」所觀看的為抽象的對象，其餘則皆有具體的對象。例如：

於王舍城。昇高樓上。四顧**視瞻**。見城內人節慶聚會。〔T04n0200_p0255b13《撰集百緣經》〕

見人死屍 惡鬼兇嶮 放髮叫呼 諸魃湊滿 貪欲慢翰 窗牖顯明 **視瞻**四顧於斯闚看 不可得常〔T09n0263_p0076c16《正法華經》〕

上述兩個例子，由「四顧」與「視瞻」的搭配，可知「視瞻」所看為抽象的四方。

於時梵志。**仰瞻**天文。下察地理。知已嗣立。即詣宮門求覲。〔T03n0154_p0077b10《生經》〕

於是世尊見眾會心。欲爲決疑。**仰瞻**上方。時天帝釋尋時來下。化作一小鼠。〔T03n0154_p0076a29《生經》〕

上述兩個例子，顯示「仰瞻」所觀看的對象為「天文」、「上方」，皆為抽象之物。以下各句，所觀看的對象為具體之物。

世尊告曰。卿強健時。不**瞻視**人。不問訊疾病。誰當**瞻視**卿乎。善惡有對。罪福有報。恩生往反。義絕稀疏。佛爲一切三界之救。救度五道。當捨卿耶。〔T03n0154_p0089c25《生經》〕

其族姓子。超於興起爲佛塔廟。起於建立精舍講堂。超於**瞻視**比丘疾病。而給醫藥供養之具。〔T09n0263_p0117a10《正法華經》〕

國王君主大力轉輪聖王。各與營從咸悉一心**瞻戴**世尊。意皆愕然怪未曾有。〔T09n0263_p0063c02《正法華經》〕

爾時阿難羅云。俱白佛言。今我等見二千聲聞。學弟子戒心懷忻然。**瞻戴**尊顏。道法正典不可思議。願及是時。〔T09n0263_p0098c20《正法華經》〕

爾時舍利弗踊躍歡喜。即起合掌**瞻仰**尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕

其祖轉輪聖王。與一百大臣及餘百千萬億人民。皆共圍繞隨至道場。咸欲親近大通智勝如來。供養恭敬尊重讚歎。到已頭面禮足繞佛畢已。一心合掌**瞻仰**世尊。〔T09n0262_p0022c07《妙法蓮華經》〕

拔提弗受命而退。即詣佛所。**瞻睹**神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

天地大冥。唯睹小光。趣東城門。門復自開。明照鹿園。尋光詣佛。**瞻睹**相好。巍巍煌煌。怖止迷解。〔T04n0196_p0149a14《中本起經》〕

進詣佛前偏袒右肩。禮畢叉手**瞻順**尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

於是賢者大目犍連。賢者須菩提。賢者摩訶迦旃延。等類同心側立頂戴。**瞻順**光顏目未曾眴。稽首足下戰戰兢兢。應時各各說斯之頌。〔T09n0263_p0087a01《正法華經》〕

數令出入。當圖殺之。吾夫乃休。因便佯病。困劣著床。其婿**瞻勞**。醫藥療治。竟不肯差。〔T03n0154_p0076c10《生經》〕

7、在具體之物的前題下，如果再進一步就受動者（也就是觀看的對象）的角度觀察，可發現「瞻仰」、「瞻順」、「瞻睹」所觀看的對象皆為佛世尊，「瞻戴」所觀看的對象則可以是佛世尊，也可以不是。「瞻視」、「瞻勞」的對象則都不是佛世尊。

「瞻仰」、「瞻順」、「瞻睹」的例子如下：

爾時阿難羅云。俱白佛言。今我等見二千聲聞。學弟子戒心懷忻然。**瞻戴**尊顏。道法正典不可思議。願及是時。〔T09n0263_p0098c20《正法華經》〕

爾時舍利弗踊躍歡喜。即起合掌**瞻仰**尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕

進詣佛前偏袒右肩。禮畢叉手瞻順尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

拔提弗受命而退。即詣佛所。瞻睹神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

驚走趣戶。戶輒自開。天地大冥。唯睹小光。趣東城門。門復自開。明照鹿園。尋光詣佛。瞻睹相好。巍巍煌煌。怖止迷解。〔T04n0196_p0149a14《中本起經》〕

「瞻戴」的例子如下：

國王君主大力轉輪聖王。各與營從咸悉一心瞻戴世尊。意皆愕然怪未曾有。〔T09n0263_p0063c02《正法華經》〕

爾時阿難羅云。俱白佛言。今我等見二千聲聞。學弟子戒心懷忻然。瞻戴尊顏。道法正典不可思議。願及是時。〔T09n0263_p0098c20《正法華經》〕

上述兩個例子，「瞻戴」的對象皆為世尊。

顏色和悅猶如秋月。一切人民瞻戴是王如父如母如兄如弟。善心視王目如青蓮。〔T03n0153_p0063a17《菩薩本緣經》〕

汝輩當往詣忍世界見能仁佛如來至真。并當瞻戴多寶世尊形像塔寺。〔T09n0263_p0103b08《正法華經》〕

上述兩個例子，「瞻戴」的對象非佛世尊。又「瞻視」、「瞻勞」的例子如下：

常以淨手施眾生食。口常宣唱與是人衣與是人食及與財寶。愛護是人瞻視是人。〔T03n0153_p0055a08《菩薩本緣經》〕

於後時間。遇疾困病。無人瞻視飲食醫藥。餘命無幾。〔T04n0200_p0205b22《撰集百緣經》〕

因便佯病。困劣著床。其婿瞻勞。醫藥療治。竟不肯差。謂其夫言。何須勞意損其醫藥。吾病甚重。當得卿所親親獼猴之肝。吾乃活耳。〔T03n0154_p0076c10《生經》〕

上述三個例子，「瞻視」、「瞻勞」的對象皆非佛世尊。

(三) 就色彩意義而言：

1、就上下語境來看，「瞻戴」、「瞻仰」、「瞻順」、「瞻睹」都出現在下對上的關係，說明「瞻戴」、「瞻仰」、「瞻順」、「瞻睹」具有（+用於下對上的關係）的色彩意義。例如：

顏色和悅猶如秋月。一切人民瞻戴是王如父如母如兄如弟。善心視王目如青蓮。〔T03n0153_p0063a17《菩薩本緣經》〕

在上述這個例子裏，人民與王屬下對上的關係。

爾時阿難羅云。俱白佛言。今我等見二千聲聞。學弟子戒心懷忻然。瞻戴尊顏。道法正典不可思議。願及是時。〔T09n0263_p0098c20《正法華經》〕

爾時舍利弗踊躍歡喜。即起合掌瞻仰尊顏。而白佛言。今從世尊聞此法音。心懷勇躍得未曾有。〔T09n0262_p0010b29《妙法蓮華經》〕

進詣佛前偏袒右肩。禮畢叉手瞻順尊顏。內自思省心體熙怡。〔T09n0263_p0080a08《正法華經》〕

拔提弗受命而退。即詣佛所。瞻睹神德威相赫然。弟子法儀恂恂洋洋。敬心踊躍拱袖進前。〔T04n0196_p0162a26《中本起經》〕

在上述這四個例子裏，都屬於佛弟子與佛之間的關係，即下對上的關係。

陸.結論

上面我們選了四組與「觀看」意義相關的動詞做義素分析。放在詞義場裡觀察其間的共性與殊性。人們對某個詞義的認識，事實上是在不自覺中，透過詞義場的比較而得，包括場內各詞的比較，相近詞義場的比較，和上下位詞義場的比較。古漢語教學工作完全可以引進這樣的觀念，用義素分析法描寫，使學習者，很快的掌握各詞的意義對比點，精確的理解一批一批詞彙的內部關聯性。這樣的研究，對漢語詞彙史的建構，也能夠提供充分的詞彙演化的具體例證，所以是一項值得運用的有效方法。另外，在通讀佛經語料，進而作為中古宗教、哲學、思想、義理、社會、文化研究的依據。這樣的義素分析，也是掌握詞義的重要關鍵。本文的探索，例證的分析，當然還會存在著一些不足之處，尚祈專家學者，同道先進，不吝賜教。

Working Out Basic Patterns in Classical Chinese Syntax: Further Data on the Benefactive Ditransitive in Late Zhou

Derek Herforth
University of Sydney

For E.G. Pulleyblank

This paper takes another look at two sub-types of ditransitive clause in Late Zhou Chinese: the privative and the benefactive. Such clauses are composed of a Verb and three bare NPs: [NP1 V NP2 NP3]. A perennial question concerns the status of 'NP2' in this array. While it has often been explained as a possessive adjunct to NP3, cross-constructural data confirm the phrase's independent NP status. The paper attempts to demonstrate the advantages of a more integrated approach to the study of Classical Chinese constructions

0. Introduction

Professor E.G. Pulleyblank's eminence in the field of Chinese historical linguistics imparts special force to his characterization of our knowledge of pre-Han grammar: "[w]e are still at the stage of struggling to work out the basic patterns of classical Chinese syntax" (1995:xiii). The student of linguistic history can never, of course, aspire to the depth of knowledge attainable through both the teasing out of native-speaker intuitions and the digital exploration of vast electronic corpora. One goal that can be pursued, however, involves going beyond the identification and description of basic constructions to focus on their inter-relations within the grammatical system to which they belong. Precisely how constructions delineated by the linguist are in fact related in the mind of the language-user – through 'derivation', 'inheritance', 'constraint-based unification', etc. – is a question which must be left to psycholinguists and neuroscientists. However, the efficient teaching of classical languages and the study of language history can be substantially advanced by the most precise and well-integrated description of constructions the surviving data will allow.

In this paper, we take up again the much-debated question of ditransitive constructions in late Zhou Chinese (LZC), bringing to bear a kind of evidence which the literature as we know it seems to have neglected. This brief study is offered to Professor Pulleyblank, in recognition of his long and profoundly influential career, and in sincere gratitude for his mentoring in years past.

1. The Ditransitive Array

Clauses consisting of a verb and three *bare* NPs, one pre-verbal and two post-verbal [NP1 V NP2 NP3], are attested in a number of functions in LZC, three of which will be treated here. The functional labels, ‘donative’ and ‘privative’ refer in the first instance to verb semantics, which then determines the distinct roles carried by the *first* of the two post-verbal NPs, NP2.

1.1 Donative Ditransitive

The most commonly attested type is found with verbs such as ‘give’, ‘offer’, ‘show’, ‘teach’, etc. Such clauses encode the transfer by Agentive NP1 of a Theme, NP3, to a Goal recipient NP2, [A V G T], as in (1).¹ Note that both the English and contemporary standard Chinese (CSC) translations of (1) are also cast in the ditransitive.

1. 野 人 與 之 塊 Zz B5.23.6/100.26
 bush person give 3O clod²
 The bush man gave him a clod of earth.

- 1a. *xiāngxià rén gěi tā yī kuài nítǔ* (Shen 1981:101)
 country person give 3O one clod earth

1.2 Privative Ditransitive

The ditransitive clause-form is also found with a much smaller class of verbs such as 奪 ‘snatch, seize’, 賦 ‘levy’ and 責 ‘demand’. Unlike the donatives cited above, verbs such as 奪 ‘snatch’ and 責 ‘demand’ are basically mono-transitive. In LZC, however, such transitive verbs may accommodate an additional post-verbal NP, the NP2, encoding a Source, the participant from whom the Theme, NP3, is removed: [A V S T]. The next example demonstrates that, unlike the donative in (1), a LZC ditransitive clause cannot always be rendered in CSC or in English as a ditransitive. In the two modern languages, NP2 in the LZC ditransitive is expressed as a possessive adjunct to NP3, not as an independent NP; this, of course, turns the LZC ditransitive clause into a mono-transitive: [NP1 V (NP_a)NP2].

2. 使 奪 之 宅 Ls 25.6/165.21
 send snatch 3pO dwelling
 (He) had (someone) seize *their* dwellings.

¹ Donative verbs are also attested with other orderings of their two postverbal NPs. Our focus here is on clauses in which a bare goal NP precedes a bare theme NP — that is, neither NP is introduced by an adposition. Liu Songchuan (1998) is comprehensive study of ditransitive clauses in pre-Qin Chinese, and as such, includes several sub-types not dealt with here.

² A list of abbreviations used will be found at the end of this article.

- 2a. *pài rén qù qiǎngduó tāmen de zhùzhái*
 send person go seize 3p pl LK dwelling
 (He) sent people to seize *their* dwellings.

Clearly, the question of which privative verbs accept such an extra source argument is very much a language-specific matter. Thus, neither ‘levy’ nor ‘demand’ allow the ditransitive in English: *‘We demanded them compensation’. Such language-internal facts should not, of course, be allowed to interfere with our analysis of LZC, an obvious methodological point that needs to be kept in mind in considering the third, most controversial type of LZC ditransitive.

1.3 Benefactive Ditransitive

The ditransitive array is also attested in LZC with a large number of basically mono-transitive verbs, such as 爲 ‘make; serve as’. Again, the ‘extra’ NP is NP2, the ‘Beneficiary’ of the action encoded by AVT: [A V B T]. The two examples below display the syntactic parallelism between benefactive and donative ditransitives in both LZC and English.

3. 冬 日 則 爲 之 饘 粥 夏 日 則 與 之 瓜 麩 Xz 10.46.6
 winter day then make 3O thick gruel summer day then give 3O melon barley
 In winter (he) makes them thick gruel; in summer (he) gives them barley with melon.

In the first clause of (3), the verb *wéi* 爲 is used transitively to mean ‘make’, but is followed by two bare NPs, the first the beneficiary of the action ‘make thick gruel’ 爲饘粥. The second clause is donative, with the verb 與 ‘give’, already seen in (1). The English translation of both clauses parallels the LZC original in being ditransitive, while an CSC translation of the first clause of (3) requires the adposition *gěi* ‘for’ to mark the beneficiary: *dōngtiān tā gěi tā-men zhǔ xīfàn* (winter 3p for 3p pl cook gruel). A ditransitive rendering, without *gěi*, is ungrammatical: **dōngtiān tā zhǔ tā-men xīfàn*, intended as ‘In winter, he makes them rice gruel’.

4. 原思爲之 宰 與 之 粟 九百 Ly 6.5/12.15
 PN be 3O steward give 3O grain 9 100
 When Yuansi served him as Steward, Confucius gave him nine hundred measures of grain (as salary).

In (4), as in (3), both 爲, ‘serve as’, in the benefactive, and donative 與 ‘give’ show two bare objects, the third-person oblique pronoun 之 ‘him’ as NP2, and a lexical theme NP3, ‘steward’ and ‘grain’, respectively. Again, CSC is constrained to encode the NP2 beneficiary in the first clause of (4) as a possessive adjunct of NP3: *Yuánsī rèn Kǒngzǐ jiā de zǒngguǎn* PN assume PN household LK superintendent (Yang Bojun 1984:56, inter alia).

The use of ditransitive syntax to encode a benefactive construction is conspicuous by its absence from CSC, as further suggested by the syntactic options available for the two meanings of the verb *zhǎo* 找. In its donative sense, *zhǎo* means ‘give change’, allowing it to pattern as a ditransitive in (5a).

- 5a. *tā zhǎo wǒ wǔkuài wǔ*
 3p give.change 1p 5 \$ 5
 She gave me \$5.50 in change.

But *zhǎo* also means ‘look for’, a sense which is neither donative nor privative, and hence, does not license the ditransitive (5b). The meaning ‘look for something for someone’ can only be expressed in CSC by using an adposition to introduce the beneficiary. As long as this requirement is met, there is more than one option available for the meaning ‘look for something for someone’, as suggested by (5c) and (5d).

- 5b. **tā zhǎo wǒ yīxiē zīliào*
 3p look.for 1p some material
 Intended: She looked for some material for me.

- 5c. *tā bāng wǒ zhǎo yīxiē zīliào*
 3p for 1p look.for some material
 She’s looking for some material for me.

- 5d. *tā zhǎo le yīxiē zīliào gěi wǒ*
 3p look.for AS some material for me
 She looked for some material for me.

The three sub-types of ditransitive presented here, the donative, the privative and the benefactive, are all found in LZC and in English, although the two languages obviously differ in which verbs permit the array. In contrast, CSC appears to lack the third, benefactive type altogether (Xu Qiting 2005:10-12; Shi Bing 2007:47). In that language, all cases of bare beneficiary NPs in such sentences as ‘I knit *her* a sweater’ or ‘they wrote *us* a check’ are encoded as adpositional phrases.

2. A Prolonged Syntactic Controversy

A very long-standing and at times acrimonious dispute in the analysis of the LZC ditransitives may be directly related to the difference between CSC and LZC described above. It has often been claimed that what we label ‘NP2’ in our templates for the privative and benefactive constructions is, in fact, not an NP at all, but a covert possessive adjunct of NP3, found overtly expressed in the CSC and English translations of 之 in 奪之宅 (snatch 3O dwelling), from (2), as *qiǎngduó tāmen de zhùzhái* ‘seize *their* dwellings’. Proponents of this analysis, assuming that OC 奪 ‘snatch’ can only be mono-transitive,

equate immediately post-verbal 之 (3O) with 其, the third-person possessive pronoun (3L). By the same assumption, 爲之饘粥 (make 3O thick gruel) in (3) is ‘parsed’ not as ‘make them thick gruel’, but as 爲其饘粥 (make 3L thick gruel), ‘make their thick gruel’. This understanding of 之 as 其 has never been applied to the donative ditransitive, however. Thus, no one has ever suggested that 之 ‘him’ in 與之塊 ‘gave him a clod of earth’ really means 與其塊 ‘gave his clod of earth’.

Among the numerous voices dissenting from this traditional analysis of NP2 as a possessive adjunct to NP3, He Leshi (2004) has demonstrated conclusively the *ad hoc* character of equating 之 with 其 in just those cases where NP2 is either a beneficiary or a source. She suggests that the refusal to admit the existence of these two ditransitive sub-constructions in LZC is directly related to the lack of non-donative ditransitives in the language of the analysts (2004: 22; cf. Li Zuofeng 2004:177-80). Thus, the reason 與之塊 ‘gave him a clod of earth’ has never been interpreted as 與其塊 ‘gave his clod of earth’ is simply that Chinese has always allowed the option of bare double objects with at least some donative verbs. Similarly, 爲之饘粥 is often claimed to mean 爲其饘粥 simply because the encoding of the beneficiary as a bare NP disappeared rather early from written Chinese and is no longer available in CSC.

He Leshi’s study is a scrupulous analysis of the distinct uses of *post-verbal* 之 and 其 in the LZC corpus. In her argumentation, however, she scarcely departs from the methodological assumptions of most other parties to the dispute.³ Over the decades, study after study has been published on the mono- vs. the di- transitive analysis of the data, in which the same examples are cited again and again, each new author seeming to find a slightly different way of affirming or denying that 之 is to be equated with 其.

It appears, however, that an important source of evidence on this question has been relatively neglected. The issue of the precise extension of the LZC ditransitive goes well beyond the confines within which the question is typically addressed — whether 之 (our ‘NP2’) should be equated under certain specific conditions with 其. LZC ditransitive clauses are not syntactic isolates, divorced from the rest of the language. If ‘NP2’ is an independent NP, that NP should be accessible to constructions that ‘target’ object NPs. As object NPs are not invariably confined to post-verbal positions, the question becomes whether and how the ditransitives interact with constructions in the language that require object NPs to appear in preverbal sites. A broader, cross-constructional approach to the problem of LZC ditransitives would assume that, if the initial phrase following verbs

³ For a brief history of this error, see Li Zuofeng (2004:177-78) and from the other side of the controversy, Yi Mengchun (2005:183-84). The equation of 之 as ‘NP2’ with 其 has been made by some of the most influential figures in modern Chinese philology, among them Wang Yinzhi and Yang Shuda. Pulleyblank (1995:32-33) has long been a strong proponent of the ditransitive analysis.

such as 奪 and 爲, etc., is indeed an independent NP (NP2), then evidence of its status as NP, not possessive adjunct, should be sought from syntactic alternations with the default VO order. Below we show that in constructions requiring the occurrence of an object in a pre-verbal position, the phrase we have labeled NP2 in the ditransitives invariably behaves like other, less controversial objects, that is, as an independent NP, not as an adjunct to a second, head NP. With one exception, the alternations studied below seem not to target adjuncts at all. It turns out that a number of LZC ‘object-advancing’ constructions provide rather unequivocal evidence on the nature of NP2.

3. Exposure in LZC

OC has a rich repertory of constructions that require an NP to appear ‘exposed’ in a position to the left of its default site within the canonical [SVO ...] clause (cf. Pulleyblank 1995:69-75). The single label, ‘exposure’, will here be used even more broadly than in Pulleyblank as a cover term for any construction that requires the pre-verbal occurrence of an object NP. Our main aim will be to demonstrate that NP2 in the privative and benefactive arrays undergoes exactly the same sorts of exposure as the sole object of mono-transitive verbs. As part of our larger project of “working out the basic patterns”, we will strive to be as clear as possible about how each of the exposure constructions we treat differs both formally and functionally from the others.

3.1 Promoting Source NP2 To Subject

Our first example examines the promotion of direct object to subject. In the first clause of (6), the object-promoting modal 可 in [可+V] ‘may be V-ed’ requires the direct object of ‘grind’ as its subject: 磨丹 ‘grind cinnabar’ > 丹可磨 ‘cinnabar can.be ground’ (The agent-oriented modal 可以, as in S 可以磨丹 ‘S can grind cinnabar’, figures in (17) below.)

6. 丹_c 可 磨 ___c也 而 不可 奪 ___c 赤 Ls 12.4/60.11
 cinnabar AP grind PL LK NA AP snatch red
 Cinnabar may be ground down, but cannot be deprived of redness.

In the second clause of (6), the same modal targets the source phrase, NP2, in the ditransitive use of 奪 ‘snatch’: 不奪丹赤 ‘not snatch.from cinnabar (its) red’ > 丹不可奪赤 ‘cinnabar not can.be deprived (of its) redness’. Such data demonstrate quite clearly that 可 targets the initial post-verbal source NP (NP2) following privative 奪 in precisely the same way it does the single object of a mono-transitive like 磨 ‘grind’.

3.2 Negative Attraction Of Pronominalized Beneficiary NP2

In another well-known syntactic alternation, canonically post-verbal pronoun objects tend strongly to be attracted to the position to the right of a matrix negative particle. (7) shows the canonical benefactive predicate 爲之後, lit. ‘be for.him successor’.

7. ... 欲盡 殺之 而 爲 之後 Ls 9.4/46.13
 want exhaust kill 3O LK be 3O after
 [Yu] wanted to kill them all and become his successor.

In (8), the ditransitive predicate 爲之後 is negated by 不, which then attracts the pronominal NP2 to yield, initially, 不之爲後; the negative and the attracted pronoun then contract to 弗: 弗爲後.

8. 宗子 爲 殤 而 死 庶 子 弗 爲 後 也 Lj 7.32/55.14
 cult son BE premature LK die plebian son N3 be after PL
 When the scion of the main line dies prematurely, the son of a secondary wife does not become his successor.

There are no known cases of structures such as ?不其爲後, where the pronominalized possessive adjunct, 其 (3L), is detached from its NP head and attracted across the verb by a matrix negative. The operation of negative attraction in (8) thus appears to identify NP2 之 in 爲之後 as an independent NP rather than as an adjunct.

3.3 Asking For The Identity Of Beneficiary NP2

The rule next investigated requires that objects interrogated by 誰 ‘who(m)’, 何 ‘what’, etc. occur in a site between the subject and the verb, [SVO] > [SO?V], as shown by the position of 誰 in (9).

9. 君 將 誰 與 ____ Zz B11.13.2/428.19
 lord PA who(m) associate.with
 With whom will the lord associate?

Example (10) shows a canonical ditransitive with the verb 爲 ‘act as’. In the second, ditransitive clause of (11), the NP2 is found interrogated by 誰 ‘whom’.

10. 箕子 爲 之 奴 Ly 18.1/51.5
 PN master serve.as 3O slave
 Master Ji served him as slave.

11. 民 死 寡人將 誰 爲 ___ 君 乎 Ls 6.4/31.23
 folk die 1p PA who serve.as lord QE
 If the folk die, for whom will I be lord?

Consider next a second reading of (11).

- 11a. 民 死 寡人將 誰 爲 君 ___ 乎
 folk die 1p PA who serve.as lord QE
 If the folk die, who will I be for the lord?

In this second construal, the question word is understood as interrogating NP3, or, put another way, as asking for the subject complement of 爲 ‘serve as’. The reading is ungrammatical, however, as subject and object *complement* phrases, when interrogated, are not promoted, but remain in situ, as shown in (12) (cf. Pulleyblank 1995: 20, 91).

12. 子 爲 誰 Ly 18.6/52.5
 2p be who
 Who are you, Sir?

Thus, “exposed” 誰 in the original sentence, 寡人將誰爲君乎, can only be understood as the beneficiary NP2, ‘for whom?’.⁴

3.4 Narrow Focus on Beneficiary NP2

The next example displays a second type of exposure which, like interrogation of the object, accommodates a direct object NP in the position between subject and verb. In this sub-type, however, the object is resumed immediately by pronominal 之. Such resumption, here symbolized by ‘r’, is not found following the interrogative pronouns 誰 ‘who(m)’, 何 ‘what’, etc. The construction [S Or V] encodes narrow focus on the object phrase, as shown in (13).

⁴ The rule about the interrogation of subject complements in situ leads us to expect that the meaning given in the translation of (11a) might have been expressed in LZC 寡人爲君誰. Unfortunately, such sentences have not been detected in the corpus. Ideally, we would also want to show that the second clause of (11) cannot be understood literally as ‘whose will I be the lord?’; however, in the apparent absence of LZC verbal sentences which interrogate a possessive adjunct, as in ‘Whose lord did he betray?’, this demonstration is not possible. No only do we fail to find the analog of ‘Whose lord did he betray’, there appear to be no cases in which an adjunct is exposed alone for questioning while its head remains in situ: ‘Whose ___ did he betray lord?’, or ‘Who_w did he betray his_w lord?’.

13. 子是 之 學 Me 5.4/29.27
 2p this 3O study
 You study *this*!

The benefactive can be used to assert a relation of kinship or succession, as already seen in 爲之後 ‘become for him successor’ (7). Note how the following explication of the expression 爲人後 lit. ‘be for.someone successor’ in (14), employs first a ditransitive, 爲之子, and then the same verb with a single, subject complement and possessive pronoun, 爲其子.

14. 爲 人 後 者 爲 之 子 也 爲 人 後 者 爲 其 子 Gong 8.15.2/94.28
 be person after NM 3O son PL NM 3L
 lit. ‘Becoming for someone a successor is being for him a son; becoming for someone a successor is being his son.’

In (15), ‘exposure for focus’ operates on the NP2 beneficiary in the canonical clause 我爲文王子 lit. ‘I am for.King Wen a son’, producing 我文王之爲子.

15. 我 文 王 之 爲 子 武 王 之 爲 弟 成 王 之 爲 叔 父 Xz 32.149.7
 1p PN king 3O be son PN younger.brother PN uncle
 I am son to King *Wen*, younger brother to King *Wu* and paternal uncle to King *Cheng*.

Focus exposure clearly treats the initial, beneficiary object, NP2, of a ditransitive exactly as it does the direct object of 學 ‘study’ in (13), placing it between subject and predicate, and resuming it with 之.

3.5 Exposure Of Beneficiary NP2 Left Of Subject

There are additional types of exposure in which an object is found to the left of both verb and default subject position: [(S)VO] > [O (S)V]. In each clause of (15), the site for the exposed beneficiary lies between subject and predicate: [S Or V ...]. Canonical order in the benefactive, [A 爲 B T], is shown again in (16), where the verb is 爲 ‘make’. This implies 可以爲 走者 罔 ‘can make for.runners nets’ as the canonical form related to the exposures in (17), where the canonical position for each NP2 is signaled by a blank line with a subscript.

16. 吾 能 爲 之 足 Zc 117/57.16
 1p able make 3O foot
 I can make (it) feet (for it).

17. 走者 z ___∅ 可以爲 __z 罔 游者 y ___∅ 可以爲 __y 綸 飛者 f ___∅ 可以爲 __f 矰
 runNM AA make net swim fishline fly string.arrow
 For runners, one can make nets, for swimmers, fishline, for fliers, arrows attached to string.⁵
 Sj 63.2140

All three clauses in (17) lack subjects. The initial NP, 走者 ‘runner’, cannot be the agent-subject required by 可以 in 可以爲罔 ‘can make net’, as that construal would yield the unintended reading ‘runners can make nets’. This implies that the exposed phrases lie to the left of the site occupied by subjects, in what is often referred to as ‘topic position’. The null subject, ‘_∅’, is represented in the translation by ‘one’, a pronoun LZC appears to have lacked. Note that if the exposed NPs in (17) were possessive adjuncts of the NPs in the predicate, they would probably be resumed by 其 within the predicate: ? 走者 可以爲 其罔. Cf. (20) below.

3.6 Double Exposures

3.6.1 Object-To-Subject And NP2 To Pre-Predicate Position

The next two examples are, like (6) above, based on the demand for object as subject triggered by 可, but each involves the exposure of a second phrase as well.

18. 求也 [千室 之 邑 百乘 之家]q 可使 爲 之 q 宰也 Ly 5.8/9.25
 PN PL 1k chamber LK town 1c vehicle LK family AP send serve.as 3O steward PL
 Ran Qiu (is such that), a town of one thousand households or a family of one hundred chariots, (he) could be sent to serve *it* as steward.

Here Qiu 求, direct object of 使, ‘send on mission; have do something’ becomes subject of 可使, ‘can be sent, be allowed to’: 使求爲之宰 ‘send Qiu to serve them (as) steward’ + 可 = 求也 可使爲之宰 ‘Qiu may be sent to serve them (as) steward’. That subject is then exposed further leftwards to make room for a second exposure, that of the coordinate NP2 of [爲 NP2 宰] ‘serve NP2 as.steward’. (An example of this very benefactive occurred in (4) above.) The long, coordinate NP2, ‘town of one thousand households (or) family of one hundred chariots’, is exposed between the promoted subject and its predicate and is then resumed by 之 in the canonical site for NP2 within the predicate: 可使爲之宰也. While this second exposure in (18) shares the pre-predicate landing site with both the question-word and narrow focused phrases exemplified in (11), (13) and (15) above, three distinct resumption strategies — null, adjacent, and predicate-internal — begin to distinguish the several types of exposure exemplified so far, as schematized in (19).

⁵ Note that designating the runners, swimmers and fliers in (17) ‘beneficiaries’ of the action described in each clause involves not a little anthropocentrism.

19. Sub-types of exposure:

- | | |
|--|---------------------------------------|
| a. Object-to-subject (patient subject, Sp) (6): | [Sp 可 V ...], 可, no resumption; |
| b. Negative attraction of Object pronoun (Op) (8): | [S NegOp V ...], Neg, no resumption; |
| c. Interrogated object (O?) (11): | [S O? V ...], O?, no resumption; |
| d. Narrow focus (Or) (13), (15): | [S Or V ...], adjacent resumption; |
| e. Beneficiary-to-topic (17): | [B (S) V ...], no resumption; |
| f. Restrictor phrase (18), (20): | [S O V r ...], remote resumption. |

On the motivation for the exposure of NP2 in (18), suffice it to say here that, although the exposed phrase in this example happens to be a heavy, coordinate NP, the crucial factor determining its position is more likely to be semantic than phonological. In this type of assertion, modalized by 可 ‘can be V-ed’, predicate phrases that encode limiting conditions on the assertion will tend strongly to occur outside the predicate itself: ‘Ranqiu, *under such and such conditions / in the case of x or y*, may be sent to serve as steward’. A preliminary generalization might be: predicate-internal phrases which restrict the assertion of the predicate cannot be embedded within it, but are exposed as preconditions on the assertion. Here, it is the size of the community Ranqiu is deemed qualified to serve as steward that restricts the assertion 可使為幸 ‘may be sent to serve as steward’. As that dimension of size is a property of the referent of the beneficiary phrase, it is the NP2 object of 為 whose ‘conditionalizing’ content is laid out between the topical subject, Qiu, and the predicate, ‘may be sent to ...’.⁶

3.6.2 Object-To-Subject And Adjunct Of Single Object To Pre-Predicate Position

The next example is not a ditransitive clause, and thus contrasts significantly with (18). In (18) it was the Beneficiary NP that was exposed and resumed by 之 in its canonical position in the predicate. In (20) it is the possessive adjunct NP of 賦 ‘levy’, the single object of 治 ‘order, bring under control’ that is exposed in the same position as was the beneficiary (18), between the exposed subject and the predicate. We assume that the motivation for the exposures is the same in both cases, that (20) represents a second case of the exposure of a restrictor phrase, sub-type (19f).

20. 由也 [千乘 之國]k 可使 治 其k 賦也 Ly 5.8/9.22-23
 PN PL 1k vehicle LK state AP send order 3L levy PL
 Zilu (is such that), a state of one thousand chariots, (he) could be sent to administer *its* levies.

⁶ A convincing demonstration of these claims would require rather more space than is available here. Various conditions, both phonological and semantic, on embedding within the LZC predicate would require detailed investigation.

The exposed NP, ‘a state of one thousand (war) chariots’, functions as possessive adjunct of 賦 *fù* ‘levy’, direct object of mono-transitive 治 ‘order’, as shown by its resumption with 其, the third person possessive. The resumption of an exposed beneficiary by 之, and an exposed possessive by 其 demonstrates not that ‘之 is sometimes to be understood as 其’, but that the grammar distinguishes unmistakably between these two types of phrases. Both (18) and (20) are from the same section of the Confucian *Analects*; the grammatical difference between them shows quite clearly exactly how the grammar treats the initial object in the ditransitive as an independent NP object, distinguishing it from a possessive adjunct to an NP.

3.6.3 Domain Beneficiary NP2 And Narrow-Focused NP3

The next example combines a different pair of exposures from within a canonical benefactive clause. In (21), canonical [A V B T] has, we suggest, been reorganized as [B (A) T V].

21. 凡 民 利 是 生 Gy 275
 broad folk advantage RS produce
 For any folk, it is advantage that one produces.

Example (21) appears to be the result of two exposures operating on a canonical benefactive predicate, [V B T], as both Beneficiary NP2 and Theme NP3 appear in preverbal sites. We assume the canonical form of the clause would be 生民利 ‘create for.folk advantage’. This understanding appears to be confirmed by Wei Zhao’s 韋照 third-century paraphrase of (21): 謂爲民生利 “(this) means ‘for the folk create advantage’” (Gy 276). The proposed canonical form, 生民利, is reminiscent of the following data.

22. 無 生 民 心 Zz B1.1.4/2.12⁷
 NI produce folk heart
 Do not give rise to ambitions among the people.
23. 天 生 民 而 立 之 君 Zz B9.14.6/256.25
 heaven produce folk LK stand 3O lord
 Heaven gave birth to the people and set up rulers for them.

⁷ In almost all of the ditransitive data reviewed here, NP2 is the object pronoun 之; however, the canonical form of (17), 可以爲走者罔, as well as examples (22) and (25) all demonstrate that the NP2 site also accommodates mono- and poly-syllabic lexical NPs.

24. 我 有 圃 生 之 杞 乎 Zz B10.12.10/352.24
 1p have vegetable.plot produce 3O river-willow QE
 I have a plot for vegetables; do I grow river-willow for it (= there)?!
25. 樹 吾 墓 櫟 Zz B12.11.4/451.11
 plant 1p grave catalpa
 Plant catalpas for my grave.⁸

The two exposures which yield (21), 凡民利是生, involve, in the first instance, the promotion of NP3 利 ‘advantage’ to immediately preverbal position for narrow focus, where it is resumed by 是 ‘this’. This is parallel to (15), 我文王之爲子 (*Xunzi*) ‘I am son to King *Wen*’ and (13) 子是之學 (*Mengzi*) ‘You study *this!*’, except that the resumptive pronoun in the earlier *Guoyu* text, example (21), is 是 ‘this’, rather than the 之 found in the two *Zhanguo* examples (Pulleyblank 1960; 1995:70). The close comparison of these three examples of narrow focusing suggests that the beneficiary NP2 (文王 in [15]), the direct object (是 in [13]) and the theme NP3 (利 in [21]) are focused in the same way, the difference between the two resumptives, 是 > 之, more a matter of diachronic variation than a distinction in case marking, beneficiary/object vs. theme. Recall that, while not a direct object in the semantic sense of ‘patient’, NP2 is nonetheless typically treated as such in the various exposures reviewed above. (See again [6], [8] and [11].)

The second exposure in (21) targets the beneficiary NP2, 民 *mín*, which must occupy clause-initial position as complement of the universal quantifier 凡 *fán* ‘in any case of’ (Harbsmeier 1981:155-63; Pulleyblank 1995:127).

3.7 Reflexive Beneficiary NP2

Each case of exposure reviewed above has confirmed that the phrases labeled ‘NP2’ in benefactive (and, occasionally, privative) ditransitives are treated exactly like other grammatical objects, i.e. as genuine NPs, not as possessive adjuncts of NP3. The NP status of the beneficiary is further borne out in ditransitive clauses which contain

⁸ Peyraube (2003:187) does not recognize (25) as ditransitive, treating it as a token of a separate construction in which a Locative occurs between the verb and the direct Object, [V L O]. There are precedents for this ordering in early Zhou texts (Yang Heming 1993: 57-58; Zhang Yujin 2004: 286), but the “separate construction” may be a mirage. Data of this sort typically occur with verbs of initiation, which have theme, rather than patient objects: 生 ‘produce; give rise to’, 樹, 種, and 藝, all ‘plant’, and 立 ‘set up’, etc. Such verbs imply a goal location, just as the meaning of ‘snatch’ 奪 entails (but does not require mention of) a source. Thus, when an institution is established *for* a group of people, as in (23), it is typically founded *amongst* them, the beneficiary interpretable as a sort of personified location.

reflexives. The first two examples below show non-reflexive (26) and reflexive (27) clauses with the donative verb 給 ‘provide’.

26. 惡 能 給 若 金 Ls 15.2/82.20

how able supply 2p metal

How can I provide you with cash (rewards)?!

27. 我 能 長 自 給 魚 Hf 35.10.21

1p able long RA supply fish

I will be able to provide myself with fish forever.

In donative (27), the reflexive adverb 自 ‘self’ is clearly standing in for the goal, NP2. This picture is confirmed by the identical behavior of 自 in benefactives with 爲 ‘make’.

28. 顏淵死 顏路請 子 之 車 以 爲 之 椁 Ly 11.8/26.28

PN die PN request master LK cart IN make 3O outer.coffin

When Yanyuan died, (his father) Yanlu asked for the master’s cart to make him an outer coffin.

29. 見桓司馬 自 爲 石 椁 Lj 3.70/18.9

see PN Marshall RA make stone outer.coffin

(He) observed Marshall Huan making himself an outer coffin of stone.

(29) is unlikely to mean ‘observed Huan make his own outer coffin of stone’, reading 自 as somehow ‘possessive’. That meaning would probably be expressed 見桓自爲其石椁 (PN RA make 3L stone outer.coffin), as suggested by examples like the following.

30. 大夫 之子 有 食 母 士 之 妻 自 養 其 子 Lj 12.50/79.14

grandee LK son have feed mother knight LK wife RA rear 3Op son

Sons of grandees have wet-nurses; wives of knights rear their own sons.

A final pair of examples will strengthen the claim that the syntax of the reflexives, 自 and 己, distinguishes clearly between the independent NP2 in benefactives and possessive adjunction.

31. 高止好 以 事 自 爲 功 Zz B9.29.14/304.15

PN like.to IN event self make merit

Gaozhi is fond of (using events to make himself merit =) turning events to his own advantage.

In (31), 自爲功 is clearly ditransitive, meaning literally ‘make for.self merit’. Compare this with (32), where ‘adverbial’ 自 cannot adjoin to an NP to encode reflexive possession.

32. 天 實 置 之 而 二 三 子 以 爲 己 力 Zz B5.24.1/103.8-9
 heaven +FS set 3O LK 2 3 child IN be self strength
 It is Heaven that has installed him, yet you fellows take (it) to be (the result of) your own might.

In the rules governing the use of the LZC reflexives, there appears to be no ambiguity between beneficiary NPs and possessive adjuncts. The two types of phrases are kept as distinct here as we have shown them to be elsewhere in the grammar of LZC.

4. Conclusions

This study has sought to show how investigating Classical Chinese grammar cross-constructively can uncover crucial evidence unavailable from other sources. The description of constructions in abstraction from the syntactic processes in which they participate often leads to ambiguities which cross-constructive perspectives may help to resolve. In the case examined here, the refusal to recognize a ditransitive benefactive in Late Zhou fails not only on the *ad hoc* understanding of NP 之 as adjunct 其, as many have already pointed out, it ignores evidence bearing directly on that claim of “convenient equivalence”, the counterevidence coming from the interaction of the ditransitive with a number of other constructions. The “struggle to work out the basic patterns of classical Chinese syntax” is most effectively carried out on multiple fronts.

ABBREVIATIONS USED:

- AA agent-oriented ability: x 可以 VP ‘x can VP’;
 AP (patient-oriented) ability/permission: x 可 V ‘x can/may be V-ed’;
 AS aspectual particle: 矣 roughly perfective, change of (cognitive) state
 BE benefactive: 爲 ‘for the sake / on behalf of’
 +FS subject focus particle 實
 f focus resumptive
 LK link: modifier to modified (NP 之 NP) / initial NP to predicate (NP 之 Pred) /
 predicate to predicate 而 / NP to NP, 與 or 於
 NA negative adjunct 不
 NI negative imperative 毋, also written 無
 NM nominalizer 者 ‘the one who’, ‘that which’, etc.
 NQ negative quantifier 莫 ‘none, nothing, in no case’

HERFORTH: CLASSICAL CHINESE SYNTAX

N3	negative adjunct 不 + 3O = 弗 (< * 不 之)
PA	proximal adjunct 將 ‘almost / about to’, etc.
PL	particle
pl	plural
PN	proper noun
QE	question/exclamation particle 豈, 乎, 與 / 歟 (< 也乎), etc.
r	resumptive
RA	reflexive adjunct 自
RP	reflexive pronoun 己
3L	3rd-person link / nominalizer in subjectless clause: 其 s
3O	3rd-person oblique, (in)direct object 之

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現代漢語程度副詞「格外」的歷時演變過程及其認知解釋

黃育正
新竹教育大學

本文分爲兩個部份。

首先，本文藉由歷時語料的呈現，觀察現代漢語程度副詞「格外」由詞組發展成詞的歷時演變過程。前期「格外」爲詞組，在句中爲處所詞作狀語用；後期「格外」由詞組發展成主要當狀語用的副詞，形容程度量非比尋常地大。上述語法功能與詞彙內部結構的發展過程與語法化（grammaticalization）與詞彙化（lexicalization）理論相關。

第二部份，本文將「格外」的發展過程，與 Lakoff & Johnson (1980)所提出的概念隱喻理論（Conceptual Metaphor Theory）相印證。最後，藉由跨語言材料的印證，本文提出“ABNORMAL > intensifier”，認爲該路徑是世界語言表程度語義的詞彙的共同發展路徑之一。

1. 前言

就漢語詞彙的歷時發展而言，現代漢語的程度副詞大多來源於古漢語中形容詞、動詞或名詞的虛化（張亞軍 2002：178）。然而，上述的論述是一個整體性的概念，而在現代漢語程度副詞中，有一組特別的詞彙，並不是源自於古漢語中的形容詞、動詞或名詞，而是以方位詞¹「外」作爲構詞成份所形成的，這組詞的內部成員較少，僅有：「格外」、「分外」。²由於來源特別，它的成詞模式也與其他程度副詞不太相同，因此，本文即以「格外」爲研究對象，探討幾個問題：一、在歷時發展過程中，「格外」所涉及的句法、詞法上的諸多語言現象；二、論述這些語言現象背後的心理認知過程；三、藉此與其他程度副詞對比，提出它與其他現代漢語程度副詞的不同之處。

¹ 有部份學者認爲漢語的方位詞「上」、「裡」、「外」等，屬於名詞的一種，如劉月華等（2001）；但也有人認爲方位詞屬於後置詞的一種，與前置詞（在現代漢語中一般稱爲介詞）相對，如徐丹（2005）。本文無意於詞類之爭，在此僅以方位詞稱之。

² 劉月華等（2001）列出現代漢語常見的程度副詞共 33 個，其中由方位詞所構成的詞彙，僅有「格外」、「分外」兩詞。

本文歷時、共時語料主要取自中央研究院所建立的漢籍電子文獻及平衡語料庫，另外還參考北京大學漢語語言學研究中心所設立之古代、現代漢語語料庫。除上述之外，也參考各式相關字辭典。所有書目或網路資料詳見文末參考文獻。

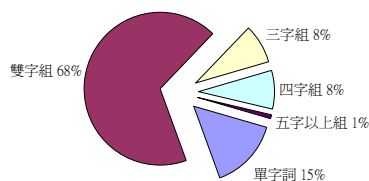
本文第一部份為前言，簡單介紹本文的研究背景、主旨與材料；第二部份為文獻回顧，首先論述與本文相關之詞彙學理論，再論述語法化與詞彙化理論，還有與本文相關的認知語言學理論；第三部份為「格外」的歷時語料分析；第四部份探討「格外」在歷時發展過程中，其語義演變背後的心理認知機制；最後，第五部份作一總結。

2. 文獻回顧

對於「格外」在歷時發展中所涉及到的各種語言現象，將在本節一一作介紹。

2.1 詞彙雙音化

綜觀漢語詞彙發展史，是一個複音詞不斷增多的過程，這形成現代漢語中複音詞佔多數的現象（葛本儀 2003：188）。根據周薦（2004：365-367）對《現代漢語詞典》（1996年第三版）所收錄詞條的考察，單字詞佔全部詞彙的15%，雙音詞則佔68%，其餘三字以上組合共佔17%，彰顯了現代漢語詞彙系統中，雙音詞佔多數的語言事實。上述數據以圖示如下：



圖一 《現代漢語詞典》詞彙字數對照圖³

然而，雙音詞佔大多數只是現代漢語的整體詞彙現象，並沒有考慮詞頻或詞類因素的影響。以詞頻來說，劉丹青（1996）、吳為善（2003）以統計數據，說明單音詞的使用頻率高於雙音節詞；再以詞類來說，劉丹青（1996）、吳為善（2003）也以數據印證現代漢語詞彙「動單名雙」的分佈態勢，因此名詞作為詞彙量最大的詞類，決定了現代漢語以雙音詞為主的整體面貌。

³ 數據引自周薦（2004：365-367）。

從上述可以推想，不同詞類系統對於內部詞彙的單雙音形式，可能有不同的潛在傾向及要求。本文立基於此，統計三本現代漢語相關辭書中所列出之常用副詞，在計算其單、雙音詞數量之後，整理數據如下表所示：

表一 現代漢語副詞系統的單、雙音詞數目對照表

書目	副詞	
	單音	雙音
《現代漢語八百詞》	86	191
	31%	69%
《現代漢語虛詞詞典》	192	433
	30%	70%
《實用現代漢語語法》	49	99
	33%	67%

由表一可知，現代漢語的副詞系統中以雙音詞佔大多數。這對於「格」、「外」為何可以複合為一個雙音副詞，也有一定的說明作用。

2.2 語法化與詞彙化理論

「語法化」(grammaticalization)一般性的定義是，一個詞彙或結構在歷時發展過程中，獲得語法功能的過程，且語法化通常是一種不可逆的單向漸進過程(Hopper & Traugott 1993, Heine et al. 1991)。

近年來，「語法化」在漢語語法學界蓬勃發展，有許多質量俱佳的研究成果問世。⁴沈家煊(1998: 41)認為「語法化」是一種「實詞虛化為語法標記的過程」。楊榮祥(2001)則進一步提出副詞語法化的條件有三：

一、基本條件：語義基礎。一個副詞不論詞義多麼虛，總能找到其原本實詞語義的聯繫。換句話說，能成為程度副詞，必然帶有某種關鍵的語義特徵。本文認為，

⁴ 事實上，漢語語言學界很早之前便注意到「實詞虛化」的現象。由於漢語有著三千年以上不曾間斷的文獻傳承，讓語言學家可以便利地以大量不同時代的文本，觀察單一詞彙或結構在歷時過程中的用法演變，豐富的文字資料使得「語法化」理論在漢語中相當容易實踐與應用。

這個關鍵的語義特徵，就是說話者帶來的個人主觀評價。

- 二、決定性條件：句法位置。一個語言單位若經常處於謂語之前（多充當狀語），就極有可能發展成爲一個副詞。「格外」原本屬於體詞性狀語，表達後接謂語的處所關係，在句中的位置本就經常位於謂語之前，因此它在一開始便已取得句法位置的決定性條件。
- 三、外部條件：語用因素。包括語法化成份與各成份的關係、與上下文的關係及句子本身所表示的各種意義，如隱含、聯義、比喻等。

以上動詞語法化爲副詞的三個條件中，語義基礎與句法位置兩條件爲必要條件，而外部條件則爲加強條件，不必然具備（楊榮祥 2001）。因此，本文將以前二條件爲基礎，進行語法化的相關論述。

關於「詞彙化」(lexicalization)，董秀芳（2002：35）認爲是一種「由非詞單位逐漸凝固或變得緊湊而形成單詞的過程」。與沈家煊（1998）所稱之「語法化」不同的是，「詞彙化」專注的是詞組、句法結構、跨層結構等非詞單位逐漸凝結成新詞，豐富詞彙系統的過程；「語法化」則專指實詞的虛化（或虛詞發展成更虛的詞），伴隨著語法功能的改變或語法範疇、語法成份的產生。⁵

一般而言，由於語法化過程伴隨著語法標記的產生，因此較容易觀察。相反地，一個詞彙是否已經發生詞彙化，則較難界定。董秀芳（2002：123-147）認爲詞組與詞的界線不明的原因，在於漢語的詞組與詞並非處於涇渭分明的兩個範疇，其間必然有一些非典型、特殊的成員，構成一個連續統。他更提到動詞性並列式雙音詞的四項歷時發展階段，分別爲：

- 一、存在一個相應的同義單音形式，但組成成分不能換序。
- 二、不再有同義的單音對應形式。
- 三、意義上發生了由具體到抽象或由泛指到專指的引申。

⁵ Bybee et al. (1994) 曾討論英語 be going to→gonna 的語法化現象。這讓我們注意到，語法化過程中往往伴隨著詞彙化，兩者差別在於，語法化關注的是一個句法單位發展成語法功能詞 (functional word) 的過程，而詞彙化則關注一組非詞結構逐漸凝結成詞的過程，兩者並不衝突。

四、句法功能發生轉化。即從一種詞類範疇變爲了另外一類詞類範疇，發生了轉類（conversion）現象。

董秀芳認爲上述四個歷時發展階段，同樣可以視爲共時存在的動詞性並列式雙音詞的四個詞化等級標準，詞化程度由一至四依序提高。然而，由於第一、二階段對於非動詞並列式結構的雙音詞（如本文所探討的「格外」）的判別並不具效力（李慧 2005），因此本文僅將董秀芳（2002）提出的第三、四個詞化等級等級（階段三、四）作爲判別「格外」是否已發生詞彙化的等級標準。⁶

2.3 隱喻與認知

Lakoff & Johnson（1980：5）認爲隱喻（metaphor）的本質是：用一種事物理解和體驗另一種事物。他們認爲隱喻可分析爲三類，分別論述如下：

一、結構隱喻（structural metaphor）：

指通過一個概念來建構另外一個概念，這兩個概念的認知域不同，但各自的構成成份存在規律的對應關係。例如 TIME IS MONEY。

一般而言，人們往往依賴較具體的概念去理解較抽象的概念。換句話說，人們通常藉由對有形的具體概念的把握（即 source domain），透過映射（mapping），去理解無形的抽象概念（即 target domain）。

二、空間方位隱喻（orientational metaphors）：

指參照空間方位而構件的一系列隱喻概念。與結構隱喻不同的是，方位隱喻並非用一個概念對應另外一個，而是在同一個概念系統內部，參照方位關係（如上下、內外、前後、……等）組織起來的。

人類的空間方位感知能力是與生俱來的本能，空間經驗也是個體成長過程中較早獲得的基本經驗，因此理所當然地，人們往往借助這類基本經驗去理解情緒、感覺等較抽象的狀況，如 HAPPY IS UP; SAD IS DOWN。

⁶ 由於董秀芳（2002）提出的前二項標準，是針對動詞並列式雙音詞而言的，而「格外」的詞彙結構爲〔名詞+方位詞〕，而非動詞並列式結構，因此董秀芳（2002）所提出的前兩項標準，並不適用於對「格外」的討論。另外，後二項標準則不限於動詞並列式雙音詞，因此適用於本文對「格外」的討論。

三、實體隱喻 (ontological metaphors)：

人類對於物理世界的實體及物質的經驗是一種基本能力，而人類往往藉由這類經驗，將抽象的概念理解為「離散性的實體」(discrete entities)，形成了本體隱喻。例如人們藉由 INFLATION IS AN ENTITY (通貨膨脹是實體)，形成這類句子 “Inflation is backing us into a corner.” (通貨膨脹讓我們陷入困境)。

2.4 小結

在雙音節句法結構的歷時演變過程中，有幾個方面需要注意。一為句法功能的演變，若一個詞彙或結構在句中的功能由實轉虛，便涉及到語法化；二為結構成份的結合，若一個雙音節詞組在歷時發展過程中，兩個單音節句法單位漸趨緊密而結合成一個新詞，便涉及到詞彙化；三為語義的演變，人類在說話時，透過自己主觀上對詞義的認知而使用詞彙，過程中會產生詞義的引申、借用等現象，促使新舊詞義的引申更迭，便涉及到認知心理的隱喻機制。

上述的語法化、詞彙化與語義演變過程的認知心理因素，其內部往往是互相糾葛的，需要細細辨明。本文將根據上述文獻的研究成果，透過歷時語料，考察並釐清「格外」的成詞過程中所涉及到的各種語言現象。

3. 「格外」的歷時演變

3.0 歷史分期

由於本節主旨在探討「格外」的歷時演變過程。因此，有必要事先說明本文所採用的漢語分期：⁷

一、古代漢語。唐代（西元 618 年）以前；

⁷ 王力（1957：34-35）依據語音標準，提出公元 13 世紀到 19 世紀為近代漢語時期，前後則為古代漢語及現代漢語；呂叔湘（1983）則認為，近代漢語開始於晚唐五代時期，而現代漢語是近代漢語內部的一個分期；胡明揚（1991：251）依據語音與句法標準，主張唐初到清初為近代漢語時期，可細分為「唐初—北宋」、「宋—元」、「元明—清初」三個時期；蔣紹愚（1994）則認為，綜合語音和語法來看，近代漢語的上限為唐代初年，下限則為清初。

本文認為，就漢語歷史語言學研究來說，漢語分期有其必要。因此，本文參考上述學者的意見，以唐代（西元 618 年）與清代（西元 1636 年）為界，將漢語分為古代、近代與現代三期。對於近代漢語的年代稍長，因此再以北宋、南宋兩朝的分界（西元 1127 年）作標準，將近代漢語分為前後兩個年代相等的時期，各 509 年。

- 二、近代漢語。唐代到明末（西元 618-1636 年），可細分為前後期：
- A. 近代漢語前期：唐代到北宋（西元 618-1127 年，共 509 年）；
 - B. 近代漢語後期：南宋到明末（西元 1127-1636 年，共 509 年）；
- 三、現代漢語：清代開始（西元 1636 年）迄今。
- 藉由上述漢語分期，本文將依序介紹「格外」的歷史演變過程。

3.1 「格」的詞義沿革

在探討「格外」之前，對於「格」的詞義，有必要先行瞭解。

《說文解字·木部》：「『格』，木長貌。從木，各聲」；王筠《句讀》：「蓋謂枝條長也」。從《說文》的相關著作可得知，「格」從木，因樹木的枝條各自生長，故從各聲而為會意字。目前可追溯的最早語義為“樹木的長枝條”，如下例（1）：

（1）草樹混淆，枝格相交。（北周·庾信《小園賦》）

在「格」、「外」複合成為副詞「格外」之前，⁸「格」即發展出多項語義，其名詞用法可表示“柵欄”，如例（2）；亦可表示“品質、風度”，如例（3）；可表示“尺度”，如例（4）；亦可表示“法律、制度”，如例（5）：⁹

（2）連雲列戰格，飛鳥不能逾。（唐·杜甫《潼關吏》）

（3）精光照人，氣格凌雲。（唐·竇泉《述書賦》）

（4）格高五嶽，袤廣三墳。（《文選·鮑照〈蕪城賦〉》）¹⁰

（5）唐之刑書有四，曰律、令、格、式。（《新唐書》）

據本文考察，儘管「格」屬多義詞，但以頻率而言，唐代以後以“法律、制度”義最為常見，是最主要義項。¹¹

⁸ 就本文所見，「格」、「外」複合為「格外」，首見於南宋初期。

⁹ 動詞「格」在唐代亦屬多義，其語義可表示：1.阻止、擱置；2.限制；3.拘執；4.糾正；5.推究；6.擊、打；7.感動、感通；……等等。因與本文較無關聯，故不詳述。

¹⁰ 瞿蛻園注：「『格』，尺度。根據所注，本句語義為「盛誇城牆之高，超過五嶽」。

¹¹ 根據本文考察，「格」在唐代的各項語義，以“法律、制度”義最為常見。然而，此一結果不能排除是文獻體裁的侷限所造成的偏差，因為本文所得的唐代語料，多為史料文本，如《北史》、《晉書》、《隋書》、《周書》等，這使得“法律、制度”義的出現頻率大大增高。

3.2 古代漢語時期的「格外」

「格外」由「格」後接方位詞「外」所形成，兩者連用最早出現於複音詞蓬勃發展的魏晉南北朝期間（魏培泉 2000），共出現三處語料，請見以下例句：

- (6) 西陵牛犂稅，官格日三千五百，元懿如即所見，日可一倍，盈縮相兼，略計年長百萬。浦陽南北津及柳浦四犂，乞爲官領攝，一年格外長四百許萬。（《新校本南齊書》）
- (7) 凡如此類，不經犂煩牛者上詳，被報格外十條，竝蒙停寢。（《新校本南齊書》）
- (8) 陳力餬口。犂司責稅，依格弗降。舊格新減，尙未議登，格外加倍，將以何術？（《新校本南齊書》）

上列例句的「格」語義皆表示“法律、制度”，「格」與方位詞「外」連用時，表示“法律、制度之外”解，與現代漢語「法外開恩」的「法外」同義。

3.3 近代漢語時期的「格外」

本文將近代漢語分爲前後兩期：前期起自唐代，終於北宋；後期由南宋開始，結束於明末清初。以下分小節依序論述。

3.3.1 近代漢語前期的「格外」

在本期中，本文僅收集到以唐代爲代表的文獻。¹²由數量看，「格外」語料計 17 筆，數量較前期（魏晉南北朝時期）稍高。略舉例句如下：

- (9) 元徽初，東宮官罷，選曹擬舍人王儉爲格外記室。（《南史》）
- (10) 後以太尉封鄱陽郡公，爲三公事，而職典連率，人以爲格外三公。（《南史》）
- (11) 上曰：「此已格外酬賞，何用追論！」弼曰：「平陳之日，諸公議不許臣行。推心爲國，已蒙格外重賞，今還格外望活。」（《北史》）
- (12) 禁乘驛官格外徵馬詔。（《全唐文》）

¹² 《南史》、《北史》皆成書於唐代，而《全唐文》主要爲唐代文獻，但仍有少數五代十國時期（唐代以後）的文章。

黃：現代漢語程度副詞「格外」

(13) 即以格文定罪。格外又無正條。即比附定刑。(《全唐文》)

(14) 問：「格外事如何？」師雲：「化道緣終後，虛空更那邊？」(《祖堂集》)

首先，上列例句所出之文本，除了例(14)出自禪宗語錄之外，其餘皆為史書、法律條文紀錄等文本，由此推測「格外」在當時多用於書面，使用範圍有很大的侷限，少數出現於禪宗傳教的口語紀錄之中。

再者，這個時期的「格外」皆作字面義“法律、制度之外”解，句法結構仍為〔名詞+方位詞〕，尚未複合成詞。總結來看，「格外」的使用頻率較前期有所提高，使用範圍也開始由書面到口語。

3.3.2 近代漢語後期的「格外」

在南宋時期，「格外」在禪宗語錄文本中出現次數明顯增加，略舉例句如下：

(15) 如何是格外事？(南宋·《五燈會元》)

(16) 格外真規，豈思量之能解？(南宋·《五燈會元》)

(17) 以為格外之句。(南宋·《古尊宿語錄》)

上列例句的「格外」語義表示“在某種制度、規定之外”。在本時期後半(元代以後)，「格外」除了在史書或官方文字中出現之外(例(18)-(21))，也開始出現在白話小說之中，如例(22)：

(18) 臣嘗略計本路月椿之數，每歲為緡錢七十萬，而格外所入者半之。(元·《文獻通考》)

(19) 夫外任百官。既有格外拔擢。獎勵其向進之心。(明·《明經世文編》)

(20) 令小民供分外之役。而得格外之償。人臣有朱張之功。而無朱張之罪。(明·《明經世文編》)

(21) 亦宜早加裁抑、曲示保全、不宜格外隆恩、以寵而益之毒。(明·《明經世文編》)

(22) 怎麼我們做元帥的，到格外加厚你們；你們做將官的，都受之安然，一個謝字兒討不得？(明·羅懋登《西洋記》)

由上列例句可以顯示，在近代漢語後期階段，「格外」開始大量進入語錄體文本及白話小說之中，顯見「格外」的口語化程度逐漸增強。

然而，若僅就上列例句而言，與前一個時期相比，在用法及語義上並沒有明顯差異。但是，本文發現南宋確曾出現語料，幾近於現代漢語「格外」的程度副詞用法，請見下例：

(23) 少年心醉杜韋娘，曾格外疏狂。(南宋·侯真詞)

本文認為，上例(23)的「格外」語義為“與眾不同、特別”，可視為「格外」由表處所的體詞性狀語演變成表程度高的副詞的過渡階段。換句話說，該例應為現代漢語程度副詞「格外」的開端，具有兩個層面的意義：

一、取得語法化為程度副詞的基本條件：語義基礎

例(23)「格外」的語義表示“與眾不同、特別”，當一個人認為某人事物特別而另眼相看時，即代表這個人認為這個對象在某個層面上與其他同類存在優劣關係。換句話說，“與眾不同、特別”義隱含著說話者透過比較，獲得了一種主觀評價，而這正是「格外」語法化為程度副詞的語義基礎。

二、詞彙化的完成

由於「格外」的語義由較具體的“在法律、制度的規範之外”發展到抽象義“與眾不同、特別”，可以藉此確定「格外」在宋代，已經藉由重新分析(re-analysis)機制，產生新的義項，發生詞彙化。¹³

然而，可能因為該例屬於單一作者的個人用法，又或者是因為文體限制¹⁴，使得由南宋到明末的四百餘年之間，除例(23)外，不再於其他文獻出現可作狀語用、表“特別”語義的「格外」用例。¹⁵因此，本文認為，例(23)出現的時間點，

¹³ 本文以董秀芳(2002)所提出之鑑定詞彙化與否的標準三：「意義上發生了由具體到抽象或由泛指到專指的引申」，認為在例(23)所代表的南宋初期，「格外」已經發生詞彙化現象(請見本文2.2)。

¹⁴ 例(23)為宋詞，因此不能排除因填詞需要而增刪字句，進而出現與當代用法不符的情形。

¹⁵ 侯真生卒年不詳，但由其作品來看，在南宋乾道、淳熙年間仍在世(1165-1189)，而明朝亡於西元1644年，與侯真的生存年代相距四百餘年。

仍符合語法化理論所強調的單向漸進原則（Hopper & Traugott 1993, Heine et al. 1991）。

3.4 現代漢語的「格外」

到了清代（現代漢語初期），「格外」的使用範圍進一步泛化，開始可以後接形容詞或心理動詞¹⁶，這使得「格外」除了語義條件（可以表達“與眾不同、特別”的評價義）之外，還藉由搭配詞語的限制減少，使用環境增加，可以合法地進入狀位¹⁷，完成語法化為程度副詞的過程，如下列例句：

- (24) 此原思表其精忠，格外尊敬也。（《鏡湖自撰年譜》）
- (25) 更有格外認真者，曰已勒石曉諭矣。（《庸閒齋筆》）
- (26) 前蒙皇上格外優容，劉蓉未必能感。（《萇楚齋隨筆》）
- (27) 此是初值手料理祭祀，所以照祖宗條款，格外豐盛。（《後紅樓夢》）
- (28) 今蒙不棄葑菲，垂青格外，敢不殫竭駑駘，仰酬高厚？（《綠野仙蹤》）
- (29) 何況我們又從天朝來的，更要格外尊敬。（《鏡花緣》）
- (30) 卻因前番曾遭橫逆，打破頭顱，故此格外謹慎。（《海上花列傳》）
- (31) 姊弟相見，自然格外的歡喜。（《老殘遊記》）
- (32) 自然的十分恩愛，格外纏綿。（《九尾龜》）
- (33) 鮑龍聽見是個京官，格外歡喜。（《乾隆南巡記》）

在「格外」可以後接心理動詞的同時，由於「格」語義逐漸虛化，先秦時期的“樹木的長枝條”義不再於清代使用，“法律、制度”義成爲主要義項，連帶使得後接的方位詞「外」的語義逐漸隱而不顯，促使「格外」結合緊密，語義不再表示字面義「在...之外」，而詞彙化爲一個複合詞。

¹⁶ 漢語的形容詞與心理動詞皆可受程度副詞修飾。因此，可後接形容詞、心理動詞，也是判斷「格外」完成語法化爲程度副詞與否的重要條件。

¹⁷ 前例(6)、(8)、(11)中，「格外」後接詞彙分別爲「長」（“增加”義）、「加倍」、「重賞」，這些詞彙皆非心理動詞，因此「格外」在古代漢語到近代漢語前期之間，雖可出現在動詞之前，雖是作爲引介處所的狀語，但還不是副詞，如同現代漢語中的「在餐廳吃飯」一般。

3.5 小結

由以上分析可知，「格外」的歷時發展過程，有兩個關鍵性階段：

一、近代漢語後期（南宋）

語義方面，「格外」出現可表示評價的“特別”義，取得語義基礎，隨著使用頻率與範圍的增加，涵蓋個人主觀評價的語義逐漸成爲主要義項。另外，原本的詞組「格外」中，方位詞「外」隨著「格」語義的由實（樹枝）轉虛（法律規範），連帶讓「外」的方位義不再明確，這也促使「格外」的語義及結構藉由重新分析(re-analysis)機制，發生詞彙化(lexicalization)作用而發展成詞。

二、現代漢語初期（清初）

隨著使用範圍的進一步泛化（可後接心理動詞），使得「格外」可以副詞身份合法進入狀位，在決定性句法條件的落實之下，配合上述的語義基礎，「格外」確立其程度副詞的地位。

在經過上述兩個關鍵性階段之後，「格外」由原本作用爲引介方位處所的方位詞組¹⁸，藉由詞彙化與語法化過程，發展成一個複合程度副詞，一直使用到現代漢語。

4. 「格外」詞義演變的認知解釋

本章節探討「格外」由詞組發展成複合詞，背後的認知心理機制，分爲詞組與複合詞兩階段來探討。

一、詞組階段

由前節分析得知，在「格」、「外」開始連用共現之前，「格」已由本義“樹木的長枝條”發展出多項語義，如“柵欄”、“品質、風度”、“尺度”、“法律、制度”等。其中，由本義“樹木的長枝條”發展到“法律、制度”義項，形成下列的歷時語義發展序列：

“樹木的長枝條” > “柵欄” > “尺度” > “法律、制度”

¹⁸ 與現代漢語介賓短語「在...之外」語法功能相同，只是當時的介詞「在」或「於」等，經常可以省略。

本文認為，在上列「格」的歷時語義發展序列中，由實體的“柵欄（的限制或邊界）”發展到語義較虛的虛擬的“尺度”，再進一步發展為表示“法律、制度（的規範）”，符合 Lakoff & Johnson 所定義的結構隱喻（structural metaphor）。當時的人們將具有實體的“樹木的長枝條”所形成的“柵欄”，透過映射（mapping），用來理解和體驗虛擬的法律或制度所規定的行為範圍。

另外一方面，無論「格」的語義表示“樹木的長枝條”、“柵欄”或者是“法律、制度”，在與其後接的方位詞「外」組合之後，語義皆表示「在...之外」，在這個時期，語言使用者是以他們固有的空間感知能力，以空間隱喻（orientational metaphor）的架構，參照「內外」的方位概念，來理解「格外」所代表的意義。

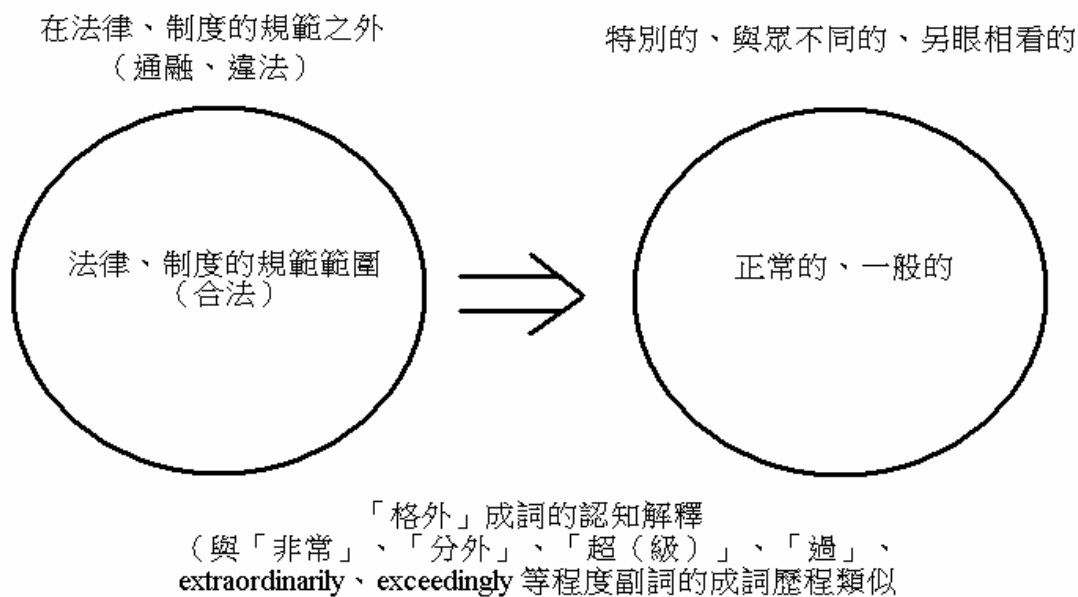
二、複合詞階段

在「格外」由詞組發展到複合詞階段的過渡階段，方位詞「外」的語義逐漸隱而不顯，人們開始將「格外」視為一個單一詞彙，並賦予語義來加以理解。

由前述，當人們開始將「格外」的語義由“法律、制度之外”理解成“與眾不同、特別”義，其語義發展路徑的背後，隱藏著一種認知心理機制——換喻（metonymy），這符合當時社會普遍存在的一種文化經驗：「與本有的法律的規定作法不同，意味著某種人與人之間由於另眼相看而形成的特殊對待」。藉此，「格外」發展出表示“與眾不同、特別”的義項。

Lakoff & Johnson (1980)認為，以認知語言學的角度來考察，隱喻的實質就是通過另一類事物來經歷、理解和認知另外一類事物。在本節中，本文藉由「格外」語義的歷時發展過程，與 Lakoff & Johnson (1980)所提出的概念隱喻理論（Conceptual Metaphor Theory）相印證，認為「格外」的語義發展歷程與結構隱喻、空間方位隱喻相符合；另外，由“法律、制度之外”義發展到“與眾不同、特別”義，背後也有換喻機制在作用著。

最後，我們可以將「分外」的成詞過程所歷經的認知心理歷程，以圖示如下：



圖二 「格外」成詞歷程的認知解釋圖示

Heine & Kuteva (2007) 曾提到世界語言中上的加強詞 (intensifier) 有兩個常見的相同來源：TRUE (真)、BAD (差、壞)，可在許多語言中得到印證。¹⁹可見，語義確為程度副詞的來源的重要關鍵。因此，一個在句中作狀語的方位詞組，如「格外」，即便它並非副詞，但只要語義符合，便可在歷時發展成為程度副詞。

綜合以上討論，本文提出一個表程度語義的詞彙的共同發展路徑如下：

(34) ABNORMAL > intensifier

再進一步觀察漢語材料，現代漢語中來源與上式相符的加強詞 (intensifier)，除了本文所討論的「格外」之外，尚有「分外」、「非常」、「異常」、「特別」等。再進一步考察跨語言材料，可以發現在英語中則有 *extraordinarily* 亦作程度副詞使用，如下例：

¹⁹ Heine & Kuteva (2007) 提到，由 TRUE → intensifier 的例子有英文的 *very*，而漢語的「真」同屬此類；再者，由 BAD → intensifier 的路徑發展而來的詞彙，現代漢語中同樣有「很」(由歷時語料證明，漢語程度副詞「很」由「狠」而來)與「壞」(作補語用，如「我今天累壞了。」)，而閩南語 (Southern Min) 則有「傷」作程度副詞使用。

(35) She is an extraordinarily beautiful girl.

藉由例(35)可推知，由“異常”(ABNORMAL)義的概念形成程度副詞的方式並非漢語所獨有。換言之，本文認為，藉由跨語言材料的印證，說明(34)式具有類型學上的普遍意義。

5. 結論

本文由歷時角度，探討「格外」在歷時的詞彙化及語法化過程，並討論其語義演變背後所涉及的認知心理機制。

首先，以歷時發展順序來看，「格外」在唐代以前，語義為字面義“法律、制度之外”；發展到南宋，開始出現“與眾不同、特別”義，由於該義項帶有說話者的主觀評價，因此得到了符合程度副詞的語義基礎；到清代正式取得決定性的句法條件，成爲一個副詞，修飾後接的動詞組，使得「格外」在語義與句法條件兩相符合的情況下，發展成爲程度副詞。

在「格外」的語義發展歷程中，隱喻與換喻機制發揮了關鍵性的作用。在詞組階段，透過結構隱喻與空間方位隱喻，促使「格外」語義因不斷由實轉虛而發生詞彙化，並取得語法化的語義基礎；在複合詞階段，換喻機制則促使「格外」發展出“與眾不同、特別”義。

最後，本文認為，無論漢語「格外」或英語的 *extraordinarily*，同樣都遵循著“ABNORMAL > intensifier”的發展路徑，發展成爲可表程度義的副詞。本文認為，這個路徑具有跨語言的普遍性，並期望能得到更多語言材料的印證。

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Instrumentality: The Core Meaning of the Coverb Yi 以 in Classical Chinese

Sue-mei Wu 吳素美
Carnegie Mellon University

Yi 以 is one of the most important and commonly used function words in Classical Chinese, and many researchers (e.g. Hsueh 1997, Pulleyblank 1995, Sun 1991, Wu 1994 and Wu 1997) have contributed to the discussion on *yi*'s meanings and functions. The main issues in the current understanding of *yi* include its verb and coverb usages. Both usages have been thought to exhibit a range of meanings, and *yi* has been thought to be able to occur flexibly either before or after a verb phrase. In addition, *yi* is also thought to be a conjunction indicating the reason, purpose or result of an action. This study proposes that the verb *yi* fundamentally indicates instrumentality, and that the coverb *yi*, which is derived from the verb *yi*, still retains that fundamental notion of instrumentality. The notion of instrumentality has been extended in *yi*'s coverb usage to indicate the means or reason by which an action occurs, or the time which an action occurs. Moreover, I will also argue that the *yi* phrase, when it occurs before a verb phrase, functions syntactically as a modifier to the verb phrase. When the *yi* phrase occurs after another verb phrase, however, the semantic emphasis has been deliberately put on the *yi* phrase, which then serves as the nucleus of the predicate. Thus, different word order of the *yi* phrase actually results in different semantic implications and syntactic functions. This will be illustrated with the phrases 以羊易之 and 易之以羊, in which the position of the *yi* phrase results in different semantic meanings and different syntactic functions.

1. The Instrumental Coverb Yi 以

Yi 以 is one of the most important and commonly used function words in Classical Chinese, and many scholars have contributed to the discussion on *yi*'s meanings and functions. The main issues in the current understanding of *yi* include its verb and coverb usages. Both usages have been thought to exhibit a range of meanings, and *yi* has been thought to be able to occur flexibly either before or after a verb phrase. In addition, *yi* is also thought to be a conjunction indicating the reason, purpose or result of an action. Intriguing and complex, these issues still attract the attention of many scholars. Recently, Sun (1991), Wu (1994, 1997), and Hsueh (1997) have attempted to find a more appropriate interpretation for the *yi* phrases through a better understanding of the basic nature of the word *yi*. In this study, I will address several of the issues surrounding *yi*.

After a summary and discussion of previous studies on *yi*, I will move on to my own assessment.

1.1. The Word 以

Beginning with the synonym strategies of the traditional Chinese approach to defining a word, *yi* as a verb and coverb has been thought to carry various meanings and be synonymous with several other words. Most modern scholars follow a similar approach of simply listing the various meanings of *yi*. However, this is neither a systematic nor satisfactory approach. If we admit the various usages come from one morpheme, we should be able to determine the fundamental property of that morpheme and then trace its extensions to include different meanings. Xie and Lan (1987) thoroughly investigate *yi* and offer some plausible explanations as to its origins and development of usage. Their contributions should be appreciated. Wu (1994) also provides us with some insights. In what follows, after consulting with these sources, I will offer my assessment on *yi*.

1.2. 以 as a Verb

As a transitive verb, the basic meaning of the word *yi* is 'to use, to take'. This meaning is naturally extended to 'to use or take something as the basis for something else'. The first set of examples below illustrates the basic meaning of *yi* as a full verb.

(1) 桓公九合諸侯，不以兵車；管仲之力也。（論語，憲問）

huangong jiu he zhuhou, bu yi bing che; guanzhong zhi li ye

NAME-nine-assemble-feudal lord, NEG-use-soldier-carriage; NAME-POSS-effort-PAR
'It was Guanzhong's doing that Duke Huan was able to assemble the feudal lords nine times without using force.'

(2) 哀公問社於宰我。宰我對曰，「夏后氏以松，殷人以柏，周人以栗，

曰，使民戰栗。」（論語，八佾）

aigong wen she yu zaiwo. zaiwo dui yue, xiahoushi yi song, yin ren yi bo, zhou ren yi li, yue, shi min zhanli

NAME-ask-altar-be at-NAME. NAME-reply-say, NAME-use-pine, NAME-people-use-cedar, NAME-people-use-chestnut, say-make-common people-tremble

'Duke Ai asked Zai Wo about the altar to the god of earth. Zai Wo replied, 'The Xia used the pine, the Yin used the cedar, and the men of Zhou used the chestnut (li), saying that it made the common people tremble (li).'

The next set of examples illustrates that, from its fundamental meaning, *yi* has been extended to mean 'to use or take something as the basis for something else'. This

extended meaning, depending on the context, can be translated into English in various ways, as we shall see below.

(A) "to take it to be that, to think,."

(3) 左右以君賤之也, 食以草具。(戰國策, 齊策)

zuoyou yi jun jian zhi ye, si yi caoju

aide-think-lord-low-him-PAR, feed-use-lowly fare

'The top aides thought that the lord treated him as lowly; (they) used lowly fare to feed him.'

(4) 老臣以媼為長安君計短也。(戰國策, 趙策)

lao chen yi ao wei changan jun ji duan ye

old-servant-think-old lady-for-NAME-lord-plan-short-PAR

'This old servant thinks that the way the elder lady plans for Lord Changan is insufficient.'

(5) 吾以女為死矣!(論語, 先進)

wu yi ru wei si yi

I-think-you-become-die-PAR

'I thought you had met your death.'

(B) "take something as the means", "rely on something". For example,

(6) 以一人之力, 則后稷不足。(韓非子, 喻老)

yi yi ren zhi li, ze houji bu zu

use-one-person-POSS-power, CONJ-NAME-NEG-sufficient

'(If) by means of the strength of one person, (then even) Houji is not sufficient.'

(C) "take something as basis for judgement." For example,

(7) 以位, 則子君也, 我臣也。(孟子, 萬章下)

yi wei, ze zi jun ye, wo chen ye

use-rank, CONJ-you-ruler, I-subject-PAR

'On the basis of rank, you are the ruler and I am the subject.'

As shown above, *yi* is recognized as a transitive verb whose fundamental meaning is 'to use, to take'. It also has a naturally extended meaning of 'to use or take something as the basis for something else'. Given these fundamental meanings, I would like to suggest

that "instrumentality" is the fundamental semantic meaning of the verb *yi*. *Yi* as a verb represents "instrumentality", that is, "to engage (somebody or something) as an instrument."

2. *Yi* 以 as a Coverb

The *yi*+NP+VP pattern presents a well-known word order issue, namely the flexibility of the *yi* phrase's occurrence either before or after the verb phrase. The general pattern for the coverbal *yi* phrase is *yi*+NP+VP. However, *yi* can also occur between two VPs in the pattern VP+*yi*+VP. For example,

晉侯復假道於虞以伐虢。(左傳, 僖公5)

Jinhou fu jia dao yu yu yi fa guo

NAME marquis-again-borrow-path-be at-NAME-in order to-attack-NAME

'The marquis of Jin once again asked for permission to pass through Yu in order to attack Guo.'

In this section I will focus on coverbal *yi* phrases in which the object of *yi* is a NP (*yi*+NP+VP). The VP+*yi*+VP pattern, which is involved with the important notion of Verb Complement, still needs further discussion and investigation.

Yi's coverb usage is extended from its use as a verb. As a coverb *yi* indicates that its following noun is a tool or means for the action to occur. The object of *yi* can be a concrete entity or an abstract concept. For instance,

(8) 許子以釜甑爨, 以鐵耕乎。(孟子, 滕文公上)

xuzi yi fu zeng cuan, yi tie geng hu

NAME-using-iron pot-earthenware-cook, using-metal-plough-PAR

'Does Xuzi cook using an iron pot and an earthenware steamer and plough using iron implements?'

(9) 儒以文亂法, 俠以武犯禁。(韓非子, 五蠹)

ru yi wen luan fa, xia yi wu fan jin

scholar-using-writing-disturb-law, knight-using-force-against-regulation

'The scholars disturb the law using their writings, while the knights flout the regulations using force.'

Yi as a coverb can also provide the reason for the following action. For example,

(10) 梁由靡御韓簡, 虢射為右, 輅秦伯, 將止之。鄭以救公誤之, 遂失秦伯。

(左傳, 僖公15)

liangyoumi yu hanjian, guoyi wei you, lu qin bo, jiang zhi zhi. zheng yi jiu gong wu zhi, sui shi qin bo

NAME-driver-NAME, NAME-serve as-right, rail-NAME-earl, about to-capture-him, NAME-because-rescue-marquis-delay-it, therefore-lost-NAME-earl

'Han Jian, driven by Liang You-mi, and having Guo Yi on his right, met the earl of Qin, and was about to capture him. (However,) because (Qing) zheng (sent Han Jian) to rescue the marquis (of Jin), therefore, (Han Jian) lost (the chance to capture) the Earl of Qin.'

(11) 君子不以言舉人; 不以人廢言。(論語, 衛靈公)

junzi bu yi yan ju ren; bu yi ren fei yan

gentleman-NEG-because-word-recommend-person; NEG-because-person-dismiss-word

'The gentleman does not recommend a man because of what he says, nor does he dismiss what is said because of the speaker's identity.'

It has been commonly accepted that the coverbal meanings of *yi* are quite varied. For example, Pulleyblank (1995:47-48) points out that the coverb *yi* may also be used to indicate the time of an action or the basis for a judgement as follows. (Examples and translations are from Pulleyblank 1995:48)

(12) 以五十步笑百步則何如? (孟子, 梁惠王上)

yi wu shi bu xiao bai bu ze heru

because-five-ten-step-laugh-hundred-step-CONJ-how

'If because of [only running] fifty paces they laughed at [those who ran] one hundred paces, how would it be?'

(13) 斧斤以時入山林。(孟子, 梁惠王上)

fujin yi shi ru shan lin

axe-use-season-enter-mountain-woods

'If axes enter the hills and woods at the proper season'...

(14) 以位,則子君也,我臣也。(孟子, 萬章下)

yi wei, ze zi jun ye, wo chen ye

use-rank, CONJ-you-ruler-PAR, I-subject-PAR

"On the basis of rank, you are the ruler and I am the subject."

Rather than simply stating that the coverb *yi* carries various meanings, I believe that the meanings of the coverb *yi*, since it is derived from the verb *yi*, should still retain the fundamental notion of "instrumentality". The notion of instrumentality has been extended in *yi*'s coverb usage to indicate the means or instrument by which an action is

performed. In other words, the *yi* phrase should be recognized as the means or basis for some action.

In this way, I conclude that semantically, the *yi* phrase indicates instrumentality, which is understood as the means, reason or time for an action to be performed. Syntactically, the *yi* phrase (*yi* +NP), when it occurs before a verb phrase functions as a modifier to the verb phrase.

3. The Word Order of the *Yi* 以 Phrases

The word order issue of *yi* phrases has long been noticed. In general, previous scholars hold that, syntactically, the *yi* phrase can occur either before or after a verb phrase. When it occurs before a verb phrase, it serves as an adverbial to modify the verb phrase. When it occurs after a verb phrase, it is a complement. Thus the common view is that no matter where the *yi* phrase occurs, it always serves as a secondary consideration, a modifier for another verb phrase. Actually, the issues surrounding the word order of the *yi* phrase are much more complex than that, and they deserve a closer look.

The issue of the *yi* phrase occurring after a verb phrase being mistakenly called a complement by many grammarians has been argued and rectified by Wu (1994, 1997) and Hsueh (1997). Rather than accept that the different word order of *yi* phrases makes no difference, Wu (1994, 1997) has illustrated that the different word order of the *yi* phrase actually results in different semantic implications and syntactic functions. Namely, when the *yi* phrase occurs before a verb phrase, it is a modifier and *yi* is a coverb. When it comes after a verb phrase, however, the semantic emphasis has been deliberately put on the *yi* phrase. Therefore, *yi* is a verb serving as the nucleus of the predicate, while the preceding verb phrase is an adverbial modifier. Let's elaborate the point. Take a look at the following passage from Mencius.

(15) 吾何愛一牛？即不忍其觳觫，若無罪而就死地，故以羊易之也。 ...

我非愛其財而易之以羊也。（孟子，梁惠王上）

wu he ai yi niu? ji bu ren qi husu, ruo wu zui er jiu si di, gu yi yang yi zhi ye...

wo fei ai qi cai er yi zhi yi yang ye

I-how-love-one-ox? simply-NEG-bear-POSS-shrink, like-NEG-guilty-CONJ-go-death-place, therefore-with-goat-change-it-PAR...I-NEG-love-POSS-money-CONJ-change-it-use-goat-PAR

'Why should I be so miserly as to grudge the use of an ox? It was simply because I could not bear to see it shrink with fear, like an innocent man going to the place of execution, that I replaced it with a goat . . . It is not true that I used a goat to replace it because I grudged the expense.'

This passage has been the favorite example for scholars to cite when addressing the word order issue of *yi* phrases. It contains two possible word orders for *yi* phrases: 以羊易之 and 易之以羊 within the same passage. Previous scholars commenting on this passage, including Wang Li (1981: 451), Lu Guoyao (1992), and Sun (1991) all hold that the *yi* phrase, 以羊, serves as an adverbial phrase modifying the verb phrase 易之 when it occurs before it, and that it serves as a complement to the main verb phrase when it occurs after it. However, when I look at these two contrasting sentences more carefully and take the special characteristics of CC and its semantic implications into consideration, there remain some questions. First of all, since Chinese is a non-inflectional language, the word order principle, namely the modifier-modified pattern, is very crucial. How could a phrase which occurs in a different position, in this case involving all the same words, cause no difference? Shouldn't there be some different semantic implication and syntactic function? Second, if we treat the *yi* phrase as a complement in 易之以羊, the adverbial phrase occurs after the focus, contradicting the modifier - modified word order principle. Third, after re-examining the passage, we find that the so-called complement *yi* phrase is in fact receiving the most emphasis. How could the so-called complement bear the most emphasized information? These questions should at least motivate us to re-investigate the real nature of the *yi* phrases.

After a close study of the *yi* phrases, we claim that when the *yi* phrase occurs before a verb phrase, it is the modifier. When it occurs after a verb phrase, the semantic emphasis has been deliberately put on the *yi* phrase and hence the *yi* phrase becomes the nucleus with the verb phrase as an adverbial phrase to modify it. The following discussion illustrates why this is so.

First, in a non-inflectional language such as Chinese, different word order should result in different semantic implication and syntactic function. Note that some scholars seem to sense this fact. For example, Norman (1988:94) wrote:

Clauses formed with *yi* may either precede or follow the verb; the position after the verb generally focuses attention on the means or instrument, while the position before the verb emphasizes the verb somewhat more.

Pulleyblank (1995: 47) agrees that the emphasis is on the *yi* phrase when it occurs after another verb phrase. He states that the contrasting position of the *yi* phrase in 以戈逐子犯 versus 殺人以梃, differs only in the main focus of attention, which falls on the last verb in the series. While both Norman and Pulleyblank sense that different word order can result in different semantic emphasis, they haven't fully recognized its implications.

An entirely different explanation is suggested by Wu (1994, 1997) and Hsueh (1997). Hsueh (1997:33) points out that "for logical and consistent syntactic theorization, the difference in word order is of utmost importance, no matter how subtle may be the resulting semantic difference." Therefore, I believe that the different word order of the *yi* phrase should result in different semantic meaning and syntactic function.

Second, in this passage the different semantic implication in the sentences 以羊易之 and 易之以羊 is clear. Consider why King Xuan of Qi 齊宣王 says *yi yang yi zhi* first, and then *yi zhi yi yang* later. The first clause *yi yang yi zhi* comes after the King says that he could not bear the ox's trembling. Thus, with the first clause he emphasized the replacement of the ox, the fact that the ox was not to be sacrificed. The animal with which the ox was replaced is only a secondary consideration at this point in the discourse. However, the second clause *yi zhi yi yang* comes after a clause in which the King stated that he was not stingy over the worth of an ox. This clause is connected to *yi zhi yi yang* by the conjunction *er* 而. According to the nature of *er* 而 (Hsueh 1991), the focus is on the second clause, *yi zhi yi yang*. In this clause, the emphasis is definitely on the goat, because in this section King Xuan of Qi was emphasizing what the ox was replaced with, rather than the simple act of sparing the ox. If we treat the sentences with different word order as having the same meaning, then the emphasis of the King will not be properly explained.

Finally, our claim that the *yi* phrase occurring after the verb phrase is the nucleus of the predicate is in complete accordance with the general rule of word order in Chinese, namely, modifier precedes the modified. Therefore the semantic meaning and syntactic function of these two sentences can be seen below.

(15a) 以 羊 易 之
 (Adverbial phrase: modifier) (Verbal phrase: Nucleus)
 'replace it with a lamb'

(15b) 易 之 以 羊
 (Adverbial phrase: modifier) (Verbal phrase: Nucleus)
 'use a lamb to replace it'

Moreover, we would like to reiterate that the nucleus *yi* phrase does not occur without limitation. It only occurs in the situation in which the object of *yi* is a noun. The following are some examples in which the *yi* phrase is functioning as the semantic focus, the nucleus in the predicate.

(16) 擊之以戈。(左傳, 昭公元年)

ji zhi yi ge

hit-him-use-halberd

'Use the halberd to hit him.'

(17) 道之以政, 齊之以刑, 民免而無恥; 道之以德, 齊之以禮, 有恥且格。(論語, 為政)

dao zhi yi zheng, qi zhi yi xing, min mian er wu chi; dao zhi yi de, qi zhi yi li, you chi qie ge

guide-them-use-edict, neat-them-use-punishment, common people-stay away-CONJ-NEG-shame; guide-them-use-virtue, neat-them-use-rite, have-shame-CONJ-reform

'Use edicts to guide them, use punishments to keep them in line, and the common people will stay out of trouble but will have no sense of shame. Use virtue to guide them, use rites to keep them in line, and they will have a sense of shame and reform themselves.'

(18) 樹之以桑。(孟子, 梁惠王上)

shu zhi yi sang

plant-it-use-mulberry tree

'Use mulberry trees to plant it.'

In conclusion, our argument is based on the belief that syntactic change should result in a change in meaning. For further support we noted the principle of word order in Classical Chinese, and the tendency in the language to have the logical predicate located in the center of the grammatical predicate. (Cf. Chao 1968:78-80)

4. Concluding Remarks

In this study, I have addressed several of the issues surrounding the coverb 以. Rather than admitting that 以 carries various meaning, I have provided some arguments to suggest that the core meaning of the coverb 以 is “instrumentality”. This meaning comes naturally from its verb usage “to use, to take” and extends to its instrumentality coverb usage. That is, 以 is used “to engage (somebody or something) as an instrument.”

Moreover, this study indicates that different word order of 以 phrases actually results in different semantic implications and syntactic functions. This is completely in accordance with the general word order principles of Chinese language. That is, when the 以 phrase occurs before a verb phrase, it is a modifier and 以 is a coverb. When it comes after a verb phrase, the semantic emphasis has been deliberately put on the 以 phrase as illustrated in the two phrases: 以羊易之 and 易之以羊. Finally, this study hopes to provide better understanding of the core meaning of the coverb 以 to help us have a chance to better understand the Classical Chinese texts.

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The Word Order of the Ditransitive Construction with GEI Revisited

Xiaoqi Wu

Defense Language Institute

This paper discusses the Modern Chinese ditransitive construction with GEI, its word order patterns, including verb types and thematic roles of verb arguments that associated with different patterns of the construction. The paper also traces the historic development of the Chinese ditransitive construction as described by Peyraube (1994). It tries to apply natural information flow, or more specifically, principles of identifiability hierarchy, and distance-marking correspondence, to account for the varied word order patterns of the Modern Chinese ditransitive construction with GEI, in contrast to its historical development.

1. Ditransitive Construction in Modern Mandarin Chinese

The ditransitive construction in Modern Chinese appears in four word order patterns. Among these patterns three contain 给 GEI. Previous studies (Zhu, 1979, 1984; Lu, 1980; Yu, 1983; Xu, 1994) have identified three possible distribution patterns for GEI in Modern Chinese: i. preverbal position; ii. postverbal position, GEI following the direct object (VOG); and iii. postverbal position, GEI preceding the direct object (VGO). The four double-object patterns are as follows:

Preverbal:	A.	给 – Oi – V – Od	(GOV)
Postverbal:	B.	V – Od – 给 – Oi	(VOG)
	C.	V – 给 – Oi – Od	(VGO)
Without 给:	D.	V – Oi – Od	(VO)

1.1 Verb Types and the Ditransitive Construction

Many Chinese linguists (Hu, 1960; Zhu, 1979; Peyraube, 1984; Li, 1986; Shen, 1992) adopt the categorization of three types of verbs occurring in the ditransitive construction. The three types are: verbs of giving; verbs of taking; and verbs of non-giving or non-taking. In Chinese, there is in fact one more type of verb, i.e., verbs of giving and taking (Cf. Zhu, 1979). Among the four types of verbs, some bear the functions of substance transference, instrument and manner, for example, most verbs of giving, verbs of giving and taking. Some do not bear these functions, for example, most verbs of non-giving or non-taking and verbs of taking. The following are some examples of the four types of verbs:

Type 1: Verbs of giving

- a. 寄, 送, 发, 扔, 捐献, 分配, 介绍
- b. 卖, 还, 交, 退, 付

Type 2: Verbs of taking

买, 收, 抢, 偷, 赚

Type 3: Verbs of non-giving or non-taking

- a. 写, 带, 拿
- b. 炒
- c. 唱, 洗, 问, 检查, 解释
- d. 吃, 喝, 用, 穿
- e. 留, 挑, 加, 摇, 抓

Type 4: Verbs of giving and taking

借, 分, 租, 换, 找 (*give change*)

1.2 Thematic Roles Of The Verb Arguments

Mandarin Double-object structure with GEI has three valencies, the subject and the two datives. These three valencies may involve several thematic roles: agent, source, benefactive, goal, recipient, and patient. The role for the direct object is simple, which is always one and the same, i.e. patient. However, roles for the subject and for the indirect object are more complicated. Each valency may have just one role. For example, the subject is usually the agent. The indirect object can have the role of benefactive or goal. However, sometimes a valency may play two roles at the same time. For example, the subject can be agent and source. The indirect object can be benefactive and goal; sometimes it may have the role of benefactive and source at the same time.

Subject: agent, source

Agent only:

1. 医生给她检查身体。
2. 老板给他卖了三本书。
3. 我给小刘租了一间房子。

Agent and source:

4. 他给我喝了一杯酒。
5. 房东给她留了一把钥匙。
6. 爸爸给儿子付房租。

Direct object: patient

Indirect object: benefactive, source, goal/recipient

- Benefactive: 7. 医生给她检查身体。
 8. 老板给他卖了三本书。
- Goal/recipient: 9. 老板卖了三本书给他。
 10. 我租了一间房子给小刘。
- Benefactive and goal: 11. 我给小刘租了一间房子。
 12. 小张给他寄了一封信。
- Benefactive and source: 13. 老板给他卖了三本书。

Changes in number as well as in nature of roles affect the function of GEI, and the meaning of a sentence.

2. Word Order, Verb Types and Thematic Roles

As shown in section 1, the distribution patterns of ditransitive construction display different word orders with regard to GEI, direct and indirect object, and the verb. They all contribute to meanings of the sentences with double-objects.

2.1 The Coverb GEI

In English, distinctions are made between 'to' and 'for' in the following sentences:

14. He bought me a book.
15. He bought a book for me.

Sentence (14) means “he bought a book and give me the book me” while (15) means “he bought a book for some one else on behalf of me.” The relation between “to,” “for” and their objects is that “for” generally introduces a benefactive, and “to” an recipient, or a goal. In Chinese, both (14) and (15) can be put in one way using GEI:

16. 他给我买了一本书。

This shows that GEI has two semantic components “to” and “for,” each contributing to the function of GEI marking the role of goal and that of benefactive. An important difference between benefactive and goal lies in that there is no transference of things/substance from the subject to the indirect object involved when GEI marks the benefactive. When this is the case, the semantic component “to” is absent and the other one, “for,” becomes prominent. Either of the two components in GEI may become prominent. However, in some situations, the two roles may overlap and in such a case GEI may have both “to” and “for” readings.

Though in most cases, meanings can be clarified in contexts and appropriate interpretations can be rendered, and in Chinese there are other words that carry less or no ambiguity that can substitute GEI in its “for” meaning, for example, 替 “for,” 为 “for,” or in some dialects, 帮 “help,” (as in *Guiyang, Wuhan, Chongqing* in southwest Mandarin.). However, ambiguity may occur with preverbal GEI as example (16).

2.2 Distribution Situations of Verbs

All types of verb cannot enter all four patterns. Verbs of different types demonstrate the following distribution situations.

Preverbal: A. 给 – Oi – V – Od (GOV)

All four types of verbs can enter this structure and ambiguity may occur except for

- (a) type b in verbs of giving, i.e., verbs such as 卖, 还, 交, 退, 付;
- (b) verbs of giving and taking such as 借, 租, 分, 换; and
- (c) certain verbs of non-giving or non-taking such as 唱, 洗, 问, 检查, 解释.

With these verbs, GEI in preverbal position has only “for” reading and the indirect object has only the role of benefactive.

- 17. a 医生给他检查身体。
The doctor gave him a physical examination.
- *b 医生检查身体给他
- *c 医生检查给他身体
- *d 医生检查他身体

- 18. a 他给我们唱一首歌。
He sang a song for us.
- Or: *He sang a song to us.*
- *b 他唱一首歌给我们
- *c 他唱给我们一首歌
- *d 他唱我们一首歌

Postverbal: B. V – Od – 给 – Oi (VOG)

All four types of verb can enter this structure with exception of some verbs of non-giving or non-taking, for example, 唱, 洗, 问, 检查, 解释, 吃, 喝, 用, 穿, etc. (categories d and e in this verb type).

19. a 老板卖三本书给他。
 b 老板给他卖三本书。
 c 老板卖给他三本书。
 *d 老板卖他三本书
20. a 张三洗一个碗给李四。
 b 张三给李四洗一个碗。
 *c 张三洗给李四一个碗
 *d 张三洗李四一个碗
21. a 张三租一间房子给李四。
 b 张三给李四租一间房子。
 c 张三租给李四一间房子。
 ?d 张三租李四一间房子。
- 22.*a 张三喝一杯酒给李四
 b 张三给李四喝一杯酒。
 *c 张三喝给李四一杯酒
 *d 张三喝李四一杯酒

Postverbal: C. V – 给 – Oi – Od (VGO)

Verbs of taking (买, 收, 抢, 赚 etc.), and majority verbs of non-giving and non-taking (唱, 洗, 问, 检查, 解释, 吃, 喝, 用, 穿, etc. and as shown in 17c, 18c, 20c, 22a and c) cannot enter this structure. Others can (as in 19c and 21c).

23. *a 张三买给李四一本书
 b 张三给李四买一本书。
 c 张三买一本书给李四。
 ?d 张三买李四一本书。

With double-object structure **without 给**, D. **V-Oi-Od(VO)**, certain verbs belonging to verbs of giving, and verbs of giving and taking are allowed to enter. These include verbs such as 送, 借, 欠, 找 (*give change*), 问, 告诉, 答应, 招待 etc. Verbs of taking, and verbs of non-giving or non-taking (唱, 洗, 问, 检查, 解释, 吃, 喝, 用, 穿, etc) cannot enter this structure. Ambiguities are possible with verbs of giving and taking as shown in (24).

24. 张三送李四一本书。
25. 张三问/回答李四一个问题。
26. 张三借李四一本书。

Zhang San borrowed (or lent) Li Si a book.

2.3 Identifiability Hierarchy and Distance-Marking Correspondence

Natural information flow (or information structure) has been frequently discussed as an aspect of the influence of pragmatics on word order. Some researches (Lambrecht 1994, among others) have maintained that the major factor responsible for natural information flow and the relevant correlations is ‘identifiability’. Among factors that may be relevant to identifiability, the most obvious is animacy. Comrie (1979) found that objects higher in animacy use overt object case markers more frequently than those lower in animacy. It has been observed that in many languages, animacy affects word order. A unit higher in animacy precedes a unit lower in animacy.

Distance-marking correspondence as proposed by Lu (2004) states that the more a dependent is away from its head, the more it needs an overt marker indicating the semantic relation of the two units, which is motivated by a fundamental strategy of human cognition and is tested in Chinese as well as by cross-linguistic data. For instance, in Chinese, the adverbial marker 地 and the attributive marker 的 drop when the modifier and modified units have close semantic relation.

The two principles provide an explanation to the distribution situations of verb types with regard to the word order presented in the four double-object structures discussed (2.2).

Structure A. 给 – **Oi** – **V** – **Od** (GOV) is most adaptable to different types of verbs among the four patterns. Many verbs without connotation of transference can enter these structures. Structure A (GOV) has **Od** following **Oi** which is inconformity with identifiability hierarchy. It also is inconformity with distance-marking correspondence with **Oi**, the one higher in animacy, marked by GEI. However, this is the pattern with ambiguity possibility (though it is remediable by using other prepositions). Could it be because the pattern is too powerful, or use of the case marker GEI is not necessary since **Oi** is close to the verb?

Structure B. **V** – **Od** – 给 – **Oi** (VOG) is also adaptable to different types of verbs. This pattern is perfectly inconformity with both principles and since **Oi** is farther away from the verb than **Od**, the one lower in animacy, it needs to be marked. This pattern has no restriction or ambiguity.

Structure C. **V** – 给 – **Oi** – **Od** (VGO) has more restriction on verb types. C is also not inconformity with distance-marking correspondence principle. The direct object is away from its head without marking. Therefore only verbs that bear the functions of transference, instrument and manner can enter this structure.

Structure D. **V – Oi – Od** (VO) is inconformity with identifiability hierarchy. Like C., it also requires verbs with connotation of transference. However, the connotation of transference for many of verbs that can enter this structure is not exactly the same as those required by C. Oi in this structure can bear the role of recipient, goal, or patient. Thus the identifiability hierarchy of the two objects is not so clear.

3. Historical Development of Ditransitive Construction

We find it interesting to look at the historic development of the ditransitive construction and see accountability of the principles of identifiability hierarchy and distance-marking correspondence.

The written form GEI is not easily traceable in the history of the Chinese language. It is simply because there existed with a number of different written forms fitting in the same construction in the historic Chinese literatures, and the presence of GEI has not been found in a consistent or uninterrupted manner from available data. However, different patterns of ditransitive constructions are found in great quantity in literatures of the Pre-Qin period as well as in the oracle inscriptions. It is generally recognized that the following three patterns of the ditransitive construction are commonly used in Archaic Chinese.

- A. V + Oi + Od
27. 王賜晏子酒。
- B. V + Od + *yu* + Oi
28. 獻楚俘于王。
- C. V + Od + Oi
29. 范座獻書魏王。

Peyraube (1986) identifies another pattern of ditransitive constructions in this period:

- A. 以 + Od + V + Oi
30. 孔子以其兄之子妻之。

In addition to the above patterns, a structure with *yu* 與 ‘give’ as the first verb, meaning “for” is also found in some Pre-Qin literature. This may probably be the origin of the benefactive use of GEI in Modern Chinese.

31. 後若有事，吾與子圖之。

In the Han Dynasty, there emerged another pattern of ditransitive construction:

E. V1 + V2 (予/遺/與) + Oi + Od

The word that was predominantly used to introduce the indirect object in V2 position was *yu* ‘give’ which developed very rapidly since Han (Yang & He, 1992; Peyraube, 1986) with written forms including *yu* 予, *wei* 遺, etc.

32. 桌王孫不得已，分子文君僮百人。

From Later Han on, *yu* 與 gradually took the place of *yu* 予 and *wei* 遺 in the process of lexical unification (Peyraube, 1986).

33. 長者取刀度與法師。

After Song Dynasty, a few other words such as *kui* 饋 and *gui* 歸 are found co-existing with *yu* 與. However, sentence patterns remain unchanged.

34. 告總管借與我馬。

35. 卻討個生活歸您做。

36. 你做饋我一付護膝。

The structure with *yu* 與, *ji* 己 meaning “for,” preceding the main verb, is also found in the literatures from Song and Yuan periods.

37. 快己他做道袍子。

During Ming and Qing period GEI emerged and gradually replaced all the others (Yang & He, 1992). Structure patterns and uses in this period are similar to that in Modern Chinese. However, in *Xing Shi Yinyuan Zhuan* 《醒世姻緣傳》, *ji* 己 is found in all positions for GEI. This may be the record of a colloquial form in some dialects at that period (cf. Otatatsuo, 1956).

38. 怎麼公母兩個合夥著拿出二兩銀來丟己人。

In *Honglou Meng* 《紅樓夢》, GEI 給 is found predominantly in the ditransitive construction. It occurs in the preverbal and postverbal positions, functioning the same as in Modern Chinese.

Preverbal:

39. 我給他帶了好東西來了。
40. 你想吃什麼，回來好給你送來的。

Postverbal:

41. 你們只管去，都交給我就是了。
42. 老太太那日竟叫人拿幾百錢給我。

In summary, identified ditransitive constructions that occurred up to the end of Song Dynasty include:

- A. V + Oi + Od
- B. V + Od + *yu* + Oi
- C. V + Od + Oi
- D. 以 + Od + V + Oi
- E. V1 + V2 (予/遺/與) + Oi + Od

The four patterns of Modern Chinese ditransitive construction (see Section 1) formed after Song Dynasty and the word GEI appeared during Ming and Qing period.

4. Comparison

It is interesting to compare the ditransitive construction word order patterns in modern Chinese with those in the history, and to find that two patterns V – Oi – Od, and V – Od – 给 – Oi (V – Od – 於 – Oi in history), exist throughout the history, while some other patterns, V – Od – Oi and 以 – Od – V – Oi (as double-object construction) no longer in existence. It seems to suggest that the two patterns have stable structures, which cannot be by accident. The fact that these two patterns have been continued to modern Chinese without word order change and that some other ditransitive construction patterns disappear or have limited use seem to support the accountability of the principle of identifiability hierarchy, and distance-marking correspondence.

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Reconstruction of Old Chinese Back Vowels*

Tong Zhao
Renmin University of China

This paper proposes a revised system of Old Chinese back vowels: *ɿ (之), *u (宵), *o (幽), *ɔ (侯) and *a (魚), which is purely monophthongal and may account for more related phenomena. There are such kinds of mixed rhymes in the *Shijing*: 之 and 幽, 宵 and 幽, 幽 and 侯. It is due to the sound similarity between the rhyme groups of each pair. The back vowels of Old Chinese widely experienced a raising-diphthongizing process, and this evolution was delayed by a preceding *-j-. This revised system may explain this series of evolution more simply and effectively.

0. Introduction

Scholars have different views on the quantity and phonetic specification of Old Chinese vowels. In this paper only back vowels are focused on.

According to their codas, Wang (1978[1982]) divided traditional rhyme groups into three types, among which, type JIA 甲, ending with zero or velar codas, consists of the most rhyme groups. Every vowel maybe appears in the rhyme groups of type JIA 甲. Since the main vowels of ZHI 之, XIAO 宵, YOU 幽, HOU 侯 and YU 魚 (including the corresponding groups of *Yangsheng* 陽聲 and *Rusheng* 入聲) of type JIA 甲 are mainly back vowels, explanation of these five rhyme groups may account for all the back vowels. Several typical systems of Old Chinese back vowels are summarized in Table I.

Table I

	之	幽	宵	侯	魚
Wang 1957	ə	əu	au	o	ɑ
Li 1971	əg	əgw	agw	ug	ag
Wang 1978[1985]	ə	U	o	ɔ	a
Baxter 1992	i(ə)	u, iw	aw, ew	o	ɑ
Zheng-Zhang 2003	u	u, iw, uw	aw, ow, ew	o	a

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It will be discussed in detail below that all previous systems have their limitations. This paper is intended to propose a revised back vowel system of Old Chinese¹, which may avoid limitations of previous systems and account for related phenomena of Old Chinese more effectively.

1. How to Evaluate an Old Chinese System?

Following Ockham's Razor, Baxter (1992: 22) proposed such an assumption:

Hypotheses which tie a number of phenomena together are to be preferred over hypotheses which account for only one phenomenon at a time.

The following items can be used as criteria to evaluate systems of Old Chinese.

1. Major evidence of Old Chinese, including rhymes of Pre-Qin verses, especially the *Shijing* 詩經, and *xiesheng* 諧聲.
2. The development from Old Chinese to Middle Chinese.
3. The internal features of Old Chinese.
4. The naturalness of the system and language universal.

2. Rhyming of the *Shijing*

Duan Yucai reordered the rhyme groups according to their rhyming condition instead of the order in traditional rhyme books, which was another significant contribution besides his division of rhyme groups. Jiang Yougao altered Duan Yucai's order of rhyme groups, and his order was widely accepted subsequently. The orders of ZHI 之, XIAO 宵, YOU 幽, HOU 侯 and YU 魚 of both Duan's and Jiang's are listed as the following:

Duan: 之 — 宵 — 幽 — 侯 — 魚
 Jiang: 之 — 幽 — 宵 — 侯 — 魚

The difference between Duan and Jiang lies on the arrangement of XIAO 宵 and YOU 幽. Both of them used the rhyming material. Why did Duan and Jiang draw different conclusions? The rhyming condition of these five rhyme groups are summarized in Table II and III.²

In Table II, adjacent ZHI 之 and XIAO 宵 did not rhyme, while ZHI 之 and YOU 幽 separated by XIAO 宵 rhymed, which is abnormal. In Table III, Jiang's revision

¹ This system is also proposed in Zhao (2003), but lacks detailed discussion.

² These two tables are based on Wang Li (1980). The digits are the times of rhyming between the two rhyme groups respectively. The parenthesized counts the corresponding *Yangsheng* or *Ru-sheng* rhyme groups.

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indicated the relationship between ZHI 之 and YOU 幽, but brought about a new problem of YOU 幽, XIAO 宵 and HOU 侯. In addition, ZHI 之 and YU 魚 are located on the two terminals in both Table II and III, while they do rhyme.

Table II

	之	宵	幽	侯	魚
之			7(5)		5
宵			9		
幽	7(5)	9		3(2)	
侯			3(2)		(1)
魚	5			(1)	

Table III

	之	幽	宵	侯	魚
之		7(5)			5
幽	7(5)		9	3(2)	
宵		9			
侯		3(2)			(1)
魚	5			(1)	

In Table IV, all kinds of mixed rhymes of these five rhyme groups are listed with their reconstructed forms.

Table IV

	之幽	之魚	宵幽	幽侯	侯魚
Wang 1957	ə ~ əu	ə ~ a	au ~ əu	əu ~ o	o ~ a
Li 1971	əg ~ əgw	əg ~ ag	agw ~ əgw	əgw ~ ug	ug ~ ag
Wang 1978[1985]	ə ~ u	ə ~ a	o ~ u	u ~ ɔ	ɔ ~ a
Baxter 1992	i(ə) ~ u	i(ə) ~ a	aw ~ u	u ~ o	o ~ a
Zheng-Zhang 2003	u ~ u	u ~ a	aw ~ u	u ~ o	o ~ a

Since they are all back vowels, these vowels can be specified by three distinctive features, namely [± high], [± low] and [± round]. Hence, the vowels can be analyzed as below.³

³ Although there is the contrast between front *a and back *a in Wang (1957), it has not been accepted currently, therefore only one of them is remained in Table V. Although there would not be all these seven vowels in ONE system, it would not influence our analysis.

Table V

	i	ə	u	u	o	ɔ	a
[± high],	+	–	+	+	(+)	–	–
[± low]	–	–	–	–	–	(+)	+
[± round]	–	–	–	+	+	+	–

In Table IV, when there are more than two different features between the main vowels of the two rhyme groups, they are marked in bold indicating that they are not regular rhymes. The italics show the rhyming between monophthongs and diphthongs, which are also considered as unnatural rhymes, although they have same or similar main vowels. Additionally, in Li's system, it is abnormal that *əg and *əgw can rhyme, while the parallel *ag and *agw can not.

Baxter and Zheng-Zhang subdivided the traditional rhyme groups XIAO 宵 and YOU 幽; nevertheless, their reconstruction can not account for such rhyme sequences of the *Shijing*:

《王風·君子陽陽》二章	Baxter	Zheng-Zhang
君子陶陶(幽)	*lju	*luu
左執翻(幽)	*du	*duu
右招我由敖(宵)	*ngaw	*ngaaw
其樂只且		

Obviously, all the previous systems have limitations on accounting for the rhymes of the *Shijing*.

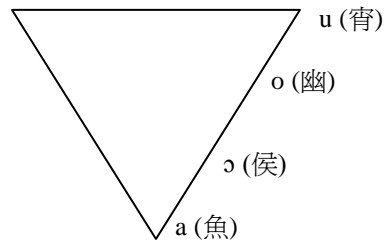
3. Revision of the Back Vowel System

Since all the previous reconstructed systems can not explain the main evidence of Old Chinese—that is, the rhymes of the *Shijing*, it is necessary to make some revision.

The naturalness of the system and language universal should be considered when reconstructing a proto-language. In Li's system, there are only closed syllables, which is extremely unnatural. His labial-velar codas *-kw, *-gw and *ngw are also rare. Between monophthong and diphthong, the former is preferred because it is more natural and more universal. Wang (1957) reconstructed two diphthongs *au and *əu for XIAO 宵 and YOU 幽 respectively, which is obviously influenced by their reflexes in Middle Chinese. Li's *-gw and Baxter and Zheng-Zhang's *-w are also labeled with Middle Chinese -u/-w. Among the five systems mentioned above, only Wang (1978) is purely monophthongal, which my revision will be based on.

First, we need to identify a basic point of Old Chinese back vowels on the vowel-triangle. It is recognized that the main vowel of the YU 魚 group is the lowest *a*.

Then according to the interrelationship of rhyming between XIAO 宵, YOU 幽, HOU 侯 and YU 魚, the vowel of each group can be specified as in the diagram below:



Every pair of adjacent groups rhymed together in the *Shijing* as shown in Table II and III. This reconstruction is from Wang (1978) with an interchange of XIAO 宵 and YOU 幽, and corresponds with Duan Yucai's order of rhyme groups.

As mentioned above, the rhyming condition of the ZHI 之 group is very special, which indicates that the relationship between ZHI 之 and the other four groups is not linear. It is reasonable that most scholars reconstructed schwa *ə for the ZHI 之 group; whereas, ə is not a good candidate as a member of a phonology, because it is a non-cardinal vowel. Considering the relationship between ZHI 之 and the other groups, I reconstruct its main vowel as *ɤ, which is very similar to the main vowel *o of YOU 幽.

The revised back vowel system of Old Chinese can be summarized in Table VI:

Table VI

之	宵	幽	侯	魚
ɤ	u	o	ɔ	a

This system may account for all kinds of mixed rhymes of the five groups in the *Shijing* more effectively:

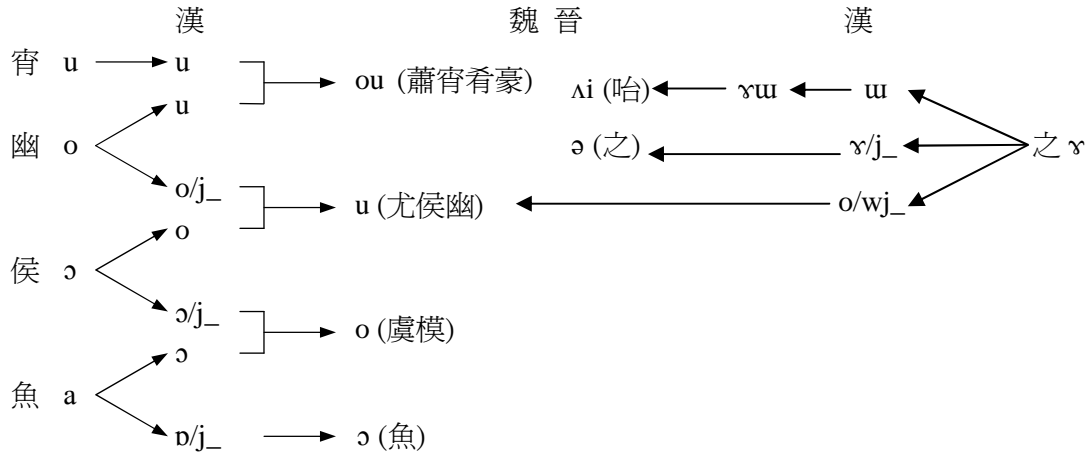
Table VII

之幽	之魚	宵幽	幽侯	侯魚
ɤ ~ o	ɤ ~ a	u ~ o	o ~ ɔ	ɔ ~ a

4. The Development from Old Chinese to Middle Chinese

As we all know, back vowels of Old Chinese widely experienced a raising-diphthongizing evolution. When we apply the revised reconstruction to observe this evolution, it becomes more systematical.

The development of back vowels from Old Chinese to Middle Chinese is summarized in the following diagram:⁴



From Old Chinese to Middle Chinese, back vowels raised and diphthongized systematically, but the evolution delayed when preceded by **-j-* (Division III). The raising-diphthongizing process has two steps.

5. Conclusion

Mainly based on the reconstruction of Wang (1978[1985]), this paper proposes a revised back vowel system of Old Chinese, which may account for more phenomena simultaneously.

There is still a mysterious question on Old Chinese back vowels. In type JIA 甲 rhyme groups, only the XIAO 宵 group has no corresponding *yangsheng* 陽聲 group, which is quite abnormal. At the end of this paper, I try to make a tentative explanation. According to the proposal of this paper, the main vowel of the XIAO 宵 group is **u*. When pronouncing *u*, soft palate and uvula are raised, so that the air can hardly go through the nasal cavity and produce a nasal.

⁴ The development of rhyme groups is mostly based on Wang (1985), while the reconstruction is revised somewhere, especially two different vowels of the YU 魚 group in the Han time, which still reflected in the Wei-Jin period.

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The Zhongxian (中仙) Min Dialect: A Preliminary Study of Language Contact and Stratum-Formation

Rongbin Zheng
The Ohio State University

Previous studies on the historical strata of the Min dialects mostly focused on the sub-stratum of the languages and their relations with the Wu dialects. There are two views that are generally accepted: 1) the aboriginal population of the Min area was the Min-Yue people, whose language formed the Min substratum; 2) the Min dialects and the ancient Wu dialects are closely connected. Some Wu dialect elements have been retained in the Min language and formed another layer. In this paper, I will discuss these two layers in the Zhongxian subdialect of Min, and will provide examples from those two strata. The paper will also discuss a more recent stratum that is in the process of formation that is the result of influence from the official language, Putonghua.

0. Introduction

Zhongxian is a small town located in the south of Youxi county (尤溪县) in Fujian Province; generically, the dialect is listed under the category of Min-Dong qu (闽东区) Hou-guan pian (侯官片) dialect group, according to the “language atlas of China.” In addition to the Zhongxian dialect, there are some other local dialects in the Youxi county that have a remarkably low degree of mutual intelligibility, including the Chengguan dialect (城关话), which is used in the middle of the Youxi county, and the Yangzhong dialect (洋中话), which is spoken in the north-east of the county.

As a small branch of the Min dialect, the Zhongxian dialect, to the best of my knowledge, has not been studied previously. The dialect data used in this paper is from my own fieldwork conducted in 2006, which reflects the rather recent phonology of the Zhongxian dialect. Due to influence of the promotion of Putonghua, the Zhongxian dialect is undergoing some phonological changes, which is best reflected by the newly formed layer in this language. To examine and sort out this new layer is certainly helpful to gain a better understanding of the language, as well as of the bigger picture of the Min dialect in general. Before discussing this new layer, I will first examine two older strata, the Yue substratum and the Wu stratum, with references to historical migration movements and language contact in the following sections.

1. The Aboriginal Min Language

To study this language, we need to trace back to the language spoken by the aboriginal inhabitants in the Min area, what is today Fujian Province, which were the Min-Yue 闽越 people. Min-Yue was a branch of the Yue 越 people, which is also called

Baiyue 百越 because of the many varieties of the Yue tribes, including Wu-Yue (吴越) and Min-Yue (闽越). The Min-Yue people lived in the Min area until the Qin-Han period. In 110 B.C., the armies of Han Wu Di 汉武帝 invaded the territory of the Min-Yue and defeated them. As a result, they were removed from Min into the Jianghuai 江淮 area. However, it is believed that those who were removed from the area were the upper classes and some of the armies, while the local people remained in Min. Therefore, the Min-Yue 闽越 language was still the main local language, the aboriginal language of Min that forms the deepest stratum of the modern Min dialects.

To study this aboriginal stratum in the modern Min dialects, the current approach is mainly lexicon-based. As Norman (1991) explains: “in the case of the Min dialects, it is hard to identify any common phonetic feature distinguishing them from other Chinese dialect groups which might be attributed to substratum influence. Even if there were, we know so little about the ancient Yue language that it would be virtually impossible to show that the trait in question could actually be traced back to a Yue substratum. As regards the lexicon, we are somewhat more fortunate.”

Norman and Mei (1976) propose that the language of the ancient Yue people was Austroasiatic, related in a particularly close fashion to Vietnamese. Assuming that the language of the Min-Yue was of the same linguistic affiliation as that of the other Yue tribes, they approach this issue by discovering colloquial words that correspond to Vietnamese words. One of the words that they cited is given here in (1a). In the Zhongxian (Min) dialect, the word for “wet, moist” is pronounced as [taŋ], as shown in (1b). The consistency is obvious here.

- (1) a. “wet, moist” *dəm in Proto-Min
 [dam] in Vietnamese
 b. “wet, moist” [taŋ] in Zhongxian (Min)

However, a different perspective, while it is also lexicon-based, is taken by other scholars. To be specific, they take efforts in discovering colloquial words that might not have written forms, but have cognates in the Zhuangdong language 壮侬语, which is considered the descendent of the ancient Yue language. The results are fruitful. Many such cognates have been found. The following are some examples from Li Rulong (2005):

- (2) a. ‘to suck’
 Min dialects: Zhongxian 中仙 sɔ Fuzhou 福州 sɔʔ Xiamen 厦门 suʔ
 Dongyu 侬语: sot
 Taiyu 泰语 : su:t

- b. ‘to hide’
 Min dialects: Zhongxian 中仙 me
 Taiyu 泰语: Yuanyang 元阳 mɛp
- c. ‘to fall off’
 Min dialects: Zhongxian 中仙 lɛʔ Xiamen 厦门 lut
 Zhuangyu 壮语: Longzhu 龙州 lu:t
 Taiyu 泰语: Xishuangbanna 西双版纳 lut
- d. ‘foot’ (骹)
 Min dialects: Zhongxian 中仙 kha Xiamen 厦门 lut
 Zhuangyu 壮语: ka, kha
- e. ‘stupid’
 Min dialects: Zhongxian 中仙 ŋɔŋ Xiamen 厦门 gɔŋ
 Daiyu 傣语: ŋɔŋ
 Liyu 黎语: ŋaŋ

Li Rulong 李如龙 (2005) points out that there are some “core words” that seem to be genuine Chinese because they exist in Chinese rhyme books as well as in dictionaries. However, Chinese is not the etymon of these words, which have been written down in Chinese characters. The etymon stems from some minority people’s languages in the south. The character [nong] 侬 is one of these examples. The character means “people”, and also indicates “oneself.” It is still used in modern Min dialects. Take Zhongxian dialect for example:

- (3) a. ‘people’ (侬)
 Zhongxian 中仙: noŋ
- b. Zhongxian 中仙: noŋ kɛʔ tsɿ ʔe k’ə
 人 自 己 会 去。
 ‘I/they can go by myself/themselves.’

Nong 侬 is very much like *renjia* 人家 in Mandarin, in a sense that it can refer to both other people and oneself.

Pan Wuyun 潘悟云 and Chen Zhongmin 陈忠敏 (1995) state the *nong* 侬 is a dialectal word that was widespread in usage in Jiangnan 江南 area in earlier times. The article suggests that the *nong* 侬 is probably a word from the Baiyue vocabulary. It is used to refer to oneself or one’s tribe. While the Baiyue people adopted the Chinese language,

they retained this word from their native lexicon. Because the Baiyue people generally lived in the south of China, this also explains why *nong* 依 is not specifically found in Min dialects, but in some other dialects as well, such as the Wu 吴 and Gan 赣 dialects of Chinese.

Another special character is *jian* 囧. This character is collected in the *Jiyun* 集韵 rhyme book. It means “son.” Its pronunciation in the Zhongxian dialect is [kuŋ]. As with *er* 儿 in Mandarin, 囧 is also grammaticalized and used as a suffix, such as 刀囧 ‘knife’, 钳囧 ‘pliers’. Li (2005) points out that it is hard to imagine words of such importance that, while they are not found in any ancient Chinese records, surface so abruptly in the Min dialects and was used so widely. The most plausible explanation is that this word was borrowed from the old Baiyue language.

It is almost unquestionable that there is a substratum of the Min-Yue in the Min dialects. However, it is extremely difficult to tell how much of that stratum is left in the modern language, mainly because the primary method to study it today is lexicon-based. In other words, the results are relatively fragmented. We do not observe any phonological or grammatical features from that stratum, which would be much more convincing.

2. The Wu Stratum

Scholars (e.g. Wang 1999, Chen 2002, Ting 2006) have shown that the Wu dialects and Min dialects are closely related, and some have even proposed that the Min dialects are the descendents of the ancient Wu dialects. For example, Wang Futang 王福堂 (1999:69) proposes, “based on common characteristics between the Wu and Min dialects, it is reasonable to draw the conclusion that the modern Min dialects are from the ancient Wu dialects.”¹

This proposal is, first of all, supported by the historical migration movements. The earliest Chinese migration into the Min area found in written records took place in the Three Kingdoms Period (Sanguo 三国 period, 202B.C.-280 A.D.). As Sunwu 孙吴, the political leader of the Wu kingdom, developed the Jiangdong 江东 area², people from there started to move south, into the region north of the Min area. These people are believed to speak the ancient Wu language.

Another major Chinese migration movement took place after the upheavals in the Jin 晋 dynasty (265 A.D.-420 A.D.). Due to the wars in the Zhongyuan 中原 area ‘Central Plains’, mainly today’s Henan province, a large number of people fled from home and moved southwards. Some went to the Jiangdong area where it was populous and well-

¹ The original words are: “从目前吴闽两方言的重要共同点引出现代闽方言是中古吴语继承者的结论，是言之成理的说法。”

² In modern China it is mainly the region of the north of Zhejiang province 浙江省 and the south of Jiangsu province 江苏省.

developed. As this resulted in conflicts with the local population, they continued to move south and into the Min area. For example, the upheavals of Yongjia period 永嘉之乱 in 311 A.D. resulted in major migration into the Min region. According to *Sanshanzhi* 三山志, the chaos triggered the move of the “Eight Surnames” groups into Min.³ As more Chinese people moved into the area, more administrative districts were established, such as Jin’an county 晋安郡, what is now present-day Fuzhou 福州, Liang’an county 梁安郡, what is present-day Nan’an 南安, Yian county 义安郡, and the present-day Chaozhou 潮州.⁴

As we can see, the majority of the Chinese migration is from the direction of Jiangzhe 江浙, which refers to today’s Jiangsu province 江苏省 and Zhejiang province 浙江省. Although some are originally from the Zhongyuan area, it is reasonable to think that their language must have absorbed some Wu language elements to various extents when they were in the ancient Wu language area. Therefore, it is very likely that, during the formation of the Min language of earlier times, the ancient Wu language played a role, and it is expected that there would exist a Wu stratum in the Min dialects.

The connection between the Wu and Min dialects can be corroborated in various linguistic aspects. First of all, from a phonological point of view, there is evidence that can be used to show such a connection. For example, the retention of bilabials and the lack of retroflex stops are two major characteristics of the Min dialects. Previous studies have found that this is not exclusive to Min, but is also the case for some of the Wu dialects. We may take a look at the following examples:

(4) a.	斧	肥	反	
	fǔ ‘ax’	féi ‘fat’	fǎn ‘to turn over’	
	江山 (Wu)	pu	bi	pa
	中仙 (Min)	pə	puɪ	paŋ
	厦门 (Min)	pɔ	pui	pu
b.	猪	帐	竹	
	zhū ‘pig’	zhàng ‘tent’	zhú ‘bamboo’	
	丽水 (Wu)	ti	tiaŋ	tioʔ
	江山 (Wu)	tɔ	tia	taʔ
	中仙 (Min)	tə	tiaŋ	tiʔ

³ The original quotation is “永嘉之乱，衣冠南渡，入闽者八族。”

⁴ Wangfutang 王福堂, 1999:70.

As we can see from the above examples, in some Wu dialects, bilabials are retained as well, and the Zhi 知 series of initials is not separated from the Duan 端 series of initials. A plausible explanation for this phenomenon is that the retention of bilabials and the lack of retroflex stops were featured of ancient Wu dialects as well. Due to the influences from the northern dialects, these features were lost in most Wu dialects, and only kept in some areas. Also, during the formation of the Min dialects, these features were brought to the local area by the immigrants in history. Because of the strong and consistent resistance against outer language influences, in part due to the relative geographical isolation of the region, the Min dialects managed to retain these features.

The phonological connection between the Wu and Min dialects can be illustrated in other, more detailed, ways as well. Chen Zhongmin 陈忠敏 (2002), for example, studies the corresponding layers of the Yu 虞 rhyme in Min and Wu dialects, and finds that there are three layers of the Yu 虞 rhyme in both Min and Wu dialects. Moreover, the layers in the Min dialects correspond with that in the Wu dialects. He uses Fuzhou 福州 and Xiamen 厦门 as representatives for the Min dialects, and Kaihua 开化 for the Wu dialects. The result is as follows:

(5)	开化 (Wu)	福州 (Min)	厦门 (Min)
Layer I	iɯ	ieu	iu
Layer II	u:ə,y:ə	uɔ	ɔ
Layer III	u,y	u,y	u

The first and second layers are colloquial readings. The example words for them are respectively *xu* 须, *shu* 树 and *zhu* 珠(目~) for the first layer and *fu* 斧, *zhu* 朱, *shu* 输 and *yu* 芋 for the second layer. The third layer is literary reading, with *zhu* 主, *chu* 厨 and *shu* 书 being its example words.

Also, I found in the Zhongxian dialect there are two layers of reading of the word *yǐ* 蚁 which correspond with those in the Wenzhou 温州 dialect.

(6) 蚁 ‘ant’	中仙	温州
literary reading	ŋi	ŋi
colloquial reading	ŋia	ŋa

Similar to Chen’s example, the consistency in both colloquial and literary readings of *yǐ* 蚁 in the two dialects serves as persuasive evidence. This example can not only be interpreted from a phonological point of view, but also from a lexical point of view, because *yǐ* 蚁 is a colloquial word in daily life. For two dialects unrelated, the word can totally have different forms of pronunciations. The consistency in the two dialects only shows there is some kind of affiliation between the two languages.

Lexicon is applied as favorable evidence in proving affiliations between languages. Colloquial words of the spoken language in daily life are a peculiar group of it for the reason that they are the most resistant to the loan words. As a result, they are most likely to keep and reflect the original readings of the word. Ting Pang-hsin 丁邦新 (2006) provides a few of such words that could prove the close relationship between the Wu and Min dialects. The Zhongxian dialect can be incorporated into the examples, as has been done here in (7) below.

(7) a. ‘evening’ Zhongxian: maŋ 冥 Xiamen: am mi 暗暝

Source: 吴歌《读曲歌》：愿得连冥不复曙

b. ‘you’ Zhongxian: nə 汝 Fuzhou: ny 汝

Source: 吴歌《子夜歌》：语笑问汝道，腹中阴忆汝

The above Wu folk songs are from the Nanbei dynasties 南北朝 (386A.D.-589A.D.). Interestingly, none of these words have corresponding spoken forms found in any modern Wu dialects, even though the written records show their existence in the history of the Wu dialects. These words are, nevertheless, retained in modern Min dialects, including in the Zhongxian dialect. The explanation to the existence of these words in both ancient Wu dialects and in modern Min dialects is that ancient Wu and Min dialects were closely affiliated.

Li Rulong (2002) also finds examples of this sort. One of the words is:

(8) ‘sleeve’ Zhongxian: tɕ’iu ɸuŋ 手□ Xiamen: ts’iu ŋ 手□

Source: 《方言》：“褯□谓之袖。”

郭注：“衣褯音橘，江东呼□，音婉。”

In modern Min dialects, the word for ‘sleeve’ is 手□, whose pronunciation vary from place to place. It is [ts’iu uoŋ] in Fuzhou, [ts’iu ŋ] in Xiamen, and [tɕ’iu ɸuŋ] in the Zhongxian dialect. According to Guopu’s 郭璞 annotation to *Fangyan* 方言, the word for ‘sleeve’ in Jiangdong is pronounced the same as the word *wan* 婉. The word, along with its pronunciation, is used in the Min dialects, as shown in (8). Similarly, the corresponding spoken form is not found in any modern Wu dialect. However, the written records show unquestioning existence of the word in the ancient Wu dialect. Again, this provides strong evidence for the historical connection between the Wu and Min dialects.

3. Putonghua Influences

Promotion of Putonghua has been the language policy of the Chinese government for the past decades, and nowadays Putonghua has established its dominance over other varieties of the Chinese language in China, and has impacted all these other varieties, or dialects. As Norman (1991) proposed, “All over China at the present time regional dialects are undergoing immense changes under the pressure of the newly established standard language (Putonghua). This change is very often reflected in surprisingly great differences between the language of different generations in a single locality.”

In the case of the Zhongxian dialect, while it might be too hasty to say a new Putonghua layer has formed, the phenomenon described by Norman is indeed taking place. A substantial proof that I find is the emergence of the labiodental initial [f].

One should note that while the labiodental initial [f] has separated from bilabial [p] in most dialects in China, this sound change did not take place in the Min dialects. According to the *Hanyu Fangyin Zihui* 汉语方音字汇, the [f] sound is not recorded in either Fuzhou 福州 or Xiamen 厦门 dialects, which are regarded as representatives for the Min dialects, nor in Jian’ou 建瓯 and Chaozhou 潮州 dialects. However, I find this initial through my research and fieldwork on the phonology of Zhongxian dialect. Take the word *fen* 分 ‘divide’ for example. There are three layers, as shown in (9), with the word *fenkai* ‘to separate’ given in Pinyin Romanization and Zhongxian broad phonetic transcription:

(9)		Zhongxian		Putonghua	Zhongxian
	First layer:	分 [puŋ]	分开	fen kai	[puŋ k’uɿ]
	Second layer:	分 [xuŋ]	分开	fen kai	[xuŋ k’uɿ]
	Third layer:	分 [fuŋ]	分开	fen kai	[fuŋ k’uɿ]

The bilabial [p] can be traced back to the Wu stratum, as has already been explained above. The [x] sound in the second layer is a lenition of the bilabial, which only takes place when the segment occurs before back vowels, such as [u] or [o]. It is important to note that [p] initial words in the first layer are not only older than those in the second layer, but that [p] initial words also occur more frequently in colloquial contexts. Therefore, the such words in the [p] initial should be counted as *baidu* 白读, or colloquial reading, and the second layer is *wendu* 文读, literary reading. Both of these layers exist for all Zhongxian dialect native speakers. As for the third layer [f], it is only used by the younger generation. The definition of younger generation here is those people who went to school and studied Putonghua. Therefore, it is safe to say that this additional pronunciation by the younger generation is due to the influence of Putonghua.

It is certain that nowadays as more and more people are going to school and study the standard language Putonghua, it is to be expected that there will be much more infiltration of Putonghua into the Zhongxian dialect. It is important to keep track of this

development, particularly because we can record the spoken forms of both varieties, Putonghua and the Zhongxian dialect, to chart on-going changes across generations over time.

4. Conclusion

In conclusion, the study of the historical strata of a language helps to sort out the development of a language in different periods of time, as well as its relationship to other languages. As we can see in the case of the Zhongxian dialect, language contact has been the primary reason for the formation of different strata in the language. This study provides a preliminary study of the historical strata in the Zhongxian dialect. Lexicon and phonology are the two major means that can be applied to examine strata formation, studied in conjunction with migration history and other historical sources. In order to gain a deeper understanding of the Zhongxian dialect and its historical development to the present day, as well as the Min dialects in general, more comprehensive data need to be obtained and more in-depth analysis need to be conducted.

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