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The Little Prince in Cantonese with Jyutping:

Usage of Sentence-Final Particles Across the Main Characters

Marjorie K.M. Chan

Ohio State University

This paper analyzes the sentence-final particles (SFPs) in Wai-chuen Thomas Tsoi's 2021 Cantonese translation of Antoine de Saint-Exupéry's (1943) world-famous novella, *Le Petit Prince*.[1] The study centers on the Little Prince and his dialogues with three other main characters, each with a different role and personality in the story: (1) Flower, an anthropomorphic rose whom he loves but leaves behind; (2) Snake, who offers to transport the Little Prince back to his planet; and (3) Fox, who imparts his words of wisdom. The book has a total of 25 different SFPs in its 27 chapters. The dialogues in this study, despite occurring in only 4 of those chapters, yield 13 different SFPs, thus constituting about half of the different SFPs in that entire book. The frequency, distribution, and usage of these 13 SFPs across the four characters is the focus of this study. The paper closes with a discussion of a topic generally ignored in linguistics, namely, the unique challenges that translations bring in dealing with languages that belong to very different language families. In this case, it involves translating the novella from French, a language without SFPs, to Cantonese, with an abundance of SFPs where their total absence in conversations would sound very unnatural.

[1] My special thanks to Professors Feng Xiao and Jun Lang for their hospitality and hard work in organizing a very successful NACCL-36 conference at Pomona College and then dedicating time to edit the conference proceedings. Sincere thanks also for feedback from Paul Ueda, Robert Xu and others at my NACCL-36 presentation and/or afterwards.

Introduction

Exactly one century ago, James Dyer Ball (1847-1919), born in Guangzhou and proficient in Cantonese, marveled at the use of sentence-final particles (SFPs) in the dialect. Below is my favorite quote from Ball (1924:122):

> "It is curious, and most interesting to notice how small and insignificant a word at the end of a sentence will change the meaning of the whole sentence, like the rudder at the stern of the ship governing the motions of the whole vessel."

Aside from sentence-final particles[2] that have a grammatical function, such as changing a declarative sentence into an interrogative one, other SFPs' functions are much more nuanced. What is particularly noteworthy in Cantonese is its rich inventory of SFPs. There are at least four important ways that Cantonese SFPs differ from those in Mandarin (Modern Standard Chinese, Putonghua), as given in (1).

(2) Four differences between Cantonese and Mandarin in SFPs

1. Cantonese has many more SFPs.
   The total number varies from 30 or so (Kwok 1984:8; Matthew & Yip 2011:391) to 62 (Egerod 1984:76), and even to 77 (Ball 1924:122-125).
2. Cantonese SFPs can occur singly, or in clusters of two or even three.
   Mandarin: Only 了 *le* combines with other SFPs (Matthews & Yip 2011:389).
3. Cantonese SFPs are more complex acoustically, in bearing lexical tone.
   Mandarin: Neutral tone on SFPs.
4. Cantonese SFPs' affective usage can be enhanced by increasing—or dramatically increasing—their duration, up to, or exceeding, one second!

In the spoken language, Cantonese SFPs, with their individual tones, also interact with intonation, resulting in even greater complexity when they are elongated. In the spoken language, the acoustic properties of SFPs become especially complex with the interaction of tone, vowel quality and duration, plus the overlay of intonation.

[2] *Sentence-final particles* have also been called *utterance particles*, but the latter term is seldom used in linguistic publications; exceptions include Luke (1990). In the case of transcriptions of spoken corpora, the term, *utterance particles*, is actually more precise, since conversational speech consists of utterances, and they may not necessarily form complete, grammatical sentences that are readily closed by a period, a question mark, or an exclamation mark.

The written language, by contrast, only has access to the orthographic forms that appear on the page, together with punctuation marks to determine if the sentence is intended to be a simple statement, a question, or an exclamation. A rich set of SFPs in written dialogues in a story gives the reader greater access to the writer's intention in bringing out the thoughts and emotions of the speakers in the story. The reader then needs to rely less on narrative description. For languages without SFPs, emphasis could still be displayed on a page, using such means as *italicization* and **boldface** highlighting. In addition, there are also the uses of ALL CAPs, asterisk (*) or tilde (~) flanking the targeted word or words, etc., which one encounters in social media online, but are not conventionally part of formal publications.

This paper studies the affective usage of SFPs by four of the main characters in a translation of Antoine de Saint-Exupéry's (1943) beloved classic, *Le Petit Prince*. It is translated into Cantonese in 2021 by Wai-chuen Thomas Tsoi (蔡偉泉) as *The Little Prince in Cantonese with Jyutping* (小王子香港粵拼版).[3] The inclusion of Jyutping romanization in this 2021 edition updates an earlier 2017 edition without romanization. The Jyutping romanization provides a very welcome addition, giving easy access to valuable segmental and tone information on the SFPs for readers, both language learners and those interested in conducting corpus-based linguistic analyses.

The remainder of this paper proceeds as follows. Section 1 discusses corpus-linguistic research and the three modalities through which language is conveyed: spoken language, sign language, and written language. Section 2 provides a synopsis of the story and its reception over the years. Section 3 introduces *The Little Prince in Cantonese with Jyutping* and the SFPs in that corpus for the current study. Section 4 focuses on the use of the SFPs in Little Prince's dialogues with three other main characters: Flower, Snake, and Fox. Section 5 provides excerpts of some dialogues,

[3] Many thanks to Zoe Lam for her gift in 2017 of the hot-off-the-press, first edition of Thomas Tsoi's Cantonese translation of *Le Petit Prince*; to Andy Chin for the Cantonese e-text of that 2017 edition from his *Cantonese* app, which was used by my collaborators and me (Cockrum et al. 2022); and to Thomas Tsoi for generously providing the e-texts (character and romanization e-texts) of the second edition (2021) of his Cantonese translation of the novella.

one from each of the four chapters. The paper closes with Section 6 offering some concluding remarks.

2. Corpus-linguistic Research and the Three Modalities

The spoken language has, until more recently, been the only modality deemed worthy of linguistic research. The focus on the spoken language is due, at least in part to the fact that all human communities and societies use some form of spoken language for communication, but not all of them also use a written language.

Sign language, another modality for linguistic research, has only been added since the 1960s. The journal, *Sign Language & Linguistics*, for example, only began publication in 1998. Sign language can be further divided into two subtypes: sign language that is visually-based for the deaf, and sign language that is tactile-based for the deafblind. The latter group can neither hear the spoken word nor see someone signing visually and, hence, must depend on touch, not unlike the famous case of Anne Sullivan (1866-1936) teaching her deafblind student, Helen Keller (1880-1968), to communicate via finger-spelling.[4]

The written language Is the third modality, serving as the new frontier for linguistic research in its own right, and not merely the recording of spoken language.[5] This is the case whether one is interested in social media and internet language these past few decades, or in textual studies of literary works in the field of literary linguistics, or in writing systems themselves in the study of grapholinguistics, broadly defined as “the interdisciplinary field focused on the study of all aspects of writing” (Meletis and Dürscheid 2022:2). One can also be reminded that in the context of historical linguistics, earlier recorded materials are accessible only in written form, before the advent of sound recordings.

For corpus-linguistic research across languages, of the three modalities, spoken language make use of corpora that include such rich multilinguistic data as

[4] Note that there are different Chinese varieties of sign languages for sighted as well as tactile-based sign language for those who are deafblind

[5] For the blind, the written language is accessed through phonetic-based Chinese Braille systems.

the Pear Stories (Chafe 1980), which use Wallace Chafe's mid-1970s Pear film,[6] Mercer Mayer's 1969 word-less story, *Frog, Where are You?,* and so forth.

Sign language had a much later start, with initial corpora based on such sources as James Woodward's (1993) special vocabulary list of 100 words for sign languages derived from the 200-word Swadesh list.[7] Signed corpora can, of course, also make use of the Pear film and other resources to collect data to build a corpus.

Written language can make use of those same sources to produce written stories (e.g., Christensen 1994). Alternatively, published materials can be digitized, if not already in digital format, and then used directly, such as translations of *Le Petit Prince*. These can be studied individually, cross-linguistically, or even through comparisons across different trans-lations within the same language if multiple editions by different translators are available.

2. *Le Petit Prince* (1943)

Le Petit Prince was written and illustrated by author, aviator, and WWII reconnaissance pilot, Antoine de Saint-Exupéry (1900-1944). First published in 1943 during the author's stay in New York, and then posthumously in Paris in 1946 after the war. The story centers around a young boy from a remote planet whom the narrator refers to as a little prince. Voted the best book of the twentieth century in France,[8] it is also the best-selling children's book with some 200 million copies sold.[9] In addition, it is the most translated book—with translations into over 600 different languages and dialects,[10] and is behind only religious works (*CTV News* in 2017, cited in Wikipedia).[11]

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[6] Pear Film World Corpus: https://www.linguistics.ucsb.edu/research/pear-film

[7] Chan and Xu (2009) used James H-Y. Tai's Taiwan Sign Language corpus from that list.

[8] *Le Petit Prince*: https://frenchaffair.com.au/petit-prince/

[9] The best-selling children's books of all times: https://www.aaastateofplay.com/the-best-selling-childrens-books-of-all-time/. See also Lohnes and Bauer (2024, November 13), *The Little Prince:* Fable by Saint-Exupéry. *Britannica*. https://www.britannica.com/topic/The-Little-Prince

[10] The total is 606 languages and dialects as of 11 November 2024, based on statistics at the Petit Prince Collection: https://petit-prince-collection.com/lang/collection.php?lang=en

[11] *The Little Prince* (Wikipedia): https://en.wikipedia.org/wiki/The_Little_Prince

Ostensibly a "children's book," it can be read on deeper, more philosophical levels by children and adults alike.

A brief Introduction to the plot itself is given here, for those who are not familiar with this work. We begin with an introductory paragraph from Lohnes and Bauer (2024),[12] summarizing the first nine chapters:

> "The narrator introduces himself as a man who learned when he was a child that adults lack imagination and understanding. He is now a pilot who has crash-landed in a desert. He encounters a small boy who asks him for a drawing of a sheep, and the narrator obliges. The narrator, who calls the child the little prince, learns that the boy comes from a very small planet, which the narrator believes to be asteroid B-612. Over the course of the next few days, the little prince tells the narrator about his life. On his asteroid-planet, which is no bigger than a house, the prince spends his time pulling up baobab seedlings, lest they grow big enough to engulf the tiny planet. One day an anthropo-morphic rose grows on the planet, and the prince loves her with all his heart. However, her vanity and demands become too much for the prince, and he leaves."

In the next 17 chapters before the final one, the little prince visits six planets, meeting an adult at each. For example, he meets a king without subjects, a drunkard who drinks to forget the shame of drinking, a lamplighter whose planet is so small that one day lasts only one minute, so that he needed to repeatedly, over and over again, light, extinguish, and relight his streetlamp. The little prince then arrives on planet Earth and meets the narrator. He also meets a poisonous snake that tells him of his ability to return the little prince to his asteroid-planet if he wishes. He then meets a fox who imparts his crucial wisdom and secret to him (translated here by Katherine Woods, 1943): "It is only with the heart that one can see rightly; what is essential is invisible to the eye." Our young protagonist yearns for his rose and allows the snake to bite him, to enable him to return home. Did the little prince return to his planet and re-unite with his rose?

In the final chapter that takes place six years later, the narrator expresses optimism that the little prince did return to his planet. However, he is uncertain if the

[12] See footnote 8.

boy's sheep might have eaten the rose, either because he might have forgotten to put the glass globe over the rose to protect her, or his sheep got out one night. The narrator then ends with an entreaty for anyone to let him know, were the little prince to return.

3. SFPs in the Corpus: *The Little Prince in Cantonese with Jyutping*

This study uses as its corpus for a small study of Cantonese SFPs Wai-chuen Thomas Tsoi's 2021 Cantonese translation of *Le Petit Prince*, entitled, *The Little Prince in Cantonese with Jyutping*. Besides commercial copies of this book, the translator has also generously made his work freely accessible online.[13]

Using Laurence Antony's (2024) concordancing software program, *AntConc*, a prepared, UTF-8 encoded, character-segmented e-text of Tsoi's 2021 translation of this 27-chapter novella yields 1,430 types (i.e., number of different characters or logographs), totalling 23,086 tokens (i.e., the total number of characters or logographs) in the corpus.

Table 1. SFPs and tokens in the Cantonese corpus

	SFP	Jyutping	Tokens		SFP	Jyutping	Tokens
1.	吖	aa1	20	14.	嘅	ge3	28
2.	呀	aa3	99	15.	咩	me1	12
3.	嗰	gaa1	1	16.	呢	ne1	31
4.	嘎	gaa2	1	17.	啫	ze1	3
5.	㗎	gaa3	76	18.	嘬	bo3	2
6.	嘎	gaa4	3	19.	呵[14]	ho2	3
7.	啩	gwaa3	2	20.	囉	lo1	13

[13] Chinese text only: https://www.cantonese.com.hk/lepetitprince/text/. Chinese text with Jyutping placed above it: https://www.cantonese.com.hk/lepetitprince/text-jyutping/. Copying and pasting the online text into *MS Word* preserves the vertical structure, while copying the online text into *Notepad*, for example, copies only the Chinese text.

[14] One of the cases of 呵 *ho2* seems to have been mistakenly printed as 可 in Chapter 15.

8.	啦	laa1	46	21.	咯	lo3	1
9.	喇	laa3	65	22.	喎	wo3	28
10.	嗱	laa4	4	23.	嗮	tim1	6
11.	嘛	maa3	5	24.	嘞	laak3	3
12.	吒	zaa1	1	25.	唧	zek1	1
13.	咋	zaa3	10				

In Table 1 above we look specifically and only at the SFPs in the corpus. Using as the starting point the set of 44 SFPs that are placed in the same website as the Cantonese text of *Le Petit Prince,*[15] the Cantonese corpus contains a total of 25 of those SFPs, or over half (57%) of that list. These are presented in the table with their orthographic forms, Jyutping romanization, and the number of tokens for each SFP in the corpus.[16] The 25 SFPs are spread out across the 27 chapters.

4. SFPs Used by the Little Prince, Flower, Snake and Fox

Our focus in this study is on just four chapters, those chapters that contain the dialogues of the Little Prince with three of the other main characters in the story, namely, Flower, Snake, and Fox. A brief description of these four characters is given in Table 2.

[15] The set of 44 Cantonese SFPs, together with audio files, explanations of their pragmatic function, and examples, are online at: https://www.cantonese.com.hk/cantonese/sfp/. Note that the list does not mention contracted forms, where an SFP may be a fusion of two SFPs, such as *ge3* + *aa3* to form *gaa3* (e.g., Kwok 1984, Matthews and Yip 2011, etc.). The list simply treats these contracted, monosyllabic forms as regular SFPs with their accompanying orthographic representation.

[16] The pitch values for the 6 phonemic tones in Jyutping romanization are as follows, using Chao-style tone numbers, ranging from '5' for the highest pitch, to '1' for the lowest pitch, such that '55' is a high-level tone, '35' is a mid-rising tone, and so forth:

Tone 1 /55/ Tone 3 /33/ Tone 5 /23/
Tone 2 /35/ Tone 4 /21/ Tone 6 /22/

Checked syllables, ending in a stop coda (historically those in Rusheng (入聲)), are phonemically analyzed as part of the set of six tones, but assigned a single number for their tone value, with the alternative numbering for the checked syllables being treated as Tones 7 through 9, here placed within parentheses: Tone 1 (= Tone 7) /5/, Tone 3 (= Tone 8) /3/, and Tone 6 (=Tone 9) /2/.

Table 2. Four main characters

	Character	Description
1.	Prince	He is the little boy at the heart of this story whom the narrator, a pilot with a broken-down plane, meets in the Sahara Desert. This little boy is very unlike grown-ups with their self-importance. [Chapters: 8, 9, 17 & 21]
2.	Flower (a rose)	The only character that is explicitly identified as female, she is an anthropomorphic rose whom the Little Prince loves. She lives in the Little Prince's home planet and he takes care of her. She loves him deeply, but comes across as vain and demanding. [Chapters: 8 & 9]]
3.	Snake	He meets the Little Prince on Earth's Sahara Desert, letting the boy know that he has the ability to send a person back to their home planet. [Chapters 17]
4.	Fox	He teaches the Little Prince how to "tame" (befriend) him and to value relationships and the responsibility that comes with them. [Chapter: 21]

The dialogues that the Little Prince had with Flower, Snake and Fox take place in just four chapters: Chapters 8, 9, 17, and 21. While Snake also appears in Chapter 26, there is no dialogue him and the Little Prince. These four characters all have their own personality and thus they all speak and behave differently. One would, therefore, expect them to make different usages of SFPs. Table 3 lists a total of 13 different SFPs used by the four characters in these chapters, or half of the 25 different SFPs that appear in this translation. These SFPs are listed together with the number of tokens for each of them.

Table 3 shows that the 13 SFPs do not occur with the same frequency. As in the case of Table 1 for the entire Cantonese corpus, 呀 *aa3* occurs the most frequently in these four dialogues, and 喺 *gaa3* the next in frequency. In addition to SFPs occurring singly, two of the SFPs in the table—吖 *aa1* and 喺 *gaa3*—occur in sequence with another SFP. 吖 *aa1* is uttered by Flower in the SFP cluster, 吖嘛 *aa1 maa3*, and 喺 *gaa3* is uttered in 喺喎 *gaa3 wo3*, once by Flower and once by the Little Prince, who also produced two other 喺 *gaa3* clusters: 喺啦 *gaa3 laa1* and 喺囉 *gaa3 lo1*.

Table 3. SFPs in the 4 dialogues (Chapters 8, 9, 17 and 21)

	SFP	Jyutping	Tokens		SFP	Jyutping	Tokens
1.	吖	aa1	4	8.	嘅	ge3	5
2.	呀	aa3	21	9.	咩	me1	1
3.	㗎	gaa3	18	10.	呢	ne1	8
4.	嘎	gaa4	1	11.	嘈	bo3	1
5.	啦	laa1	10	12.	嚧	lo1	1
6.	喇	laa3	11	13.	喎	wo3	5
7.	嘛	maa3	1				

SFPs also differ with respect to who uses them, as shown in Table 4, with ordering of the list based on the proportion of their utterances containing an SFP.[17] Among the four characters, Flower, for example, uses them in most of her utterances. Flower's conversations with the Little Prince took place in only two chapters, namely, Chapters 8 and 9. In those two chapters, she produced a total of 30 utterances and used 11 different SFPs, some of which she repeated. The result is a total of 24 occurrences of SFPs out of a total of 30 utterances. In other words, 80% of her utterances contains an SFP. From Table 4, one can also see that Flower produced the greatest variety of SFPs, totalling 11 in all. Furthermore, as noted above, Flower also produced 2 SFP clusters, 吖 嘛 *aa1 maa3*, and 㗎喎 *gaa3 wo3*. Flower's SFP production, both in frequency and in variety of SFPs, conforms with expectations that SFP usage is gender-linked (Chan 1996; 1998a,b; 2000; 2002, Chan and Lin 2019). Table 4 also shows that Flower used 3 SFPs that are not shared with the other three characters, namely, 嘈 *bo3*, 嚧 *lo1*, and 咩 *me1*. However, these three SFPs are not gender-linked or gender-exclusive, since other characters in this translation also used them in their speech.

[17] Utterances are counted essentially based on sentence-final punctuation marks: period, question mark, and exclamation mark, plus the occasional cases of "……" Hence, excluded are pause particles and interjections that may share the same logograph as an SFP, but are followed by a comma, as in the case of 呀 *aa3*, which can serve at times as an interjection or a pause particle.

Table 4. Distribution of SFP usage across the four characters

	Char.	No. of Utterances	Types	Tokens (%)
1.	Flower	**30** (Ch. 8 & 9)	**11** – 吖 *aa1*, 呀 *aa3*, 㗎 *gaa3*, 嘅 *ge3*, 啦 *laa1*, 喇 *laa3*, 呢 *ne1*, 喎 *wo3*, 嚤 *bo3*, 囉 *lo1,* 咩 *me1*	**24** (80.0%)
2.	Prince	**59** (Ch. 8, 9, 17, 21)	**10** – 吖 *aa1*, 呀 *aa3*, 㗎 *gaa3*, 嘅 *ge3*, 啦 *laa1*, 喇 *laa3*, 呢 *ne1*, 喎 *wo3*, 嘎 *gaa4,* 嘛 *maa3*	**33** (55.9%)
3.	Snake	**15** (Ch. 17)	**2** – 呀 *aa3*, 㗎 *gaa3*	**3** (20.0%)
4.	Fox	**86** (Ch. 21)	**7** – 吖 *aa1,* 呀 *aa3*, 㗎 *gaa3*, 嘅 *ge3*, 啦 *laa1*, 喇 *laa3*, 呢 *ne1*	**15** (17.4%)

Turning next to the Little Prince, he produced the most SFPs, a total of 33 across the four chapters where he conversed with one of the other three characters. However, observe that they are distributed across 59 utterances; thus, just over half of his utterances contains an SFP, in contrast to Flower with an SFP at the end of almost all her utterances. Next to Flower, Prince produced the second-most different SFPs, with a total of 10 different SFPs, 8 of which are shared with Flower. Similar to Flower, the Little Prince also produced SFP clusters, a total of 3 altogether, all involving 㗎 *gaa3*: 㗎啦 *gaa3 laa1,* 㗎囉 *gaa3 lo1*, and 㗎喎 *gaa3 wo3*. Since neither Snake or Fox produced any SFP clusters, the question of whether SFP clusters tend to be produced more by females and children needs to be explored in the future. It is also important to note that the Little Prince used SFPs in proportionately more utterances with Flower than with either Snake or Fox. In fact, he used SFPs in almost all his utterances with Flower in Chapter 8, and in all 4 of them with her in Chapter 9. In contrast, he used SFPs in only half of his utterances with Fox and even fewer with Snake. This skewed distribution in the Little Prince's speech suggests that the nature of the topic in a conversation, the relationship between the participants, and who they are with respect to age, gender, social rank and so forth, can affect the interlocutors' choice and frequency of SFP usage.

The third character in Table 4 is Snake in Chapter 17. He spoke very little, producing only 15 utterances. In addition, Snake used only two different SPFs, the two most frequent ones in the novella. He uttered 呀 *aa3* once and 㗎 *gaa3* twice.

The last character in the table is Fox. He spoke a great deal in Chapter 21, with much wisdom to impart. The serious nature of what Fox had to say resulted in his 86 utterances containing only 15 SFPs that made use of 7 different SFPs.

In the following section, short dialogues that the Little Prince had with each of the three characters will be presented to illustrate their usage of SFPs.

5. The SFPs in Some Sample Dialogues

Excerpts of sample dialogues are provided in this section, one for each of the four chapters where the Little Prince talked to one of the three characters. Hence, for the conversations between the Little Prince and his Flower, there are two excerpts, (1) for Chapter 8 and (2) for Chapter 9.

In (1), the setting is one morning just at sunrise. Flower showed herself for the first time, having just awakened and apologized for not being fully presentable. Her apology notwithstanding, the Little Prince could not help expressing his admiration for her beauty. Flower responded sweetly.[18] Hearing her reply, he could readily see that she was not in the least bit modest; but, oh, he was clearly entranced!

(1) The Little Prince's Initial encounter with Flower (Chapter 8)

Prince: a. 你 好 靚 呀!
Nei5 hou2 leng3 aa3!
'You're so beautiful!'

Flower: b. 唔 通 唔 靚 咩?
m4 tung1 m4 leng3 me1?
'Is it possible not to be beautiful?'

c. 我 同 太 陽 係 同 一 時 間 出 世 㗎 喎。

[18] While the original French text introduced Flower as flirtatious or coquettish ("*Elle était très coquette!*") in Chapter 8, the adverb, *doucement*, was used to describe how she responded to the Little Prince's praise, which has been translated into English as 'sweetly' by Woods (1943) and others (e.g., Wilkinson 2011, Howard 2018, etc.).

ngo5 tung4 taai3 joeng4 hai6 tung4 jat1 si4 gaan3 ceot1 sai3 gaa3 wo3.
'I was born at the same time as the sun.'

In this exchange, one to two SFPs were used in each utterance. The Little Prince strengthened his admiration for Flower's beauty in adding 呀 *aa3*, while Flower used three SFPs in praise of herself (咩 *me1* and 㗎喎 *gaa3 wo3*). She is clearly quite vain. As the narrator states, 冇錯! 佢就係咁貪靚! *Mou5 co3! Keoi5 zau6 hai6 gam3 taam1 leng3!* 'That's right! She so likes to look pretty!' Flower is, in fact, described as flirtatious or coquettish in the original novella (see footnote 18). The inclusion of 唔通 *m4 tung1* 'could it be that' in the Cantonese translation, and juxtaposing that phrase with 咩 *me1*, not only underline the rhetorical nature of her question, but also adds a coquettish tone to her words (akin to *sajiao* 撒嬌 'to act cutesy'). And lastly, Flower's SFP cluster, 㗎喎 *gaa3 wo3*, puts the finishing touch to her boastful assertion. Put together, the image that Flower projects is someone who knows how to *sajiao* and prides herself for her natural beauty. The full impact of Flower's personality would have been lost were those words and SFPs omitted from her speech. That exchange would have sounded stiff and mechanical if it needed to depend solely on intonation, without the embellishment of the added words and SFPs.

The exchange In (2) Is an excerpt from the dialogue In Chapter 9, set on the Little Prince's last morning before leaving his planet. Having watered Flower for one last time and nearly in tears despite having been the one who made that decision, the Little Prince bid Flower a wistful farewell. Not receiving a response, he repeated his farewell.

(2) The Little Prince's farewell and Flower's response (Chapter 9)

Prince: a. 再 見 喇。
Zoi3 gin3 laa3.
'Good-bye.' *(No response from Flower.)*

b. 再 見 喇。
Zoi3 gin3 laa3.
'Good-bye.' *(Flower then coughs and responds.)*

Flower: c. 我 一 直 都 真 係 好 蠢。
ngo5 jat1 zik6 dou1 zan1 hai6 hou2 ceon2
'I have been so foolish.'

d. 我 希 望 你 可 以 原 諒 我。
Ngo5 hei1 mong6 nei5 ho2 ji5 jyun4 loeng6 ngo5.
'I hope you can forgive me.'

e. 嘗 試 生 活 得 開 心 啲。
soeng4 si3 sang1 wut6 dak1 hoi1 sam1 di1.
'Try to live happier.'

f. 其 實, 我 好 愛 你。
Kei4 sat6, ngo5 hou2 oi3 nei5.
'In actual fact, I love you very much.'

g. 你 一 直 都 唔 明 白 我, 係 我 嘅 錯。
Nei5 jat1 zik6 dou1 m4 ming4 baak6 ngo5, hai6 ngo5 ge3 co3.
'All along, you did not understand me; it's my fault.'

h. 不 過 而家 都 唔 再 重 要 喇。
bat1 gwo3 ji4 gaa1 dou1 m4 zoi3 zung6 jiu3 laa3.
'But that is not important anymore.'

i. 而 你 偏 偏 亦 一 直 同 我 一 樣 咁 蠢。
Ji4 nei5 pin1 pin1 jik6 jat1 zik6 tung4 ngo5 jat1 joeng6 gam3 ceon2.
'And all along you have been just as foolish as me.'

j. 嘗 試 生 活 得 開 心 啲 啦 ……
soeng4 si3 sang1 wut6 dak1 hoi1 sam1 di1 laa1 ...
'Try to be happier in your life.'

k. 個 玻 璃 罩 拎 走 啦, 我 唔 再 需 要 佢 喇。
go3 bo1 lei1 zaau3 ling1 zau2 laa1, ngo5 m4 zoi3 seoi1 jiu3 keoi5 laa3.
'Take the glass dome away, I don't need it anymore.'

The Little Prince added the SFP 喇 *laa3* in his two repetitions of his near-tearful farewell to Flower, while making some attempt to hide his emotions. Flower first coughed, even though she did not really have a cold. Then she forthrightly confessed her feelings for him, which he had not understood, in part because she had not made herself clear. Her regret added poignancy to the scene. In her response, her initial utterances (c-g) were very solemn and very forthrightly delivered, without a single SFP, and without a hint of the *sajiao*, flirty behavior that we saw in Chapter 8.

Despite being heartbroken that her Little Prince was leaving, Flower tried to put on a brave front in the following lines (1-h), attempting to repeat her earlier performance. She shifted her speech style, producing a total of 4 SFPs, with 2 occurrences of 喇 *laa3* and 2 occurrences of 啦 *laa1*. She expressed regret for what

had transpired in their relationship and gently offered the advice for him to try to be happier in his life, and perhaps giving herself that same advice. She also tried in her own way to comfort him in showing her independence, urging him to take away the glass dome, indicating that she did not need it any longer. The intent was to convey to him that he was free and would no longer need to be there to take care of her. The Little Prince, a bit wiser later, confided to the narrator that he should have guessed her affection for him through her actions; however, at that time he was too young and did not understand and did not know how to love her.

In (3), the excerpt is the beginning portion of the dialogue between the Little Prince and Snake in Chapter 17. The first two SFPs in (3) were produced by the Little Prince, and are the only ones shown in this excerpt. A third SFP is omitted in his truncated turn in (3-i). This excerpt contains the three occasions when Snake uttered an SFP.

(3) The Little Prince's meeting with Snake (Chapter 17)

Prince: a. 喂，你好!
wai3, nei5 hou2!
'Hey, hello!'[19]

Snake: b. 你好!
nei5 hou2!
'Hello!'

Prince: c. 我着陸咗喺邊個行星呀?
ngo5 zoek6 luk6 zo2 hai2 bin1 go3 haang4 sing1 aa3?
'Which planet have I landed on?'

Snake: d. 喺地球，喺非洲。
hai2 dei6 kau4, hai2 fei1 zau1.
'On the Earth, in Africa.'

Prince: e. 噢! 嘅地球上面冇人住嘎?
ou3! Gam2 dei6 kau4 soeng6 min6 mou5 jan4 zyu6 gaa4?
'Oh! Then there are no people living on the Earth?'

Snake: f. 呢度係一個沙漠，
ni1 dou6 hai6 jat1 go3 saa1 mok6,
'This here is a desert,'

[19] The original French has *Bonne nuit* ('Good evening') for both the Little Prince's greeting and Snake's response.

g. 沙 漠 上 面 冇 人 㗎。
saa1 mok6 soeng6 min6 mou5 jan4 gaa3.
'Deserts don't have people there.'

h. 地 球 好 大 㗎。
dei6 kau4 hou2 daai6 gaa3.
'The Earth is very large.'

Prince: i. 我 有 陣 時 會 諗, < snip >
ngo5 jau5 zan6 si4 wui5 nam2,
'I would sometimes think, < snip > '

Snake: j. 你 個 星 球 好 靚。
nei5 go3 sing1 kau4 hou2 leng3.
'Your planet is beautiful.'

k. 噉 你 點 解 會 嚟 呢 度 呀?
gam2 nei5 dim2 gaai2 wui5 lai4 ni1 dou6 aa3?
'So how is it that you have come here?'

Prince: l. 我 同 一 朵 花 有 啲 詬 撬。
ngo5 tung4 jat1 do2 faa1 jau5 di1 aau3 giu6.
'I had some disagreement with a flower.'

Snake: m. 哦 ……
o5 ……
'Ah …'

The first SFP in this excerpt is 呀 *aa3* produced by the Little Prince in (3-c), which served to soften his WH-question, thus making it politer. In (3-e), the Little Prince expressed his surprise that the Earth had no people on it, punctuating his incredulity with his question ending with an emphatic SFP 嘎 *gaa4*. Snake used SFP 㗎 *gaa3* twice (3-g, 3-h), both times to make a strong and firm assertion, first to explain that the desert had no people living there, and then to emphasize the enormity of the Earth's size. The Little Prince's turn in (3-i), which has been truncated, contains a lengthy, contemplative question ending with the SFP 呢 *ne1*, highlighting his reflection in pondering whether the stars were glowing in order to assist those seeking to find their way back to their own planets. That is followed by another fairly long utterance (with no SFP) in which he had just spotted his own planet overhead, but exclaimed that it was actually very far away. That prompted the follow up statement and question from Snake, where he uttered his third SFP. In (c-k), Snake was curious as to why the Little Prince left his beautiful planet and asked his question politely, and

not assertively. He did so by adding SFP 呀 *aa3*, which serves as a softener to avoid posing his question too abruptly and unintentionally sounding overbearing.

The fourth and final dialogue to be presented here Is one between the Little Prince and Fox in (4). At the end of Chapter 21, after having spent time together, the Little Prince bid Fox a friendly good-bye, and Fox reciprocated, following that up with a few words of wisdom. The Little Prince took to heart Fox's words, repeating them to reinforce them in his mind. In this chapter, the Little Prince finally understood what made his rose so special and important to him, unlike all the other roses in the rose garden that he had encountered on this trip. His relationship with Flower was one to be cherished. His love for her was built on the time that he had spent with her, listening to her, watering her, putting her under the glass dome to protect her, sheltering her behind the screen, and so forth.

(4) The Little Prince bids farewell and Fox Imparts his wisdom (Chapter 21)

Prince: a. 再 見 喇。
Zoi3 gin3 laa3.
'Good-bye.'

Fox: b. 再 見 喇。
Zoi3 gin3 laa3.
'Good-bye.'

c. 我 話 你 知 我 個 秘 密 啦。
ngo5 waa6 nei5 zi1 ngo5 go3 bei3 mat6 laa1.
'Let me tell you my secret.'

d. 其 實 好 簡 單:
kei4 sat6 hou2 gaan2 daan1:
'It's actually very simple.'

e. 只 有 用 心 先 至 可 以 睇 得 清 楚
zi2 jau5 jung6 sam1 sin1 zi3 ho2 ji5 tai2 dak1 cing1 co2.
'Only with the heart can one see clearly.'

f. 最 重 要 嘅 嘢 都 係 無 形 於 雙 眼。
zeoi3 zung6 jiu3 ge3 je5 dou1 hai6 mou4 jing4 jyu1 soeng1 ngaan5.
'The most essential things are invisible to the eyes.'

Prince: g. 最 重 要 嘅 嘢 都 係 無 形 於 雙 眼。
zeoi3 zung6 jiu3 ge3 je5 dou1 hai6 mou4 jing4 jyu1 soeng1 ngaan5.
'The most essential things are invisible to the eyes.'

Fox: h. 令 你 朵 玫 瑰 花 變 得 咁 重 要 嘅,
ling6 nei5 do2 mui4 gwai3 faa1 bin3 dak1 gam3 zung6 jiu3 ge3,
'What made your rose become ever so essential (to you),'

i. 係 你 花 喺 你 朵 玫 瑰 花 度 嘅 時 間。
hai6 nei5 faa1 hai2 nei5 do2 mui4 gwai3 faa1 dou6 ge3 si4 gaan3.
'It was the time that you had spent with your rose.'

Prince: j. 係 我 花 喺 我 朵 玫 瑰 花 度 嘅 時 間……
hai6 ngo5 faa1 hai2 ngo5 do2 mui4 gwai3 faa1 dou6 ge3 si4 gaan3 ...
'It was the time that I had spent with my rose …'

Fox: k. 好 多 人 都 已 經 唔 記 得 咗 呢 個 事 實,
hou2 do1 jan4 dou1 ji5 ging1 m4 gei3 dak1 zo2 ni1 go3 si6 sat6,
'Many people have already forgotten this truth.'

l. 但 係 你 絕 對 唔 可 以 唔 記 得。
daan6 hai6 nei5 zyut6 deoi3 m4 ho2 ji5 m4 gei3 dak1.
'But you must never forget.'

m. 你 永 遠 要 對 你 馴 服 咗 嘅 嘢 負 責。
nei5 wing5 jyun5 jiu3 deoi3 nei5 seon4 fuk6 zo2 ge3 je5 fu6 zaak3.
'You are forever responsible for what you have tamed.'

n. 你 要 對 你 嘅 玫 瑰 花 負 責。
nei5 jiu3 deoi3 nei5 ge3 mui4 gwai3 faa1 fu6 zaak3.
'You need to be responsible for your rose.'

Prince: o. 我 要 對 我 嘅 玫 瑰 花 負 責……
ngo5 jiu3 deoi3 ngo5 ge3 mui4 gwai3 faa1 fu6 zaak3 ...
'I need to be responsible for my rose ...'

The Little Prince and Fox bid each other a warm farewell with the adding of the SFP 喇 *laa3*. One might try to translate their good-bye as "Good-bye now," to denote the friendliness of their farewell to each other. Fox extended the warmth of their friendship in offering his secret in the next line in (4-c), ending it with SFP 啦 *laa1*. And in (4-h), unlike the subordinative 嘅 *ge3,* which precedes noun phrases,[20] 嘅 *ge3* in Fox's (4-h) utterance behaves as an SFP in strengthening the assertion of what it was that made Flower so essential to the Little Prince, namely, the time that he had spent with her in nourishing that relationship. With the exception of (4-h), the overall seriousness and importance of the lesson that Fox wanted to convey to the Little

[20] The subordinative particle 嘅 *ge3* appears before 時間 *si4 gaan3* 'time' in (4-i), before 嘢 *je5* 'things' in (4-m), and before 玫瑰花 *mui4 gwai3 faa1* 'rose' in (4-n).

Prince resulted in his deliverance of his words without SFPs. Appreciating the wise lesson from Fox, the Little Prince repeated his friend's words to help him commit them to memory.

In this section, four dialogue excerpts were presented that cover 8 different SFPs in the four chapters: 呀 *aa3*, 㗎 *gaa3*, 嘎 *gaa4*, 嘅 *ge3*, 啦 *laa1*, 喇 *laa3*, 咩 *me1*, and 喎 *wo3*. While not exhaustive, these SFPs serve to illustrate at least 8 of the 13 different SFPs and their usage in these four chapters.

6. Concluding Remarks

In this paper, we chose Wai-chuen Thomas Tsoi's 2021 Cantonese translation of Antoine de Saint-Exupéry's (1943) novella, *Le Petit Prince,* to study SFP usage by the Little Prince in his conversations with three other characters, Flower, Snake, and Fox. Literary and more colloquial writings, be they original materials or translations, offer another window into language usage besides naturally-occurring conversations and those in movies, spoken dramas, television programs, talk shows, experiment-based spoken data, discourse-completion tasks, and so forth. At the same time, the observation of the skewed distribution of SFPs in the dialogues of the Little Prince and Flower (and even within one turn in Flower's style shift in Chapter 9), versus those between him and Snake, and between him and Fox provides ample opportunities for further exploration. That could be to study further the role of settings (formal versus informal), topics in conversations. And who are the interlocutors, as in child-child dyads, child-adult dyads, or adult-adult dyads, including contrasts that can be found between spouses versus close friends versus strangers (e.g., Chan 1996). Register differences with respect to formality, politeness, and so forth come into play. All these may affect choice and frequency of SFP usage.

SFPs in Chinese, and especially in Cantonese with its tones and a large inventory to draw from, are crucial in the spoken language. Absence of affective SFPs in spoken, conversational Cantonese sounds extremely unnatural, and are thus crucial in reading a story aloud. French, English, and many other languages, on the other hand, do not have SFPs and must rely rather heavily on the skill of the reader to children. How closely should one hew to the original in translating a story with

dialogues? How much can one make use of the richness of SFPs in Chinese, especially in Cantonese, to enliven the language and make the speech sound natural?

One study that complements this paper is Chan (2025). It makes some comparisons between the Cantonese and Mandarin Chinese translations of the novella, and provides some acoustic analyses of online audio recordings using ToBI-based annotations in *Praat* to display waveforms and fundamental frequency (f0). Even the same translation can yield different productions by different speakers of the same SFPs and utterances. These are preliminary attempts by the current author to address some of the questions raised here. Much research remains for future investigation even just within Chinese alone, to study a single variety of Chinese or across Chinese varieties, be it focusing only on translations as written corpora, or extending to audio recordings to serve as spoken corpora for corpus linguistic research.

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D-Linkability of Mandarin *Wh*-Nominals: A Morphosyntactic Account*

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This paper centres around two major issues: (i) examining the correlations between D-linkability of Mandarin *wh*-nominals and their clausal distributions, and (ii) investigating the relationship between the D-linkability of these *wh*-nominals and their morphosyntactic structures. Our analysis distinguishes three types of *wh*-nominals: inherently D-linked *which*-complexes, ambiguously D-linked *what*-complexes, and the stubbornly non-D-linked *what*-simplex. We demonstrate that, 'D-linking' is a precondition of *wh*-fronting rather than the result. Therefore, we argue, in the vein of a split-DP hypothesis, that *wh*-nominals in Mandarin Chinese spell out different functional heads within the DP structure, and that the D-linkability of these *wh*-nominals depends on whether the *wh*-item is realised at the D head.

2. Introduction

It has been well known since Pesetsky (1987) that a characteristic that differentiates *which*-phrases from others is *D(iscourse)-linking*. As Pesetsky argues, *which*-phrases are aggressively D-linked, picking an entity or a subset of entities from a set of alternatives known to each interlocutor by the time the speech occurs. By contrast, canonical *wh*-phrases like *what* or *who* are non-D-linked, which can be asked out of the blue.

The concept of D-linking has some precursors as well as descendants in the literature. For instance, Katz and Postal (1964) claim that *what* or *who* questions an indefinitely marked domain, while *which* questions a definitely marked one. Kuroda (1969) argues that, by raising a *which*-question, the speaker expects an answer with a definite nominal expression, whereas no such expectation is readily available for *what*-questions. Erteschik-Shir (2007) proposes that the

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corresponding element in an answer to the D-linked *wh*-phrases is construed as a restrictive focus. It is fair to say that the majority of literature focuses on the interpretational differences among these *wh*-phrases, and attention has not been paid enough to the interaction between the morphosyntactic structures of these phrases and D-linking (with the exception of, e.g., Hirose 2003 and Boeckx and Grohmann 2004, among many others).

In this paper we pursue an account for the correlation between D-linkability of *wh*-nominals and their distributions in a *wh*-in-situ language, namely, Mandarin Chinese. We claim that *wh*-phrases bearing a D-linking reading are not restricted to *which*-phrases in Mandarin Chinese. Instead, we make a distinction among three types of Mandarin *wh*-nominals in terms of D-linkability (in the sense of Pesetsky 1987, 2000 and Dayal 2017), as illustrated in (1).

(1) *Three types of Mandarin wh-nominals w.r.t. D-linkability*
a. *Which*-complexes: Inherently D-linked, e.g., *na-(yi)-ben shu* 'which book'
b. *What*-complexes: Ambiguously D-linked, e.g., *shenme shu* 'what book(s)'
c. *What*-simplex: Stubbornly non-D-linked, e.g., *shenme* 'what'

By relating *wh*-nominals' D-linking status (i.e., whether they are D-linked or not) with their distributions (i.e., whether they stay in situ or move to the clausal periphery), we argue that *wh*-words in Mandarin Chinese spell out different functional heads within the DP structure, and that the D-linking status of *wh*-nominals derives from the D head's interaction with other functional heads, namely, whether D participates in a head movement chain. We propose that, to license overt *wh*-fronting, *wh*-nominals must be D-linked in their base position. That is, D-linking is the precondition of *wh*-fronting rather than the result.[21]

The paper Is organised as follows. Section 2 shows the distinct *wh*-nominals' Dlinkabilities and their correlations with *wh*-fronting. Section 3 compares *which*-complexes with their *what*-counterparts. Section 4 outlines our proposal and account for the varying D-linking status of *wh*-nominals. Section 5 further discusses D-linkability as a precondition of *wh*-fronting. Section 6 concludes the paper with two questions left for future research.

2. D-linkability and *wh*-fronting

2.1 In-situ *wh*-nominals

The default way of forming an information-seeking question in Mandarin Chinese is spelling out the *wh*-nominals in the base-generated, argument position.[22] The three types of *wh*-nominals are able to form *wh*-in-situ questions, as shown in (2).

(2) a. Ni xihuan **na-(yi)-ben shu**?
2SG like which-one-CLF book
'Which book do you like (among the presupposed alternatives)?'

b. Ni xihuan **shenme shu**?
2SG like what book

[21] A similar idea has been taken by Pan (2007, 2011) for *wh*-topicalisation in Mandarin Chinese.
[22] There are lots of ways of licensing in-situ *wh*-nominals proposed in the literature. See Pan (2019) for a concrete literature review. As to more detailed discussions, see Huang (1982), Cheng (1991), Aoun and Li (1993), and Tsai (1994), among many others.

'What (kind of) books do you like (among the presupposed alternatives)?'

c. Ni xihuan **shenme**?
2SG like what
'What do you like?'

The felicity of these questions varies under different contexts. In-situ *which*-complexes like (2a) are systematically D-linked, thereby cannot be licensed by the out-of-the-blue context (3c). The in-situ *what*-simplex like (2c), by contrast, is always non-D-linked, leading to the infelicity of its occurrence under (3a) and (3b). Interestingly, in-situ *what*-complexes like (2b) are ambiguous between a D-linked reading and a non-D-linked one, as evidenced by the felicitous results observed across all three contexts given in (3).

(3) a. *Context 1: D-linking*
Zhangsan and Lisi, two book lovers, went to a bookstore together. Zhangsan asked Lisi . . .
→ (2a): felicitous ✓; (2b): felicitous ✓; (2c): infelicitous ✗

b. *Context 2: D-linking*
Zhangsan: 'I bought three books for my friend today: *A Tale of Two Cities*, *Pride and Prejudice*, and *The Old Man and the Sea*.' Lisi asked Zhangsan ...
→ (2a): felicitous ✓; (2b): felicitous ✓; (2c): infelicitous ✗

c. *Context 3: Out-of-the-blue*
Zhangsan and Lisi, two strangers, met each other for the first time in their shared kitchen. Zhangsan asked Lisi ...
→ (2a): infelicitous ✗; (2b): felicitous ✓; (2c): infelicitous ✓

In view of the above observations, we generalise as follows.

(4) Mandarin *wh*-nominals can appear in situ, regardless of their D-linking status.

2.2 Ex-situ *wh*-nominals

Another way of forming content questions in Mandarin Chinese is fronting the *wh*-nominals to the clausal left periphery (5), though there exists some restriction with respect to their interpretations (see also Pan 2007, 2011).

(5) a. [**Na-(yi)-ben shu**]$_i$ ni xihuan t_i?
which-one-CLF book 2SG like
'Which book do you like (among the presupposed alternatives)?'
→ felicitous ✓ in (3a) and (3b); infelicitous ✗ in (3c)

b. [**Shenme shu**]$_i$ ni xihuan t_i?
what book 2SG like
'What (kind of) books do you like (among the presupposed alternatives)?'
→ felicitous ✓ in (3a) and (3b); infelicitous ✗ in (3c)

c. ***Shenme**$_i$ ni xihuan t_i?[23]
what 2SG like
'What do you like?'
→ infelicitous ✗ in (3a), (3b) and (3c)

(5a) indicates that the D-linking status of *which*-complexes remains unchanged even when fronted to the clause-initial position, as demonstrated by the identical licensing contexts observed when these *which*-complexes are in situ. *What*-complexes become unambiguously D-linked when they occur clause-initially, as evidenced by (5b). However, fronting *what*-simplex overtly to the clausal left periphery is barely acceptable (5c). Unsurprisingly, they are infelicitous in all the given contexts. Based on what are observed in (5), the second generalization we derive is given in (6).

(6) Ex-situ *wh*-nominals in Mandarin Chinese are fixed with a D-linked reading.

2.3 *Wh*-fronting as A'-movement

What is the syntactic nature of the reordering of *wh*-phrases? The diagnostics showing A'-properties, including, but not limited to, parasitic gaps (7), ATB movement (8), and reconstruction effects (9), all point to a conviction that overt *wh*-fronting in Mandarin Chinese is A'-movement. We are agnostic about the feature in the left periphery that triggers *wh*-fronting in this study. We refer readers who are interested in this question to the more relevant discussions in Ren (2023, 2024) and citations therein.

(7) *Parasitic gaps*
a. [Na-(yi)-ben shu]$_i$ Zhangsan mai-le t_i zhihou meiyou kan-guo t_i?
which-one-CLF book Zhangsan buy-PFV after NEG read-EXP
'Which book (among many) hasn't Zhangsan read after buying it?'

b. [Shenme shu]$_i$ Zhangsan mai-le t_i zhihou meiyou kan-guo t_i?
what book Zhangsan buy-PFV after NEG read-EXP
'What book(s) (among many) hasn't Zhangsan read after buying it?'

(8) *A(cross)-T(he)-B(oard) movement*
a. [Na-(yi)-ben huati]$_i$ Zhangsan taolun-guo t_i Lisi mei taolun-guo t_i?
which-one-CLF topic Zhangsan discuss-EXP Lisi NEG discuss-EXP
'Which topic (among many) has Zhangsan discussed but Lisi not discussed?'

b. [Shenme huati]$_i$ Zhangsan taolun-guo t_i Lisi mei taolun-guo t_i?
what topic Zhangsan discuss-EXP Lisi NEG discuss-EXP

[23] *Shenme* 'what' in this sentence is only licensed to have the exclamative interpretation (e.g., 'It is not right that ...'), rather than an interrogative reading (Yang, 2021).

'What topic(s) (among many) has Zhangsan discussed but Lisi not discussed?'

(9) *Partial/total reconstruction*

a. [Ziji$_{j/k}$ de na-ben shu]$_i$ Zhangsan$_j$ xiang-zhidao [t_i Lisi$_k$ du-le t_i]?
self POSS which-CLF book Zhangsan want-know Lisi read-PFV
'Which of his$_{j/k}$ books does Zhangsan$_j$ wonder that Lisi$_k$ read?'

a. [Ziji$_{j/k}$ de shenme shu]$_i$ Zhangsan$_j$ xiang-zhidao [t_i Lisi$_k$ du-le t_i]?
self POSS what book Zhangsan want-know Lisi read-PFV
'What his$_{j/k}$ books does Zhangsan$_j$ wonder that Lisi$_k$ read?'

2.4 Interim summary

The observations above are summarized in (10).[24] *Which*-complexes are constantly D-linked, and felicitous only under the D-linking contexts. *What*-complexes are quite flexible with respect to their D-linking status when staying in situ. However, they become exclusively D-linked once getting fronted. The *what*-simplex always behaves non-D-linkably, thereby prohibited to occur clause-initially.

(10)

	D-link.+in situ	*O.o.t.B+in situ*	*D-link.+ex situ*	*O.o.t.B+ex situ*
which-com.	✓	✗	✓	✗
what-com.	✓	✓	✓	✗
what-sim.	✗	✓	*✗	*✗

We hypothesize that *wh*-nominals in Mandarin Chinese are distributed along a *D-linkability spectrum*. At one extreme are *which*-complexes, and at the other is the *what*-simplex, with *what*-complexes positioned in between.

3. Comparing *na* with *shenme*

In this section we make three comparisons between *na* in *which*-complexes, and *shenme* in *what*-complexes and the simplex. Coming up, it will be shown that although both *na* 'which' and *shenme* 'what' are treated as *wh*-items, their morphosyntactic properties are essentially different. This further suggests that these *wh*-items in Mandarin Chinese receive separate analyses concerning their D-linkabilities, which we will turn to in Section 4.

3.1 Dependence on other D-related functional elements

The first distinction between *na* 'which' and *shenme* 'what' lies in their dependence on other functional elements within the nominal structure as well as the corresponding interpretations. As shown in (11), *na* 'which' cannot stand alone as an independent constituent. It must co-exist with a classifier but optionally with a numeral (when the number is 'one') or an NP. Since there is a rich inventory of classifiers in Mandarin Chinese, some of them are considered informative enough to denote an entity independently. When the NP is phonetically null, it is almost always the case that the set of referents denoted by the *which*-(one)-CLF combo is visually perceived by the interlocutors. Note that the individual-denoting classifier used in the *which*-complexes, as

[24] For the sake of space, 'out-of-the-blue' is abbreviated to 'O.o.t.B', 'complexes' to 'com.', and 'simplex' to 'sim.'.

given in (11), predetermines that the answer to the question must denote an individual. Consequently, a kind-denoting nominal like *xiaoshuo* 'novel' is ruled out as a valid answer.

(11) Q: Ni xihuan kan na-(yi)-ben shu?
2SG like read which-one-CLF book
'Which book do you like to read?'
A: Wo xihuan kan *Zhanzheng-Yu-Heping* / *xiaoshuo.
1SG like read war-and-peace novel
Individual-denoting reading: 'I like to read *War and Peace* (among a set of alternatives).'
**Kind-denoting reading*: 'I like to read novels (in comparison with other genres of books).'

As illustrated in (12), *shenme* 'what' can directly select an NP and form a constituent without appealing to other functional elements, unlike *na* 'which' discussed above. Such a constituent results in an interpretation equivalent to either *what type/kind of NP* or *which NP*, corresponding to a kind-denoting or individual-denoting reading, respectively. This is because *shenme* 'what' forms a linkage to the previous discourse by either setting a criterion of classification (known to the interlocutors) of the set of NPs which it quantifies over (Kiss, 1993), or picking out a member among a set of pre-established alternative individuals.

(12) Q: Ni xihuan kan shenme shu?
2SG like read what book
'What books/kind of books do you like to read?'
A: Wo xihuan kan *Zhanzheng-Yu-Heping* / xiaoshuo.
1SG like read war-and-peace novel
Individual-denoting reading: 'I like to read *War and Peace* (among a set of alternatives).'
Kind-denoting reading: 'I like to read novels (in comparison with other genres of books).'

Conversely, the *what*-simplex is free-standing, as demonstrated in (13). Interpretation-wise, since it does not bear a linkage to the discourse, the bare *what* in the question can be resolved, by default, by an NP with a generic reading.

(13) Q: Ni xihuan kan shenme?
2SG like read what
'What do you like to read?'
A: Wo xihuan kan shu / manhua / baozhi.
1SG like read book manga newspaper
Generic reading: 'I like to read books/manga/newspaper.'

3.2 Parallel to demonstratives

The second distinction is illustrated by comparing the *wh*-items to canonical demonstratives. The Num-Cl sequence can be sandwiched by the *wh*-item and the nominal in

which-complexes (14b) but not in *what*-complexes (14c). This suggests that *which*-complexes function similarly to demonstratives, as demonstrated in (14a).

(14) a. zhe/na (yi)/ji ben shu

this/that one/several CLF book

'this/that/these/those books' Dem Num Cl N

b. na (yi)/ji ben shu

which one/several CLF book

'which book(s)' *Which* Num Cl N

c. *shenme (yi)/ji ben shu

what one/several CLF book

Int.: 'what book(s)' **What* Num Cl N

Additionally, both demonstratives and *which* can be combined with the plurality marker *xie*, as shown in (15a) and (15b). This property, however, does not apply to the *what*-complex (15c). This is probably because the kind-denoting nature of *what*-complexes is conceptually plural by default (Dayal, 2004). Adding the plurality marker to *what*, in this sense, seems redundant and unnecessary, thereby leading to a clash.

(15) a. zhe/na-xie shu

this/that-PL book

'these/those books' Dem-PL N

b. na-xie shu

which-PL book

'which books' *Which*-PL N

c. *shenme-xie shu

what-PL book

Int.: 'what books' **What*-PL N

3.3 Local ordering restrictions

The third aspect for comparison regards the positions of the *wh*-words along the nominal extended projection. Within the DP structure, the hierarchical position of *na* 'which' is always higher than other adnominal elements such as the numeral, the classifier, and the adjective, as exemplified in (16). It turns out that *na* 'which' consistently acts as an 'edger' of nominal phrases in Mandarin Chinese, similar to its role in many other languages discussed by Cinque (2005) and Giusti (2018).

(16) a. na yi jian bai chenshan
which one CLF white shirt
'which piece of white shirt' *Which* Num Cl A N

b. *yi jian na bai chenshan
one CLF which white shirt
Int.: 'which piece of white shirt' *Num Cl *Which* A N

c. *yi jian bai-de na chenshan
one CLF white-DE which shirt
Int.: 'which piece of white shirt' *Num Cl A *Which* N

As we previously mentioned, the *Shenme*-Num-Cl-N sequence is never allowed, whereas Num-Cl-*Shenme*-N is perfectly fine, as demonstrated in (17). Moreover, it is worth noting that, when both *shenme* 'what' and the adjective are hierarchically lower than the numeral and the classifier, the order between them seems to be flexible, as illustrated in (17b) and (17c).

(17) a. *shenme yi jian bai chenshan
what one CLF white shirt
Int.: 'what piece of white shirt' **What* Num Cl A N

b. yi jian shenme bai chenshan
one CLF what white shirt
'what piece of white shirt' Num Cl *What* A N

c. yi jian bai-de shenme chenshan
one CLF white-DE what shirt
'what piece of white shirt' Num Cl A *What* N

The relative orders between these two *wh*-items and the Num-Cl sequence is pretty telling: *shenme* 'what' is merged hierarchically lower than *na* 'which', as shown in (18). The two must be positioned on opposite sides of the Num-Cl sequence: *na* 'which' must precede the sequence, while *shenme* 'what' must follow it.

(18) a. na yi ben shenme shu
which one CLF what book
'which book of what kind' *Which* Num Cl *What* N

b. *shenme yi ben na shu
what one CLF which book
Int.: 'which book of what kind' **What* Num Cl *Which* N

4. A morphosyntactic account for D-linkability

4.1 Theoretical assumptions

In what follows, we propose a morphosyntactic account for *wh*-nominals with respect to their distinct D-linkabilities. To this end, we rely on two key theoretical underpinnings. The first is the assumption that the DP structure, where the *wh*-phrases are 35arlato35, is split by the presence of an *n*P layer (Guardiano, 2012; Roberts, 2017). According to Roberts (2017), a similar bi-phasal structure exists in the nominal domain, analogous to what has been proposed for the clausal domain (Chomsky, 2000, 2001). This parallel is shown in (19).

(19) a. *Clause structure* (Chomsky, 2000, 2001)
[CP **C** [TP **T** [*v*P ***v*** [VP **V**]]]]

b. *Nominal structure* (Roberts, 2017)
[DP **D** [QP **Q** [*n*P ***n*** [NP **N**]]]]

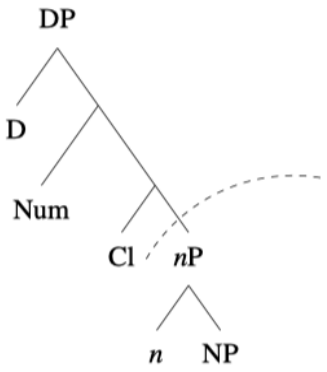
A further point made by Roberts is that C and D are external phase heads interacting with the higher categories or discourse contexts. On the other hand, *v* and *n* are 'inward-looking' internal phase heads that assign functional properties to the lexical roots. A similar split-DP structure is proposed by Guardiano (2012), without resting on the parallel to the clause structure as well as phasehood.

The second assumption Is that the bi-phasal nominal structure also contains a tree-splitting function that affects the interpretation of nominals. It was observed that English bare plural subjects of stage-level predicates are ambiguous between a generic and an existential reading. Those of individual-level predicates, by contrast, only receive a generic interpretation. This being the case, Diesing (1992) argued that the asymmetry between these predicates regarding subject interpretation boils down to different mappings between the syntactic structures and the logical representations. Splitting the IP into two distinct zones at LF, Diesing mapped VP into the 'nuclear scope', and the remaining IP-level elements into the 'restrictive scope'. She further partitioned the generic reading from the existential reading by positing that the semantics of the latter consists of a restrictive set defined by a restrictive clause and a nuclear scope. The semantics of the former, however, requires only a nuclear scope. Thus, anything remaining in the VP has an existential reading, while those involved in the IP-level subtree can have a generic one. The distinction

between the two types of predicates can then be explained by manipulating the syntactic positions of the subjects at LF. Subjects of the stage-level predicates can take the position of either Spec,IP or Spec,VP, and those of the individual-level predicates only occupy Spec,VP.[25] This analysis forms the basic mechanism of what Diesing referred to as the *Mapping Hypothesis*.[26]

In this study, we leverage the second hypothesis in the nominal domain from two perspectives. First, we postulate that the DP structure can be divided into an *n*P and a DP-level subtree, with *n*P resisting D-linking. Second, the ambiguous D-linking status of *what*-complexes arises from their flexibility in either remaining in *n*P or moving to DP. The split-DP structure we argue for is illustrated in (20). Following Cheng and Sybesma (1999), we posit that Num and Cl are individual functional heads along the nominal extended projection, being sandwiched between D and *n*. For ease of exposition, all the specifiers are omitted, but structurally they are still in the tree.

(20)



4.2 Analysis

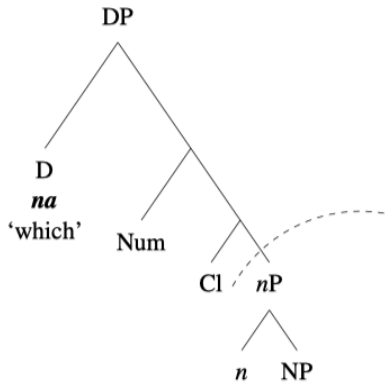
We propose that the D-linkability of *wh*-nominals depends on whether spelling out the *wh*-items at the D head. Starting with *which*-complexes, recall that *na* 'which' has to precede all the other functional elements in the DP structure. Thus, the D head seems to be the only place to spell out *na* 'which', as shown in (21). Such a configuration offers an account for *na*'s parallel to demonstratives and its consistent D-linking status simultaneously.

As to *what*-complexes, we argue that both n and D are able to spell out *shenme* 'what'. Spelling out *shenme* 'what' at *n* is supported by the fact that it can be positioned between the Num-Cl sequence and an NP. When *n* realises *shenme* as in (22), the *what*-complex is non-D-linked, since the Num-Cl-*Shenme*-N sequence is prohibited from being fronted to the left periphery, as exemplified in (23).

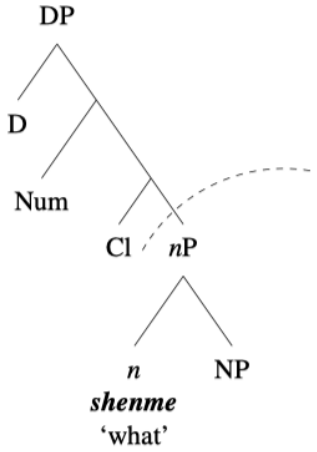
[25] The terminologies used by Diesing (1992) are easily translatable into more modern ones like Spec,TP, Spec,*v*P, or Spec,VoiceP. Here we ignore any nuanced differences between them.

[26] The interpretational distinctions between strong and weak determiners can also be accounted for in the same vein. See also Berman 1991.

(21)



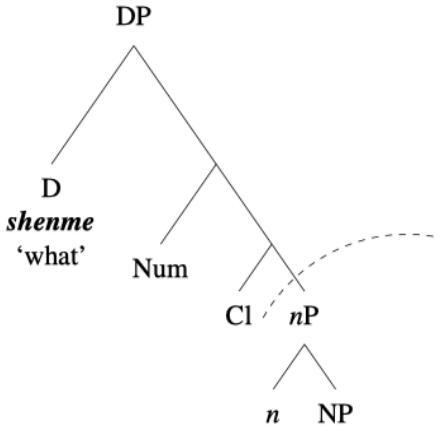
(22)



(23) *[Yi-ben shenme shu]$_i$ Zhangsan xiang mai t_i?
one-CLF what book Zhangsan want buy
Int: 'One token of what book does Zhangsan want to buy?'

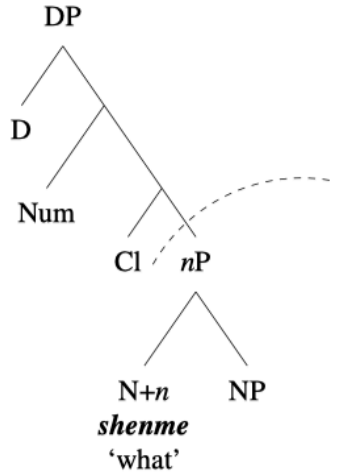
Alternatively, when the *what*-complex is unambiguously D-linked, we posit that *shenme* 'what' undergoes head movement from *n* to D and gets spelled out at D as with *na* 'which', as demonstrated in (24). This also captures the fact that the *Shenme*-Num-Cl-N order is ruled out, as the separate spell-out of the Num-Cl sequence would violate the *Head Movement Constraint* (Travis, 1984).

(24)



Turning to the *what*-simplex, we argue that N head-moves and adjoins to *n*, where they together spell out the bare *shenme* 'what', as given in (25). Since the *what*-simplex is exponed by N-*n*, it cannot undergo further head movement to D. That is, the head movement in the lower *n*P-level subtree is unable to reach other functional heads in the higher DP-level subtree. Thus, the *what*-simplex is stubbornly non-D-linked. Empirically we think that our proposal is reasonable, since it helps rule out the ungrammatical *Shenme*-A sequence, e.g., **shenme bai* '*what white'. Theoretically we admit that we cannot give a more satisfactory account at the moment for the reason why N-*n* stops moving higher to the DP-level subtree. We leave this for further research.

(25)



5. D-linkability as a precondition of *wh*-fronting

Let us simply comment on the relationship between D-linkability of *wh*-nominals and *wh*-fronting. As mentioned in Section 2.2, only D-linked *wh*-nominals are able to be fronted to the left periphery. The fact suggests that there must exist some relation between these two phenomena. That is, either *wh-fronting feeds D-linking*, or *D-linking feeds wh-fronting*.

The former relation '*wh*-fronting ≺ D-linking' has several puzzling issues. Why is *what*-simplex never able to be fronted in the first place? How do we explain the fact that *which* and *what*-complexes can be D-linked while staying in situ? What is the point of triggering *wh*-fronting to the left periphery if the target is already D-linked?

The approach we pursue in this work strongly favours the latter relation 'D-linking ≺ *wh*-fronting'. We provide an adequate account for the varying D-linking status of the in-situ *wh*-nominals. D-linkability, in our sense, is best regarded as the licensing condition of fronting *wh*-nominals. This idea successfully predicts the distributions of *wh*-nominals with respect to their D-linkabilities.

6. Closing remarks

In this paper we have looked through D-linkabilities of three types of *wh*-nominals in Mandarin Chinese, with a particular focus on their relations with overt *wh*-fronting as well as their morphosyntactic structures. We have demonstrated that *wh*-nominals behave differently with respect to D-linkability, that is, complex *wh*-phrases are able to receive a D-linking interpretation, contrasting with the *what*-simplex which canonically resists a linkage to the discourse. This further speaks to our observation that the D-linkability of *wh*-nominals correlates with their frontability: only *which*- and *what*-complexes can undergo fronting, whereas the *what*-simplex cannot. We argue that being D-linked requires the D head in the nominal structure 39arlato39 the *wh*-items. Therefore, the D-linking status of *wh*-nominals whose D-linking property is dynamic (i.e., the *what*-complexes) can be fixed through morphosyntactic maneuvers within their internal DP structures (i.e., undergoing head movement from *n* to D).

We leave two relevant remarks for future research. One of them concerns the D-linking status of *wh*-phrases other than *which* and *what* in Mandarin, e.g., *shei* 'who'. As far as we can tell, *shei*, which looks like a *wh*-simplex on the surface, can undergo *wh*-fronting as well. Our account predicts that the internal structure of *shei* 'who' is in effect more similar to the *what*-complexes. The other remark is related to the licensing conditions of *wh*-fronting. So far, we have only known that being D-linked is one condition for Mandarin *wh*-nominals to undergo overt movement to the left periphery. It is worth studying what other conditions could be, in particular, at the syntax-semantics interfaces.

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Mandarin focus particle *shi* revisited*

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This paper establishes the exhaustivity marking function of *shi* 'be' in six focus constructions, drawing on data from three exhaustivity tests. To explain the optionality observed in the use of two focus marking strategies within *shi* constructions—namely, through PF-adjacency to *shi* or by assigning prosodic prominence—this study adopts a minimalist framework anchored in three central claims: (i) the exhaustivity marked by *shi* constitutes a conventional implicature, which is syntactically realized as the Focus Associated Implicature Projection (FaiP) (Bianchi, Bocci & Cruschina 2015); (ii) *shi*, serving as the exponent of the Fai head, takes as its complement a FocP, which is defined by a [focus] feature and an optional EPP feature, thereby licensing the alternative 'Move-Agree' relations between Foc and its associated foci; and (iii) the negator *bu* attaches directly to *shi*, aligning the scope of negation solely to the focus activated by the exhaustive implicature trigger.

2. Introduction

Mandarin has productive focus constructions featuring *shi*. In previous studies (Paul and Whitman 2008; Cheng 2008; Pan and Liu 2023), it has been observed that by manipulating the positions of *shi* and the prosodic prominence of

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elements, sentences can shift their locus of focus. Such variations are captured by postulating different types of *shi*-containing focus constructions. This paper adopts the general spirit of the classifications described by Pan and Liu (2023) and categorize these constructions into two major types: (a) bare *shi* constructions, and (b) *shi*…*de* constructions. The former category includes two subtypes: (a-i) the bare initial *shi* pattern, where *shi* appears at the beginning of the sentence, and (a-ii) the bare pseudo-clause-medial *shi* pattern, where *shi* can be placed immediately before any constituent generated no lower than VP. The second category is divided into four subtypes: (b-i) *shi* occurring at the start of the clause and *de* at the end of the sentence, (b-ii) *shi* occurring in a pseudo-clause-medial position and *de* marking the end of the sentence, (b-iii) *shi* appearing at the beginning of the clause and *de* immediately preceding the object, and (b-iv) *shi* appearing in a pseudo-clause-medial position and *de* immediately preceding the object. (1) provides some selected examples of these constructions.

(1) (a-i) Shi [ZHANGSAN[27]]$_F$ zuotian zhao-dao le wo-de yaoshi.
SHI Zhangsan yesterday find-arrive PFV[28] my key
'It was Zhangsan who found my keys yesterday.'
(a-ii) Zhangsan shi [zuotian]$_F$ zhao-dao le wo-de yaoshi.
Zhangsan SHI yesterday find-arrive PFV my key
'It was yesterday that Zhangsan found my keys.'
(b-i) Shi [ZHANGSAN]$_F$ zuotian zhao-dao wo-de yaoshi de.
SHI Zhangsan yesterday find-arrive my key DE
'It was Zhangsan who found my keys yesterday.'
(b-ii) Zhangsan shi [zuotian]$_F$ zhao-dao wo-de yaoshi de.
Zhangsan SHI yesterday find-arrive my key DE
'It was yesterday that Zhangsan found my keys.'
(b-iii) Shi [ZHANGSAN]$_F$ zuotian zhao-dao de wo-de yaoshi.
SHI Zhangsan yesterday find-arrive DE my key
'It was Zhangsan who found my keys yesterday.'
(b-iv) Zhangsan shi [zuotian]$_F$ zhao-dao de wo-de yaoshi.
Zhangsan SHI yesterday find-arrive DE my key
'It was yesterday that Zhangsan found my keys.'

[27] Intonational prominence is represented by capital letters.
[28] Non-Leipzig abbreviations adopted in this paper: SHI *shi*; DE *de*; NOM nominalizer.

(1a-i), (1b-i), and (1b-iii), where *shi* appears clause-initially, are characterized by a focused subject that bears the prosodic prominence. In contrast, in constructions like (1a-ii), (1b-ii) and (1b-iv), where *shi* is pseudo clause-medial, the elements immediately following *shi* is focus-marked by default, without the need of additional PF-marking. However, in clause-initial *shi* patterns, prosody cannot mark VP-internal elements, such as the direct or indirect objects, as focus, as shown in (2a). Furthermore, in pseudo-clause-medial *shi* patterns[29], *shi* cannot appear anywhere lower than the main verb, as illustrated in (2b).

(2) a. #Shi Zhangsan zuotian zhao-dao le [WO-DE YAOSHI]$_F$.

SHI Zhangsan yesterday find-arrive PFV my key

Int.: 'It was my keys that Zhangsan found yesterday.'

b. *Zhangsan zuotian zhao-dao le shi [wo-de yaoshi]$_F$.

Zhangsan yesterday find-arrive PFV SHI my key

Int.: 'It was my keys that Zhangsan found yesterday.'

To narrowly focus on the object, clause-initial *shi* patterns employ overt fronting of the relevant element to the immediate right of *shi*, as demonstrated in (3a); while (2b) can be rescued by retracting *shi* to anywhere higher than the VP and prosodically marking the object left within the VP, as in (3b).

[29] The pseudocleft-like "*...de shi...*" pattern, as in (i), is excluded here, as *shi* occurring in that pattern is a real copula which connects the former part of the sentence nominalized by *de*—*hangsan xihuan de* 'what Zhangsan likes' and the nominal predicate *zuqiu* 'football'.

(i) Zhangsan xihuan de shi zuqiu.
Zhangsan like NOM COP football
'What Zhangsan likes is football.'

(3) a. Shi [wo-de yaoshi]$_{F/i}$ Zhangsan zuotian zhao-dao le t_i.
SHI my key Zhangsan yesterday find-arrive PFV
'It was my keys that Zhangsan found yesterday.'

b. Zhangsan zuotian shi [$_{VP}$ zhao-dao le [WO-DE YAOSHI]$_F$].
Zhangsan yesterday SHI find-arrive PFV my key
'It was my keys that Zhangsan found yesterday.'

These findings challenge the Adjacency restriction proposed by Paul and Whitman (2008), which posits that only PF-adjacent constituents appearing to the right of *shi* can be focus-marked and bear the exhaustive focus interpretation. Our observations indicate that in pseudo-clause-medial *shi* patterns, the absence of strict adjacency can typically be compensated for through PF-marking. This alternative focus-assignment strategy still achieves exhaustive identification of the focus. Therefore, seeking out a comprehensive analysis of this Adjacency-non-Adjacency asymmetry in *shi* constructions forms the primary objective of this paper. Pan and Liu (2023) have made a significant contribution in molding our understanding of this issue by advocating a "focus-domain" analysis. According to their framework, when the 'Adjacency' strategy is adopted, the focus domain is restricted to the elements immediately right-adjacent to *shi*. However, when the alternative strategy is utilized, the focus domain extends to include non-adjacent constituents, provided they are PF-marked. Their analysis amounts to saying that if a sentence pattern allows for both strategies, *shi* in that pattern can select focus domains of varying sizes. However, the correlation established between the choices that *shi* makes and the phonological feature of the focus is not self-evident. In this study, alternatively, I pursue an analysis ascribing the alternation between the two focus-marking strategies to the optional EPP feature residing in the feature matrix of Foc selected by *shi*. The optional EEP feature simply captures how Mandarin works when it comes to marking a focus in *shi*-containing constructions. The rest of the paper is organized as follows. Section 2 will re-examine the default and marked foci in each of the six constructions. In Section 3, I will illustrate with evidence drawn from three

exhaustivity tests that *shi*-marked focus consistently encodes exhaustive identification across all the structures studied. Section 4 provides a syntactic analysis of the *shi*-containing focus constructions. Section 5 concludes the paper.

2. The syntactic distribution of *shi*

2.1 Bare *shi* constructions

Bare *shi* constructions involve two subtypes: *shi* appearing in a clause-initial position, and *shi* appearing in a pseudo-clause-medial position. As what has been briefly mentioned in the previous section, each of these patterns make use of two focus-marking strategies: *shi*-focus Adjacency or PF-marking. The clause-initial *shi* can either mark the whole IP that follows it as a broad focus (4a) or mark the prosodically prominent subject as a narrow focus (4b).

(4) a. Shi [Zhangsan zuotian zhao-dao le wo-de yaoshi]$_F$, ***IP-focus***

SHI Zhangsan yesterday find-arrive PFV my key

(bushi Lisi qiantian diu le yi-ba san).

Not Lisi the-day-before-yesterday lose PFV one-CLF umbrella

'It was that Zhangsan found my keys yesterday (not that Lisi lost an umbrella the day before yesterday).'

b. Shi [ZHANGSAN]$_F$ zuotian zhao-dao le wo-de yaoshi, ***Subject-focus***

SHI Zhangsan yesterday find-arrive PFV my key

(bushi LISI).

Not Lisi

'It was Zhangsan who found my keys yesterday (not Lisi).'

For non-adjacent elements in this pattern, there are two main cases: Elements that are higher than VP, such as the adjuncts, can achieve a focal construal

through prosody (5a). In contrast, elements lower within VP can only do so by being fronted to the immediate right of *shi*, as demonstrated in (5b).

(5) a. Shi Zhangsan [ZUOTIAN]$_F$ zhao-dao le wo-de yaoshi. ***Adjunct-focus***

SHI Zhangsan yesterday find-arrive PFV my key

'It was yesterday that Zhangsan found my keys.'

b. Shi [wo-de yaoshi]$_F$ Zhangsan zuotian zhao-dao le. ***Object-focus***

SHI my key Zhangsan yesterday find-arrive PFV

'It was my keys that Zhangsan found yesterday.'

The syntactic nature of this fronting operation is diagnosed as A' type, for reasons that the fronted constituents reconstruct for binding in both short and long-distance dependencies, as illustrated in (6). Reflexives embedded in the fronted *wh*-phrases consistently require reconstruction for proper interpretation. Example (6a) illustrates total reconstruction, where the reflexive is referentially bound by the matrix subject. Example (6b) demonstrates the ambiguity between total and partial reconstruction, allowing the reflexive to be co-referential with either the embedded subject or the matrix subject. Thus, it can be concluded that reconstruction—whether total or partial—is essential for interpreting the fronted constituent.

(6) a. Short-distance fronting

Shi [ta-ziji de yaoshi]$_{F/i}$ Zhangsan zuotian zhao-dao le t_i.

SHI 3SG-self POSS key Zhangsan yesterday find-arrive PFV

'It was his$_j$ own keys that Zhangsan$_j$ found yesterday.'

b. Long-distance fronting

Shi [ta-ziji[30] de yaoshi]$_{F/i}$ Xiaoming shuo [$_{CP}$ t_i [$_{IP}$ Zhangsan

SHI 3SG-self POSS key Xiaoming say Zhangsan

zuotian zhao-dao le t_i]].

Yesterday find-arrive PFV

'It was his$_{i/j}$ own keys that Xiaoming$_i$ says Zhangsan$_j$ found yesterday.'

Additionally, this fronting operation also induces island effects, lending further support to the claim that the dependency between the displaced constituent appearing to the immediate right of *shi* and its lower unpronounced counterpart is formed by A'-movement. Consider the following examples.

(7) a. Complex NP constraint

*Shi [wo-de yaoshi]$_{F/i}$ Zhangsan zuotian zhao-dao le

SHI my key Zhangsan yesterday find-arrive PFV

yi-ge [$_{DP}$ 48arlat zhe t_i de bao].

One-CL contain PROG DE bag

Int.: 'It was my keys that Zhangsan found a bag that contains it.'

b. Subject island

*Shi [wo-de yaoshi]$_{F/i}$ [$_{DP}$ Zhangsan zhao-dao le t_i] shi bu-keneng de.

SHI my key Zhangsan find-arrive PFV COP impossible DE

[30] The reason why we are adopting the complex reflexive – *ta-ziji* 'himself' rather than the bare reflex *ziji* 'self' is simply due to the fact that the former is considered more natural by native speakers than the bare reflexive. The adoption of complex reflexives should not affect the key point we are meant to make here, even though they exhibit different blocking effects compared with the bare reflexive *ziji* 'self' (Pan 1998). Specifically, 1st, 2nd, and 3rd person NPs all block the long-distance binding of *ta-ziji*, whereas only the former two types of NPs can block that of *ziji*.

Int.: 'It was impossible that it was my keys that Zhangsan found.'

c. Adjunct island

*Shi [wo-de yaoshi]$_{F/i}$ [$_{PP}$ Zhangsan zhao-dao t_i hou] hui-jia le.

SHI my key Zhangsan find-arrive after return-home PFV

Int.: 'It was my keys that Zhangsan went back home after finding it.'

Before addressing the other type of bare *shi* pattern, I would like to clarify why I refer to it as the "pseudo-clause-medial *shi* pattern" rather than simply the "clause-medial *shi* pattern." This is because when we see *shi* occurring in a non-initial position, the constituents appearing linearly before *shi* have actually undergone topicalization. This is evidenced by the fact that such elements cannot be substituted by anti-topic items like NPIs, quantificational NPs, and disjunctive NPs (Tomioka 2007) (see (8)).

(8) a. *Meiyou-ren shi [zhao-dao le wode yaoshi]$_F$. ***NPI***

nobody SHI find-arrive PFV my key

Int.: 'It was finding my keys that nobody did.'

b. *Suoyou-ren shi [zhao-dao le wode yaoshi]$_F$. ***Quantificational NP***

everyone SHI find-arrive PFV my key

Int.: 'It was finding my keys that everyone did.'

c. *Zhangsan huo Lisi shi [zhao-dao le wode yaoshi]$_{CF}$. ***Disjunctive NP***

Zhangsan or Lisi SHI find-arrive PFV my key

Int.: 'It was finding my keys that Zhangsan or Lisi did.

The pseudo-clause-medial bare *shi* pattern differs from the initial bare *shi* pattern in that it is incompatible with a broad sentential focus when no particular element is stressed. Crucially, nothing to the left of *shi* can be focused even if it was PF-marked. In this pattern, *shi* seems to be able to "float"[31] in various pseudo-clause-medial positions and mark its right-adjacent element as a narrow focus. However, it can never occur within VP, as is demonstrated in (2b). The following two tables summarize how a contrastive focus (CF) can be marked in the initial bare *shi* pattern and the pseudo-clause-medial bare *shi* pattern respectively.

Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus	Adjuncts	Subject
	VP	Subject-embedded elements
	Object	Adjuncts (non-adjacent to *shi*)
		Verb (*shi*-VP adjacent)
		Object (*shi*-VP adjacent)

Table 1 Summary of how a CF is marked in the initial bare *shi* construction

Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus (N/A)	Adjuncts	Adjuncts (non-adjacent to *shi*)
Adjuncts	VP	Verb (*shi*-VP adjacent)
VP		Object (*shi*-VP adjacent)

Table 2 Summary of how a CF is marked in the pseudo-clause-medial bare *shi* construction

2.2 *Shi* … *de* constructions

The *shi…de* constructions that this paper is concerned with are those containing a clause-initial or a pseudo-clause-medial *shi*, and a sentence-final or a pre-object *de*. The position of *de* used in this construction reflects geographical variations (Paul & Whitman 2008): Northerners are more likely to use a pre-object *de*, whereas Southerners prefer to put *de* in the sentence-final position. Let us now consider each of the four subtypes of this construction in turn.

[31] The syntactic analysis of this pattern, presented in Section 4, will demonstrate that the position of *shi* is actually fixed, with the relevant focused constituent being the one that "floats."

S*hi*…*de* constructions with a clause-initial *shi* and a pre-object *de* pattern with the initial bare *shi* pattern in how a sentential CF or a subject CF is marked: when there is no stress that falls on any constituent of the sentence, the construction has an IP-wide broad focus reading by default; the subject receives a narrow CF reading when it bears the focal stress. In addition, this construction also allows the prosodic prominence to shift focus to adjuncts, even though they are remote to *shi*. Nevertheless, this strategy is not compatible with VP-internal constituents (compare (9a) and (9b)). In that case, such constituents have to undergo fronting to the right of *shi*.

(9) a. Shi Zhangsan [ZUOTIAN]$_{CF}$ zhao-dao de wode yaoshi,

SHI Zhangsan yesterday find-arrive DE my key

(bushi qiantian).

Not the-day-before-yesterday

'It was yesterday that Zhangsan found my keys not the day before yesterday.'

b. #Shi Zhangsan zuotian zhao-dao de [WO-DE YAOSHI]$_{CF}$,

SHI Zhangsan yesterday find-arrive DE my key

(bushi yi-ba san).

Not one-CLF umbrella

Int.: 'It was my keys that Zhangsan found yesterday (not an umbrella).'

Shi…*de* constructions with a clause-initial *shi* and a sentence-final *de* only differ from the aforementioned type in that they do not permit VP fronting. The table below provides a summary of how a CF, whether narrow or broad, is marked in these two subtypes of *shi*…*de* constructions.

(i) *Shi*…*de* construction with a clause-initial *shi* and a sentence-final *de*

Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus	Adjuncts Object	Subject Subject-embedded elements Adjuncts (non-adjacent to *shi*)
(ii) *Shi…de* construction with a clause-initial *shi* and a pre-object *de*		
Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus	Adjuncts VP Object	Subject Subject-embedded elements Adjuncts (non-adjacent to *shi*) Verb (*shi*-VP adjacent) Object (*shi*-VP adjacent)

Table 3 Summary of how a CF is marked in *shi…de* constructions with a clause-initial *shi*

In pseudo-clause-medial *shi…de* constructions, *shi* displays the same 'floating' property observed in the pseudo-clause-medial bare *shi* pattern. Additionally, any constituent positioned to the right but at a distance from *shi* can associate with *shi* through PF-marking (AwF, Paul and Whitman 2008). However, unlike the pseudo-clause-medial bare *shi* construction, their *shi…de* counterparts appear to forgo VP-fronting as a method for marking VP focus, as illustrated by the contrast between (10a) and (10b-c).

(10) a. Pseudo-clause-medial bare *shi* pattern

Zhangsan shi [zhao-dao le wo-de yaoshi]$_{CF/i}$ zuotian t_i,

Zhangsan SHI find-arrive PFV my key yesterday

(bu-shi mai le kaoya).

NEG-SHI buy PFV roasted-duck

'It was finding my keys that Zhangsan did yesterday (not buying a roasted duck).'

b. *Shi…de* construction with a pseudo-clause-medial *shi* and a pre-object *de*

??Zhangsan shi [zhao-dao de wo-de yaoshi]$_{CF}$ zuotian t_i,

Zhangsan SHI find-arrive DE my key yesterday

(bu-shi mai de kaoya).

NEG-SHI buy DE roasted-duck

Int.: 'It was finding my keys that Zhangsan did yesterday (not buying a roasted duck).'

c. *Shi*...*de* construction with a pseudo-clause-medial *shi* and a sentence-final *de*

*Zhangsan shi [zhao-dao le wo-de yaoshi]$_{CF}$ zuotian t_i de,

Zhangsan SHI find-arrive PFV my key yesterday DE

bu-shi mai le kaoya de.

NEG-SHI buy PFV roasted-duck DE

Int.: 'It was finding my keys that Zhangsan did yesterday (not buying a roasted duck).'

Although VP focus-fronting is generally poorly accepted, the sentence in (10b) is notably more acceptable than (10c). My tentative explanation for this is that the pre-object *de* functions as an aspectual marker (Paul and Whitman 2008) and is merged relatively closer to the VP, whereas the sentence-final *de* acts as an assertion operator (Pan & Xu 2022) and heads the AssertionP, which is presumably base-generated in the left periphery between the FocP and the TP (Paul & Whitman 2008, Pan & Xu 2022). The presence of sentence-final *de* intervenes in the focus fronting of the entire VP, which may account for the surface word order discrepancies.

Table 4 summarizes how a contrastive focus is marked in the pseudo-clause-medial *shi*...*de* constructions.

(iii) *Shi…de* construction with a pseudo-clause-medial *shi* and a sentence-final *de*		
Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus (N/A) Adjuncts	Adjuncts	Adjuncts (non-adjacent to *shi*) VP (non-adjacent to *shi*)
(iv) *Shi…de* construction with a pseudo-clause-medial *shi* and a pre-object *de*		
Unmarked	Marked	
Shi-focus Adjacency	Linear reordering	PF marking
IP focus (N/A) Adjuncts VP	Adjuncts	Adjuncts (non-adjacent to *shi*) VP (non-adjacent to *shi*) Verb (*shi*-VP adjacent) Object (*shi*-VP adjacent)

Table 4 Summary of how a CF is marked in the type (iii) and type (iv) *shi…de* constructions

3. *Shi* marks exhaustive focus

This section presents novel data focusing on three exhaustivity tests: the entailment test (Szabolcsi 1981), the negation test (Kiss 1998), and the coordination test (Van der Wal 2016). I argue that *shi*-marked foci systematically encode exhaustivity. The discussion begins with a brief explanation of how these tests work. The entailment test contains a pair of sentences of the same construction. In the first sentence, the focus is composed of two coordinated phrases. However, only one of them is retained in the focus position of the second sentence. If the first sentence logically brings about the second one, in other words, if the two sentences can be concatenated by 'therefore/hence', then the focus in the first sentence does not encode exhaustive identification. In contrast, if the second sentence fails to be a logical result of the former one, an exhaustive focus (EF) is thereby coerced by the sentence structure. The mechanism behind the negation test proposed by Kiss (1998) is that, if a focused constituent does not form an exhaustive subset of the potential alternatives and can be corrected by supplying some additional information, the position that hosts the focus should be an exhaustive focus position. Lastly, the coordination test functions based on the algorithm that if the focus marked by a specific sentence structure is exhaustive, it cannot be coordinated by another focus marked by the same structure.

Our tests are designed based on specific contexts that enable the addressee to have a clear mental representation of a set of contextually available alternatives

that the focus anchors. Due to space constraints, only two representative constructions have been selected for presentation: the initial bare *shi* pattern and the *shi*…*de* construction. First, consider the initial bare *shi* pattern, where the PF-marked subject is narrowly focused in (11).

(11) Context: The company hosted a welcome party yesterday for the new recruits to meet their co-workers. As part of the tradition, newcomers were invited to showcase their artistic talents. *Zhaoyi* played a piano solo, *Wangwu* performed a modern dance, and *Zhangsan* and *Lisi* sang a pop song together.

Q: Zuotian shi shei chang-ge le?

Yesterday SHI who sing-sang PFV

'Who was it that sang yesterday?'

a. Entailment test

A: Shi [ZHANGSAN HE LISI]$_{CF}$ zuotian chang-ge le.

SHI Zhangsan and Lisi yesterday sing-song PFV

#Yinci shi [ZHANGSAN]$_{CF}$ zuotian chang-ge le.

Therefore SHI Zhangsan yesterday sing-song PFV

Int.: 'It was Zhangsan and Lisi who sang yesterday. Therefore, it was Zhangsan who sang yesterday.'

b. Negation test

A: Shi [ZHANGSAN]$_{CF}$ zuotian chang-ge le.

SHI Zhangsan yesterday sing-song PFV

'It was Zhangsan who sang yesterday.'

Correction :

Bu, Lisi zuotian ye chang-ge le.

No Lisi yesterday also sing-song PFV

'No, Lisi also sang yesterday.'

c. Coordination test

A: #Shi [ZHANGSAN]$_{CF}$ ye shi [LISI]$_{CF}$ zuotian chang-ge le.

SHI Zhangsan also SHI Lisi yesterday sing-song PFV

Int.: 'It was Zhangsan and it was also Lisi who sang yesterday.'

The context in (11) provides a set of individuals who showed their talents during the event: {*Zhaoyi*, *Wangwu*, *Zhangsan*, *Lisi*}, and the question is to inquire which of them sang at the party. The entailment test reveals that the second sentence does not logically follow from the first, indicating that the focus following *shi* carries an exhaustive interpretation, as *Zhangsan* and *Lisi* constitute the entire set of people who sang at the party. This pattern also passes the negation test, where an inexhaustive focus in the answer can be negated in a correction, along with additional information. Moreover, the sentence in the coordination test is infelicitous because the two coordinated *shi*-marked elements, each intended to be exhaustive, create the impression that the speaker is contradicting themselves.

Let us now examine if these tests could be applied to the IP focus marked by the clause-initial *shi* when no particular constituent receives a focal stress. Consider an example given in (12).

(12) Context: *Zhaoyi* and *Wangwu* were chatting in the shared kitchen about yesterday's dramas happened to their friends: *Zhangsan* was ranked first in an exam among his peers in the class; *Songyi* lost her phone in the canteen; and *Lisi* found a dream job.

Q: Zuotian fasheng le shenme hao-shi?

Yesterday happen PFV what good-matter

'What good things happened yesterday?'

a. Entailment test
Shi [$_{IP}$ Zhangsan kao le diyi] he [$_{IP}$ Lisi zhao-dao le gongzuo],

SHI Zhangsan exam PFV first and Lisi find-arrive PFV job

#Yinci, shi Zhangsan kao le diyi.

Therefore SHI Zhangsan exam PFV first

Int: 'It was that Zhangsan ranked first in the class on the exam and Lisi found a job. Therefore, it was that Zhangsan ranked first in the class.'

b. Negation test
Shi Zhangsan kao le diyi.

SHI Zhangsan exam PFV first

'It was that Zhangsan ranked first in the class on the exam.'

Bu, Lisi ye zhao-dao le gongzuo.

No Lisi also find-arrive PFV job

'No, Lisi also found a job.'

c. Coordination test
#Shi [$_{IP}$ Zhangsan kao le diyi], ye shi [$_{IP}$ Lisi zhao-dao le gongzuo].

SHI Zhangsan exam PFV first also SHI Lisi find-arrive PFV job

Int.: 'It was that Zhangsan ranked first in the class on the exam, and it was also that Lisi found a job.'

Likewise, comparable results can be observed for the IP-wide focus marked by *shi*. In this case, the context provides a set of propositions that meet the criteria of being a "good matter": {Zhangsan ranked first in the class on the exam; Lisi found a job}. The initial bare *shi* pattern requires that the focus it marks be exhaustive, meaning that any answer containing only one of these propositions will be excluded and, therefore, cannot occupy the focus position.

We now turn to the *shi*…*de* construction containing a pseudo-clause-medial *shi* and a sentence-final *de*, as is demonstrated in (13). In this construction, the focused element is PF-marked while staying linearly distant from *shi*.

(13) Context: Following a relaxing summer break, *Zhangsan* journeyed from his hometown, Jiaxing, back to his university in Beijing yesterday. He opted for a train ride for the first leg of the trip, traveling from Jiaxing to Shanghai. For the latter part, he boarded a plane from Shanghai to Beijing.

Q: Zhangsan shi zenme qu Beijing de?

Zhangsan SHI how go Beijing DE

'How was it that Zhangsan went to Beijing?'

a. Entailment test

A: Zhangsan shi zuotian [ZUO HUOCHE HE FEIJI]$_{CF}$ qu de.

Zhangsan be yesterday sit train and airplane go DE

#Yinci Zhangsan shi zuotian zuo huoche qu de

Therefore Zhangsan be yesterday sit train go DE

Int.: 'It was by train and plane that Zhangsan went there yesterday. Therefore, it was by train that Zhangsan went there yesterday.'

b. Negation test

A: Zhangsan shi zuotian [ZUO HUOCHE]$_{CF}$ qu de.

Zhangsan SHI yesterday sit train go DE

'It was by train that Zhangsan went there.'

Correction:

Bu, Zhangsan ye zuo le feiji.

No Zhangsan also sit PFV plane

'No, he also took a plane.'

c. Coordination test

A: #Zhangsan shi zuotian [ZUO HUOCHE]$_{CF}$ qu de,

Zhangsan SHI yesterday sit train go DE

ye shi zuotian [ZUO FEIJI]$_{CF}$ qu de.

Also SHI yesterday sit plane go DE

Int.: 'It was by train that Zhangsan went there yesterday, and it was also by plane

that he went there.'

Evidently, this pattern also passes all three exhaustivity tests, indicating that PF-marked adjuncts, even when non-adjacent to *shi*, function as exhaustive foci. In summary, based on these test results, we conclude that *shi*-marked foci consistently encode exhaustivity, regardless of the focus size or the focus assignment methods. Up until this point, a natural question arises: How do we syntactically implement the exhaustivity marking property of *shi* in face of the alternative focus assignment methods. In the next section, I will provide an analysis based on two theoretical

underpinnings: the Focus Associated Implicature projection that *shi* heads and the alternative 'Move-Agree' relations between Foc and the foci it associates with.

4. Towards a minimalist approach

I propose that the adjacency asymmetry observed between the two focus-marking strategies stems from the alternation between "Agree with movement" and "Agree without movement." According to Chomsky (2000, 2001), Agree occurs when an interpretable feature on the goal matches the uninterpretable feature on the probe, with movement being triggered only if this Agree relation exists and the c-commanding probe has an EPP feature. Therefore, I argue for an optional EPP feature in the Foc head, which manipulates the alternation between movement and non-movement, accounting for the adjacency asymmetry. The data observed so far suggests that this EPP feature is typically present by default in the phonetically null Foc head, leading to the unmarked interpretations of the six focus constructions. Furthermore, movement occurs at this stage for criterial checking of the [focus] feature on Foc, as per Rizzi (2006). When *shi* appears in a post-topic position, the EPP feature can be absent, allowing any prosodically prominent element, even a non-XP element like the verb (as in 14), to carry the [focus] feature through Agree while remaining in situ. This is possible because Agree can apply to heads without necessitating movement. Thus, prosodic marking can be seen as a reflex of the Agree relationship between *shi* and the relevant element.

(14) [Zhangsan]$_{TOP}$ shi zuotian [DIU]$_{EF}$ le wo-de yaoshi,

Zhangsan SHI yesterday lose PFV my key

bu shi [ZHAO-DAO]$_{EF}$ le wo-de yaoshi.

NEG SHI find-arrive PFV my key

'It was LOSING my keys that Zhangsan did yesterday rather than FINDING my keys.'

Further, I propose that the exhaustive interpretation associated with the *shi*-marked focus is a conventional implicature, in line with Potts (2007). This proposal is corroborated by the fact that the exhaustive import cannot be canceled by the speaker per se, as coordinating some additional alternatives to the exhaustive focus (see the coordination tests presented in Section 3) is completely ruled out. This suggests that exhaustive identification has been conventionalized as an inherent part of the meaning of *shi*, thereby it is undeniable. Since the semantics of an exhaustive focus marked by *shi* comprises two components: an identification of a subset of alternatives evoked by the focus structure (a component shared by all focus types), and a denial of all the other alternatives that potentially make the presupposition true (a component exclusive to EF), I propose an articulated focus projection in the left periphery, following Bianchi et al. (2015, 2016). Given that the exhaustive implicature of the focus is only activated in the availability of a set of alternative propositions triggered by a focus structure, I argue that there is a Focus-associated-implicature Projection (FaiP) base generated right above the FocP. *Shi* is merged in Fai, bearing an implicature triggering feature [exhaustive]. In this vein, the former semantic component of a *shi*-marked focus is completed by the time the [focus] feature of Foc is checked off, with Its specifier being optionally filled. The second semantic component is achieved through the selectional requirement imposed by *shi* on the element bearing a focus feature. The following schematization should offer a syntactic account for the asymmetry in terms of the Adjacency requirement.

(15) a. Adjacency-obeying

$[_{ForceP}$ Force ... $[_{FaiP}$ shi$^{0}{}_{[exh]}$ $[_{FocP}$ XP Foc$^{0}{}_{[Foc,\ EPP]}$... $[_{TP}$...<~~XP~~> ...]]]]

Criterial

b. Adjacency-violating

$[_{ForceP}$ Force ... $[_{FaiP}$ shi$^{0}{}_{[exh]}$ $[_{FocP}$ Foc$^{0}{}_{[Foc]}$... $[_{TP}$... <...$[_{XP}$ X^{0} $[_{YP}$...]]> ...]]]]

Agree

Regarding the negator *bu*, I propose that it be directly attached to the Fai head—*shi*. This is because when adding *bu* to the left of *shi*, its scope of negation only affects the focus, regardless of how the focus is assigned. This can be shown in (16).

(16) a. Adjacency-obeying

Zhangsan bu shi [zuotian]$_{EF}$ zai jianshenfang zhao-dao le

Zhangsan NEG SHI yesterday in gym find-arrive PFV

wode yaoshi.

My key

'It was not yesterday that Zhangsan found my keys in the gym.'/*'It was yesterday that Zhangsan did not find my keys in the gym.'

b. Adjacency-violating

Zhangsan bu shi zuotian zai jianshenfang zhao-dao le

Zhangsan NEG SHI yesterday in gym find-arrive PFV

[WODE YAOSHI]$_{EF}$.

My key

'It was not my keys that Zhangsan found in the gym yesterday.'/*'It was my keys that Zhangsan did not find in the gym yesterday.'

One outstanding issue still remains to be explained: Why does the clause-initial *shi* rely on prosody to associate with both its neighboring constituent—the subject, and its non-neighboring constituents such as the adjunct, as shown in (17a-b)?

(17) a. Shi [ZHANGSAN]$_{EF}$ zuotian zai jianshenfang zhao-dao de wode yaoshi.

SHI Zhangsan yesterday in gym find-arrive DE my key
'It was Zhangsan who found my keys in the gym yesterday.'

b. Shi Zhangsan [ZUOTIAN]$_{EF}$ zhao-dao de wode yaoshi.

SHI Zhangsan yesterday find-arrive DE my key

'It was yesterday that Zhangsan found my keys not the day before yesterday.'

(17a) suggests that to EF-mark the subject, both Adjacency and PF-marking should be involved. Would this run counter to the two mutually exclusive Agree relations we proposed in (15)? In other words, if we assume that the *shi*-adjacent subject checks the [focus] feature by means of (15a), the non-movement Agreement option–as shown in (15b)–should become inactive, as the [focus] feature has already been checked. Then, why does the subject still bear the prosodic prominence? Here I propose a constraint on the application of (15b), as is shown in (18).

(18) *The constraint on the application of 'Agreement without movement'*

The 'Agreement without movement' rule only applies to elements that are linearly

non-adjacent to *shi*.

For elements that are linearly adjacent to *shi*, the prosodic prominence is treated as a disambiguation strategy to distinguish them from the readily available focus readings on their extended maximal projections, namely the IP for (17a).

5. Conclusions

In this paper, I re-examined the syntactic distributions of *shi* in 6 *shi*-containing focus constructions. I have also established that all these constructions make available with two focus marking strategies: (i) *shi*-focus Adjacency: *shi* appearing to the immediate left of the focus that it marks; (ii) AwF: *shi* associates with a

prosodically prominent non-adjacent element. The application of the two strategies comes with certain restrictions: VP-internal elements in initial *shi* constructions are not compatible with AwF, hence they have to undergo fronting to the right-adjacent position of *shi* and get focus-marked through the former strategy. In contrast, pseudo-clause-medial *shi* constructions prohibit *shi* from occurring within VP, thereby rejecting the Adjacency strategy and favoring AwF for marking a VP-internal element as a focus. In Section 3, I show with evidence drawn from three exhaustivity tests–the entailment test, the negation test, and the coordination test–that *shi* is an exhaustive focus marker irrespective of the size of the focus or the way the focus is assigned. In Section 4, this study proposes that *shi*, as a grammaticalized focus particle originating from the copula *shi*, heads the FaiP. This is because the exhaustive identification of the focus enforced by *shi* is an uncancellable conventional implicature. I then present an analysis ascribing the alternation between the two focus-marking strategies to the optional EPP feature available in the feature matrix of the focus head selected by *shi*. The EPP feature is present by default, thereby rendering the unmarked interpretations of the six structures with either the whole IP or any particular phrase adjacent to *shi* ending up in Spec-FocP. This step of movement happens exclusively for checking the [focus] feature. Exactly for the same reason, VP-internal constituents are displaced to the beginning of the clause adjacent to the clause-initial *shi*. Nevertheless, when the AwF option is in play, EPP is absent so that any prosodically prominent element, even for a non-XP element such as the verb, that is far apart from *shi* can bear the [focus] feature through Agree while remaining in situ. Crucially, I set a constraint on the application of the 'Agreement without movement' rule. That is, it is exclusively applicable to elements that are not linearly adjacent to *shi*. When EF-marking elements that sit in the immediate right of *shi*, such as the subject, they have to be marked as prosodically prominent to cancel the otherwise available focus reading on their extended maximal projections, namely an IP focus for example.

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Intertwining between Interrogatives and Negation

A Story Beginning with Chinese *Zenme*

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Abstract: This paper examines the rhetorical use of interrogative sentences in Mandarin, with a focus on the particle *zenme*, which functions similarly to *how* or *how come* in English. It explores how *zenme*-scoped sentences convey two types of negation: deontic negation, where the speaker implies that something should not have occurred, and propositional negation, which signals the impossibility of the proposition being true. This study draws primarily on natural conversation corpora and intuitive examples, identifying the contextual elements that trigger these forms of negation. Broadly, deontic negation arises from the conflict between the speaker's justified belief and their prior belief, while propositional negation pertains to public beliefs within the conversation, with the speaker refuting these by excluding all possible answers to the *zenme* sentence. This analysis aims at contributing to a deeper understanding of the interplay between interrogatives and negation in Mandarin semantics and pragmatics.

2. Introduction

This paper concentrates on the rhetorical usage of interrogatives obtained in particular contexts, from the perspective of semantics and pragmatics. Interrogative sentences, under certain circumstances, may express a sense of assertion. This phenomenon could be observed across various languages. Take English as an instance, Kim & Kim (2011) argue that the proposition scoped by *how come* often hold the presupposition that the stated proposition should not have occurred. Their proposal is illustrated in (1).

(1) The rhetorical usage of *how come* (*how*)
A: How come John left?
B: He had to catch the flight.

(Kim & Kim, 2011)

Compared with English, an examination on Mandarin would shed light on potential distinctions in the interpretations of *how* words. Specifically, the interrogative particle *zenme* in Mandarin serves as the equivalent of *how/how come* in English, while sentences scoped by *zenme* could yield two rhetorical interpretations in different contexts (Tsai, 1999; 2008). One interpretation mirrors the usage of *how come*, also suggesting that something should not have happened. Another interpretation implies a subtle difference, indicating that the proposition scoped by *zenme* is deemed impossible to materialize. The dialogues below exemplify the contrast.

(2) The rhetorical interpretations of sentences with *zeme*
a. Meaning: Something should not have happened.
(Context: John believed that Sam was still in the office, but found that Sam has left. Then John turned to Lily and asked,)
John: Ta zenme zou le?
3SG ZENME leave PFV
How come he(Sam) left?
Lily: Ta yao qu gan feiji.
3SG must go catch airplane
He(Sam) had to catch the flight.

(intuitive materials)

b. Meaning: The proposition is deemed impossible to materialize.
(Context: John believed that Sam had left, whereas Lily held an opposing belief. Then John said,)
John: Ta yijing zou le.
3SG already leave PFV
He(Sam) has already left.
Lily: Ta zenme zou le?
3SG ZENME leave PFV
How did he(Sam) leave?
Ta hai zai bangong-shi li ne.
3SG still in office inside PRT.remind
He(Sam) is still in the office.

(intuitive materials)

In accordance with Tsai (2023), I divide sentences scoped by *zenme* into two categories, deontic negation and propositional negation. Deontic negation corresponds to the meaning that something should not have occurred, with propositional negation related to the interpretation that the scoped proposition is false in the given context.

The first issues to be solved in this paper concerns the deontic negation interpretation of sentences with *zenme*. Few previous studies pay much attention on the precise contexts and pragmatic functions for deontic negation, leading to a mystery about how and when the speakers could obtain this reading and employ the *zenme* sentence to express the sense that something should not have happened.

The latter Interpretation, propositional negation, Is often analyzed within the realm of rhetorical questions. Biezma & Rawlins (2017) briefly outline the concept of rhetorical questions, highlighting that some questions can carry a tone of assertion. They suggest that the speaker, based on contextually salient information, excludes all potential answers to the question at the moment of utterance. As a result, the sentence incompletely transforms from an interrogative into an assertion.

Guo & Ye (2021) further extend Biezma and Rawlins' framework to analyze rhetorical questions in Mandarin, providing insights into the derivation of propositional negation of various types of interrogatives. According to Guo and Ye's analysis, a sentence with interrogative *zenme* typically seeks information about the manner or reason behind the described event; however, if the speaker already assumes that all possible manners or reasons have been ruled out based on preceding contexts, the question with *zenme* ceases to seek information and instead yields an empty answer set. In such instances, a rhetorical meaning emerges. These explanations deeply investigate the semantic mechanism of rhetorical questions.

Building upon this foundation, I aim to incorporate contextual operators into the analysis. Consequently, this paper will concentrate on the specific contexts that prompt the rhetorical interpretation of sentences modified by the interrogative particle *zenme*. By exploring the impact of contexts on interrogative sentences, the connection between interrogatives and negation should become clearer, potentially leading to a refinement of the semantic mechanism involved.

Section 1 will introduce the basic methodologies used in this research. Section 2 and 3 would respectively contexts associated with two types of negation. Lastly, section 4 will conclude the paper with insights into future directions and a concise summary.

2. Methodology

The theoretical framework employed in this research encompasses formal semantics and pragmatics, with a particular emphasis on the latter. The primary objective of this study is to describe the specific contextual operators that trigger two negative interpretations of sentences scoped by the interrogative particle *zenme*.

The data collection process involves two primary sources: natural conversation corpora and intuitive materials provided by the author, who is a native speaker of Mandarin. Three corpora are referenced here: the DIG Mandarin Conversations (DMC) Corpus, the BFSU DISCUSS Corpus, and a self-built corpus developed during the course of Discourse: Prosody and Grammar (2024 Spring) at Peking University (PKU DISCOURSE). The conversations cover a range of occasions and topics in daily life, such as campus life, work, diets, hobbies, social customs, and traditions. It is important to note that, for research convenience, transcriptions on prosody, for example, such as symbols representing stress patterns, have been omitted.

The verification process Is carried out mainly through the "next turn proof procedure" (Haugh, 2010). In this procedure, the subsequent speaker responds to the prior speaker. Through this interaction, we can discern how the subsequent speaker interprets the preceding utterance, which is considered to represent the pragmatic meaning within that particular context.

2. Contexts for Deontic Negation

This section primarily centers on the pragmatic environment conducive to the emergence of deontic negation. In essence, when a speaker employs the sentence with *zenme* to inquire about the reason, it frequently triggers a sense of deontic negation in that moment, and this sense is activated within a context where a fact (justified belief) (Goldman, 1979) contradicts the speaker's own belief (Stalnaker, 2002). This proposal is illustrated in (3).

(3) A sentence containing *zenme* inquiring about the reason would also express a sense of deontic negation

(Context: Kong and Tu are college students outside Qingdao city. One day, Kong called Tu to go to the dining hall together.)

Kong: Wei.
Hello
Kong: Hello.

Tu: Wei. Ni zenme shi Qingdao de guishu-di?
Hello 2SG ZENME be Qingdao POSS location
Tu: Hello. How come the location of your phone number is Qingdao?

Kong: Zhe shi wo benke de hao.
Dem be 1SG undergraduate POSS number
Kong: I registered this phone number during my undergraduate program.

Tu: O dui, ni benke zai Qingdao.
Oh yes 2SG undergraduate be.in Qingdao
Tu: Oh! Yes! You finished your undergraduate in Qingdao.
(DMC Corpus[32])

(Analysis: The fact/justified belief of this dialog is that Kong is using a phone number registered in Qingdao city. However, Tu initially believes that Kong should be using a phone number from a city other than Qingdao, given that they are currently not residing in Qingdao. The conflict between the fact and Tu's prior belief prompts Tu to question the reason behind this discrepancy, leading to a sense of surprise and deontic negation in their response.)

Let's first talk about the fact, which is the belief justified by the preceding speaker Tu in (3). A conceptual definition of the justified belief is given Goldman (1979): "If *S*[peaker]'s belief in *p*[roposition] at *t*[ime] results from a reliable cognitive process, and there is no reliable or conditionally reliable process available to *S* which, had it been used by *S* in addition to the process actually used, would have resulted in *S*'s not believing *p* at *t*, then *S*'s belief in *p* at *t* is justified." In other words, the fact is not an objective entity in the real world; rather, rather, it pertains to a psychological entity within the speaker's cognitive realm. Therefore, if the context permits the subsequent speaker to refute this justified belief in the next turn, the justified belief itself becomes overt. The verification process is provided in (4), which is the modified version of the dialog of (3).

(4) The verification of the justified belief through the next turn procedure

(Context: Kong and Tu are college students outside Qingdao city. One day, Kong called Tu to go to the dining hall together, and Tu could see where Kong's phone number is registered.)

Kong: Wei.
Hello
Kong: Hello.

Tu: Wei. Ni zenme shi Qingdao de guishu-di?
Hello 2SG ZENME be Qingdao POSS location
Tu: Hello. How come the location of your phone number is Qingdao?

Kong: Bu-dui, wo bu shi Qingdao de guishu-di.
Neg-right 1SG Neg be Qingdao POSS location
Kong: No, I didn't use a phone number registered in Qingdao city.

[32] For the convenience of both reading and analysis, I subtly modify the content or the structures of sentences except for the sentence with *zenme*.

Tu: Mei-you ba, shi Qingdao de ya.
Neg-have ASS be Qingdao POSS ASS
Tu: I don't think so. It was registered in Qingdao.

Kong: Ni kan, shi Shanghai de.
2SG look be Shanghai POSS
Kong: Look, it belongs to Shanghai.

(Analysis: In this scenario, the justified belief is represented by Tu's conviction that Kong uses a phone number associated with Qingdao, a belief that is challenged by Kong's correction – the number was registered in Shanghai.)

Another crucial pragmatic operator revolves around the belief or prior belief of the preceding speaker (Tu in this example). In contrast to the justified belief (proposition *p*), the speaker himself holds a belief that contradicts *p*, denoted as the negation of *p* (¬*p*). This prior belief becomes apparent when the speaker introduces a contradictory thought or belief into the utterance, resulting in an infelicitous judgment on the sentence. Phrases like "I thought" or "I believed" can effectively underscore this aspect. The verification process can be observed in (5), which also derives from (3).

(5) The verification of the prior belief through the additional thought.

(Context: Kong and Tu are college students outside Qingdao city. One day, Kong called Tu to go to the dining hall together.)

Kong: Wei.
Hello
Kong: Hello.

Tu: Wei. Ni zenme shi Qingdao de guishu-di?
Hello 2SG ZENME be Qingdao POSS location
Tu: Hello. How come the location of your phone number is Qingdao?
Wo yiwei shi Shanghai/(#Qingdao) de.
1SG think be Shanghai/Qingdao POSS
Tu: I thought it should be Shanghai/#Qingdao.

Kong: Zhe shi wo benke de hao.
Dem be 1SG undergraduate POSS number
Kong: I registered this phone number during my Bachelor's program.

Tu: O dui, ni benke zai Qingdao.

Oh yes 2SG undergraduate be.in Qingdao
Tu: Oh! Yes! You finished your undergraduate in Qingdao.

(Analysis: Tu himself introduces a belief by the sentence 'I thought it should be Shanghai/Qingdao'. Intuitively, the sentence is appropriate in the context if *Shanghai* is mentioned. However, if Tu states 'I thought it should be Qingdao' instead, then that sentence will be inappropriate and infelicitous. This minimal pair indicates that Tu's prior belief that Kong should use a phone number from a specific city other than Qingdao.)

Besides, I would like to present an intriguing observation regarding the response to a sentence containing *zenme* in a deontic negation scenario. As previously discussed, deontic negation typically arises with seeking reasons. The key point to highlight is that the listener (i.e., the subsequent speaker) has the autonomy to choose the interpretation they wish to respond with. This can be gleaned from the two possible responses to the *zenme* sentence—one catering to the reason-inquiring meaning and the other to the deontic negation. Both responses are appropriate, as exemplified in (6).

(6) Two possible answers for *zenme* sentence in the deontic negation scenario

(Context: Kong and Tu are college students outside Qingdao city. One day, Kong called Tu to go to the dining hall together.)

Kong: Wei.
Hello
Kong: Hello.

Tu: Wei. Ni zenme shi Qingdao de guishu-di?
Hello 2SG ZENME be Qingdao POSS location
Tu: Hello. How come the location of your phone number is Qingdao?

(Possible Answer 1)
Kong: Zhe shi wo benke de hao.
Dem be 1SG undergraduate POSS number
Kong: I registered this phone number during my undergraduate program.

(Possible Answer 2)
Kong: Bu-dui, wo bu shi Qingdao de guishu-di.
Neg-right 1SG Neg be Qingdao POSS location
Kong: No, I didn't use a phone number registered in Qingdao city.

(Analysis: In the possible answer 1, Kong responds with the meaning of reason-seeking, while in the answer 2, Kong refutes the justified belief of Tu.)

In conclusion, the serial utterance subsequence of *zenme* sentences in the deontic scenario could be constructed as (7).

(7) Speaker 1: *Zenme* p? I thought that ¬p.
Speaker 2: Because q. / No, it is actually ¬p.
(*p*: the justified belief; ¬*p*: the prior belief; *q*: the reason/cause for *p*)

3. Contexts for Propositional Negation

This section focuses on the contexts that activate the propositional negation interpretation. While deontic negation is associated with $zenme_{cause}$, propositional negation exhibits a close relationship with $zenme_{manner}$. In contrast to deontic negation, propositional negation is independent of the inquisitive meaning. Rather, propositional negation serves as the pragmatic variant of the interrogative function of manner-seeking. Therefore, sentences with $zenme_{manner}$ could be ambiguous when out of the blue. Speakers differentiate propositional negation from the manner-seeking interpretation by contextual cues.

Before delving into the contexts for disambiguating, it's essential to clarify a fundamental fact about propositional negation. Propositional negation can be further categorized into two types: refutative negation and reinforcement negation. Refutative negation pertains to a scenario where, following a speaker's statement implying a certain belief, the subsequent speaker utilizes a *zenme* sentence to contradict this belief. Reinforcement negation, on the other hand, is a subtype of refutative negation, describing a situation where a speaker Initiates a statement by expressing a belief with a negative operator and subsequently employs a *zenme* sentence to strengthen this assertion.

In refutative negation, two essential contextual conditions are necessary. Firstly, the preceding context should either indicate or imply certain public beliefs held by other speakers (Stalnaker, 2002). Secondly, the speaker expressing propositional negation should introduce certain conditions that limit the realization of the proposition.

The public belief could be overtly uttered in the next turn by epistemic sentences such as "I think…". These epistemic sentences are appropriate and felicitous in the contexts, positively supporting the assumption that there is some public belief, although diagnostics for negative evidence is still needed. The verification process is exemplified in (8).

(8) The public belief in the scenario of propositional negation

(Context: Rui and Min are talking about hard working.)
Rui: Yiding yao zhenxi ziji de xuexi shiguang,
DEO DEO value own POSS study time

gai xuexi de shihou xuexi.
DEO study POSS time study
Rui: You should value your own time for studying, and study hard when it is time to study.

Min: Wo tian, zhe ye tai guanfang le ba.
My god DEM PRT too official LE PRT
Min: Oh my god! It is much more official than I thought!

Rui: Zhe zenme guanfang la?
DEM ZENME official LA
Zhe shi yi ge guolairen de jingyan jiaoxun.
DEM be one CL stager POSS experience lesson
Rui: How can it be too official? It is the experience and lesson from a stager.

Min: Wo juede ni shuo zhe zhong hua jiu-hui hen guanfang.
1SG think 2SG say DEM CL word will much official
Min: I thought the utterance like what you said seems so official.

(DMC Corpus, with little modification)

(Analysis: Min explicitly expresses her belief in the final turn of the dialogue, aligning well with this context. In fact, such a public belief has already been articulated earlier in the conversation.)

Another condition, the additional information regarding constraints on the realization of propositional negation, is clearly evident in (8) as well. In (8), Rui responds to Min's remark on his persuasion with a *zenme* sentence, "how can it be too official," followed by a sentence, "it is the experience and lesson from a stager." This sentence essentially signifies that in all possible worlds, this persuasion merely constitutes the shared experience of a stager, rather than official and ineffectual statements. Thus, the literal translation then should be "if it is the experience and lesion from a stager, it is impossible to be an official and ineffective statement". What the speaker (Rui) presents here is akin to an ultimate scenario that eliminates all potential responses from the answer set of the *zenme* sentence. This aligns with the assumptions about rhetorical questions put forth by Biezma & Rawlins (2017) and Guo & Ye (2021).

Reinforcement negation functions in a manner similar to refutative negation. In this type of situation, a speaker initially presents a negative proposition and subsequently uses a *zenme* sentence along with a condition to underscore that the proposition is unattainable or impossible to realize. (9) serves as an example.

(9) Reinforcement negation

(Context: Tan and Zhou are caring for a baby. The baby is wearing a pair of shoes and socks, and creeping on the ground of the bedroom.)
Tan: Zhe wazi bu yao le.
DEM sock NEG have PFV
Na 76arlat, zenme yao o, you qiqiu!
DEM looking ZENME have PRT even billing
Tan: We won't keep the pair of socks. How could we keep these socks, since they have already been like that and even pilling!
(BFSU Corpus, with little modification)

(Analysis: Tan her/himself states a negative sentence, "we won't keep the pair of socks," and then utilizes a *zenme* sentence to accentuate this decision, "how could we keep these socks." The condition that these socks are pilling restricts the potential reasons or manners for keeping these socks.)

Reinforcement negation can be viewed as a subtype of refutative negation in the sense that reinforcement negation contradicts some public beliefs that are akin to common sense and are challenging to directly perceive or recover within the conversation. For example, the public belief of (9) might be the common sense (for Chinese) that we don't have to throw away clothes if it still could be worn. This common sense can be highlighted by the next turn, as seen in (10).

(10) The common sense hidden in (9)

(Context: Tan and Zhou are caring for a baby. The baby is wearing a pair of shoes and socks, and creeping on the ground of the bedroom.)

Tan: Zhe wazi bu yao le.
DEM sock NEG have PFV
Na 76arlat, zenme yao o, you qiqiu!
DEM looking ZENME have PRT even billing
Tan: We won't keep the pair of socks. How could we keep these socks, since they have already been like that and even pilling!

Zhou: Wo juede hai neng chuan dehua, jiu bu yao diu le ba.
1SG think still DYN wear if just NEG EPI throw PFV PRT

(Analysis: Through "I think…", the common sense that everyone usually follows in daily life are introduced, such as not casually discarding clothes if they can still be worn.)

Also, similar to deontic negation, there are two appropriate answers for *zenme* sentences in the scenario of propositional negation. One serves as the response for the manner-seeking reading, i.e., the *zenme* sentence is treated as an interrogative expression. The other one concerns the propositional negation interpretation, in which case the *zenme* sentence is interpreted as an assertion or at least a partially assertive question. The two possibilities are exemplified in (11).

(11) Two possible answers for *zenme* sentences in the case of propositional negation

(Context: Tan and Zhou are caring for a baby. The baby is wearing a pair of shoes and socks, and creeping on the ground of the bedroom.)

Tan: Zhe wazi bu yao le.
DEM sock NEG have PFV
Na 77arlat, zenme yao o, you qiqiu!
DEM looking ZENME have PRT even billing
Tan: We won't keep the pair of socks. How could we keep these socks, since they have already been like that and even pilling!

(Possible Answer 1)
Zhou: Hai neng chuan, liu zhe ba.
Still DYN wear keep STATE PRT
Zhou: They still work. Just keep them.

(Possible Answer 2)
Zhou: Ye dui, diu le ba.
Also right throw PFV PRT
Zhou: You are right. Just throw them away.

(Analysis: Possible answer 1 addresses the manner-seeking interpretation by offering a reason for keeping the socks, whereas possible answer 2 aligns with propositional negation and agrees to discard these socks.)

In conclusion, the serial utterance subsequence of *zenme* sentences in the propositional negation scenario could be constructed as (12).

(12) Speaker 1: (We may/must/should) p.

Speaker 2: Consider that q, *zenme* p?
Speaker 1: You're right, it should be ¬p./I think it should be p because z.
(*p*: the public belief ; *q*: the condition for *p*; *z*: the manner or reason for *p*)

4. Future Directions and Conclusion

Future studies could delve further into the correlation between modality and interrogatives. As evidenced by translations of *zenme* sentences, propositional negation is consistently rendered in English sentences containing modal verbs (like *could* or *can*). Moreover, Kim & Kim (2011) note that *how come* sentences in English often convey a sense that something should not have happened. In Mandarin, the use of modal verbs is not mandatory, but when *zenme* is combined with *keneng* (possible), only propositional negation could be obtained. Furthermore, the prosodic patterns of *zenme* sentences in the context of propositional negation differ from those in interrogative or deontic propositions. These intriguing observations are likely to stimulate further investigation into the connection between modality and interrogatives.

In conclusion, this study focuses on the pragmatic factors that trigger tow negative readings of *zenme* sentences in Mandarin, namely the deontic negation and the propositional interpretation. Deontic negation arises from the conflict between a participant's justified belief and their prior belief, leading to the use of *zenme* sentences to express surprise. Propositional negation, on the other hand, involves the public belief implied in the previous context. By uttering a *zenme* sentence and presenting additional evidence (conditions), the speaker aims to constrain the realization of the public belief, ultimately asserting its impossibility. While the connection to modality remains unclear, the observation on propositional negation aligns well with Biezma & Rawlins (2017)'s framework for analyzing rhetorical questions. This framework posits that all possible answers are excluded in the context at the moment the speaker utters a *wh*-question.

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Unnecessary repairs are necessary:

Bilingual adaptation strategies for intervocalic nasals

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This study, couched within the broader issue of what factors condition nasal gemination in Mandarin loanword adaptation, presents the distributions of nasal gemination in a corpus and production and perception experimental data generated from Mandarin-English bilingual speakers in which intervocalic English nasals are variably adapted as either geminates or singletons in Mandarin. The corpus data (Huang & Lin, 2013, 2016b) indicate that the English prenasal vowel features and stress location determine nasal gemination in Mandarin loanwords, i.e., nasal gemination is contextually conditioned. The findings in both experiments show that the bilingual strategies for nonce word adaptations show similarities to the Mandarin loanword patterns observed in the existing corpus. The experimental results prove that the perceived duration and nasalization of the English prenasal vowels determine the preferred variant. However, unlike the corpus generalizations, stress location condition is not observed in the experimental data, neither perception nor production. The English intervocalic nasal adaptation in Mandarin loanwords showcases that unnecessary repair in loanword adaptation is necessary due to bilinguals' sensitivity to the fine phonetic cues on the prenasal vowel.

2. Introduction

This paper investigates how English intervocalic nasals are adapted into Mandarin loanwords. It explains when and why seemingly unnecessary nasal insertion occurs with the perception and production of experimental data incorporating corpus generalizations identified in (Huang & Lin, 2013, 2016b). Nasal consonants in English have several adaptation forms in Mandarin loanwords. The most common form is a faithful mapping in syllable onset position, e.g., *Nate* → *[nai.thɤː]*, *Mark* → *[maː.khɤː]*. Since Mandarin does not allow [m] in the coda position, a coda [m] In English has to change to [n] or [ŋ] In Mandarin loanwords, e.g., *Pam* → *[phan]*, *Thompson* → *[thɑŋ.puː.sən]*. What is of interest is that an English intervocalic nasal is adapted in three different ways: (i) faithful one-to-one mapping, e.g. *Lina* → *[liː.naː]*, (ii) one-to-two mapping with nasal insertion, e.g., *Benedict* → *[pən.niː.tiː.kɤː.tɤː]*, and (iii) variable adaptation with or without nasal insertion, e.g., *Tiffany* → *[tiː.fan.nei]* ~ *[tiː.fuː.niː]*.

In loanword adaptation, various repair strategies are used to produce licit-adapted forms. Still, there are cases where an unnecessary repair is made even when a direct mapping without any repairs would have created a licit-adapted form (Kang, 2011; Peperkamp, 2005). Nasal gemination in Mandarin loanwords is one such case since no phonotactically illicit structure needs repair. That said, an intervocalic nasal in English can be faithfully mapped as a single nasal consonant in Mandarin without incurring a phonotactic violation. This paper uses perception and production data from Mandarin-English bilingual speakers and a previous corpus study to examine and argue whether fine acoustic cues trigger nasal gemination in Mandarin loanwords. If they do, what are they? In addition, I want to discuss whether the current adaptation process is phonetically or phonologically driven.

In the next section, I review consonant gemination in other loanword systems to show how triggering gemination in different loanword systems shares similar features. The Mandarin loanword data (Huang & Lin, 2013, 2016b), generalizations, and proposed analysis are presented in section 3. Section 4 presents the methodology and the results of the perceptual and production experiments from bilingual Mandarin-English speakers. The last section gives a general discussion and concludes this study.

2. Consonant gemination in loanwords

Gemination is a cross-linguistically widespread phenomenon in loanword adaptation. A singleton in the donor language is geminated in the recipient language even when the singleton is spelled with a single consonant letter in orthography. Some examples (from (Magyar, 2015)) of consonant germination in different loanword systems are given below.

(1) Japanese: [katto] 'cut [kʌt]' (Kubozono et al., 2008)
(2) Telugu: [roːddu] 'road [rod]' (Krishnamurti & Gwynn, 1985)
(3) Finnish: [poppi] 'pop [pɑp]' (Karvonen, 2005, 2009)
(4) Hungarian: [sokk] 'shock [ʃɑk]' (Kertész, 2005; Nádasdy, 1989)
(5) Italian: [fann] 'fan [fæn]' (Passino, 2004)

In the examples above, the word-final consonant in the source language, English, gets geminated in the recipient languages, Japanese, Telugu, and Finnish. In addition, vowel epenthesis occurs to form an open syllable to repair the ungrammatical geminated consonant. Loanword gemination in Hungarian and Italian is similar. The word-final consonant gets geminated in the recipient languages without vowel epenthesis after the geminated consonant.

Previous studies on consonant gemination are discussed in this section since the nasal insertion in the Mandarin loanword system, to some extent, is similar to consonant gemination in other languages with gemination patterns, e.g., nasal gemination happens when the prenasal vowel is lax and non-high. The prenasal vowel bears the primary stress in the English source. Consonant gemination in loanword adaptation is also strongly correlated to the quality of the pre-consonantal vowel and stress location in the source language.

Consonant gemination is a high-frequency repair strategy in loanwords from English to Japanese in similar contexts (Kawahara, 2007; Kubozono et al., 2008; Lovins, 1973; Shirai, 1999). This repair strategy is also found in Italian (Repetti, 2009), Hungarian (Magyar, 2016), and one of the Chinese dialects, Cantonese (Yip, 1993). The conditions that trigger nasal insertion in Mandarin loanwords also trigger consonant gemination in loanword systems in other languages. Those languages that have consonant gemination as a loanword adaptation repair strategy duplicate the targeted consonant to form a geminate, e.g., cut [kʌt] (English)→[katto] (Japanese).

I argue that in Mandarin loanword adaptations, the nasal is not taken as a true geminate because, in some cases, the two neighboring nasal consonants are not identical. Three non-identical segment circumstances are discussed here:

(6) [n]→[ŋ.n], e.g., Monahan→[meŋ.naː.xan]
[m]→[n.m] / [ŋ.m], e.g., Hamilton→[xan.miː.əɹ.tun]

[ŋ]→[ŋ.k], e.g., Young→[jɑŋ.kɤː]

I suggest that the transformation of the first nasal in gemination is due to Mandarins's native phonotactic constraints. When the intervocalic nasal consonant in English is [m], the adapted form changes to [n.m] or [ŋ.m] because Mandarin does not allow [m] in the coda position. Hence, the first nasal must change to one of the licit nasals. Which licit nasal is picked depends on the backness of the prenasal vowel in the source (cf. Hsieh et al. (2009)). When the intervocalic nasal consonant in English is [ŋ], the adapted form changes to [ŋ.k], or [n.k]. The second geminated half changes to [k] because the velar nasal [ŋ] cannot be in syllable onset position in Mandarin. Hence, the nasal feature gets removed, and only the place feature remains. The voicing changes from [+voice] to [-voice] because Mandarin only has voiceless oral stops. It does not have /g/ in its consonant inventory. Therefore, [ŋ]→[k] is the closest sound mapping result. In addition, even when the intervocalic nasal is [n], it can be adapted as [n.n] or [ŋ.n] (cf. Miao, 2005). Due to Mandarin phonotactics, perception, and sociocultural factors, either the [+nasal] or the place feature of the target consonant gets geminated. Although the surface form of the two nasals is sometimes not identical in the current study, it is sensible to use the term gemination in this study.

Lovins (1973) shows that Japanese loanwords from English often undergo gemination when the source word contains a stressed short vowel and an obstruent in the word-final position and that intervocalic consonants sometimes undergo gemination in loanwords. Lax vowels in English are adapted into Japanese as short vowels. Tense vowels are adapted as long vowels to block gemination. Lovin's discussion is mainly centered on the stress and the quality of the source vowels. The patterns of nasal insertion in Mandarin loanwords are also related to the shorter duration of the prenasal vowel and the primary word stress in English. Prenasal long vowels also block nasal insertion in loanwords in Mandarin.

Shirai (1999), by examining a corpus dataset with 3,399 Japanese loanwords adapted from English, also concludes that most geminates are from three source environments:

- a consonant is a singleton in the word-final position of a source word or,
- a consonant follows a stressed syllable or,
- a consonant is considered an ambisyllabic consonant.

In both Japanese loanword studies above, gemination requires a lax vowel, a singleton consonant, and the target consonant in a stressed syllable. With the generalizations, Shirai further observes that voiceless consonants are geminated in most cases, and word-final consonants get geminated more often than ambisyllabic consonants. Like the Japanese consonant gemination in loanword outputs, nasal gemination applies in Mandarin loanwords when an English nasal consonant is intervocalic (cf. Lovins (1993)), the prenasal vowel is lax (cf. Shirai (1999)), the nasal is In a stressed syllable, and It Is ambisyllabic (cf. Shirai (1999)).

Repetti (2009) examines gemination in English-based loanwords in American varieties of Italian, e.g., coal→[ˈkolle], and bushel→[ˈbuʃʃolo]. She argues that many factors play a role in gemination, such as the inventory of segments of the recipient language, the structure of the stressed syllables, the presence of similar native lexical items, and the phonetic details of the source words. She argued that speakers try to preserve the syllable structures of the source form by gemination, specifically the moraicity of final consonants; that is, if the stressed syllable in the source language is bimoraic, gemination is a repair strategy. She also takes Peperkamp & Dupoux's (2003) view, which argues that the speakers can interpret the fine acoustic detail of the vowel and consonant length of their phonological system. For example, a consonant that follows a long vowel is phonetically shorter than if it follows a short vowel. Her study shows that American-Italian loanword gemination cannot be accounted for by only one of the abovementioned factors; instead, a combination of both phonological and phonetic factors must be considered.

Yip (2002, 2006) discusses syllable weight as a factor for Cantonese consonant gemination in its loanword system. Duanmu (2007) argues that the minimal syllable in Cantonese is [μμ]σ, i.e., in an open syllable, all vowels have to be long, for example, *flower* [faː], *[fa]. Yip agrees with Duanmu's claim on Cantonese

syllable structure and concludes that Cantonese bimoraic syllable structure is supported by loanword phonology. English short, open syllables surface as closed syllables in Cantonese by gemination of the following onset, e.g., ˈ*copy* [kapi]→[khappi], *gui*ˈ*tar* [gɪˈtɑɹ]→[kittha]. However, long open syllables in English do not trigger gemination in Cantonese loanwords, e.g., *soda*→[sota]. She concludes that consonant gemination in the Cantonese loanword system can be understood as the result of the need for a bimoraic syllable. She also points out that stress is not the main factor that decides gemination in Cantonese loanwords. Her point regarding the syllable weight of Cantonese loanword consonant gemination is very similar to the nasal insertion process in the current study. However, I identified that stress plays a role in the appearance of the nasal insertion process in the Mandarin loanword corpus data (Huang, 2020; Huang & Lin, 2013, 2016c, 2016b).

In summary, cross-linguistically, consonant gemination in loanword adaptation is related to the target consonant syllable location and the preceding vowel quality of the target consonant. It is also associated with the consonant class. Consonant gemination can also be related to the stress pattern in the donor language. However, it is not always relevant, e.g., Cantonese loanwords. In the next section, I will review my own study regarding how an English intervocalic singleton nasal is adapted in Mandarin loanwords in the existing corpora and identify the main factors that condition nasal insertion.

3. The corpus data and generalizations (Huang (2020) and their studies before)

Huang (2020) and Huang & Lin (2016 (a)) show that intervocalic nasals have variable adaptations in different phonological contexts. The intervocalic nasals are variably adapted with an extra nasal or faithfully with one nasal, depending on the quality of the prenasal vowel and the primary word stress. The occurrence of vowel epenthesis depends on its preceding adjacent consonant. This section will present and discuss the data and generalizations of how intervocalic nasals are adapted in Mandarin.

The corpus data are collected from Appendix I, a list of common British and American names from A New Chinese-English Dictionary (1988) and words from public media such as newspapers, magazines, and the Internet. This data set

contains more than 2,400 British and American male and female names and other proper names.

The main findings from the corpus can be grouped into three types: adaptation with nasal gemination, adaptation without gemination, and variation between the two. The free variation adaptation is not discussed in this paper. Each type occurs consistently under specific conditions. The two main factors that affect the adaptation of nasal gemination in MANDARIN loanwords are vowel types and stress locations 1. The prenasal vowel in English has to be nonhigh, short/lax, and bear the primary stress. The examples in (7) illustrate how the intervocalic nasal singletons in English are adapted with nasal geminates in Mandarin loanwords.

(7) Nasal gemination: prenasal vowel is nonhigh, lax, and bears the primary stress

ENG [ˈVnV]	MAN [Vn.nV]
Diˈana	[tai.an.naː]
ˈFenick	[fen.niː.kʰɤː]
ˈDanica	[tan.niː.kaː]
ˈEnid	[ən.niː.tɤː]
Heˈlena	[xɤː.lan.naː]

(8) Faithful adaptation I: prenasal vowel is long/a diphthong

ˈLina	[liː.naː]
ˈDowney	[tau.niː]
ˈBruno	[puː.luː.nuo]
ˈConan	[kʰɤː.nan]
ˈNina	[niː.naː]

(9) Faithful adaptation II: postnasal vowel bears the primary stress

Deˈnise	[tiː.niː.sɻː]
Beˈnet	[pei.nei.tʰɤː]

Boˈnita	[pʷoː.niː.taː]
Corˈnelia	[kʰɤː.niː.liː.yaː]
Reˈnei	[lei.n̲iː]

(10) Faithful adaptation III: prenasal vowel is [ɑ]

Caˈbana	[kʰaː.paː.naː]
Asˈtana	[aː.sɻ̩ː.tʰaː.naː]
Guiˈana	[tɕiː.jaː.naː]
Miˈami	[maɪ.aː.miː]

Figure 1 shows that nasal gemination in Mandarin loanwords is cued by English prenasal stressed nonhigh lax vowels. Nasal gemination rarely happens when the prenasal vowel is high, tense, or unstressed.

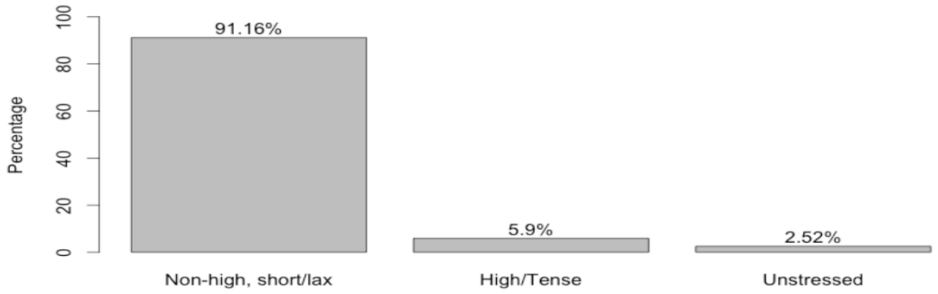


Figure 1. Percentage of nasal gemination with different prenasal vowel conditions.

To sum up, the English intervocalic nasal adaptation is not a simple one-to-one segment mapping process. The English intervocalic nasal can be adapted with and without nasal gemination, and can sometimes vary between the two. The English prenasal vowel quality and the stress location in the word condition the adaptation process. To trigger nasal gemination in Mandarin loanwords, the English prenasal vowel has to be lax and bear the primary stress. In other words, if the prenasal vowel is tense, a diphthong, or is phonetically long, nasal gemination does not occur. As for stress location, if the post-nasal vowel bears the primary word stress, which also

means the English syllabification is clear, e.g., *Boˈnita*, then the nasal is clearly syllabified to the onset of the second syllable. Nasal gemination barely occurs in Mandarin loanwords. The nasal gemination process is an unnecessary repair strategy since the native Mandarin syllable structure directly allows a single nasal to match a single intervocalic nasal in English.

I propose that the seemingly unnecessary nasal insertion in Mandarin loanwords is needed to match the perceived phonetic prenasal vowel duration of the stressed syllables and the more salient nasality on the prenasal nonhigh vowels in English (Solé, 1992). The long vowels in English are perceived as long and adapted as heavy open syllables in Mandarin; therefore, nasal insertion is unnecessary. English ambisyllabic nasal pattern with word-medial codas regarding vowel nasalization (cf. Durvasula & Huang (2013)). Vowels are universally shorter in a closed syllable than in an open syllable (Maddieson, 1984). Therefore, the vowels before ambisyllabic consonants in English are short. Rather than the vowel lengthening, inserting an extra nasal in Mandarin satisfies the phonological requirement for heavy syllables (Duanmu, 2007) and better matches the nasality on the prenasal lax vowel in English (Hayes, 2009). The exceptions in (8) and (10) are attributed to the perceptual and phonetic vowel length factors. English low back [ɑ] is perceived as tense in English loanwords (Green, 2001), and it is phonetically long (House, 1961), rendering nasal insertion in Mandarin loanwords unnecessary.

4. The production and perception experiments

Based on the corpus data generalizations and proposed analysis above with possible phonetic and phonological factors in Mandarin and English. I conduct production and perception experiments to answer the following questions:

- Do the prenasal vowel quality and stress location trigger nasal gemination in Mandarin loanwords? In other words, do the prenasal vowel quality and stress location still play a role in online adaptation?
- Which variant is preferred under what contexts?

The production experiment was run before the perceptual one to avoid participants being biased by hearing the possible adaptation forms.

Hypothesis. Based on the generalizations identified in the corpus data, I hypothesize that nasal gemination is induced by English prenasal vowel quality and stress location, i.e., the English prenasal vowel should be non-high and lax and bear the primary stress.

Participants. Twenty-four adult Mandarin-English bilingual undergraduate and graduate students majoring in different subjects volunteered to participate in the experiment. Their ages fell between 21 and 33 years old. At the time of the experiment, they either studied or taught at Michigan State University or worked in a company. They were native Mandarin speakers born in Mainland China with normal hearing. They do not speak and do not use any Chinese dialect at home. At the time of the experiment, they lived, studied, or worked in the U.S. for more than three years. They had to use English as their dominant language for their classes, teaching, and work. Their English proficiency was assessed using a self-report TOFEL score. Their TOEFL scores were above 100 (the global average score is 78).

Production experiment test items. The experiment has 42 test items and 85 filler items. All the inputs were pseudowords. Filler items are monosyllabic and disyllabic words that are with and without nasals. They were read out loud by a female native-American English speaker with linguistics training from Michigan.

Perceptual experiment test items. The same test items and filler items were used in the production experiment. The possible Mandarin loanword outputs were produced by one female native Mandarin speaker from Taiwan who does not speak any Chinese dialect and has linguistics training. The stimuli were tokens in a three-word series. Each sound string consists of two possible adapted loanword forms in Mandarin and a pseudoword. The order of the words is {Mandarin, Mandarin, Pseudo word input}.

The corpus data show that nasal gemination strongly correlates to the prenasal vowel quality in English. Therefore, all the English tense and lax vowels that occupy the prenasal vowel position were tested, e.g. ENG [ˈbe̲ini]/ENG [ˈbɛ̲ni]. The corpus data show that stress location also affects the appearance of nasal gemination. Hence, pseudowords with the primary stress fall on the prenasal and postnasal vowel were tested, e.g., ENG [ˈbɛni]/ENG [bɛˈnita].

Another set of test items contrasting the prenasal vowel [æ] and the low back [ɑ] in trisyllabic and disyllabic words, e.g., ENG [bəˈbæ̲nə]/ENG [bəˈbɑ̲nə], and ENG [ˈbænə]/ENG [ˈbɑnə], were also tested in both experiments.

As for the tone pattern of the two possible Mandarin outputs, the tone patterns of the consecutive characters in the possible adapted Mandarin outputs were the same if there were no systematic gaps, e.g., MAN [pēi.níː], MAN [pān.níː], ENG [ˈbɛ̲ni].

In the current experiment, I only used the alveolar nasal [n] as the target because, compared to [m] and [ŋ], the intervocalic English [n] is adapted with nasal gemination most frequently, with 83.19%. The geminated nasal is either identical to the source form or transformed to [ŋ] to agree on backness with its preceding vowel (cf.Hsieh et al. (2009)).

Procedure. To collect the production data, all participants listened to 127 (42 test items & 85 filler items) English nonce-word inputs on Psychopy and orally recorded a Mandarin adaptation for each input. Participants were allowed to ignore Mandarin orthographical and tonal effects. To collect the perceptual data, the participants listened to the same nonce words, but in triplets twice in the ABX and BAX formats with an input (X, e.g., [bǽni]) and two possible adapted Mandarin outputs (A and B, e.g., [pa**n.n**i] and [pa.**n**i]). They were asked to choose which adapted Mandarin form, with or without nasal gemination, sounded more similar to the source word.

Results. In comparing inputs with stressed prenasal lax vs. tense vowels in disyllabic words, the results from both experiments present a significantly higher rate of producing the geminate variant [CVN.NV] to match the [CV_{Lax}NV] structure (Fig. 2), which followed the vowel type condition identified in the corpus.

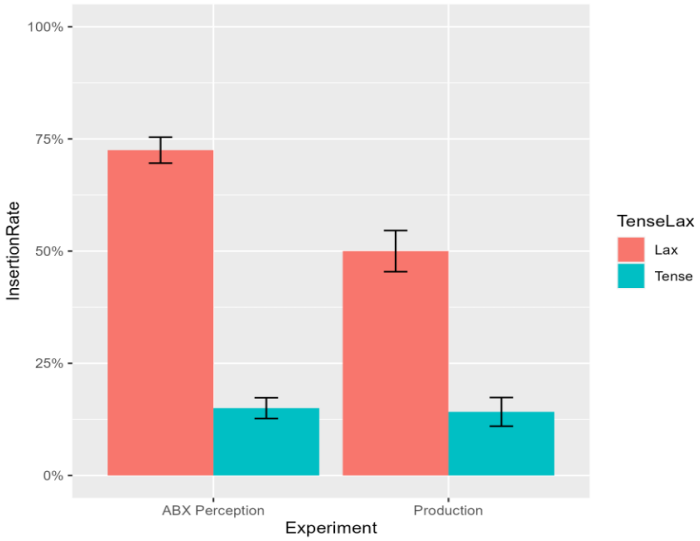


Fig. 2. Nasal gemination rate with different prenasal vowel quality and stressed prenasal vowels: ˈCV $_{Tense}$NV vs. ˈCV $_{Lax}$NV

The results from both experiments do not align with the stress location condition in the corpus data, i.e., [ˈCV $_{Lax}$NV] and [CVˈNita] do not differ significantly (Fig. 3).

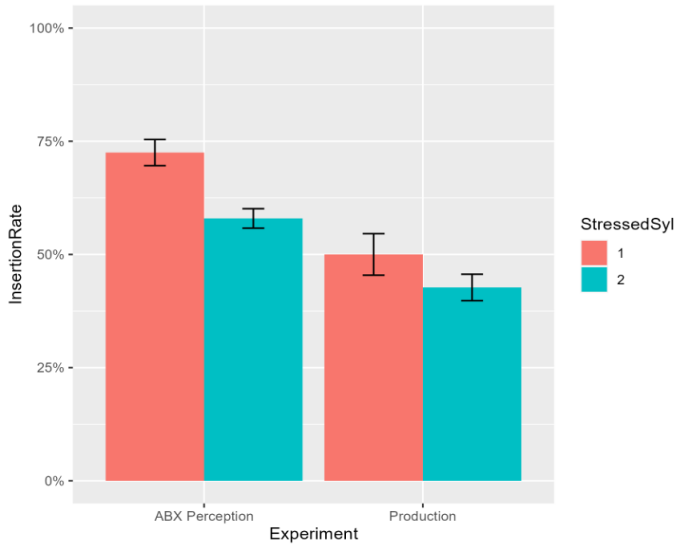


Fig. 3. Nasal gemination rate with the stress on the first and second syllable: ˈCV $_{Lax}$NV vs. CVˈNita

However, in both experimental results, [CVLax'Nita] triggers significantly more nasal gemination than [CVTense'Nita] (Fig. 4).

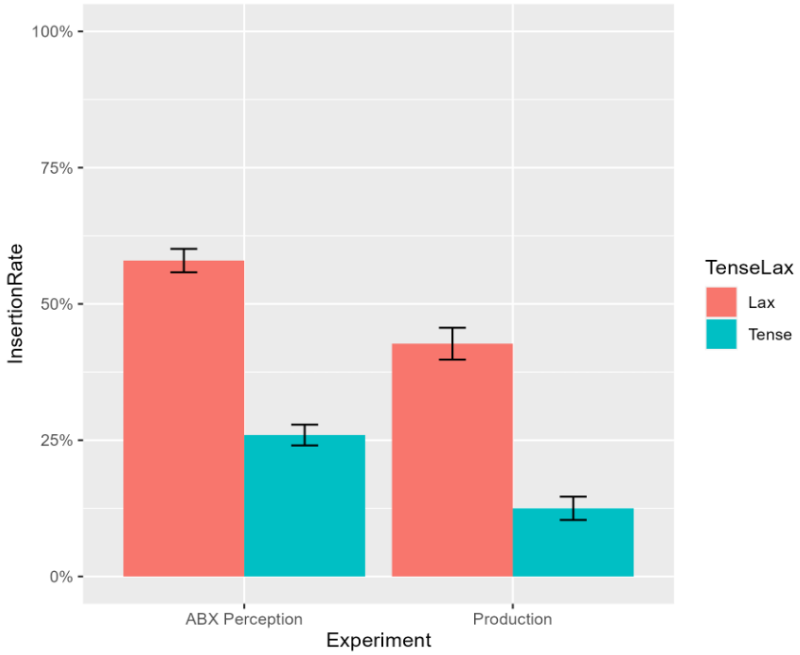


Fig. 4. Nasal gemination rate with different prenasal vowel quality and stress on the postnasal vowel: CV_{Lax}'Nita vs. CV_{Tense}'Nita

The results of comparing the low back [ɑ] to the lax and tense vowels tell us that the low back [ɑ] behaves significantly differently from other lax vowels in English during the intervocalic nasal adaptation process (Fig. 5). The low back vowel [ɑ] does not trigger nasal insertion in Mandarin loanwords like other tense vowels.

5. Discussion and conclusion

After analyzing the results from all participants, I want to discuss i) the similarities and differences between the experimental results and the corpus data, ii) the causes of the differences, and iii) the comparison between the two experiments.

In general, the experimental results from both experiments are consistent with the analysis of the corpus data. The corpus data analysis shows that nasal insertion

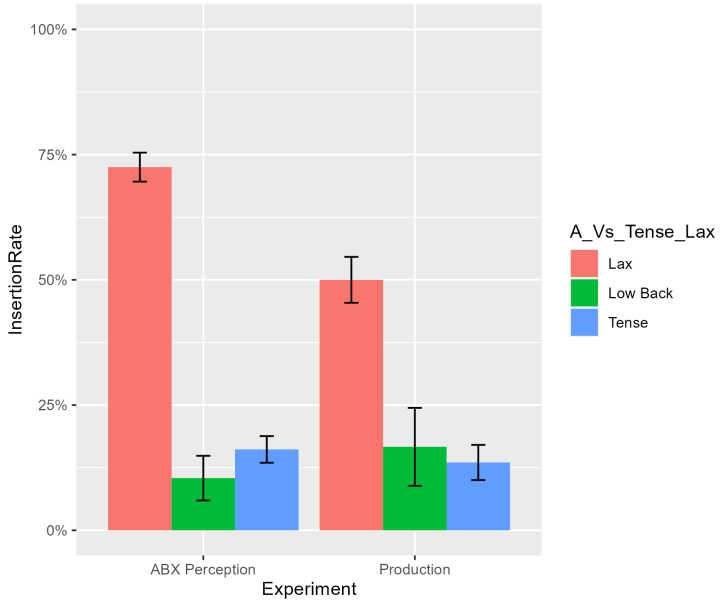


Fig. 5. Nasal gemination rate with a prenasal low back [ɑ], lax and tense vowels

accounts for 92.47% of English intervocalic nasal adaptation when the prenasal vowel is non-high lax (see Fig. 1). The experimental results also show that English prenasal vowel quality plays a vital role in nasal insertion in Mandarin loanword adaptation. However, the rate (perception results: 72.5%, production results: 50.8%) is not as high as the corpus data (92.5%). The experimental results differ from the corpus data regarding the stress location condition. However, the mentioned discrepancies are interpretable.

I argue that the difference in the nasal insertion rate can be attributed to how the participants handle the prenasal vowels (Lin, 2008, 2012). Taking the prenasal vowel [æ] as an example, it can be adapted as [ac], [je], [a], [ai], and [ja]. In the current experiment setting, the two given Mandarin outputs of [æ] were either [ac] without nasal insertion in an open syllable or [a] the fronted allophonic [ac] with nasal insertion in a closed syllable. Suppose the participant had adapted English [æ] as [a]; the form with nasal insertion was selected as the most perceptually similar form to the input. Another possibility is that the participants heard two nasals from the input due to the phonetic feature of the ambisyllabic intervocalic nasal, i.e., heavy vowel

nasalization in the prenasal vowel. The participants might also misperceive one nasal as two (cf. Peperkamp & Dupoux (2003)).

The results from both experiments do not show that stress location triggers nasal gemination in the adaptation process. For the CV_{lax}ˈNita test items, the participants in both experiments preferred the outputs with nasal insertion as the more perceptually similar option, as opposed to the variant without gemination. I suggest this is attributed to the English input recordings showing clear nasalization of unstressed prenasal lax vowels. The table below shows the total vowel duration of the prenasal vowel, the duration of the proportion of the nasalized part within the prenasal vowel, and the percentage of vowel nasalization of the CV_{lax}ˈnita test items.

Prenasal lax vowel	Vowel duration (ms)	Nasalization within the vowel (ms)	Ṽ/V
[ɪ]	86	60	69%
[ʊ]	107	63	58%
[ɛ]	115	92	80%
[ɔ]	144	111	77%
[æ]	157	122	78%

On the contrary, the CV_{tense}ˈnita test items are not adapted with nasal insertion even though the prenasal vowel in the test items is nasalized. I argue that the prenasal tense vowel already fits into Mandarin phonotactics. Therefore, even though the prenasal vowel shows a large proportion of nasalization, adding another nasal consonant is unnecessary. If an extra nasal is added, an ungrammatical syllable, i.e., CVːN.NV, will be formed in Mandarin. Hence, we can further conclude that when adapting English intervocalic nasals, Mandarin speakers weigh English prenasal vowel duration more than its nasal allophonic feature.

Some second-language research on the perception of Mandarin-English bilinguals indicates that they often experience difficulties in English lexical stress (Wang, 2008)Among the three acoustic cues for stress perception, F0, duration, and intensity, tonal language speakers frequently mainly rely on the perception of F0. Mandarin-English bilinguals have more accurate lexical stress perception for trochaic stress patterns than iambic (Yu & Andruski, 2010). This explains that the participants in the current experiments were confused by the iambic [CVˈNita] structures.

Similar to the corpus data, nasal insertion is not preferred when the English prenasal vowel is low back [ɑ]. Nasal insertion should occur if we treat the low back [ɑ] as a lax vowel while it fulfills the vowel type and stress location conditions. The combination [ɑŋ] is also a possible syllable in Mandarin. However, [ɑ] rarely triggers nasal insertion in Mandarin. I proposed that [ɑ] is phonetically long in duration. Hence, it fills the X slot in C(G)VX. There is no need to insert another nasal consonant. In addition, [ɑ] is one of the peripheral vowels in the donor language and the recipient language. Without sound modification, it can be faithfully mapped from English to Mandarin. Therefore, extra repair, i.e., nasal insertion, is not necessary. Another possibility is that [ɑ] acts as a tense vowel in open syllables, as proposed by (Ladefoged & Johnson, 2001). Green (2001) suggests that [ɑ] in English can be lax and tense in different environments. He points out that all words in which [ɑ] appears in contexts otherwise restricted to tense vowels are either loanwords like *spa* and *mirage* or hypocoristics like *ma* and *pa*.

Moreover, the discrepancies between the corpus study and the experimental results can be attributed to the adaptation method or the form of the inputs. Smith's (2006) study on Japanese doublets shows that when the adaptation is done by reading, vowel epenthesis is always used to repair syllable codas, whereas when the medium of borrowing is auditory, consonant deletion and vowel epenthesis both appear in Japanese loanwords. In the current study, the dictionary corpus is from 1988. It is reasonable to assume that, similar to Japanese loanwords, at that time, loanwords were generally entered into Mandarin through reading materials rather than spoken English since English education was not popular and people rarely had a chance to access foreign languages through public media. Following Smith's (2006) proposal, we can argue that by reading, the adapters perceived two nasals based on English spelling or orthography; therefore, two nasals are represented in the underlying representation of Mandarin, and there is no process when the underlying representation maps to the surface representation. However, phonologically, there is only one nasal in an ambisyllabic position such as this, and many cases show one nasal in English orthography. Still, they are adapted with two nasals in Mandarin (see data in section 3). There are also words with two nasals in spelling but adapted with only one nasal in Mandarin, e.g., *Minnie*→[miː.niː]. Hence, I argue that English orthography is not the primary factor that causes nasal insertion in Mandarin

loanwords. Based on the experimental results and the corpus data, I argue that nasal insertion is due to speakers' perception even though orthography may play a role inside, i.e., how Mandarin speakers perceive the prenasal vowel and the number of nasal features (Ṽ and N[+nasal]) in English.

To conclude, this paper presents the distributions of nasal gemination in a corpus and production and perception experimental data generated from Mandarin-English bilingual speakers in which intervocalic English nasals are variably adapted as either geminates or singletons in Mandarin. The corpus data show that the adaptation of intervocalic/ambisyllabic nasal in English to Mandarin loanwords is contextualized. Whether or not nasal gemination appears in Mandarin loanwords depends on the prenasal vowel quality and the primary word stress location in English. The experimental results partially pattern with the generalizations identified in the corpus. That said, the vowel type condition is identified in the results from both experiments. However, the effect of stress location is not shown. Mandarin speakers are cued by English prenasal vowels' duration and vowel nasalization. Still, they are not sensitive to the iambic stress pattern when they adapt intervocalic vowels in English.

This study contributes to a better understanding of which phonetic cues modulate variation in adapted forms and how they do so. Nasal gemination is necessary for perceptual reasons. It also showcases multiple sources for variable loanword adaptation: linguistic contexts, auditory vs. non-auditory inputs, and perception vs. production experiments.

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China's Forgotten Simplification Scheme: A Cross-Disciplinary Analysis of the Failure of the Second Round of Simplified Chinese Characters

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This paper seeks to determine the various reasons and their significance in the failure of the ERJIANZI (二简字) scheme, particularly through analysis in two major parts, followed by a reflection on the conclusions therein. Section 1 is a historical and political argument regarding the delay of the scheme, the internal strife within the Chinese Communist Party during the plan's creation, and hesitance towards large-scale reform both publicly and privately in a post-Mao China. Section 2 is a linguistic and computational investigation, using empirical methods to determine characteristics such as stroke counts across ERJIANZI, the distribution of simplification methods, and additional trends to characterize the reform in quantitative terms. The data demonstrates an overreliance on simplification methods that are less linguistically valid, as well as a significant stroke count reduction that makes new simplifications harder to distinguish at a glance. Results are discussed with respect to both parts individually, as well as overarching conclusions that arise when considering them in parallel.

0. INTRODUCTION

This article is adapted from my original undergraduate-level research thesis for my Bachelor of Science degree, defended in May 2023 at The George Washington University with the Department of East Asian Languages & Literature. Due to length considerations, this does not contain every detail mentioned in that paper, most notably removing the summary and discussion of pre-existing research in the field, as well as limiting the lengthy raw data present in the appendix to a hyperlink for a

read-only document containing said data. That being said, the majority of the original findings and personal discussion of results has been maintained in this publication, akin to what was presented in-person at NACCL-36. Non-standard Chinese characters are present in this paper, several of which do not exist within the Unicode standard of text encoding—in such cases, an image of a rendering of that character is placed in-line as if it were any other character.

2. SOCIOHISTORICAL ARGUMENTS

In order to properly contextualize the following arguments, some background information on the origins of the second-round scheme, as well as the relevant timeline of events in practice, need to be established. Although we now classify the major reforms in Chinese simplification by official publications or declarations of large-scale changes in the character set, the process of simplification in mainland China was significantly more porous and gradual than these classifications indicate. Since 1964, the CCP encouraged everyday citizens to simplify characters on their own, a movement which they termed "simplification by the masses" (Ramsey 1989:146-147). As such, officials in the Committee on Script Reform began to collect these simplifications as early as 1973. According to reports from a 1974 U.S. delegation to the People's Republic of China regarding its linguistic environment, the head of the Committee Mr. Laishi Ye informed the researchers that there were plans to publish "a list comprising around 100 simplified characters would be formally promulgated sometime in 1975" (Lehmann et al. 1975:47). In much the same way that the first round had a draft distributed in 1955 before a complete revision was promulgated in 1956, the Committee sought to distribute these lists to various local villages and towns for approval before final publication.

However, this original deadline did not hold, with the full draft in actuality being published on December 20th, 1977 as front-page news in several national newspapers, including the People's Daily. Likewise, rather than a revision of only a hundred or so characters, the draft comprised 1,116 first-round characters reduced into 853 second-round simplifications, sorted into two major tables. As explained in West's (2009) section on the second-round scheme, Table 1 comprises two subtables totaling 248 simplifications, meant for immediate use at the moment of

publication, while Table 2 comprises nine subtables organized by simplification method totaling 605 simplifications, meant for future consideration and implementation if Table 1 was received well. By July 1978, a directive was issued to stop the use of second-round simplifications in most official contexts, yet several examples exist of government use of the Table 1 characters beyond this point (West 2009:23-24). In Spring 1980, the Committee on Script Reform (CSR) was reorganized and a new revised draft consisting of a single list totaling 111 characters was proposed—despite the reduced number of simplifications, this list and the reform as a whole were officially terminated with the Second National Conference on Language and Script in January 1986 (Rohsenow 2004:29).

2.3. The Delay

To begin, we should consider the following question: Why was the project delayed from 1975 to late 1977? Due to a lack of available contemporary government documentation surrounding the CSR's methodology and process, the exact reasons cannot be fully understood. However, with what is known alongside original research done by previous literature on the topic, there are a few plausible leads as to the delay's origins.

The official party line on this topic was published alongside the scheme itself in national newspapers, on December 20th, 1977. According to Guangming Daily's publication of the scheme, the draft was initially submitted by the CSR to the State Council in May 1975, but was "unreasonably suppressed by Zhang Chunqiao, using authority that he had stolen." Many of the failures during the Cultural Revolution (1966-1976) were explained away as consequences of overreliance on Maoist principles, with four officials in particular seen as the scapegoat for the entire movement's shortcomings, a group dubbed the "Gang of Four". Zhang Chunqiao, then Vice Premier of the State Council, was one of these four officials. Thus, the eventual publication of the supposedly repressed plan was framed as a success for writing reform, in particular stating it was that "which the masses have long awaited" (Seybolt & Chiang 1979:379).

Yet, given the strong connection between Mao and the simplification projects in mainland China, this explanation alone seems rather hypocritical. In fact, it is moreso valuable as an indication of the tumultuous political shifts after the death of Mao in September 1976. Given leadership surrounding and within the CSR changed hands numerous times during the final years of Mao's rule, priorities likewise shifted with each successive boss; the prevalence of fear mongering around not following the party line and the persecution of the Mao-loyal "Gang of Four" plausibly could have resulted in CSR members being less willing to openly advocate for further simplification during this time. Previous research has likewise noted this contradiction, suggesting that the passage of the scheme was due to Zhang's successor Ni Zhifu wishing to protect himself by submitting it unaltered (Zhao & Baldauf 2008:59-60), explaining the way in which the plan was framed in the official publication. With more significant considerations at hand for the State Council in late 1977, the scheme was thus approved for distribution without much forethought on the part of the government.

In contrast to the uncertainty surrounding the reason behind the delay, the significance of the delay is much clearer. First is the changing political atmosphere post-Mao, in particular with the rise of Deng Xiaoping. Deng's early years as chairman were characterized by his "four modernizations", four major areas of national interest, comprising agriculture, industry, defense and science (Atwill & Atwill 2021:329-330). With shifting overarching priorities, previous systems that were constructed during Mao's rule were either abandoned or reformed to best support the new direction of China, hence the aforementioned restructuring of the CSR in Spring 1980, possibly to remove any remaining Maoist elements from the organization. Thus, language policy at this point took a backseat to economic reforms or research and development in the areas of science and farming. Even within language education and policy in China, Deng's government was the start of a shift away from fostering Chinese literacy and promoting English literacy. According to his 2004 book on English education policies throughout the CCP's history, Adamson notes on page 150 that the plans formed in 1982 were a massive overhaul to previous English curriculums, even compared to those from just four years earlier, indicative of the international outreach the Chinese government was promoting in excess at the time. As a result, I postulate that the

second-round scheme became so unimportant a priority that it was effectively phased out well before it was officially removed from the books in 1986.

Another important result of the delay was increased public skepticism towards large-scale cultural projects, coupled with a greater literate population impacted by a change in the script. This public skepticism was fostered from Deng's government itself, as a means of quickly setting an example against the Cultural Revolution that defined the late Mao era. Starting with the 1981 publication of the "Resolution on Certain Questions in the History of the Party since the Founding of the PRC", there was a concerted effort by the Chinese government to frame all previous efforts and projects during the recent past as harmful to national progress and leftist ideology, so anything from the Cultural Revolution was particularly taboo to promote during the early 1980s (Thornton 2019:55). Thus, the public at large was encouraged to criticize the Cultural Revolution's policies, which implicitly includes the second-round simplification scheme. With this in mind, the relative openness of linguists against the scheme, such as their refusal to adopt the characters in academic publications (Zhao & Baldauf 2008:57), can be better understood. For the general public meanwhile, this factor alone cannot explain the pushback entirely. Instead, the increase in literacy rates from the start of simplification efforts to the rejection of the second-round scheme supports the notion that more Chinese people were impacted by a change in appearance of the script compared to the first round. At the foundation of the PRC in 1949, literacy rates were claimed to be as low as 20% (Zhao & Baldauf 2011:171), but by the 1982 national census, that figure had increased to 68% (Jowett 1989:417). Regardless of what caused this spike in the literate population, it is evident that a majority of Chinese people—48% of which would only have experience with simplified characters, never needing to adjust from traditional to simplified—were thus being asked in 1977 to readjust to a new corpus of characters. Therefore, primed to view anything from Mao's final years with a critical eye, I hypothesize that the Chinese people were able to raise objections on the basis of its needless personal impact, subsequently underpinning why the reform as a whole was widely unpopular.

1.2. The Scope

The other remaining aspect worthy of discussion is the expanded size of the reform itself. Unlike the previous factor, there seems to be general agreement within existing literature that the eightfold increase in the number of simplifications is a result of the Cultural Revolution's rejection of experts, and the subsequent influence of linguistically-untrained politicians on the selection process. One of Mao's major rationales against expertise during his final years was the bourgeois connotation associated with specialization (Rohsenow 2004:27), thus both the staff and agenda of the CSR was altered to accommodate this ideological stance. For the latter, after the initial hundred or so characters were collated by the CSR as evidenced in the Lehmann report, the responsibility for the reform then fell into the hands of another department that split off from the CSR, labelled as the "748 Project" (Zhao & Baldauf 2008:59). This section concentrated on collecting characters from the public and adding them to the project, while emphasizing on a staffing level non-scholars over intellectuals. Additionally, Rohsenow (2004:29) claims that other lower-level employees working for the offices of the department were "probably trying to justify or maintain their political position within the Committee's offices" by engaging in the simplification scheme. As such, these people would have lacked the linguistic proficiency to properly filter the characters discovered through the 748 Project, while possibly having a perverse incentive to include more characters simply to perpetuate their employment during a tumultuous period. In doing so, the validity of these homegrown characters was never adequately verified prior to release, and the poor reception to the reform resulted in the CSR's credibility being tarnished from then on.

As for additional impacts, these largely come down to the quality of the simplifications themselves, some of which is quantified by my original research in 2. Computational Linguistic Analysis. However, there are numerous accounts both contemporary and from existing research as to the inadequacy of the simplifications. For contemporary accounts, Rohsenow (2004:29) mentions that certain simplifications constructed by staff members themselves were claimed to be "laughable" by members of the public, though he fails to mention any simplifications by name. The current consensus by linguists on the value of the scheme is epitomized by Chen (1999:159-160), in which he emphasizes an overreliance on phonetic substitution and newly created forms instead of pre-existing simplifications common amongst the public. In particular, he writes that a good amount of the simplifications

selected were "confined to certain geographical areas or to certain sectors of society, or were in use for a limited period of time only". In other words, several of the characters chosen which had a historic root in society were extremely obscure and thus not immediately recognizable; other research (West 2009:26) has determined some of these simplifications date back to the Tang dynasty in the playbooks of certain travelling drama troupes, yet the forms written therein were largely forgotten over time. For instance, the Yuankan Zaju Sanshizhong ("The Thirty Zaju Plays in Yuan Paintings") includes numerous glyphs that were later employed as simplifications in that round, including 𠂤 (能), 𡈼 (事), 𠂢 (推) and 𢎘 (要). Therefore, when exposed to these ancient or obscure forms in large number, the public would have most likely needed to learn the new simplifications as if they were entirely new characters, in comparison to the previous scheme, considered largely a formal adoption of long-standing and relatively widespread simplified forms.

Such a large number of new characters likewise conflicted with the growing influence of the computer in China during the 1980s, and in particular the digitization of hanzi systematically. One of the first major steps in standardizing text in the digital age was a 1981 publication by the CCP itself, "Basic Collection of Character Coding Graphs in Exchange of Information", comprising 6,769 simplified characters as a baseline for computer encoding (Li 2019:145), yet none of the second-round simplifications (with the possible exception of 炖, see 2.3. Discussion for more) are included in this list. Subsequently, the very first efforts to digitize Chinese characters as computer fonts relied on the first-round simplified script, including the influential yet commercially unreleased Sinotype III, a project which sought to develop a Chinese operating system based off of the Apple II in 1981 (Mullaney 2021). In fact, the very first standardized character encoding set in mainland China, commonly referred to as GB 2312, is directly based on the 1981 publication in which Chinese characters are included. This remained the standard in Chinese computing circles until an adaptation of the first iteration of Unicode (which includes GB 2312 as a subset) superseded it in 1993. Thus, when the second round was under consideration in the first half of the 1980s, digital text in an industry that Deng's government was directly promoting was standardized to exclude these particular simplifications. In my view, it stands to reason that the required changes to computing standards the new simplifications would have necessitated constituted yet another draw to

continuing the reform at any scale, even moreso when it was initially proposed with over 800 simplifications.

2. COMPUTATIONAL LINGUISTIC ANALYSIS

With a stronger understanding of the sociopolitical circumstances surrounding the failed reform, it seems appropriate now to analyze the simplifications more abstractly. While a large goal of character simplification in the People's Republic of China was to adjust hanzi gradually to enable for greater acceptance of a phoneticized form of the Chinese script (Zhao & Baldauf 2011:170), the process of simplification in of itself concerns more with reducing the visual complexity of hanzi and removing variant forms from regular use (Qiu 2000:404). Both of these notions can be quantified in stroke count reduction and spread of simplification methods respectively, thus a statistical investigation into these characteristics in the second round's scheme may provide formal evidence that characters were oversimplified or simplified improperly.

Before detailing the methodology, a few key decisions were made that warrant explanation. First, although the plan for the second round was published in its entirety in December 1977 in two major tables, only the first table (with two subtables) was ever promulgated for use in official contexts, such as the People's Daily newspaper. Therefore, the public was only regularly exposed to the couple of hundred characters contained in those two subtables. As such, the sample chosen for this investigation were the characters contained within those two subtables—270 first-round characters simplified into 248 second-round ones, the former of which will be referred to as "current characters" or "current simplifications" hereon. By using this sample, the results made in this section can better reflect or relate to the earlier conclusions of 1. Sociohistorical Arguments.

However, the first subtable of Table 1 also includes a handful of monomorphemic words comprising two characters each, where the characters included are only simplified in these contexts and not as individual characters. Almost all of these are either loanwords, place names or terms for animals, where each of the two characters are replaced with homophonic equivalents. For example,

the word for tadpole (蝌蚪, *kēdǒu*) was replaced character for character with the phonetic components by themselves, 科斗; yet, these characters are only simplified in this way in this context. Trying to conform these seven particular compound simplifications to the analysis I have conducted results in unfavorable results either way: either we treat the whole two characters as a single character for stroke count and simplification type which would skew the stroke count spread quite considerably, or we split these compounds into the individual characters and how they are simplified by themselves, which neglects the particular context in which these certain simplifications are employed in reality. Interestingly, the latter is how the count of 172 characters in the first subtable is derived—each character in the individual pairs is treated as its own simplification, for a total of 11 unique simplifications not listed elsewhere. As such, along with the fact these only total 7 in all, I have decided to remove them from consideration in the scope of this investigation.

Additionally, a third metric was tracked alongside the simplification method and stroke count for the hanzi in the aforementioned sample—whether the character in question had already been simplified in the first round. This was tracked to determine the proportion of resimplifications present in this reform, a measure of redundancy for the project as a whole. In the first round, some characters were simplified in a way that resulted in a fewer number of strokes, while others were tweaked stylistically to present a cleaner form without a change in stroke count. For instance, a cursive simplification of the left-hand component form of 言 results in all characters containing 言 in traditional using 讠 in simplified instead. Meanwhile, when the component form of 肉 is used in the left of a character, traditional script writes it as 月, while simplified script prefers writing it as 月, eliminating the visual distinction between a character using 肉 versus 月. The second example results in a new ambiguity in simplified forms, yet only the first one results in a difference in stroke count, a reduction from seven strokes down to two. For clarity and consistency, only the former kind of simplification will be considered "already simplified" for this data set. Any stylistic ambiguities arising from second round simplifications will still be mentioned in the discussion section, but existing instances within the current simplifications are not denoted in the data.

2.1. Methodology

绱	11	上	3	TRUE		8	72.72727273
鞘	17	上	3	Unsure, see note	Potentially simpl	14	82.35294118
杓	7	勺	3	FALSE	The other pronun	4	57.14285714
输	13	轨	6	TRUE	Possible pictoph	7	53.84615385
爽	11	夹	7	FALSE		4	36.36363636
私	7	厶	2	FALSE	Also an ancient f	5	71.42857143
算	14	祘	10	FALSE	Other sources or	4	28.57142857
泰	10	太	4	FALSE		6	60
檀	17	坛	8	FALSE	Of the same styl	9	52.94117647
糖	16	矿	9	FALSE	Has a variant trac	7	43.75
套	10	奁	7	FALSE	Replacing the co	3	30
腾	13	誊	9	TRUE		4	30.76923077
停	11	仃	4	FALSE	The scheme stat	7	63.63636364
稳	14	秂	9	TRUE		5	35.71428571

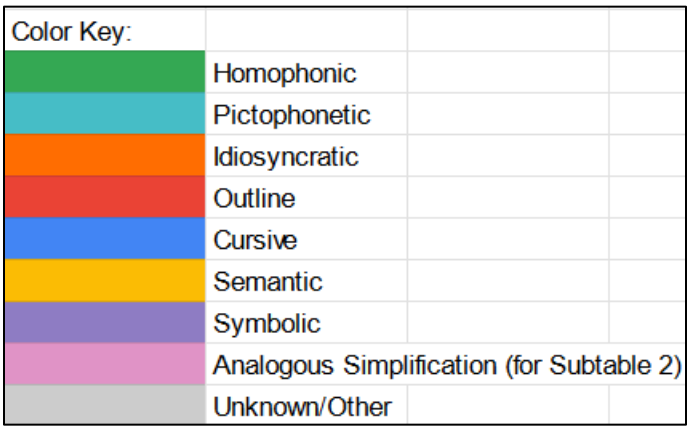
(1) A screenshot of a portion of the raw data, demonstrating the layout of the spreadsheet.

The set of characters for consideration comes from Andrew West's (2009:28-55) compilation of the second-round simplifications, as part of his proposal mentioned in the literature review. Over the span of a week, I compiled these into a spreadsheet[33]—a pair of columns for the current simplification and its stroke count, and another pair for the second-round form and the new stroke count (see Example (1)). From here, a number of different quantitative and qualitative variables were tracked.

Apart from the aforementioned Boolean variable determining whether a character has been (meaningfully) simplified prior, the major variable under consideration is the stroke count reduction, computed as the number of strokes in the current simplification subtract the number of strokes in the second-round simplification. This was then also expressed as a percentage reduction, computed in the spreadsheet as 100 times the stroke count reduction divided by the current

[33] For those interested in seeing the full raw data, the original Google Sheet this data is available at the following link:
https://docs.google.com/spreadsheets/d/1yRi_LM82q20kuQzY5apR8RFeTJbCE8zCO4XuGLCukW8/edit?usp=sharing
For those unable to access via the link, email jake_messick@gwu.edu for an access request.

simplification's stroke count. Tracking these two separately allows for a raw number result, as well as a more proportional result, characterizing the scheme numerically in different ways.



(2) Screenshot of the color key used in the spreadsheet to distinguish different simplification methodologies.

The other remaining data point is the simplification method, tracked by color of the row (see Example (2) for the color key). The scheme itself does not list simplification methods for either of the subtables under Table 1, thus I had to make a personal judgment for every row in the spreadsheet using available resources such as online etymology listings and compilations of caoshu forms of characters. That being said, all but one of the methods listed in Diagram 2.2 come from the simplification types that the subtables in Table 2 were sorted by; they were likewise explained by West (2009: 27-28) in his introduction to the second-round scheme, as follows:

• Homophonic: A character is wholly replaced by one with similar or identical pronunciation.

• Pictophonetic: A phonetic component in a character is replaced with another.

• Idiosyncratic: A characteristic component from the original character now represents the entire character.

• Outline: The overall shape of the original glyph is maintained, but some internal strokes are omitted.

• Cursive: A cursive (caoshu) form of a character is adopted into a print version.

• Semantic: A semantic component in a character is replaced with another.

• Symbolic: A meaningful component is replaced with an arbitrary one, without any connection to the original function of the component.

• Analogous: A character containing a component previously simplified in one of the above ways has that component simplified by analogy.

Thus, not only do the types themselves derive from the second-round scheme's own rationale, but the choices I made for which character comes from where used the plentiful example characters listed in Table 2 as a basis of decision making. A good example are the several characters that could be sorted under either homophonic (green) or idiosyncratic (orange), which were made by taking just the phonetic component of the current simplification and letting that represent the whole, such as 帮 → 邦. In cases where the phonetic component is an existing character with similar pronunciation and relative frequent use, I classified them under homophonic. For instances where the component chosen does not exist as a character in any context, or where the character is obscure and pronunciation is not closely related to the current simplification (e.g. 病 *bìng* → 疒 *n*è), I sorted them under idiosyncratic.

The only remaining simplification method not explained by West or present In the second-round scheme itself is "unknown/other", labeled with gray. These are instances where the character either has a methodology that does not fit under any of the existing methods or is unclear which method in particular is employed. All of these have full explanations for the rationale listed under the "notes" section in the full spreadsheet.

After these were all compiled for every current simplification within Table 1, several graphs, tables and additional results were computed from the raw data, including measures of spread of the stroke counts for both sets of characters, the percentages

of different simplification methods, as well as the percentage of characters already simplified. Any anomalies in the data, such as uncertain simplifications, strange edge cases for stroke counts or methodology, or anything else worthy of discussion in this paper were noted in the spreadsheet itself for future reference. Now, with the methodology laid out in full, the results can be fully understood.

2.2. Results

First are the data pertaining to stroke counts within the two sets of characters, as well as the stroke reductions resulting from the second-round scheme. Averages, medians and other relevant measures of spread are displayed in Table A and Table B below. Additionally, to best accompany the numerical results is a visual representation of the stroke counts in both current simplifications and second-round counterparts across the entire sample of data, a type of graph known as a box-and-whiskers plot (Example (3)). The colored box represents the inner 50% of the data, in our case the stroke counts of the sample characters, the boundaries of which are the first quartile (25th percentile) and third quartile (75th percentile) respectively. The outer "whiskers" denote the maximum and minimum for both sets, demonstrating the extremities of the stroke counts data.

Table A: Raw Data Regarding Stroke Counts Across Table 1 Characters

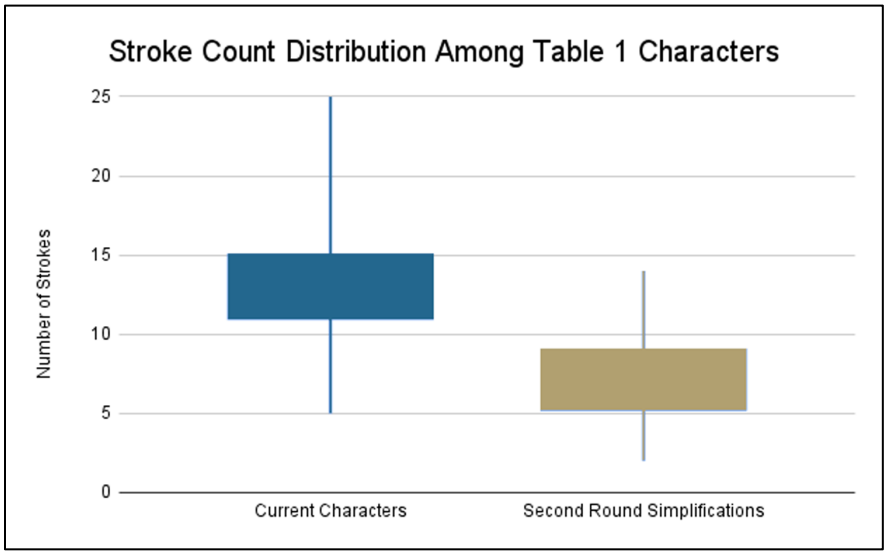
Statistical Value	**Current Characters**	**Second Round Simplifications**
Total Number of Distinct Glyphs	270	237
Average Number of Strokes	13.18	7.22 (↓ 5.96 strokes)

Minimum Stroke Count	5	2
Quartile 1 of Stroke Counts	11	5.25
Median Stroke Count	13	7
Quartile 3 of Stroke Counts	15	9
Maximum Stroke Count	25	14
Mode Stroke Count	14 (37 characters)	7 (42 characters)
Number of Characters Previously Simplified	88	N/A

Table B: Percentage Change in Stroke Count Between Current Characters and Second Round Simplifications Within Table 1 Characters

Statistical Value	**Second Round Simplifications**
Average Percentage Reduction (PR)	44.22%
Minimum PR	0%
Quartile 1 of PRs	30.77%
Median PR	44.10%
Quartile 3 of PRs	56.25%
Maximum PR	86.67%
Mode PR	50% (22 characters)

(3) Stroke Count Distribution Among Table 1 Characters Visualized as a Box-and-Whiskers Plot

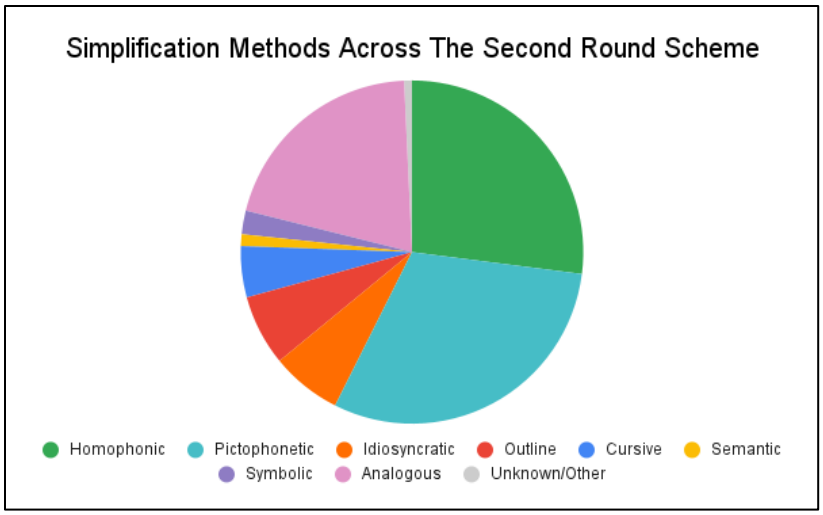


Next are the categorical data pertaining to the simplification methods and their distribution, displayed as both raw count and percentages in Table C, alongside a couple of examples to demonstrate characters exemplar of that particular methodology. As with the previous table, another visual representation accompanies this data, a pie chart color-coded in the very same way as the original datasheet, as Example (4) below.

Table C: Distribution of Simplification Methods Across Table 1 Characters

Simplification Method	**Number of Characters**	**Percentage of Total**	**Example**
Homophonic	73	27.04%	蛋 → 旦 糊 → 胡

Pictophonetic	82	30.37%	酒→氿 稳→ 秖
Idiosyncratic	18	6.67%	街→亍 雪→ 彐
Outline	18	6.67%	荔→芳 器→ 皿
Cursive	13	4.81%	阎→闫
Semantic	3	1.11%	信→仪
Symbolic	6	2.22%	鞋→ 鞋
Analogous	55	20.37%	青→ 青 thus 请→ 请
Unknown/Other	2	0.74%	卒 →卒



(4) Simplification Methods Across the Second Round Scheme Visualized as a Pie Graph

2.3. Discussion

Let us begin by discussing the stroke count reductions and various measures of spread surrounding the data sets as presented in the first set of tables and examples. The average stroke count decreasing by nearly half from 13.18 strokes to 7.22 strokes demonstrates a strong adherence to a key factor in the failure of the scheme, as highlighted by Chen (1999). His main argument is that a directive published in 1964 resulted in a central flaw that fundamentally undermined the effectiveness of the second-round scheme. According to the directive, the goal for all simplification projects after the first round was that "all characters in common use should have the number of strokes reduced to ten or less" (Chen 1999:155). Chen explains that this conflicts with two competing goals of any writing system, ease of production and ease of recognition, where the latter is sacrificed for improvements in the former in the case of the second-round scheme. With 75% of second-round characters across Table 1 within single digits of strokes and more than 25% of current characters contain more strokes than any second-round simplification, Chen's notion of indistinguishability is well supported by these findings. It is worth noting that the percentage difference between the averages in Table A and the average PR in Table B are different—45.22% and 44.22% respectively—implying that on a per

character basis, the scheme is a little less reductive than the raw data trends may show.

However, if compared to known data on the stroke reduction of the first-round characters from their traditional counterparts, a few interesting results emerge. Namely, if only considering the 515 simplifications listed not formed by analogy in the first round, the stroke reduction is actually higher than that of this sample, decreasing from an average of 16.8 strokes to 8.16 for a percentage change of 51.43% (Li 2019:141). However, this result does not align with the methodology of this investigation, as analogous simplifications were kept. When accounting for every character simplified by analogy in the first round, the average number of strokes was reduced from 15.6 to 10.3 (Chen 1999:157), for a percentage change of 33.97%. Thus, the claim that the second round was "oversimplified" compared to the first round is supported by this result, and visually apparent in the significantly reduced spread of stroke counts of ERJIANZI compared to the current characters, as depicted in Example (3).

In addition, the significance of the final row of Table A is within the impact it implies for those whom already were accustomed to the first-round simplifications. With nearly a third of all characters in Table 1 being simplified previously in 1956, this figure emphasizes both the repetitive nature of the reform, as well as the hassle the project was thrusting onto a public that only recently became more literate. It stands to reason that the amount of resimplifications present in the data would have posed a challenge towards reeducation of these new simplifications when many only learned how to read the simplified forms within the last decade. It is also possible that the high inclusion of previous simplifications was by design, given that one of the largest goals of the simplification process was to boil the writing system down into a phonetic script. By readjusting known and familiar characters in regular, gradual batches, readers may have become more accepting of a sound-based system if acclimatized in this manner.

As for the remaining results, the most significant are the prevalence of certain simplification methods. According to the data present in Table C, the majority of ERJIANZI rely upon some phonetic aspect in their logic, namely the homophonic and pictophonetic methods, which together make up 57.41% of all simplifications. This

is significant, as it provides evidence that later simplification projects were indeed progressing towards a phonetic script for the Chinese language, hence the relatively high proportion of homophonic characters in particular. Homophonic simplification is considered to be one of the weaker methods of simplification (Zhao & Baldauf 2011:172) due to the inherent increase in ambiguity from giving a single glyph multiple pronunciations and meanings. Despite this inherent issue, they comprise the second largest methodology across Table 1, demonstrating the reliance the CSR had on replacement of this type. Another alarming statistic is the relatively high proportion of symbolic simplifications, at twice the number of semantic simplifications. Despite only making up six of the 270 current characters being simplified, this methodology is fundamentally flawed, due to the aforementioned arbitrary nature of the replacement. The fact these particular methodologies are employed to the extent they are in the sample studied lends credence to the notion that organizers of this plan were not as linguistically sound in their selection logic as argued in 1.2. The Scope.

In addition to these statistical trends, there are plenty of particular examples of second round simplifications worth mentioning in detail. To begin, there are a couple of edge cases regarding whether these second-round simplifications are still in use, the most notable of which is 炖. Despite not being present in the 1986 revised first round table as a simplification, it is generally the character used today in mainland China in place of 燉 for "stew", despite the fact it seemingly originates from a repealed reform. It seems likely that the former was a so-called "variant form" (异体字, *yìtǐzì*) of the latter to some degree, as no other second round simplification has been retained to the same extent as 炖 in the modern era. This character is one of two listed as "unsure" in the data for whether it constituted a resimplification, alongside 鞒, which was already simplified to 绱 in the first round yet was listed as a separate character for simplification in the second-round list.

Next, the two simplifications listed as "unknown/other" for simplification method warrant explanation. Some of these are because the methodology does not cleanly fit into one simplification method of those officially listed in Table 2, such as 卒 → 卆, which derives from an ancient form of the current character. However, others are classified into this category 冂 due to uncertainty over the

simplification fitting any known simplification method. Perhaps the best example of this is simplified from 部. Initially, I believed this to either be a cursive simplification or an outline simplification, due to similarities with known examples of those methodologies. Despite that, looking up CAOSHU or XINGSHU forms of 部 gave none substantially similar to the second-round simplification listed. Likewise, most outline simplifications simply deleted existing strokes to produce a new character, while this one instead appears to be a very general shape for the strokes of the original character.

Last in a look at case studies are numerous examples of poor simplifications, on the basis of stroke counts or improper consideration of the structure of the current character. There are exactly two simplifications which fail to reduce the stroke count whatsoever, those being 建 → 迠 and 迎 → 迓, the former pair both having 8 strokes and the latter having 7 each. As both current characters are already less than 10 strokes, it still conforms to the 1964 directive about simplification goals, but this begs to question the reason for these changes. While not more efficient to write, it is possible that these new glyphs are easier to recognize at smaller sizes, easier to write, or both. In doing so, however, a few broken components arise. The first is a pictophonetic simplification, but the current character is ideogrammic, so a semantic component has been replaced with a phonetic one. The second is a cursive simplification, but the phonetic component in 窄 the original character has lost its meaning entirely, now resembling 帀, a variant of 匝 (*zā*). Outside of these inefficient simplifications, there are others which break the current character's internal coherence. Perhaps the best example of this is simplified from 寨(*zhài*). The current character has two valid deconstructions, both of which consider 木 ("wood") at the bottom to be a semantic component, but take 寉 (*sāi*, "to block up, to plug", variant of 塞) to be either phonetic or semantic. However, the only possible interpretation of the121arlatd-round form is that 在 provides the sound information while 宀 provides the meaning, the latter of which was never a meaningful component of the original character.

3. CONCLUSIONS AND FUTURE CONSIDERATIONS

From the evidence gathered and presented, it seems clear that one of the most significant factors underpinning the failure of the second round of simplification was a lack of linguistic rigor in the formation of the draft published in 1977. With the Cultural Revolution swapping learned expertise for a supposed natural intuition of the general public, the validity of the scheme on a linguistic level suffered, resulting in a more literate public confronting difficulties when encountering the script in newspapers and other formal instances during the official promotion of the reform. This, in turn, led to the scheme and the department responsible for it being strongly associated with a controversial period under strict criticism from the public during the rise of Deng Xiaoping. With China's priorities changing towards the international stage and economic sectors in the early 1980s, a scheme plagued with improper organization both surrounding its formation, as well as within the simplification methodologies used, failed to win over a government with wildly different priorities to that of Mao's by January 1986. In all, both the sociopolitical and linguistic factors discussed in this report seem equally balanced in their effect on the general public, and their eventual distaste towards the second round of simplification.

As for future research, I believe that assessment of Table 2 characters in a separate context may be warranted, particularly to determine the proportion of characters that were "created" directly for the scheme. My resources were not large enough to conduct independent research into the origins of every character in my sample, but given anecdotal evidence from some staff members in my school's department, it seems that many of the forms I believe could have been invented by staff members of the CSR were in fact used by members of the public well before their official promulgation in the late 1970s. As such, interviews with people who lived through this time period or case studies into specific simplifications may shed further light onto the processes involved in this reform, as well as clarifying the uncertain classifications within my own data set or within my historical arguments.

Lastly, I want to emphasize the importance of further research of any kind into ERJIANZI, as numerous documents from the 1970s are written in these characters, many of which are unable to be fully digitized due to a lack of interest in preserving the reform. Studies such as my own serve as an initiative to provide insight into the composition of the characters themselves, so as to assist in documenting linguistic change in mainland China and abroad. Determining the origins of these

simplifications on a local or historical level is pertinent to understanding the overall history of Chinese orthography, not just the second round in isolation.

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A Study on Discourse Marker Use in the Mandarin Oral Speech of English-Chinese Bilinguals

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The use of discourse markers (DMs) in bilinguals' oral speech shows different patterns from the use of DMs in monolinguals' oral speech. Some L2 DMs reflect the same functions as the functions of the corresponding DMs in L1 (Liu, 2013). Additionally, some DMs from the dominant language of bilinguals have been prominently used in the less dominant language (Tao & Thompson, 1991; Lee, 2013). English and Chinese are two typologically different languages. How English-Chinese bilinguals use DMs in their Mandarin oral speech is underexplored. This study adopted a sociolinguistic interview method (Liu, 2013) to investigate English-Chinese bilingual participants' use of DMs in their Mandarin oral speech, aiming to address these questions: (1) Do English-Chinese bilingual speakers living in an English-dominant environment use English DMs in their Mandarin oral speech? If so, which English DMs are employed, and what functions do they serve in Mandarin oral speech? (2) Do English-Chinese bilingual speakers in an English-dominant environment employ Mandarin DMs differently from Mandarin speakers who live in a Mandarin-dominant environment? This study finds that English DMs have been employed in the Mandarin oral speech of English-Chinese bilinguals. These include the English DM *like*, which is used for introducing an example or an explanation, and for searching for the appropriate expression; and the English DM *yeah*, which is used as a confirmation marker, and a pause filler and also to hold the floor**.** Additionally, English-Chinese bilinguals in this study overgeneralize the Mandarin DM 所以(suoyi [so]) by using it to indicate a new sequence, and use 好像 (haoxiang [like]) as a DM to introduce examples and as a pause filler. Overall, this study helps to unveil the functions of DMs in the oral speech of bilingual speakers, offering insights into language use patterns and influences in bilingualism.

0. Introduction

The use of DMs is regarded as a key feature of oral discourse (Brinton, 1996). DMs contribute to "the coherence of the discourse by signaling or marking a relationship

across utterances" (Torres, 2002:65). Bilingual and multilingual speakers might use various linguistic resources when using DMs in their oral speech. Different usage patterns of DMs are found in bilinguals' oral speech, including bilingual speakers using DMs from one language in the oral speech of another language, and such DMs might take on similar functions to those in the original language (Tao & Thompson, 1991; Hlavac, 2006; Lee, 2013; Liu, 2013; Wang, 2008); second language (L2) learners employ DMs with functions that differ from native speakers' patterns of use (De Cristofaro & Badan, 2019; House, 2013; Liu, 2013; Müller, 2005; Wang, 2014); some L2 DMs in L2 speech are overgeneralized while others were undergeneralized (Reaves, 2023).

English and Mandarin are typologically different languages, and do not share phonological or orthographical similarities in their DMs. However, some DMs in these two languages semantically overlap. Whether these DMs that have overlapping semantics in Mandarin and English are used differently by bilingual Mandarin speakers compared to monolingual Mandarin speakers or monolingual English speakers is underexplored. For bilinguals of English and Mandarin, how these two languages contact and influence each other, and whether this contact is reflected through the usage of the DMs, is also underexplored. There is a paucity of learner corpora of spontaneous interactions available for researching the pragmatics of Mandarin-English bilinguals teenagers' speech.

Speakers of all ages use DMs, and different age groups might have different trends in using DMs. The adolescent speech, or teenage talk, refers to speech produced by speakers ages 13 to 19 (Roberts, 2019). The features of adolescent speech, compared to adult speech, create bonds between their members as well as work as identity markers, and such features include frequent DMs, intensifications and taboo words (Jorgensen, 2013). Studies on adolescent speech help to unveil the social and interpersonal functions of DMs in conversation (Roberts, 2019). However, the use of DMs in Mandarin-English teenage bilinguals' speech has not been thoroughly researched.

To address such research gap, this study aims to explore how English-Chinese bilingual speakers who live in an English-dominant environment use English DMs in their Mandarin oral speech. Additionally, it aims to discover which English DMs are employed, and what functions they serve in Mandarin oral speech. Furthermore, the study seeks to find out if English-Chinese bilingual speakers in an English-dominant language environment employ Mandarin DMs differently than Mandarin speakers in a Mandarin-dominant environment. This research helps to unveil how different language resources, including DMs, are used in the speech of bilingual speakers.

The paper first reviews previous studies on the definition and functions of DMs, followed by an analysis of the use of DMs among bilingual speakers in Section 1. The research questions are outlined in Section 2. Section 3 introduces the research methods, including data collection and analysis techniques. The findings are presented in Section 4. Section 5 provides a discussion of the results, and Section 6 concludes the paper.

1. Literature review

1.1 The working definition of discourse markers in this study

Although there are variations in the definition of DMs, the following criteria is agreed upon among scholars: DMs are syntactically optional (Brinton, 1996); DMs lack or have a little semantic meaning (Brinton, 1996; Ostman, 1982; Schourup, 1999); DMs may be multifunctional (Aijmer, 2002; Brinton, 1996). Based on these agreed upon features, a working definition of DMs is given: "1.DMs are grammatically optional or syntactically independent. 2.DMs have little or no propositional meaning 3.DMs have textual or interpersonal functions" (Liu, 2013: 151). This working definition of DMs (Liu, 2013) provides a practical rule to define DMs while studying the DMs from participants' L1 oral speech and L2 oral speech, so this working definitions of DMs are used to guide the current study.

1.2 The functions of discourse markers

DMs can have textual functions and interpersonal functions, and those functions can co-occur in the same discourse (Liu, 2013; 2017). The textual functions of DMs include: "1. Marking transitions; 2. Introducing to a new turn; 3. Introducing an explanation, justification, background; 4. Introducing or closing a digression; 5. Self-correction; 6. Introducing direct speech; 7. Serving as a filler or holding the floor" (Liu, 2013:153). The interpersonal functions of DMs include: "1. Expressing a response or a reaction to the preceding discourse or attitude toward the following discourse including back-channel signals; 2. Hedges expressing speaker tentativeness; 3. Effecting cooperation, sharing, or intimacy between speaker and hearer, including confirming shared assumptions, checking or expressing understanding, requesting confirmation, expressing deference, or saving face (politeness)"(Liu, 2013:153).

The use of DMs in bilinguals' speech provides a chance to observe how bilingual speakers use linguistic resources to keep the cohension and coherence in their speech. Examining the speech of bilinguals to determine the status of DMs provides a window into the role of DMs in situations of language contact (Dajko, N., & Carmichael, K.; 2014). The pragmatic functions of DMs act as crucial elements in maintaining natural interaction among participants in conversation in both Chinese and English (Tsai & Chu, 2017). Though English and Mandarin have some DMs that semantically overlap, the sub-functions of these corresponding DMs in English and Mandarin are not exactly the same. How DMs function in the Mandarin speech of L2 Mandarin speakers and Mandarin-English bilingual speakers has currently raised the interest of researchers.

1.3 The use of DMs in Mandarin oral speech by L1 English speakers and English-Mandarin bilingual speakers

Bilingual speakers might use DMs from one named language in the oral speech of the other named language (Tao & Thompson, 1991; Hlavac, 2006; Lee. 2013; Liu, 2013; Wang, 2008). For example, Croatian–English speakers use the English DM *yeah* in their Croatian dominant speech (Hlavac, 2006), and Spanish-English bilinguals integrate English-language DMs into their Spanish-language oral narrative (Torres, 2002). Previous literature (Lee, 2013; Wang, 2008; Wang, 2014; Tao & Thompson, 1991) shows that the use of Mandarin DMs by L2 Mandarin speakers and English-Chinese bilingual speakers may be influenced by English. English DMs are used in the L2 Mandarin discourse (Wang, 2008). Wang (2008) examined the Mandarin oral speech of 51 Mandarin Chinese L2 students in China whose native language is English, and the approximately 5-hour recording of teacher-student and student-student interactions shows that English DMs occur in L2 Mandarin oral speech, including *I mean*, *you know*, *like* and *or*. The use of English DMs is also found in Mandarin oral speech by English-Chinese bilingual speakers who live in a bilingual or multilingual community. Singapore is a multilingual nation that has four official languages including English, Malay, Chinese and Tamil. English is the main medium of instruction and working language in Singapore, and Mandarin is taught in school for ethnic Chinese students (Lee, 2013). Lee (2013) has found that English DMs such as *then*, *but*, *actually* and *ok* are incorporated in conversations carried out mostly in Mandarin in Singapore, and *then* is the most frequently used English word in Mandarin in Singapore. Additionally, Tao and Thompson (1991) found that Mandarin-English bilinguals in the US used English backchannels such

as *yeah, aha, mm-* in Mandarin conversations as continuers or to signal understanding, confirmation, and acknowledgement of agreement. English-dominant speakers used English in addition to Mandarin backchannel tokens, and they produced these tokens in positions and with functions and frequencies reminiscent of English backchannel behavior (Tao & Thompson, 1991).

In the oral speech of L2 or a less dominant language, speakers may overgeneralize functions of some DMs from L2 or from the less dominant language (Liu, 2013; Wang, 2014). For example, Singaporean English-Mandarin bilinguals use the Mandarin DM 所以(suoyi [so]) to introduce new sequence. This function of 所以(suoyi [so]) is not found in native Mandarin speakers in Mainland China, but is found in the corresponding English DM *so* in native English oral speech (Wang, 2014).

Overall, some bilingual speakers use DMs from a variety of linguistic resources or overgeneralize DMs in their speech. The specific DMs used in the Mandarin speech of teenage bilingual speakers to maintain the flow of conversation remains underexplored.

2. Research questions

(1) Do English-Chinese bilingual speakers living in an English-dominant environment use English DMs in their Mandarin oral speech? If so, which English DMs are employed, and what functions do they serve in Mandarin oral speech?

(2) Do English-Chinese bilingual speakers in an English-dominant environment employ Mandarin DMs differently from Mandarin speakers who live in a Mandarin-dominant environment?

3. Methodology

3.1 Participants

This study adopts a qualitative research method. English-Mandarin bilingual teenagers (aged 17-18) were recruited through snowball sampling in 2021. Eight English-Chinese bilingual students aged 17-18 years old agreed to join this study. At the time of the study, these participants were studying in a school where the main language of

instruction is English (only Chinese language class is taught in Mandarin Chinese). All participants have ethnic Chinese family backgrounds. The use of DMs by bilingual speakers is a window into how different languages interact with each other and how new functions emerge in bilingualism. The dominant language of the English-Chinese bilingual speakers interviewed in this study is English, as their academic and social lives are communicated in English. Five participants use English DMs and overgeneralize the use of Mandarin DMs in their Mandarin speech. Therefore, this study will only focus on the language data of these five participants. To protect the participants' privacy, the names of the participants presented in this paper are pseudonyms. The participants' language background is listed in Table 1.

Table 1. Participants' background

	Chinese language course level at school at the time of study	English language course level at school at the time of study
JI	L1	L1
MI	L1	L1
TI	L1	L1
WE	L2 Higher Level	L1
JE	L2 Higher Level	L1

3.2 Data collection

To collect the natural use of DMs in their Mandarin Chinese oral speech, participants were not informed that the purpose of the interview was looking for DMs in their oral speech. Participants were interviewed individually by the researcher in Mandarin on Zoom. Each participant was interviewed for about 15 minutes. The interview protocol is guided by Wang (2014). The interview includes the following sections. The first section is a presentation, and the second section is a series of conversations. For the presentation, participants are presented with a picture and a list of prompts. Each participant is given one minute to prepare a three- to five-minute presentation based on the picture and prompts. The participant is then asked to give a presentation. Follow-up questions may be asked in order for participants to elaborate on their arguments or connect to their personal experiences of similar situations. For the conversation portion, the participants are invited to have conversations with the researcher. The conversation portion has two

topics: one is about their future majors in college and the other is about their Chinese learning experience. Such topics are selected because they relate to the participants' lives, which may help participants have sufficient content to share in their Mandarin oral speech.

3.3 Data analysis

The recordings are transcribed based on the conventions adapted from the previous research (Liu, 2013; Müller, 2005) (see Appendix A). The Chinese transcription section follows Li and Thompson (1989) (see Appendix B). In the next stage, the DMs are identified using Liu (2013, 2017)'s working definition of DMs.

4. Findings

In the approximately 75 minutes of recorded conversations, the English DMs *like*, and *yeah* are used in Mandarin discourse by English-Chinese bilingual speakers. The functions of the Mandarin DMs 好像 (haoxiang [like]), and 所以(suoyi [so]) are overgeneralized in English-Chinese bilinguals' Mandarin speech. The tokens of the examined DMs are listed in Table 2. 81 cases of the English DM *like* are found to introduce an example or explanation, and 27 cases of the English DM *like* are found to use as a pause filler for searching for the appropriate expression. Additionally, 17 cases the English DM *like* are found to take on multifunction both as a pause filler for searching for the appropriate expression and as a word to introduce an example or explanation. In terms of the use of the English DM *yeah,* in 22 cases the English DM *yeah* is used as a confirmation marker, and in 23 cases the English DM *yeah* in the Mandarin discourse is used as a pause filler and to hold the floor. Regarding the Mandarin DM 所以(suoyi [so]), in 5 cases the Mandarin DM 所以(suoyi [so]) is used to introduce a new aspect of the topic or to initiate a new conversational turn, and in 36 case, 好像 (haoxiang [like]) is used as a DM to introduce examples or search for appropriate expressions. The detailed analysis is listed in the following part.

4.1 English DM *like* in Mandarin speech

4.1.1 Introducing an example or an explanation

The DM *like* is found to work as a textual discourse marker in native English oral speech (Müller, 2005). The English DM *like* can take the functions of searching for the appropriate

Table 2. The analyzed recordings of this study

Participant	Tokens of DM *like*	Tokens of DM *yeah*	Tokens of DM *haoxiang*	Tokens of DM *suoyi* (overgeneralized function)
JI	77	15	0	1
MI	16	3	0	0
TI	32	21	0	1
WE	0	0	36	1
JE	0	6	0	2
Total	125	45	36	5

expression, introducing an example or an explanation, and marking lexical focus, based on Müller (2005)'s studies of the spoken data gathered from American students who are native English speakers from the Giessen-Long Beach Chaplin Corpus (GLBCC). Such functions of English DMs are found in the English-Chinese bilingual speakers' Mandarin oral speech. In the analyzed English-Chinese bilingual speech data, the English DM *like* can be used to introduce an example, as shown in example (1), and to introduce an elaborated explanation, as shown in example (2). In example (1), the speaker MI described the boy as taking an online class on the computer. She mentioned the technological platform the boy might use by saying 像 Zoom (xiang Zoom [like Zoom]), and then follows this by listing another example, beginning with the Mandarin word 像 (xiang [like]) following the English DM *like*. She then provided a more specific description of the example by saying 阿里巴巴之类的 (alibaba zhilei de [something like Alibaba]) to illustrate what the popular software was in her opinion. In example (2), the speaker explains how she felt about using another language to learn Chinese history. She states that she felt a bit uncomfortable "所以我觉得这样子会不太舒服(suoyi wo juede zheyangzi hui butai shufu [so I felt this is a bit uncomfortable]), and then she used the DM *like* followed by 有一点点尴尬的感觉(you yidiandian ganga de ganjue [a little bit of awkward]), to elaborate on the explanation of the previous statement.

Example (1)

MI: (…) 然后 他 通过 一些 现在 比较 流行 的 软件

(…) ranhou ta tongguo yixie xianzai bijiao liuxing de ruanjian

then he by some current rather popular DE software

像 Zoom 或者 像 <like> 阿里巴巴 之类 的 在 和 他 的 老师

xiang Zoom huozhe xiang alibaba zhilei de zai he ta de laoshi

like Zoom or like Alibaba kind DE ASP and he DE teacher

和 同学们 一起 学习

he tongxuemen yiqi xuexi

and classmates together study

'(…) then he used some currently popular softwares like Zoom or like something like Alibaba (software) to study with his teacher and his classmates.'

Example (2)

MI: 我 觉得 这样 作为 一 个 中国 人

wo juede zheyang zuowei yi ge zhongguo ren

I felt this as one CL Chinese person

会 有 一 种 以 一 个 他人 的 角度

hui you yi zhong yi yi ge taren DE jiaodu

will have one kind use one CL other person DE angle

去 看待 自己 的 文化

qu kandai ziji de wenhua

to view self DE culture

所以 我 觉得 这 样子 会 不 太 舒服

suoyi wo juede zhe yangzi hui bu tai shufu

so I think this look can not very comfortable

<like> 有 一点点 尴尬 的 感觉

you yidiandian ganga de ganjue

have little. Awkward DE feeling

'I felt like in this way, as a Chinese, it will be using other people's perspective to view one's own culture, so I felt this is a bit uncomfortable, like a bit awkward.'

4.1.2 Pause filler for searching for the appropriate expression

The DM *like* can also be used when the speaker is thinking about what to say next (Cobuild 1995; Macmillan 2002) or is searching for the appropriate expression. When the DM *like* is used for this function, other hesitation markers, such as filled and unfilled pauses, co-exist with the DM *like* (Müller, 2005). In example (3) the speaker talks about the major she wants to pursue in university. She first admits that she does not have a clear plan yet by saying 其实也没有很具体的想法(qishi ye meiyou hen juti de xiangfa [actually (I) do not have a specific idea]). Then she starts giving a possible direction by saying 就是(jiushi [exactly is]) Following that, she uses a hedge, 可能(keneng [probabaly[], which shows uncertainty in her answer. Then she used a series of hesitation devices in the speech to buy time while searching for the appropriate expressions to continue, including a short pause followed by the filler 呃(e [uh]), the English DM *like,* another filler 呃(e [uh]), and another DM *like.* After this assembly of hesitation, the speaker gives an example of her choice of major by saying 社会科学之类的东西(she hui kexue zhilei de dongxi [things like social sciences]). Then she says 就可能(jiu keneng[just probable]) to further narrow down the field she is interested in for her future university major. Following that, she uses another assembly of hesitation devices, including a short pause, a pause filler 呃(e [uh]), and the DM *like*. Following these

hesitation devices, the speaker continues the speech to give another example of 心理学之类的专业(xinlixue zhilei de zhuanye [majors like psychology]).

Example (3)

JI: (…) 呃 其实 也 没有 很 具体 的 想法

(…) e qishi ye meiyou hen juti de xiangfa

uh actually also not very specific DE idea

就是 可能. . 呃 < like> 呃 < like > 社会 科学 之类 的 东西

jiushi keneng e e shehui kexue zhilei de dongxi

just probably uh uh society science kind DE thing

就 可能. . 呃 <like> 心理学 之类 的 专业(…)

jiu keneng e xinlixue zhilei de zhuanye (…)

just probably uh psychology kind DE major

'Uh actually (I) do not have a specific idea, just probably.. uh like uh like social sciences, just probably. .uh something like psychology (…)'

4.1.3 English DM *like* serving multifunctions in the Mandarin discourse

In example (4), before the speaker's turn, the interviewer asks about the most difficult part of learning Chinese and how the speaker tackles these challenges. Prior to this excerpt, the speaker initially states that one difficulty in learning Chinese is identifying the theme in literary works. In example (4), the speaker uses 然后(ranhou[then]) to continue to elaborate on her ideas. She describes a specific

scenario, 写评论文章的时候 (xie pinglun wenzhang de shihou [when writing a commentary]). Following this, the speaker uses 就(jiu[just]) to refer back to the previous topic of writing a commentary. Then the speaker uses the English DM *yeah* as a filler followed by the English DM *like* to continue her conversational turn and provide a detailed comment. Subsequently, she elaborates that 比较难去 (bijiao nan qu[rather difficult to]), and then follows with 捕捉(buzhuo [catch]). Following 捕捉(buzhuo [catch]) she again uses the English DM *like* and follows it with the object 作者的意图 (zuozhe de yitu[author's intention]), completing her explanation of the difficulties encountered in learning Chinese. In this case, English DM *like* serves as a multifunctional device that maintains the continuity of the current conversational turn when the speaker attempts to elaborate on explanations or make detailed comments on the previously mentioned topic.

Example (4)

JI: 然后 写 评论 文章 的 时候 就 <yeah> <like>

ranhou xie pinglun wenzhang de shihou jiu

then to write comment essay DE time just

比较 难 去 <like> 捕捉 <like> 作者 的 意图

bijiao nan qu buzhuo zuozhe de yitu

rather difficult to catch author DE intention

'Then when writing a commentary just like, is rather difficult to find the author's intention.'

4.2 English DM *yeah* in the Mandarin discourse

4.2.1 English DM *yeah* in the Mandarin discourse as a confirmation marker

The English DM *yeah* is found to affirm the speaker's own preceding or following discourse in Liu (2013)'s study of the spoken English data of American university students in the U.S. who are native speakers of English from interviews in the U.S. Such use of the English DM *yeah* is also found in the Mandarin speech of the English-Chinese bilingual speakers of this study. The English DM *yeah* can be used to affirm the speakers' own preceding discourse. Example (5) is from the speaker's presentation, which consists of describing a picture and sharing personal opinions on the depicted phenomenon. This part is a monologue that the interviewer is not expected to interrupt. In this example, the speaker used the English DM *yeah* and Mandarin DM 嗯(en [um]) in her speech to signal the end of her presentation.

Example (5)

JE: (…) 我 觉得 在 网 上 上 课 的 话

wo juede zai wang shang shang ke de hua

I feel at internet on take class DE word

有 学生 会 感到 更少 的 压力

you xuesheng hui gandao gengshao de yali

have student will feel less DE pressure

这 有 可能 是 个 好 的 事情

zhe you keneng shi ge hao de shiqing

this have probablely is CL good DE thing

但 如果 这 引起

dan ruguo zhe yinqi

but if this cause

就是 会 让 学生 没 感到 压力 的 时候

jiushi hui rang xuesheng mei gandao yali de shihou

just will make student not feel pressure DE time

有 可能 他们 会 不 交 作业

you keneng tamen hui bu jiao zuoye

have probable they will not submit homework

而 这 最后 会 影响 他们 的 学习 <yeah> 嗯

er zhe zuihou hui yingxiang tamen de xuexi en

and this finally will influence they DE study um

'I feel that having classes online might reduce students' stress, which could be a good thing. However, if the lack of stress leads to students not submitting their homework, it could ultimately impact their studies. Yeah, um.'

4.2.2 English DM *yeah* in the Mandarin discourse as a pause filler and to hold the floor

The English DM *yeah* is found to take on the functions of holding the floor and as a pause filler in the Mandarin discourse of the English-Chinese bilinguals of this study. In example (6), the speaker explains what she thinks are the rewards of learning the Chinese language, which is an off-the-cuff question asked by the interviewer. The speaker uses a variety of pause devices, including 还有(haiyou [also]), the DM *like*, the DM *yeah*, 呃(e [uh]), and the DM *like*, at the beginning. After these pauses, she continues by saying 坚持更去 (jianchi geng qu [persist on more doing]). Then she says 呃 (e [uh]) followed by the DM *yeah*, and *I don't know*, suggesting a difficulty of producing an answer. But the speaker holds her conversational turn of giving an answer by using a hedge,可能 (keneng

[probably]), followed by 就是(jiushi [precisely be]) as a pause filler/floor holder (Biq, 2001; Liu, 2009); the DM *yeah,* 还有(haiyou [also]), 就是(jiushi [precisely be]), 呃(e [uh]), the DM *yeah*, and the DM *like*. Following these pauses, the speaker finally gives a specific explanation of the rewards of continuing to learn Chinese.

Example (6)

JI: (…) 还有 <like> <yeah> 呃 <like> 坚持 更 去 呃 <yeah> <I don't know>

haiyou e jianchi geng qu e

also uh persist more to uh

可能 就 是 <yeah> 还 有 就 是 呃 <yeah>

keneng jiu shi hai you jiu shi e

probable preciesely be also have precisely be uh

<like> 更 去 了解 不同 的 文化 还 有 风格

geng qu liaojie butong de wenhua hai you fengge

more to know different DE culture also have style

'Also, um, persisting more, to um, probably, just also, just um, getting to know more about different cultures and styles.'

4.3 所以(suoyi [so]) as a DM in Mandarin discourse by English-Chinese bilinguals

所以(suoyi [so]) as a DM in Mandarin is found that its semantic meaning is bleached in some cases and it serves the function of going back to the previous topic (Fang, 2000), closing the current topic (Liu, 2009), and serving as a topic initiator and to mark a topic shift (Wang & Huang, 2006). 所以(suoyi [so]) is found in the initial position of an oral speech, which in this study is a presentation in the Mandarin discourse of the

English-Chinese bilingual speakers. The DM 那(na [then]) is found to take on the functions of topic shifting or introducing a new aspect of the topic, and to initiate a new conversational turn (Liu, 2009), but DM 那(na [then]) is not used by speakers in examples (7) and (8). In example (7), the speaker uses 所以(suoyi [so]) to begin the presentation in which a picture is described. This occurs after the allotted preparation time. In example (8), after the interviewer gives the explicit instruction, 请开始 (qing kaishi [Please start.]), JI uses 所以(suoyi [so]) to start her presentation. A similar use of 所以(suoyi [so]) to introduce a new scene is also found in Singaporean Chinese-English bilingual speakers whose L1 is English (Wang, 2014). 所以(suoyi [so]) shares overlapping semantic meaning with the English DM *so* (Wang, 2014). *So* is used to introduce a new sequence in native English discourse (Müller, 2005).Wang (2014) compared this to the spoken Mandarin discourse by L1 Chinese speakers from an TV talk show in mainland China called 鲁豫有约 (Lu yu you yue [A TV program named "A talk with Lu, yu"], but 所以(suoyi [so]) does not introduce new turns in such discourse data.

Example (7)

WE: … 所以 在 这 个 图片 里面 我 可以 在 左手 边 我 可以

suoyi zai zhe ge tupian limian wo keyi zai zuoshou bian wo keyi

so at this CL picture inside I can at left-hand side I can

看到 有 一 个 男孩子 他 在 穿 着 蓝色 和 白色 的 衣服，

kandao you yi ge nanhaizi ta zai chuan zhe lanse he baise de yifu

see exist one CL boy he ASP wear ASP blue and white DE clothes

而 戴 上 了 蓝色 的 耳机 (…)

er dai shang le lanse de erji (…)

and wear on ASP blue DE earphone

'So in this picture, I can at the left-hand side I can see a boy, he is wearing blue and white clothes, and wearing a blue earphone (…)'

Example (8)

JI: 所以 在 这 张 图片 中 就 有 个 小孩 在

suoyi zai zhe zhang tupian zhong jiu you ge xiaohai zai

so at this CL picture in just exist CL kid ASP

上 <like> 网 上 的 课 (...)

shang wang shang de ke (...)

take Internet on DE lesson

'So in this picture, there is a kid is taking, like, taking online class (…)'

4.4 好像 (haoxiang [like]) in Mandarin discourse by English-Chinese bilinguals

In speaker WE's Mandarin presentation, 好像 (haoxiang [like]) is used as a DM to introduce examples or search for appropriate expressions. Prior to the excerpts shown in example (9), the interviewer asks a question about what challenges the speaker encounters in learning Chinese. Following the interviewer's question, the speaker WE uses 好像 (haoxiang [like]) to introduce specific examples in her speech by saying 好像我们出去的时候好像在餐厅里讲 (haoxiang women chuqu de shihou haoxiang zai canting li jiang [like when we go out like in at restaurant saying]). In the second line of example (9), the speaker uses hesitational markers such as filled pause 呃(e [uh]), 不知道 (buzhidao [don't know]), and 怎么说(zenmeshuo [how to say]) before 好像 (haoxiang [like]), which shows that the speaker may be searching for appropriate expressions to continue her descriptions about this scenario in a restaurant. The functions of 好像 (haoxiang [like]), which include introducing examples and searching for appropriate expressions, corresponds to the functions found in the English DM *like*, which is

discussed in the previous section. 好像 (haoxiang [like]) is not a canonical DM in contemporary Mandarin oral speech (Zhu & Tang, 2017). 好像 (haoxiang [like]) is seen as an epistemic adverb (Lin, 2012), however, the use of 好像 (haoxiang [like]) as a pause filler and to initiate a narration is not common in L1 Mandarin oral speech.

Example (9)

WE: 嗯: 我 觉得 好像 我们 出去 的 时候

en: wo juede haoxiang women chuqu de shihou

um: I think like we out DE time

好像 在 餐厅 里 讲

haoxiang zai canting li jiang

like at restaurant in say

呃（2.0） 不 知道 怎么 说 好像 想要 那些 菜 的 时候..

e bu zhidao zenme shuo haoxiang xiangyao naxie cai de shihou..

uh not know how say like want those dish DE time

我 都 不 知道 怎么 说 或 怎么.. 有 时候 都 不 能 读 餐牌 (…)

wo dou bu zhidao zenme shuo huo zenme..you shihou dou bu neng du canpai (…)

I even not know how say or how have time even no can read menu (…)

‘Um I feel like when we go out, like at the restaurant, say, um, I don’t know how to say, like, when I want those dish, I even do not know how to say or how.. sometimes even (I) cannot read the menu.’

5. Discussion

This study found that some bilingual speakers use a variant strategy of using DMs in their speech that is unlike those used by monolingual Mandarin and monolingual English speakers. In this study, the English DM *like* and the English DM *yeah* take on textual functions to keep the coherence and cohesion of their discourse. The speakers used the English DM *like* to introduce examples or elaborate on explanations, and to fill a pause while searching for appropriate expressions. The younger generation is found to make more abundant use of the DM *like* than the older generation (Levey, 2006). Teenage groups who speak other languages are also found to make similar use of the corresponding DM in their own languages. For example, Swedish adolescents use DMs such as *liksom* (cognate with English *like*) for displaying a discourse identity as young people (Norrby & Wirdenäs, 2003). The current study only includes teenage speakers who are English-Chinese bilinguals, but how the other age groups of English-Chinese bilinguals use the English DM *like* in their Mandarin speech is still unknown. Future research can include more age groups. Additionally, the speakers used the English DM, *yeah*, to affirm the preceding speech and signal the end of the current conversational turn, and to fill a pause with other pause fillers in the middle of the speech.

For the second research question, English-Chinese bilingual speakers who live in an English-dominant environment overgeneralize some Mandarin DMs in their Mandarin speech. English-Chinese bilingual speakers in this study overgeneralized Mandarin DMs, 所以(suoyi [so]) and 好像 (haoxiang [like]) are also found in this study to take on the textual function of maintaining the coherence and cohesion of their discourse. They used 所以(suoyi [so]) at the beginning of their new narration, and such function shows a similar function to the DM *so* in English. Besides this, they used 好像 (haoxiang [like]) to introduce new examples or to elaborate on explanations. Such usage is similar to that of the DM *like* in English, but this usage of 好像 (haoxiang [like]) in L1 Mandarin speakers is scarce.

DMs are easily borrowed across languages (Myers-Scotton, 1992). When languages are in contact, any linguistic feature may be borrowed from one language system to another (Thomason & Kaufman, 1988), and the borrowing of core lexical items such as discourse markers is quite common (Torrkes, 2002). In this study, English DMs are used in English-Mandarin bilingual speakers' Mandarin speech,

which echoes the previous research that DMs from one language can be used in the speech of another language by bilingual speakers to create and strengthen discourse cohesion and coherence (De Rooij, 2000)

Furthermore, this study finds that the overgeneralized use of the DMs of the less dominant language share similar functions to the semantically overlapping DMs of the dominant language. For example, English-Mandarin bilingual speakers use 所以(Suoyi [so]) to initiate their individual oral presentations, which described a picture and were given after an allotted period of preparation time. Similar usage of 所以 (Suoyi [so]) is found in the Mandarin speech of Singaporean Mandarin speakers who use English as a dominant language in their environment. This overgeneralized function shares similarities to the English DM *so* that initiates one's speech. Additionally, 好像 (haoxiang [like]) is used as a DM to introduce examples or search for appropriate expressions in English-Mandarin bilingual speakers' Mandarin speech. This function of 好像 (haoxiang [like]) is similar to that of the English DM *so*, which is to initiate a new conversational turn or new topic. However, in this study, only one speaker is found to use 好像 (haoxiang [like]) in this way. Due to the small sample size of this study, it is not clear if this usage is associated with an individual speech style or if it is a common usage among English-Mandarin bilingual teenagers. Further studies among more participants in the future is needed.

In summary, bilingual speakers use a variety of linguistic resources from both languages to maintain coherence in their speech during conversations. Emerging discourse markers are observed in their speech. This emerging usage might be related to dominant language transfer, individual preferences, or speech styles within communities, such as teenage talk.

6. Conclusion

This empirical study suggests that English-Chinese students' Mandarin speech might be influenced by English. The sample size of this study is small, and DM usage is explored at the idiosyncratic level, the natural use of DMs in bilingual speakers' speech sheds light on how bilinguals initiate, continue and transit their conversational turns. At the pedagogical level, this study helps teachers understand how English-Chinese bilingual speakers use DMs while giving presentations and answering off-the-cuff

questions. It is found that some speakers integrate English DMs in their Mandarin oral speech and overgeneralize the functions of some Mandarin DMs. Such overgeneralized functions are similar to the functions of the corresponding DMs in English. For teachers who would like to facilitate L2 Mandarin learners is giving fluent presentations and having conversations in Mandarin, some Mandarin DMs can be explicitly taught to students, such as those that allow them to initiate a narration, keep the floor during a conversational turn, and show affirmation of their own discourse in Mandarin. To put it forward, curriculum writers and teachers should put more focus on the pragmatic functions of discourse markers (Hellermann & Vergun 2007; Liu, 2009), and teachers can use more authentic listening materials in the classroom to expose students to authentic DMs in Mandarin speech. In conclusion, the study highlights the intricate ways in which English-Chinese bilingual speakers use DMs to navigate their Mandarin speech. Due to predominantly using English in their academic and social lives, these speakers adopted and adapted DMs from both languages, demonstrating unique functions not typically seen in monolingual contexts. English DMs such as *like* and *yeah* serve various functions, such as introducing examples and signaling new conversational turns, while Mandarin DMs such as 所以 (suoyi [so]) and 好像 (haoxiang [like]) are overgeneralized in ways that mirror English usage of the corresponding DMs. This empirical research provides valuable insights for educators, emphasizing the need to explicitly teach Mandarin DMs to students to better continue their conversational by using Mandarin linguistic devices.

Overall, this study contributes to understanding the use of DMs in natural language, especially in bilingual communities. Future studies can include more English-Mandarin bilingual participants. It can also include comparative studies, such as the Mandarin speech of an L1 Mandarin group and an English as a foreign language group, to further explore how groups of different linguistic backgrounds use a variety of resources to continue their speech.

Appendix A

Units

Speakers

Speaker identity/turn start :

Speech overlap [ ]

Transitional continuity

Final .

Continuing ,

Appeal ?

Long pause (no less than 0.5 seconds) …

Short (less than 0.5 seconds) ..

Transcriber's perspective

Uncertain hearing <XX>

Indecipherable syllable X

Filled pause 呃 *e* "uh"

Agreement (backchannel) 嗯 *en* "um", 嗯哼 *en heng* "uh-huh"

Specialized notations

Code switching <L2 L2>

Appendix B. Grammar gloss

CL classifier

DE *de* in Mandarin Chinese, including, associative (*de*), the complex stative construction (*de*), genitive (*de*), and nominalizer (*de*).

ASP aspectual marker

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Reframing *zìjǐ(-men)*[*]

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Sperlich (2019, 2022) argues that the recent observation in which Mandarin *zìjǐ* 'self' can take on a morphologically plural form *zìjǐ-men* 'self-PL' supports a pragmatic theory of anaphora. In this short paper, I take a stance to the contrary and evaluate the basic feasibility of binding-as-agreement in Mandarin as a valid avenue for the syntax of this phenomenon. In so doing, I also address the existing Agree-based analysis of Giblin (2016) and its application in, e.g., Wong (2021).

0. Introduction

Increasing work in formal syntax and semantics considers the extent to which anaphora as it was *classically* conceived (e.g., Chomsky 1981, 1986) can be reduced to underlying derivational operations — whether Merge, Agree, or some combination of the two (Hornstein 2001, 2007; Chomsky 2008; Kratzer 2009; Reuland 2011; Rooryck & Vanden Wyngaerd 2011; Murphy & Meyase 2022; Ershova 2023; Paparounas & Akkuş 2024; a.o.). This has also included unification or, at least, comparison with, intensifiers on both synchronically and diachronically empirical accounts (Charnavel & Sportiche 2022; Bassel 2024a,b). Beyond reductionist approaches, some have also called into question what exactly 'binding' in this sense

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should cover: variable binding (as in Reinhart 1983; a.o.) versus coreference (see Bruening 2018 for discussion).

In this paper, I offer an extension of this discussion to Mandarin Chinese, an otherwise well-studied language in referential binding more broadly, on the basis of recent observations such as those in (1) adapted from Sperlich (2019, 2022).[34] The anaphoric form *zìjǐ* 'self' can take a pluralized form *zìjǐ-men* 'self-PL' among innovative speakers, which, by consequence, blocks short- and long-distance binding by singular potential antecedents.

(1) a. Ta-men$_i$ shuo Zhangsan$_j$ piping-le zi-ji-men$_{i/*j}$
3-PL say Zhangsan criticize-ASP REFL-self-PL
'They$_i$ said that Zhangsan$_j$ criticized themselves$_{i/*j}$.'

b. Ta-men$_i$ shuo ta-men$_{i/j}$ piping-le zi-ji-men$_{i/j}$
3-PL say Zhangsan criticize-ASP REFL-self-PL
'They$_i$ said that Zhangsan$_{i/j}$ criticized themselves$_{i/j}$.'

Sperlich (2019) argues that the collective/group restriction of *zìjǐ-men* on potential antecedents straightforwardly points to a pragmatically-regulated system for anaphora across the board, as opposed to one incorporating syntactic or semantic constraints. In this paper, I re-evaluate this hasty conclusion and demonstrate how a theory of a linguistically anteceded, local- and non-local *zìjǐ-men* would take form with Agree-established dependencies, extending Giblin (2016).

With this in mind, I proceed in Section 1 by briefly overviewing the basic pronominal system of Mandarin and the general distribution of *zìjǐ*. In Section 2, I outline the original puzzle identified by Sperlich (2019) for the plural form *zìjǐ-men* and summarize its relevance for long-distance binding. In Section 3, I outline a binding-as-agreement analysis for non-logophoric use-cases of the plural anaphor. Section 4

[34] Abbreviations: ASP=aspectual marker; BA=*bǎ*; DE=*de*; PL=plural; REFL=reflexive

offers broader discussion of relevant implications for reflexive/intensifier forms, and Section 5 concludes.

1. Referential set-up in Mandarin

1.1. Pronouns and reflexives

In Mandarin, pronominal forms marked for person compose with *zìjǐ* 'self' (自己) to yield the complex *'self*-reflexives,' e.g., *wǒ* 'I' (我) to *wǒ-zìjǐ* 'myself' (我自己), similarly seen among other Sinitic languages, e.g., *keoi5* 'he/she' to *keoi5-zi6gei2* 'himself/herself' in Cantonese.[35] Anaphors generally co-vary with antecedents in person and number, where plural number for the former is realized with suffixation on pronouns — e.g., *wǒ-men* 'we' (我门) and *wǒ-men-zìjǐ* 'ourselves' (我门自己).

Attention to Mandarin reflexives within the context of syntactic theory began to take shape with Huang (1982, 1983), and the bare *zìjǐ* soon became an object of intense study as a robust licensor of long-distance antecedents (2). Descriptively speaking, the anaphor can occupy a position one or more clause boundaries from its antecedent (2a).

(2) a. Zhangsan$_i$ yiwei Lisi$_j$ hui ba Xiaoming$_k$ dai hui zi-ji$_{i/j/k}$ de jia.
Zhangsan think Lisi will BA Xiaoming bring back REFL-self DE home
'Zhangsan$_i$ thought Lisi$_j$ would bring Xiamong to self's$_{i/j/k}$ home.'

(Lyu & Kaiser 2021:4)

b. Zi-ji$_{i/j}$ de shi, Zhangsan$_i$ xiwang Lisi$_j$ neng guan-yi-guan
REFL-self DE matter Zhangsan hope Lisi can care-a-little
'Self's$_{i/j}$ own business, Zhangsan$_i$ hopes Lisi$_j$ will care for a bit.

(Huang 1993:117)

[35] Cantonese tones are marked with the conventional numerical notation (Jyutping); for specificity, in-text Mandarin is marked for tone as well (basic pinyin), but all example text is left uniformly unmarked.

b. Piping zi-ji$_{i/j}$ de pengyou, Zhangsan$_i$ zhidao Lisi$_j$ juedui bu hui
criticize REFL-self DE friend Zhangsan knows Lisi definitely not will

'Criticize self's$_{i/j}$ own friends, Zhangsan$_i$ knows Lisi$_j$ definitely will not.

(Huang 1993:117)

As in (2b-c), fronting of verbal structure (*v*P/VoiceP) and objects also can yield configurations where *zìjǐ* precedes its associated antecedent.[36] Across these data, long-distance binding can evidently persist, and for the *self*-reflexives, long-distance binding remains unavailable throughout.[37]

The corresponding blocking effect for *zìjǐ* is perhaps as well-known as its binding status is: intervening first- or second-person potential antecedents block binding across clause boundaries such that local coreference is a forced result:

(3) Adapted from Cole & Sung (1994:363)

a. Zhangsan$_i$ renwei wo$_j$ zhidao Wangwu$_k$ xihuan ziji$_{*i/*j/k}$
Zhangsan think 1SG know Wangwu like REFL-self

'Zhangsan$_i$ thinks that I$_j$ know Wangwu$_k$ likes self$_{*i/*j/k}$.' 3 > 1 > 3

b. Ni$_i$ renwei wo$_j$ zhidao ziji$_{*i/j}$ de taitai shi yige da hao ren
2SG think 1SG know REFL-self DE wife is one big good man

'You$_i$ thought that I$_j$ knew self's$_{*i/j}$ wife was a very good person.' 3 > 3 > 1

[36] This observation draws a parallel to certain languages with ergative-absolutive alignment, where the position of a high absolutive object above its antecedent does not automatically eliminate binding relations (see Ershova 2023 on West Circassian; Yuan 2024:24 on Inuit).
[37] In all numbered examples, I gloss *zìjǐ*, including in its complex and pluralized forms, as bimorphemic. I adapt example data from authors who do not employ this choice for consistency. This is done based on usage of *zì-* as a reflexivizer elsewhere in Mandarin, and follows arguments from Reuland et al. (2020) and Wong (2021). See the next subsection (1.2) for justification.

c. Wo$_i$ juede ni$_j$ dui ziji$_{*i/j}$ mei 157arlat
1SG feel 2SG to REFL-self no confidence
'I$_i$ felt that you$_j$ had no confidence in self$_{*i/j}$.' 2 > 1 > 3

d. Zhangsan$_i$ zhidao {wo, ni}$_j$ dui ziji$_{*i/*j/k}$ mei 157arlat
Zhangsan think 1SG 2SG to REFL-self no confidence
'Zhangsan$_i$ felt that {I, you}$_j$ had no confidence in self$_{*i/j}$.' 3 > 1/2

A variety of existing proposals attempt to explain the blocking effect as a constraint on the long-distance binding of the anaphor. Cole & Sung (1994) cast the pattern in terms of verbal agreement — such that languages without verbal agreement (Mandarin and Korean) should yield a blocking effect. This typological prediction is intended to support the argument that long-distance coreference with *zìjǐ* arises from head-movement ('hopping') at LF (e.g., Battistella 1989; Cole et al. 1990; Reinhart & Reuland 1993; Cole & Sung 1994; cf. Huang & Tang 1989; Progovac 1992). I identify some corresponding issues to this below and in Section 3.

1.2. Interlude: Internal complexity

The syntactic status of *zìjǐ* does not neatly satisfy what might traditionally be squared away as a simplex (or 'SE') reflexive. In particular, *zìjǐ* shows a 'semi-reflexive' character, in the terminology of Volkova & Reuland (2014) and Reuland et al. (2020).

Empirically, the general line is often drawn between simplex and complex reflexives in whether or not long-distance binding is available, and, theoretically, the same line has been used to justify the head-movement analysis (recall Cole & Sung 1994 from Section 1.1).[38] The result is that *self*-reflexives in Mandarin are correctly predicted to avoid long-distance binding — and that a language such as English, without a productive simplex reflexive to begin with, would not permit long-distance binding at all.

[38] The simplex-complex argument from Cole & Sung (1994) is attributed to constraints on government and minimality (in the sense of Chomsky 1981) of the head-movement in question.

Yet, Mandarin's *zìjǐ* differs from superficially similar versions in other languages in that the former robustly permits local binding (in addition to the long-distance facts from earlier). As Reuland et al. (2020) point out, monoclausal coreference with Germanic simplex reflexives (e.g., Dutch z*ich* 'self') is only compatible for a particular subset of verbal predicates in comparison to *zìjǐ*. Further reinforcing this observation is the fact that sloppy identity (and thus, local binding) obtains in VP-ellipsis as well (adapted from Reuland et al. 2020:804):[39]

(4) Zhangsan$_i$ nvedai zi-ji$_i$ duoguo Lisi$_j$ Δ.
Zhangsan abuse REFL-self more.than Lisi
'Zhangsan$_i$ abuses self$_i$ more than Lisi$_j$ does abuse self$_{i/j}$.'

A separate distinguishing factor for *zìjǐ* is that Mandarin can reflexivize predicates by prefixing *zì-* — e.g., *zì-jià* 'self-drive' (自驾), *zì-xiū* 'self-study' (自修), *zì-zé* 'self-blame' (自 责) — which suggests that the anaphor is in fact complex rather than monomorphemic (contra the assumptions of the head-movement theories).[40] Reuland et al. (2020) and Wong (2021), by consequence, conclude that *zì-* contributes a reflexivizing meaning to *zìjǐ*, with *jǐ* having originated as a distinct anaphor in Classical Chinese. Instead of a (complex) reflexive anaphor that *always* enforces local binding, *zìjǐ* is instead termed a semi-reflexive, given that it *allows* local binding. The theoretical result is a two-fold approach: in local configurations, Reuland et al (2020) argue, *zì-* reflexivizes the main predicate at LF, and in non-local configurations, the anaphor's two morphemes compose in-situ to yield a ϕ-featurally 'defective' constituent. This latter outcome will become relevant in Section 3, where

[39] Also available in (4) is the reading where *Lisi* is a remnant object, i.e., *Zhangsan abuses self more than Zhangsan abuses Lisi.* I follow the tradition of notating the ellipsis site with the Δ symbol, but I spell out the interpretation of the underlying material in the corresponding English translation for clarity.

[40] See Liu (2016) and Wong (2021) for further examples of Mandarin reflexivization. For a diachronic and typological perspective, see Lai (2024).

I discuss binding via (ϕ-)agreement; in the meantime, I adopt the proposal that *zìjǐ* is a polymorphemic item (reflected in glosses, recall fn. 4).

2. Syntactic dependencies and *zìjǐ-men*

A recent observation in the literature on Mandarin anaphora is that yet another form, *zìjǐ-men* 'selves'/'self-PL', is emerging among speakers (repeated from (1a-b); Sperlich 2019):

(5) a. Ta-men$_i$ shuo Zhangsan$_j$ piping-le zi-ji-men$_{i/*j}$
3-PL say Zhangsan criticize-ASP REFL-self-PL
'They$_i$ said that Zhangsan$_j$ criticized themselves$_{i/*j}$.'

b. Ta-men$_i$ shuo ta-men$_j$ piping-le zi-ji-men$_{i/j}$
3-PL say 3-PL criticize-ASP REFL-self-PL
'They$_i$ said that Zhangsan$_j$ criticized themselves$_{i/j}$.

I agree with Sperlich's (2019:24) note that, while speakers can accept this form as grammatical when presented, it might not be a immediately accessible or widely used lexical item[41]; I suspect this innovative form may be similar to Japanese, where a plural morpheme can attach to *zibun* 'self' as in *zibun-tati-zisin* 'oneselves' (see Ikawa 2024).

Sperlich (2019, 2022) supports the broader understanding of reflexive/pronominal distribution as a result of neo-Gricean pragmatic reasoning. The discussions and subsequent refutations of syntactic and semantic approaches therein also presuppose monomorphemicity of *zìjǐ*. In brief, the author argues that a compositional approach fails to solve the puzzle from Huang (2002) in (6) while also

[41] Many thanks to Qingge Chen for discussion about this as well.

accounting for *zìjǐ-men*, and that a pragmatic theory would be a simple solution.[42] While blocking seems to also occur based on number (Tang 1989) — such that a singular potential antecedent intervenes in binding with a long-distance plural antecedent (6) — Huang (2002) observes more broadly that plural potential antecedents cannot bind the semi-reflexive anaphor *at all* when long-distance (7a). Moreover, the addition of a distributivity marker (7b) to the plural long-distance antecedent obviates this effect by removing a collective interpretation:

(6) Tang 1989; Huang (2002:9)

a. Ta-men$_j$ shuo Zhangsan$_j$ chang piping zi-ji$_{*i/j}$

3-PL say Zhangsan often criticize REFL-self

'They$_i$ said that Zhangsan$_j$ often criticize self$_{*i/j}$.'

b. Zhangsan$_j$ shuo ta-men$_j$ chang piping zi-ji$_{i/j}$

Zhangsan say 3-PL often criticize REFL-self

'Zhangsan$_i$ said that they$_j$ often criticize self$_{i/j}$.'

(7) Huang (2002:10)

a. Ta-men$_j$ shuo ta-men$_j$ chang piping zi-ji$_{*i/j}$

3-PL say 3-PL often criticize REFL-self

'They$_i$ said that they$_j$ often criticize self$_{*i/j}$.'

b. Ta-men$_j$ dou shuo ta-men$_j$ chang piping zi-ji$_{i/j}$

3-PL all say 3-PL often criticizeREFL-self

[42] It is worth noting here that Sperlich (2019, 2022) is the not the only discussion of the plural form within the context of compositional syntax/semantics. Another example is Li (2021), which includes discussion of *zíjǐ-men* based on exhaustive versus partial readings with control constructions, but I leave this aside in herein.

'Each of them$_i$ said that they$_j$ often criticize self$_{i/j}$.'

Given the ensuing discussion in Sperlich (2019:33-34), the author's explanation for this pattern essentially recapitulates Huang's (2002), as well as Giblin's (2016:113-115). The difference between the former author and the latter two is whether this distributivity observation should make (6) worthy for disposing of a syntactic/semantic approach to *zìjǐ* altogether (Sperlich 2019) or whether the observation should make (6) something to set aside as a phenomenon separate from canonical blocking (Huang 2002; Giblin 2016).[43]

The data from (5), in combination with the examples in (8) below, reveal that the motivation for side-stepping the distributivity observation in (6) should not extend to *zìjǐ-men*. While the addition of a distributivity marker on a plural potential antecedent for *zìjǐ* repairs long-distance binding, it does not reverse this effect with respect to *zìjǐ-men*. In other words, a distributive reading associated with a long-distance plural pronoun does not therefore render *zìjǐ-men* ineligible as its bindee.

(8) Sperlich (2019:33)

a. Ta-men$_i$ dou shuo ta-men$_j$ piping-le zi-ji-men$_{i/j}$

3-PL all say 3-PL criticize-ASP REFL-self-PL
'They$_i$ all said that they$_j$ criticized themselves$_{i/j}$.'

b. Ta-men$_i$ dou shuo Zhangsan$_j$ piping-le zi-ji-men$_{i/*j}$

3-PL all say Zhangsan criticize-ASP REFL-self-PL
'They$_i$ all said that Zhangsan$_j$ criticized themselves$_{i/*j}$.'

[43] Separately, Sperlich (2022:36, 55-56) makes note of the primary ideas from Giblin (2016) and Reuland et al. (2020), but questions various benefits of adopting complex internal structure for *zìjǐ* and continues to support an overall pragmatic system.

The long-distance binder still covaries in number with the pluralized anaphor, and, independently of the number of any interveners, the distributivity marker does not play a role in this possible result.

3. Agree and the pluralized form

Any theory of pronominal or reflexive anaphora, whether compositional or purely pragmatic, will presumably need to face the question of non-local binding without leaving it to 'spooky action at a distance'. From a perhaps philosophical/theoretical orientation, I take at face value the notion that syntactic dependencies beyond combinatoric structure-building are the result of probe-goal Agree (as in, e.g., Chomsky 2000, 2001; see Deal 2023 for the 'Merge-Agree Hypothesis'). It should follow that the partial featural correspondences widely seen between antecedents and linguistically-licensed anaphors (person, number, gender, and so on) can in fact be described by such an operation.[44]

A common assumption among various proposals discussed so far is that the *referential* deficiency construed with anaphors also reflects, or is perhaps one and the same with, *featural* deficiency in the syntax or semantics. With the already well-established body of research on abstract agreement involving ϕ-features, Agree is also being used to understand empirical data elsewhere. Delegating empirically syntactic phenomena beyond typical A-/A′-movement to Agree increasingly includes Sinitic languages as well: e.g., hyperraising and phase deactivation (Cantonese; Lee & Yip 2021, 2024), resumption (Mandarin; Yip & Yuan 2024), post-verbal modals (Cantonese *dak*1, Hakka *tek* 'can'; Cheng & Sybesma 2004), and aspectual marking (Mandarin *le*; Wang 2018). Giblin (2016) provides the initial treatment of long-distance *zìjǐ* in this light, which is also supported in Reuland et al. (2020) and Wong (2021). One intention for switching to Agree instead of a (covert) movement analysis

[44] I use the term *linguistically-licensed* to set aside various exemptions, for instance, where an antecedent is not found in the utterances or broader speech discourse in question. Similarly, for discussion of whether or not linguistically-licensed or logophoric anaphors in Mandarin are sensitive to animacy as another relevant factor, see Charnavel & Huang (2018). For experimental and acquisition-based observations on binding in Mandarin, which I do not discuss here, see, e.g., Chen (2020).

as discussed in Section 1 is the empirical fact that long-distance binding in Mandarin can persist across islands:

(9) Miyagawa (2017:67), citing a later version of Huang & Tang (1989)

Zhangsan$_i$ bu xihuan neixie piping zi-ji$_i$ de ren.
Zhangsan not like those criticize REFL-self DE person
'Zhangsan$_i$ does not like those people who criticized self$_i$.'

Beyond islands, the premise of Agree in terms of unvalued probes conducting searches for valued goals also allows for an intuitive characterization of the featural dependency that anaphora exhibits: reflexives serve as unvalued objects that are valued by the ϕ-features of the corresponding antecedent via Agree.

3.1. Reducing binding

Kinds of analyses besides Giblin (2016) that treat referential binding as derivative of syntactic operations are given below, with some characteristic examples for each.[45]

- **Binding as movement**, e.g., Hornstein (2001, 2007); McKeown (2013).
- **Binding as ϕ-feature agreement**, e.g., Kratzer (2009); Paparounas & Akkuş (2024).
- **Binding as movement + ϕ-feature agreement:** e.g., Rooryck & Vanden Wyngaerd (2011); Diercks et al. (2020).

This is not to say that the establishment of a referential dependency with Agree must be restricted to ϕ-features in particular: Hicks (2009) argues for a separate syntactic

[45] A prominent body of work in a different vein is an economy-/competition-based approach (e.g., Reinhart 2000, 2006; Safir 2004a,b; see also Fox 1999, 2000; Safir 2008 for LF/interface-driven discussion). The material I discuss within the confines of this paper, however, is largely restricted to the syntax of binding dependent on Agree as the derivational driver of featural relations. So, I leave further discussion of this separate mode of analysis to another time.

feature VAR in combination with last-resort upward probing, where variable binding follows from the interpretation of the feature on the corresponding antecedent and anaphor. Ke (2019) similarly reconceptualizes indices as index features [Ind:] (intending to avoid violating the Inclusiveness Condition as in Chomsky 2000, 2001), subject to a version of Agree; see also Kratzer (2009:198) for discussion of a [reflexive] 'signature feature' that *v* may transmit in the formation of reflexives.

3.2. Agreement via Voice

With this in mind, I turn attention back to *zìjǐ-men* through an Agree-reductionist system similar in spirit to Giblin (2016). First, I consider Reuland et al.'s (2020) understanding of *local* binding of *zìjǐ* to be compatible with *zìjǐ-men* as well, but an Agree relation between the the anaphor and its local antecedent would also capture the number agreement between them. I give a basic starting set-up in (10):

(2) [DP … [<DP> [$\text{Voice}_{\text{refl}}$ [*v* [V *zìjǐ-men*]]]]]

I carry over the early motivations from, e.g., Reinhart & Reuland (1993) and the head-movement accounts to describe the relation between the anaphor and the (articulated) verbal predicate with a mediating Voice head. This takes inspiration from Ahn's (2015) proposal of a reflexive Voice, as well as its later variants in Ershova (2023) and Paparounas & Akkuş (2024). In brief, the introducer of the external argument (to be the antecedent) represents the functional locus of the feature-covariance in the anaphora.

At the start of this derivational progression, the anaphor is unvalued for ϕ-features (11). While I set aside the internal structure of reflexives in this sketch, a decompositional theory would be successful for outlining the exact functional heads corresponding to the features in question in relation to underspecified syntactic roots (e.g., Ikawa 2024 on Japanese).

(2) [DP [$\text{Voice}_{\text{refl}}$ [*v* [V [#: __, π: __, γ: __]]]]]

Voice as a functional probe — whether searching for only ϕ-features (which would run into the need to avoid agreement with any applicative arguments) or for both ϕ-features and an index-related feature — encounters the anaphor in its c-command domain. The anaphor, being unvalued, fails to satisfy the probe, and the two form a composite probe (as in Paparounas & Akkuş 2024); under a 'cyclic' version of Agree (Béjar & Rezac 2009), Voice will search the specifier under its maximal projection (the potential antecedent). The pre-valued features of the external argument values both unvalued items at once. For speakers of Mandarin already using *zìjǐ-men*, valuation by a plural antecedent would thus be able to license the plural form of the anaphor in object position.

(2) [*tamen* [Voice$_{\text{refl}}$ [*v* [V [#: PL, ...]]]]]

By delegating the mediation of antecedent-anaphor agreement to Voice, the general observation of subject-orientation is reinforced in the syntax; such that subject versus indirect object binding possibilities are accounted for (see Cole & Sung 1994).For long-distance binding, I adopt the relevant details from Giblin (2016), such that the functional probe's (matrix C in Giblin 2016, antecedent-introducing Voice herein) search is blocked from reaching the anaphor on the basis of a mismatching person feature [+/- participant] (see also application to Vietnamese in Doan et al. 2023).

Given that the addition of a distributivity marker (Section 2) does not further constrain the antecedent possibilities of for *zìjǐ-men* or prevent antecedence with an otherwise plural DP, feature-valuation becomes the natural way to express the number-covariance for the anaphor. The plural form emerges from a plural number value, and is thus straightforwardly predicted to not surface if valued by a singular antecedent in the syntax.

4. Extending discussion

What I leave for future work is the question of how to unify both short- *and* long-distance anaphors with intensifier counterparts. While many papers exist on Mandarin intensifier syntax (especially Tsai 2015, 2018, 2019) and syntax/semantics-interface treatments (e.g., Hole 2008; Liao 2018), it seems that a unifying theory across anaphors and intensifiers via agreement has yet to be attained.

Rooryck & Vanden Wyngaerd (2011), who adopt a system where unvalued reflexives serve as direct probes, draw the line between complex reflexives and intensifiers in terms of Internal and External Merge, respectively. Conforming to downward Agree, complex reflexives raise to c-command in-situ subjects and enter into an Agree relation. Intensifiers, by contrast, are not externally merged into the c-commanding position instead (Rooryck & Vanden Wyngard 2011:135-138). Their analysis does not however, seek Agree-based unification with long-distance anaphors as well (pronouns, for instance, are pre-valued, and semi-reflexives become a resulting challenge).

Other attempts at unification (e.g., Charnavel & Sportiche 2022, 2023) may yield promising avenues to consider interactions between all three seemingly related groups, intensifiers, local anaphora, and long-distance simplex/semi-reflexive anaphora.

5. Conclusion

While primarily serving as a short sketch and overview, this paper takes a novel step in evaluating the emergence and licensing of the innovative *zìjǐ-men* form as a consequence of syntactic interactions. The restriction of this plural anaphor to plural antecedents, no matter the inclusion of a distributivity marker (unlike *zìjǐ*), points to feature valuation as a relation that is associated with reflexive anaphora in Mandarin. With a Voice-mediated Agree system, I avoid the need for new machinery in describing the morphosyntactic valuation of the plural anaphor in Mandarin. In so doing, I extend some of the main points first outlined by Giblin (2016).

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How does phonation interplay with pitch in Mandarin tone perception?[46]

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This paper investigates the perceptual interaction between pitch and phonation in identifying high and low tones, specifically Tone 1 and (half) Tone 3 in Mandarin. Two tone identification experiments were conducted: one involving 30 native listeners and the other involving a total of 92 native and non-native listeners. In both experiments, participants were instructed to judge Tone 1 and Tone 3 on the initial syllables in disyllabic expressions. The stimuli were created by synthesizing pitch and creaky voice properties from naturally produced disyllabic words. The results of the experiments reveal that while pitch is the essential cue for perceiving tones varying in pitch height, the role of phonation becomes relatively salient at the categorical boundary of pitch. Both native and non-native listeners appear to utilize creaky voice cues to identify Tone 3, particularly when the pitch cue is ambiguous in tone judgments. This study also presents novel findings regarding perceptual differences between native and non-native listeners. While non-native listeners are less sensitive to pitch cues, creaky voice cues are important for them. As Mandarin proficiency progresses, learners appear to rely increasingly on phonation cues as a secondary cue for tone perception. This suggests that Mandarin learners of non-tonal languages may develop a

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strategy to identify Tone 3 that makes greater use of voice quality compared to native Mandarin listeners.

2. Introduction

As is well known, pitch is the most crucial acoustic cue for tone perception. Not only is the intrinsic pitch on the target tone important, but the contextual pitch properties of adjacent tones also serve as significant cues. Both native and non-native listeners, albeit to varying degrees, use pitch cues in a categorical manner to identify tones in Mandarin (Shi 2019; Lee and Lee 2022; references therein). Another acoustic dimension of tonal contrasts observed in a number of varieties of Chinese is phonation (Davison 1991; Belotel-Grenié and Grenié 1994; Yu and Lam 2014; Yang 2015; Kuang 2017; Huang 2020; Zhang and Kirby 2020). In Mandarin, Tone 3, which requires lowering the pitch to the bottom of the speaker's pitch range, is often produced with creaky voice. However, little agreement has been reached on the perceptual roles of creaky phonation and its interaction with pitch cues in Mandarin tones. Even less is understood regarding the differences between native and non-native listeners in utilizing phonation for tone identification.

The goal of the present study is to examine how phonation types, specifically modal and creaky voice, affect the identification of Tone 1 and (half) Tone 3, which are otherwise distinguished by pitch height. The study also investigates differences in how native and non-native listeners with varying levels of Mandarin proficiency utilize pitch and phonation cues. To achieve these research goals, two perception experiments were conducted using disyllabic stimuli with synthesized pitch and voice quality. The findings from the experiments will help us understand how the perception of pitch cues changes with different phonation types and provide further insight into how native listeners of a non-tonal language develop strategies to identify Mandarin tones using different types of cues. Section 2 presents a brief background and outlines the specific research questions, while Section 3 details the experiments. The discussion and conclusion are provided in Section 4.

2. Background and research questions

Mandarin has four lexical tones, which are often referred to as Tone 1 through Tone 4 for ease of notation. Among the four tones of Mandarin, Tone 3 surfaces as low level, dipping, and high rising tones that are described as '21/11', '214', and '35' in Chao's 5-number scale (Chao 1930, 1968), respectively. Tone 3 has a few phonetic forms; it is realized as low tone (i.e., the so-called half Tone 3) when Tone 1, Tone 2, or Tone 4 follows, while dipping tone is produced only when it occurs in isolation or in the phrase-final position. It changes to Tone 2 when followed by another Tone 3 due to the phonological tone sandhi rule. Therefore, the most productive variant of Tone 3 is low tone, which has a broader distribution in both the lexicon and natural speech (Chen 1984; Wang 1979; Zhang 2010; Shi and Ran 2011). This study treats low tone as the base form of Tone 3, and the term 'Tone 3' hereafter indicates low tone if not indicated otherwise. Therefore, in terms of pitch properties, Tone 1 and Tone 3 are distinguished by pitch height, whereas pitch movement cues are crucial for differentiating Tone 2 and Tone 4 in Mandarin.

Although tones use pitch height and movement properties as the primary cues, phonation, duration, and amplitude appear to be secondary, yet important cues. For instance, earlier studies have found that some tones are produced with creaky voice in the Wu and Yue varieties of Chinese. While both Tone 2 ('34') and Tone 3 ('23') are rising contours in Wu Chinese, they are also distinguished by phonation: the former is modal voice, while the latter is breathy voice (Chao 1928/2011, 1934, 1948; Ren 1992; Gao and Halle 2015). With the association between low tones and creaky voice widely attested across languages (Belotel-Grenié and Grenié 1994, 1995, 2004; Zhu 2015; Kuang 2017), two low tones in Cantonese that are also distinct in phonation are Tone 4 (low falling, '21') and Tone 6 (low level, '22'), with the former being creaky voice and the latter being modal voice, respectively (Yu and Lam 2011; Zhang and Kirby 2020). In Mandarin, Tone 3 is normally produced with creaky voice, as presented in Figure 1. The acoustic attributes of creaky voice include constricted glottis, low F0, a relatively stronger H2 compared to H1, a smaller open quotient (OQ), irregular F0, period doubling, and a smaller speed quotient (SQ) (Belote-Grenié and Grenié 1994, 1995, 2004; Kuang 2013, 2017; Huang 2019, 2022). The figure shows the difference between modal and creaky voice from a pair of segmentally identical words, zhāorén 招人 'to recruit' and zhǎo rén 找人 'to look for someone'.

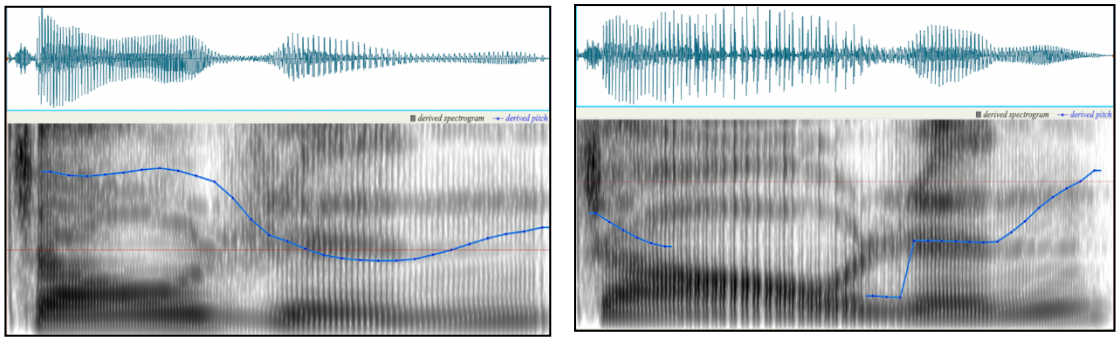


Figure 1. Modal voice (left) and creaky voice (right) in Mandarin

However, the detailed role of creaky voice in Tone 3 perception in Mandarin remains controversial (Gårding et al. 1986; Cao et al. 2012; Li and Li 2008; Yang 2011, 2015; Li and Cao 2007; Huang 2019, 2020). In particular, little attention has been paid to differences in the utilization of phonation cues by native and non-native listeners. To understand the interaction between pitch and phonation in tone perception among native and non-native listeners, the present study examines the influence of phonation types on the identification of Tone 1 and Tone 3, which are categorically distinguished by pitch height. The native listener group is compared to two groups of native Korean listeners: one group consists of learners with advanced Mandarin proficiency and the other group consists of learners with beginning proficiency. The specific questions that the present study aims to answer are as follows:

1. Does creaky voice enhance the identification of Tone 3 in native perception?

2. If so, does it significantly change the categorical boundary between Tone 1 and Tone 3 in pitch height, as schematized in Figure 2?

3. How do native Mandarin listeners and native Korean listeners differ in their use of phonation cues?

4. How does L2 Mandarin proficiency affect non-native listeners' use of phonation cues?

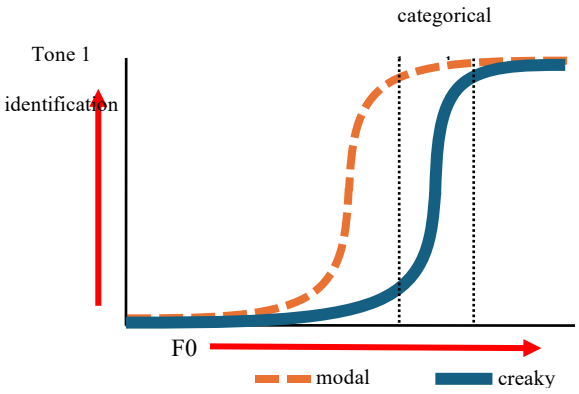


Figure 2. Hypothesized perceptual boundary shift between modal voice (dashed line) and creaky voice (solid line)

3. Tone perception experiments

Two tone perception experiments were conducted, in which participants were instructed to identify Tone 1 and Tone 3 on the initial syllables from the audio stimuli

presented. Experiment 1 involved 30 native listeners of Mandarin, while Experiment 2 included a total of 92 native Mandarin and native Korean listeners.

Experiment 1: Native listeners' tone perception

Experimental design and stimuli

The stimuli consist of three sets of segmentally identical disyllabic expressions that can have either the T1+T2 or T3+T2 tone sequence, as presented in Table 1. All target syllables in the stimuli (i.e., initial syllables, henceforth referred to as SYLLABLE1) were designed to have /a/ as the nuclear vowel, since creaky voice is more frequently produced with low vowels (Belotel-Grenié and Grenié 1995; Li and Li 2008; Panfili 2016). The onsets were composed of unaspirated plosive, affricate, and fricative consonants to prevent aspiration from affecting the pitch of the following vowels and to explore any relations between consonant types and phonation in Mandarin. The final syllables (henceforth referred to as SYLLABLE2) were deliberately designed to be Tone 2, with the onset pitch positioned at the midpoint of the pitch range to avoid any contrast effect on the preceding tone perception (Lee and Lee 2022; references therein).

Onset / tone	plosive		affricative		fricative	
	b[p] [pɑo.xan]	d[t] [tɑo.tʰou]	z[ts] [tsɑo.fəŋ]	zh[tʂ] [tʂɑo.ɹən]	f[f] [fa.miŋ]	sh[ʂ] [ʂa.ɹən]

T1+T2	包含	刀头	遭逢	招人	发明	杀人
	include	blade	encounter	recruit	invent	murder
T3+T2	饱含	倒头	早逢	找人	法名	傻人
	filled with	lie down	meet early	look for someone	Buddhist name	foolish man

Table 1. Experiment 1 stimuli

A female speaker of Mandarin produced the words, and the stimuli were created by synthesizing F0 and phonation of SYLLABL1 on a 12-level continuum using Praat KlattGrid (Weenik 2009). Since the onset F0 of SYLLABLE2 was fixed at the midpoint of the pitch range, SYLLABLE1 was higher than the onset F0 of SYLLABLE2 in half of the stimuli; in the other half, SYLLABLE1 was lower than the onset F0 of SYLLABLE2, as schematized in Figure 3. The creaky voice on the vowel of SYLLABLE1 was synthesized by creating a stronger H2 than H1 ([open phase: 0.2 (modal:0.7)]), irregular F0 [flutter: 1 (modal: 0)], period doubling [double pulsing 0.2 (modal:0)], and a smaller speed quotient ([power 1,2: 7,8 (modal 3,4)]) (Belote-Grenié and Grenié 1994, 1995, 2004; Kuang 2013, 2017; Huang 2019, 2022). The intensity was fixed at 70 decibels across the stimuli. In total, 144 stimuli (6 onset types x 12 pitch levels x 2 phonation types (modal, creaky)) were used in the experiment.

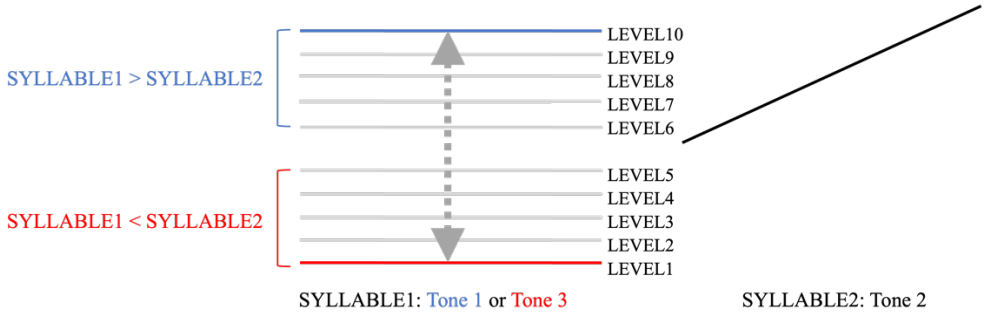


Figure 3. Schematized representation of stimuli pitch synthesization

Participants and procedure

A total of 30 native Mandarin listeners, who reported no hearing or speech impairment, participated in the tone identification experiment (15 M, 15 F, mean age 28.6, SD=5.18). Randomized audio stimuli were grouped into six blocks and presented individually using the *Labvanced* program. Participants were asked to select one word from the pair shown on the screen that differed in the tone of SYLLABLE1. A practice session using 12 stimuli, which contained all consonant, vowel, and tone types, preceded the experiment.

Analysis

The tone identification responses and the response times were analyzed using the R hmisc package (Harrell 2022). Four variables were treated as fixed effect factors: (1) phonation (modal, creaky), (2) pitch relation between SYLLABLE1 and SYLLABLE2 ('SYLLABLE1 > SYLLABLE2', 'SYLLABLE1 < SYLLABLE2'), (3) pitch difference measured by SYLLABLE1 F0 minus SYLLABLE2 onset F0 (-6 ST ~ 6 ST), and (4) onset (plosives, affricates, fricatives). Phonation was used as a moderator variable, and participant was set as a random effect. The effects of phonation, as well as the interactions between phonation and variables (2), (3), and (4), were analyzed using a Mixed-Effects Logistic Model with the lme4 package (Bates et al. 2014). A Multiple Linear Regression Analysis was conducted for reaction time analysis. *Bonferroni* post hoc analysis was also performed using the emmeans package (Lenth 2022).

Results

We found significant main effects of phonation, pitch relation, and onset, as well as significant interaction effects of phonation*pitch relation and phonation*onset. A summary of the results is provided in Table 2.

	Chisq	Df	Pr(>Chisq)
phonation	75.576	1	<.0001 ***
pitch relation	2083.982	1	<.0001 ***

onset	13.330	5	0.020 **
phonation*pitch relation	7.784	1	0.005 **
phonation*onset	57.120	5	<.0001 ***

Table 2. Summary of Experiment 1 results

Bonferroni post hoc analysis revealed that markedly more Tone 3 responses were provided when the pitch relation was 'SYLLABLE1 < SYLLABLE2' and when phonation was creaky voice (p<.0001). Regarding the interaction effects of phonation*pitch relation, significantly more Tone 3 responses were yielded for creaky voice in both pitch relations, namely 'SYLLABLE1 < SYLLABLE2' and 'SYLLABLE1 > SYLLABLE2' (p<.0001). It is worth noting that when the pitch relation and phonation cues act contrastively (e.g., the pitch relation was 'SYLLABLE1 > SYLLABLE2' while phonation was creaky), the effects of pitch relation were greater. That is, more Tone 3 responses were observed in the condition 'modal phonation*'SYLLABLE1 < SYLLABLE2' than in the condition 'creaky phonation*'SYLLABLE1 > SYLLABLE2'). These results demonstrate that pitch cues are essential in the perceptual distinction of Tone 1 and Tone 3, while creaky voice supports Tone 3 identification.

As for the response times, pitch relation, pitch difference, and onset (pitch relation: p=.0295; pitch difference: p=.0127; onset: p=.0087) were found to be significant. Significant interaction effects of phonation*pitch relation were also found. *Bonferroni* post hoc analysis revealed that the response times were longer for the pitch relation 'SYLLABLE1 > SYLLABLE2' than for 'SYLLABLE1 < SYLLABLE2' (p=.013) and that they were longer for [ts] than [t] and [ʂ] ([t]: p=.0399; [ʂ]: p=.0209), and for [tʂ] than for [ts] (p=.0256). In the condition of creaky voice, the response times were longer for the pitch relation 'SYLLABLE1 > SYLLABLE2' than for 'SYLLABLE1 < SYLLABLE2' (p=.0084).

Figure 4 presents prediction models, where the x-axis represents the pitch difference between the two syllables and the y-axis corresponds to Tone 1 response probability. They confirm that markedly more Tone 3 responses were observed when SYLLABLE1 was lower in pitch than SYLLABLE2 (-6 ST ~ -1 ST, left figure). The effects

of pitch relation were significant for the pitch relation 'SYLLABLE1 < SYLLABLE2' (p<.0001). However, when SYLLABLE1 was higher in pitch than SYLLABLE2, i.e., for the pitch relation 'SYLLABLE1 > SYLLABLE2', Tone 1 responses for SYLLABLE1 notably increased as the pitch difference became larger. This indicates that the pitch relation between two syllables plays a critical role in distinguishing Tone 1 and Tone 3 for SYLLABLE1.

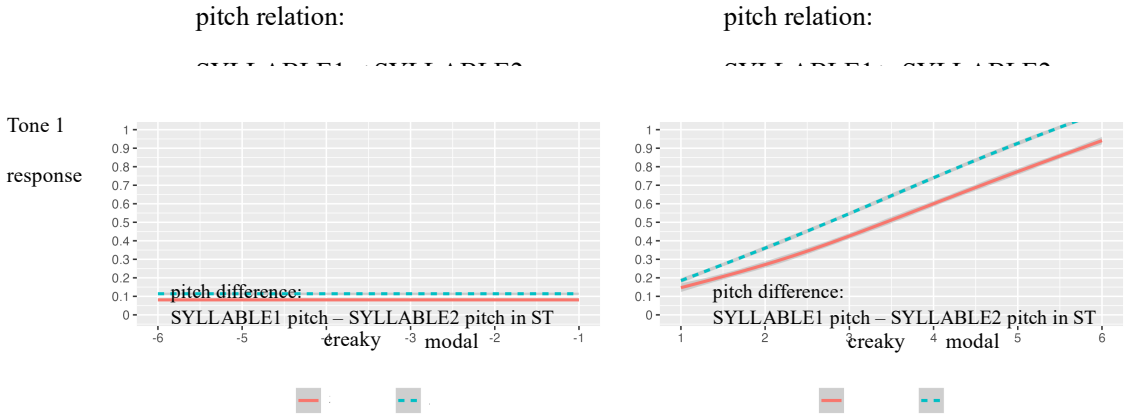


Figure 4. Prediction models of tone identification and pitch relation (dotted line: modal, solid line: creaky)

Note that in both pitch relation types, significantly more Tone 3 responses were observed for creaky voice (p=.0002 for 'SYLLABLE1 < SYLLABLE2'; p<.0001 for 'SYLLABLE1 > SYLLABLE2'). Interaction effects of pitch relation*phonation were also found; significantly more Tone 3 responses were observed for the condition 'modal*SYLLABLE1 < SYLLABLE2' than for the condition 'creaky*SYLLABLE1 > SYLLABLE2' (p<.0001). This confirms that pitch cues are essential in distinguishing Tone 1 and Tone 3, while the creaky voice cues significantly enhance Tone 3 identification. The effects of creaky voice were considerably larger when the syllable onsets were [p, t, ts] compared to [f, s̲, ts̲], as presented in the prediction models in Figure 5. This suggests that creaky voice may be utilized more in perception when onset consonants are plosives, which typically involve less glottal abduction relative

to fricatives (Hoole 1997, references therein). However, it is also likely that both pitch and phonation cues are less effectively perceived due to shortened vowel durations following fricatives and some affricates.

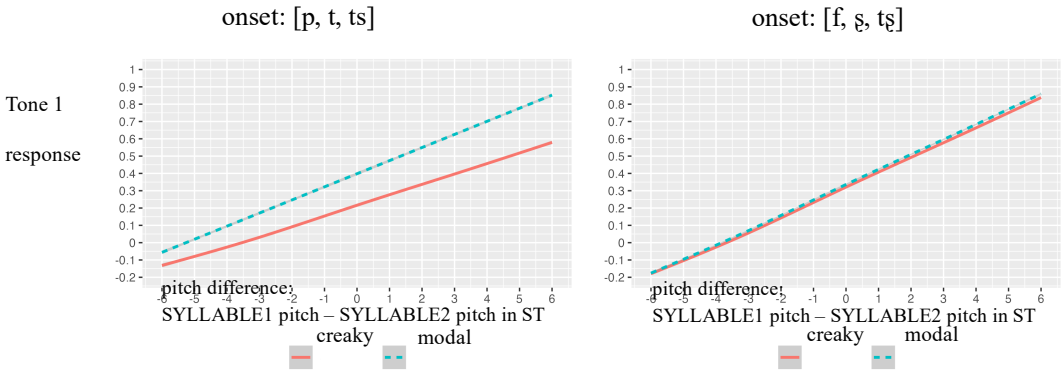


Figure 5. Prediction models of tone identification and onset (dotted line: modal, solid line: creaky)

The interaction between pitch and phonation cues is clearly captured in the categorical perception patterns of Tone 1 and Tone 3, as illustrated in Figure 6. It demonstrates that as the pitch of SYLLABLE1 increases relative to SYLLABLE2, SYLLABLE1 is more likely to be perceived as Tone 1, while creaky voice triggers more Tone 3 identifications. The effects of creaky voice become particularly salient at the categorical boundary, resulting in a noticeable shift in the perceptual boundary.

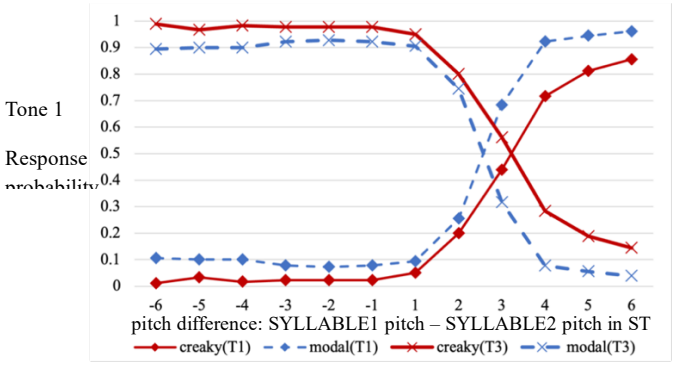


Figure 6. Interaction of pitch and phonation in categorical perception
(dashed line: modal, solid line: creaky)

Experiment 2: Native vs. non-native listeners' tone perception

Building upon our findings from Experiment 1, we conducted Experiment 2 to further investigate the interaction between pitch and phonation cues in native and non-native listeners' tone perception. We will highlight new findings in the discussion of Experiment 2 due to the limitations of the paper.

Experimental design and stimuli

The stimuli used in Experiment 2 comprise three sets of segmentally identical disyllabic expressions, each with either the T1+T2 or T3+T2 tone sequence. To examine possible influences of vowel types, the target syllables (i.e., SYLLABLE1) were designed to include low, mid, and high vowels, with the onsets controlled to be plosive consonants. The disyllabic words used to create the stimuli are listed in Table 3.

Onset / tone	b[p]			d[t]			g[k]		
	ao[ɑo] [pɑo.xan]	o[o] [po.ɕiŋ]	u[u] [pu.lju]	ao[ɑo] [tɑo.tʰou]	uo[wo] [tuo.njɛn]	u[u] [tu.ɕɥe]	a[ɑo] [kɑo.ɹən]	uo[wo] [kuo.ljɛn]	u[u] [ku.ɹən]
T1+T2	包含	波形	逋留	刀头	多年	督学	高人	锅帘	孤人
	include	waveform	stay	blade	many years	educational inspector	master	steamer plate	lonely person
T3+T2	饱含	跛行	补流	倒头	躲年	笃学	搞人	果莲	古人
	filled with	limp	feeder current	lie down	avoid the New Year	study hard	make fun of someone	lotus pip	ancient person

Table 3. Experiment 2 stimuli

Both male and female Mandarin speakers produced the words, and the stimuli were created by using the same method as in Experiment 1. A total of 360 disyllabic expressions were used as stimuli (3 onset types x 3 vowel types x 10 pitch levels x 2

phonation types (modal, creaky) x 2 speaker genders = 360), and they were fixed at 80 decibels in the experiment.

Participants and procedure

Three groups of a total of 92 subjects participated in the experiment: 32 native Mandarin listeners (16 M, 16 F, mean age 29.19, SD=3.27), 30 native Korean listeners with advanced Mandarin proficiency (13 M, 17 F, mean age 26.1, SD=6.04; more than 5 years of learning, new HSK level 5 or 6), and 30 native Korean listeners with beginning Mandarin proficiency (15 M, 15 F, mean age 24.9, SD=2.04; less than 1 year of learning). Hereafter, three listener groups are referred to as NM, NKA, and NKB, respectively. Randomized audio stimuli were grouped into eight blocks and presented individually using the *Labvanced* program. Participants were instructed to choose one word from the pair shown on the screen that differed in the tone on SYLLABLE1. A short break was given between the first four sessions and the second four sessions, and a practice session using 12 stimuli, which included all consonant, vowel, and tone types, preceded the experiment.

Analysis

The tone identification responses and the response times were analyzed using the R hmisc package. Six variables were treated as fixed effect factors: (1) phonation (modal, creaky voice), (2) pitch relation between SYLLABLE1 and SYLLABLE2 ('SYLLABLE1> SYLLABLE2', 'SYLLABLE1<SYLLABLE2'), (3) SYLLABLE1 pitch (level 1 ~ level 10), and (4) onset ([p, t, k]), (5) speaker gender (male, female), (6) listener group (NM, NKA, NKB). Phonation was set as a moderator variable, and participant was treated as a random variable. The effects of phonation, as well as the interaction effects between phonation and variables (2), (3), (4), (5), and (6), were analyzed using a Mixed-Effects Logistic Model with the lme4 package. A Multiple Linear Regression Analysis was adopted for reaction time analysis. *Bonferroni* post hoc analysis was also conducted using the emmeans package.

Results

We observed significant main effects of phonation, pitch relation, SYLLABLE1 pitch, onset, speaker gender, and listener group, as well as significant interaction effects of phonation*pitch relation, phonation*listener group, phonation*SYLLABLE1 pitch, phonation*speaker gender, and phonation*onset, pitch relation*listener group, SYLLABLE1 pitch*listener group. Additionally, significant three-way interaction effects of phonation* pitch relation*listener group were found. The results are summarized in Table 4.

	Chisq	Df	Pr(>Chisq)
phonation	651.729	1	<.0001 ***
pitch relation	7964.897573	1	<.0001 ***
SYLLABLE1 pitch	4156.137527	8	<.0001 ***
onset	8.127784797	2	0.0172 ***
speaker gender	443.4528891	1	<.0001 ***
listener group	51.13462737	2	<.0001 ***
phonation*pitch relation	19.77404485	1	<.0001 ***
phonation*SYLLABLE1 pitch	30.08230993	8	<.0001 ***
phonation*onset	47.23241116	2	<.0001 ***
phonation*speaker gender	15.57492703	1	<.0001 ***
phonation*listener group	131.1305924	2	<.0001 ***
pitch relation*listener group	206.620093	2	<.0001 ***
SYLLABLE1 pitch*listener group	1161.70215	16	<.0001 ***
phonation*pitch relation*listener group	7.026929422	2	0.030 *
phonation*SYLLABLE1 pitch*listener group	21.66609968	16	0.154

Table 4. Summary of Experiment 2 results

Bonferroni post hoc analysis found that significantly more Tone 3 responses were observed for the pitch relation 'SYLLABLE1 < SYLLABLE2' (p<.0001). The interaction effects of phonation*pitch relation showed that significantly more Tone 3 responses were observed for creaky voice in both pitch relations (p<.0001). In both phonation types, significantly more Tone 3 responses were provided for the pitch relation 'SYLLABLE1 < SYLLABLE2' (p<.0001). We also found significantly more T3 responses in the condition 'modal*SYLLABLE1 < SYLLABLE2' compared to the condition 'creaky*SYLLABLE1 > SYLLABLE2' (p<.0001). These results align with those from Experiment 1, confirming that pitch cues are most crucial for distinguishing Tone 1 and Tone 3, while creaky voice certainly enhances Tone 3 identification.

The results further reveal Important perceptual differences between native and non-native listeners. We found that overall, more Tone 3 responses were provided in the order of 'NM > NKA > NKB'. The differences among the groups were significant (NM vs. NKB*:* p<.0001; NKA vs. NKB: p<.0001; NM vs. NKA: p=.0174). *Bonferroni* post hoc analysis showed that while all three groups provided more Tone 3 responses in the condition 'SYLLABLE1 < SYLLABLE2', NM and NKA had notably more Tone 3 responses than NKB (p<.0001), with no significant differences observed between NM and NKA. By contrast, in the condition 'SYLLABLE1 > SYLLABLE2', NM yielded more Tone 3 responses than both NKA and NKB (p=.0028; p=.0022), while no differences were found between NKA and NKB.

The differences between native and "on-native perception were also evident in the interaction effects of SYLLABLE1 pitch*listener group and phonation*listener groups. NM had more Tone 3 responses than NKA for levels 5 to 7 in SYLLABLE1 pitch (level 5: p=.0449, levels 6, 7: p<.0001), and more Tone 3 responses than NKB across levels 1 to 7. NM also had more Tone 1 responses than NKB for levels 9 and 10 in SYLLABLE1 pitch (p<.0001). Additionally, NKA had more Tone 3 responses than NKB across levels 1 to 6 (p<.0001) and more T1 responses for levels 9 and 10 (p=.0175; p=.0047). This indicates that perceiving low tones is more challenging for non-native listeners, while their perception patterns may approach those of native listeners as their proficiency advances. The differences among the listener groups are clearly shown in the categorical perception patterns presented in Figure 7.

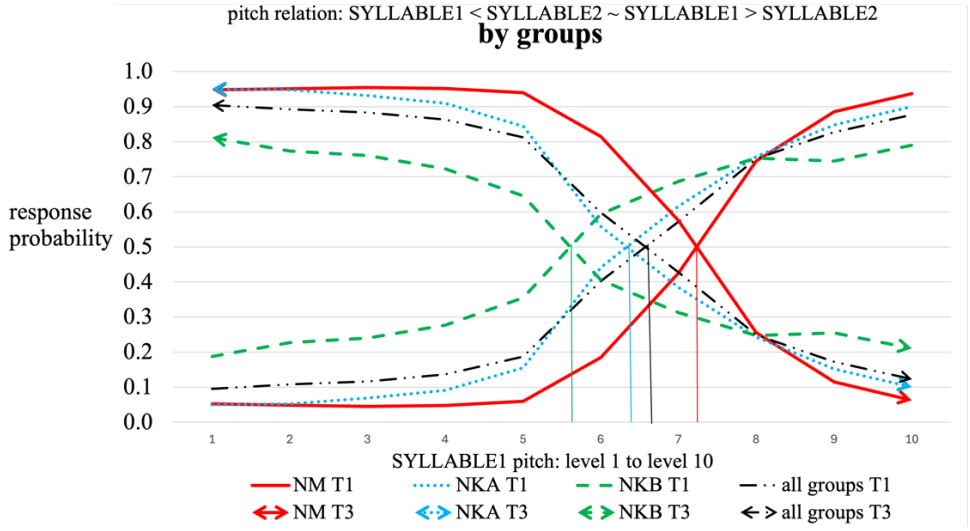


Figure 7. Categorical perception among native and non-native listener groups

Another interesting observation arises from the interaction effects of phonation*listener group. In creaky phonation, both NM and NKA had more Tone 3 responses than NKB (p<.0001). In modal phonation, however, NM had more Tone 3 responses than both NKA and NKB (p<.0001), and NKA, in turn, had more Tone 3 responses than NKB (p=.0062). This demonstrates that NKB had more difficulty with low tone identification, regardless of phonation type, and that NKA relies heavily on creaky phonation for identifying low tones. The different effects of phonation on native and non-native listeners' categorical perception of Tone 1 and Tone 3 are illustrated in Figure 8.

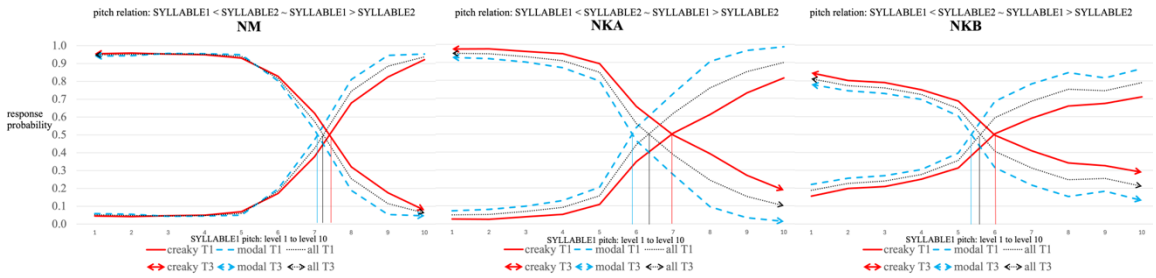


Figure 8. Interaction of pitch and phonation in categorical perception (dashed line: modal, solid line: creaky, dotted: all)

4. Discussion and conclusion

The present study examined the role of phonation in the perception of Mandarin tones by native and non-native listeners. By focusing on Tone 1 and Tone 3 preceding Tone 2 in naturally occurring disyllabic expressions, it effectively disentangled the effects of pitch heights and phonation types. The results from the two perception experiments indicate that while pitch is the most crucial cue in Mandarin tone perception, creaky phonation significantly enhances Tone 3 identification. The perceptual effects of creaky phonation become evident over the categorical boundaries where pitch cues may be ambiguous. Therefore, phonation is integrated as a perceptual cue, complementing pitch cues. We also found intriguing differences between native and non-native listeners, whose Mandarin proficiency varies from beginner to advanced. In general, Tone 3 is challenging for Mandarin learners to perceive, possibly due to the acquisitional difficulty of its phonetic variants as well as less salient nature of low pitch (Fu and Lee 2022, Lee and Lee 2022). While native Korean listeners use phonation cues to identify Tone 1 and Tone 3, these cues are, in fact, utilized to a greater extent as their Mandarin proficiency progresses. The observation that Mandarin learners may develop a perceptual strategy to utilize phonation cues may be attributed to the fact that pitch cues are less stable for non-native listeners, necessitating secondary cues. It is also possible that native Korean listeners may be sensitive to the phonation distinction, which is associated with onset consonants in their native language (Silva 2006). While the question of how Mandarin learners' native languages influence their use of phonation cues in tone perception remains open, the present study suggests that Tone 3 may be introduced to Mandarin learners not only with the lowest pitch but also creaky voice quality, which was described as "being squeezed to a grunting quality of the voice" early by Chao (1948).

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Enhancing Cultural Understanding and Language Learning of Song Ci-Poetry by L2 Chinese Learners in a Hong Kong International Baccalaureate (IB) School through a Virtual Reality Program: A Systematic Evaluation

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Abstract

Virtual Reality (VR) is becoming increasingly prevalent in education. However, its impact on language learning, particularly in teaching Chinese literature, remains underexplored. This study assessed the impact of a VR program on learning "Green Jade Table: Lantern Festival," a poem by Xin Qiji from the Song Dynasty, among Chinese second language (L2) learners at an international school in Hong Kong. It used a mixed-methods approach, incorporating qualitative interviews with three teachers and a Likert scale survey completed by 76 students online. The findings revealed that the VR program offered an immersive learning experience, enhancing cultural understanding and student engagement. However, it was also noted that there were limitations such as lack of student interaction and emphasis on task meanings. Despite this, scaffolding activities and other VR-integrated classroom challenges were identified. The research highlights the potential of VR as an effective tool for teaching Chinese literature, emphasizing the advantages of using VR to create a more immersive learning experience. It also provides suggestions on how teachers can integrate VR into their teaching methods seamlessly.

Keywords: Virtual reality, VR program, Chinese Song Ci-poem VR, Second language learning, Computer-assisted language learning

1. Introduction

1.1Research background

The rise of Virtual Reality (VR) has profoundly impacted various sectors, including education. Its potential for creating immersive learning environments has sparked interest among educators and researchers. VR's interactive nature has been especially beneficial in language education, where context and immersion play a crucial role in facilitating comprehension and retention. Despite the promising prospects, research on VR's effectiveness in teaching Chinese literature remains limited. This study aims to fill this gap by evaluating a VR program designed for teaching "Green Jade Table: Lantern Festival," a Song Dynasty poem, to second language learners in a Hong Kong International Baccalaureate （IB） school. The study uses a mixed-method approach, combining qualitative teacher interviews with a Likert scale student survey, to provide a comprehensive evaluation of the VR program's impact on students' cultural understanding, engagement, and learning outcomes.

2.3 Research questions and goals

This study seeks to answer the following research questions:

1. How effective is a VR program in enhancing the learning of "Green Jade Table: Lantern Festival," a Song Dynasty poem, among second language learners?
2. How does the VR program influence students' motivation and cultural understanding?
3. What are the educators' experiences and perspectives regarding the implementation of the VR program in teaching Chinese literature?

The primary goal of this research is to fill the gap in the literature concerning the use of VR in teaching Chinese literature, specifically within the context of a Hong Kong IB school. The study aims to provide comprehensive insights into the potential benefits and challenges of integrating VR into Chinese literature teaching, thereby contributing to the ongoing discourse on the role of technology in language and literature education. Furthermore, by exploring both teachers' and students' perspectives, the study hopes to offer practical recommendations on how VR can be effectively and seamlessly integrated into teaching methods.

2.3 Theoretical framework

The theoretical framework of this study is anchored in the constructivist learning theory, underpinning the belief that learners construct knowledge and meaning from their experiences (Piaget, 1973; Vygotsky, 1978). Recent works such as Lan and Tam (2022) have shown how immersive technologies like VR can significantly enhance this learning process, fostering a deeper understanding of the subject matter.

The concept of situated learning, as proposed by Lave & Wenger (1991), and reinforced by recent research from Huang et al. (2021), forms another pillar of this study. They suggest that learning is most effective when it occurs in context. VR provides students with a simulated context, allowing them to experience the ambience of the Song Dynasty's Lantern Festival, enhancing their cultural understanding and engagement, thus facilitating their comprehension of the poem.

Lastly, the framework draws upon the idea of authentic learning (Herrington & Oliver, 2000), a concept further bolstered by Chen and Yuan's (2023) recent research. They found that VR provides an authentic learning environment mimicking real-life situations. This immersive and authentic environment significantly enhances students' motivation and engagement, leading to improved learning outcomes.

2. Literature review

2.1 Learner motivation

The application of virtual reality (VR) technologies in language education has been shown to be an effective approach to increasing learner motivation and engagement. A study conducted by Lan and Tam (2022) demonstrated how the use of 360° videos could significantly impact basic Chinese writing lessons. Their research concluded that this immersive method of teaching not only increased engagement amongst the students but also significantly improved their motivation to learn. This evidence suggests that incorporating interactive and immersive technologies like 360° videos into language learning can significantly enhance the learning experience. Furthermore, Huang et al. (2021) developed a new model of design collaboration among learners. This model was based on the use of VR and AR technologies, and the study's findings highlighted the potential of these technologies to enhance student motivation

and engagement, particularly within the context of VR 3D modelling. The research shows that when learners are actively involved in the design process and collaborate with their peers, their motivation to learn and engagement with the learning material increase.

The Importance of Immersion In VR for language learning has also been emphasized by Barrett et al. (2020). The researchers found that immersion had a decisive influence on the learners' perceived usefulness of VR and their motivation to learn. This suggests that creating an immersive learning environment using VR can significantly impact learners' motivation levels and their perception of the learning material's relevance. The findings of these studies are further reinforced by the research conducted by Legault et al. (2019). They found that immersive VR for second-language vocabulary learning promoted students' motivation, engagement, and retention. By creating an immersive and interactive learning environment, VR technology was seen to facilitate better retention of vocabulary and promote greater engagement with the learning material. This, in turn, led to increased motivation amongst the learners.

2.2 Authentic learning context and cultural awareness

In the context of authentic learning and cultural awareness, numerous studies affirm the efficacy of VR in language education. Chen and Yuan (2023), for instance, discovered that VR provides a genuine learning environment that promotes engagement and repetition, significantly aiding students' vocabulary learning. Similarly, Lan and Tam (2022) enhanced the learning experience by constructing an immersive Chinese language course utilizing VR, which incorporated authentic materials and real-life situations.

Furthermore, DeWitt et al. (2022) underscored the importance of VR in offering immersive intercultural experiences, which are crucial in our globally connected world. They emphasized VR's capacity to foster an understanding of cultural differences and similarities, as well as enhance communication skills in diverse cultural settings. Echoing these insights, Legault et al. (2019) observed that immersive VR instruction and authentic learning experiences not only have

a positive impact on learning outcomes but also bolster students' motivation to learn.

2.3 The challenges of virtual reality in language teaching

Virtual Reality (VR) is praised for its potential in language learning, specifically its immersive and interactive nature that bolsters language understanding and retention. Radianti et al. (2020) implies that, although promising, VR should complement, not replace, traditional teaching methods. Successful adoption of VR needs thorough planning, teacher supervision, and supplementary materials to ensure a relevant and effective learning journey (Yildirim et al., 2020).

However, the application of VR in language learning comes with possible risks and hurdles. Overuse might lead to dependency issues (Yoshimura & Borst, 2021), and the cost and resources involved in creating and maintaining viable VR language applications can be considerable. Other issues include health concerns like eye discomfort and motion sickness from long-term VR use (Eunhee et al., 2020). Hence, it’s essential to balance VR with conventional teaching approaches and manage its implementation to tackle its constraints and potential risks (Graeske & Sjoberg, 2021). Doing so allows VR to offer students enriching language experiences that go beyond the conventional classroom.

2. Research methodology

3.1. Participants

Teachers

This study used the purposive sampling method to select six IB teachers experienced in VR technology and its application in Chinese language and literature teaching. The study aimed to include teachers who had experimented with various VR tools in a language-learning context.

All participants are Chinese language teachers who teach in secondary schools. They were selected based on their VR experience, which ranged from

one to three years. This range provided a diverse level of exposure to VR technology and its use in language learning. Additionally, some participants had attended VR workshops and training sessions, both locally and internationally. Others had explored and experimented with VR independently.

Ultimately, three individuals were chosen for the study. Both had significant exposure to VR technology, had attended training sessions, and had previously incorporated VR into their Chinese language and literature teaching. Their exploration of VR tools offered valuable insights into their familiarity and potential readiness for integrating VR into Chinese language and literature education. **Table 1** shows that these selected participants have a substantial background in using VR and have engaged with VR technology in various contexts, making them well-prepared to answer the research questions proposed in this study.

Table 1

Participants' VR teaching experience and training

Teacher	Teaching experience	VR teaching Experience	VR Apps/Tools Observed	VR training Experience
Teacher 1	3 years	1 year	ImmerseMe, NounTown	Attended local workshops
Teacher 2	6 years	3 years	NounTown, JC-VR	Attended international workshops
Teacher 3	2 years	1 year	ImmerseMe, Avakin Life	Self-explored
Teacher 4	4 years	1 year	JC-VR, Avakin Life	Attended local workshops
Teacher 5	9 years	2 years	ImmerseMe, NounTown	Self-explored
Teacher 6	6 years	2 years	JC-VR, NounTown, Avakin Life	Attended local workshops

Students

This study involved 76 secondary grade nine students, including 45 boys and 31 girls from a Hong Kong international curriculum school. This study used questionnaires to gauge changes in student attitudes and motivation towards learning before and after using VR. This study then compared these findings with student performance in tests conducted before and after the study. The study spanned three weeks, and upon completion, this study invited 10 students for individual interviews to understand their thoughts and emotions about VR. These interviews were audio-recorded and transcribed.

3.2 Research design

Quantitative phase

The study involved an online survey of 76 students to gather data on the attitudes and motivations toward the use of VR tools in Chinese literature teaching. The survey, created via Google Forms, was distributed to each participant through a shared link.

Qualitative phase

T his research involved conducting interviews with three teachers experienced in using VR for Chinese literature teaching, chosen for their ability to offer diverse insights and foster dynamic discussions.

Additionally, focus group dialogues were captured via Zoom to gain a deeper understanding of the teacher's views on the application of VR in Chinese literature teaching. These conversations tackled a range of subjects, including the promise of VR in language education, its integration into the classroom environment, the engaging elements of VR in language instruction, overcoming obstacles in digital learning, the essential characteristics of efficient VR language learning, and tactics for integrating VR tools into Chinese classes.

3.3 Data analysis

Quantitative data analysis

This study utilized the Likert scale to analyze quantitative data gathered from a questionnaire survey. The Likert scale, a widely used rating scale, allows respondents to express their levels of agreement or disagreement with specific statements (Liddell & Kruschke, 2018). The survey primarily probed two areas: participants' perceptions of VR's effectiveness in education and its potential to bolster learning attitudes and motivations. The goal was to examine VR's efficacy in enhancing language learning.

To gather this information, the study designed questions, based on Pintrich, Smith, Garcia, & McKeachie's (1991) research on learning attitudes and motivations. These questions aimed to understand the participants' attitudes and motivations for using virtual reality technology in Chinese classes. The question structure aimed to obtain numerical ratings typically between 1 and 5, or from strongly disagree to strongly agree.

Qualitative data analysis

Thematic analysis was used to analyze the qualitative data obtained from the focus group discussions of three Chinese teachers. This method involves encoding and categorizing the data to identify recurring ideas, concepts, and patterns, and then organizing them into themes (Nowell et al., 2017). The study used Nvivo, a computer-assisted qualitative data analysis software, to better organize, manage, and analyze data (Aspers and Corte, 2019).

Thematic analysis can identify key themes (Maguire and Delahunt, 2017). This includes the effects of virtual reality in teaching Chinese literature. These themes originate from the participants' narratives, highlighting the potential advantages and challenges of virtual reality technology in teaching IB literature courses.

To enhance the reliability and validity of the research results, this study conducted member checks (Candela, 2019). The participants all received a copy of the research, which they could review and provide feedback or make necessary modifications. Notably, the qualitative and quantitative stages of the

research were both exploring the same issue, further enhancing the validity of the study.

4. Results and discussion

Students learning attitude and motivation of VR in facilitating Chinese learning

This study attempts to obtain quantitative evidence of the potential effectiveness of VR in teaching Chinese language and literature. As shown in **Table 2**, a majority of participants, 64 out of 76 (84%), hold a more positive attitude towards learning classical Chinese using VR, with 58 strongly agreeing. Through qualitative interviews, students thought that learning classical Chinese with VR was "quite interesting, making the learning of classical Chinese not so dull." And "The background music is very nice, allowing me to feel the artistic conception of the poetry."

Table 2

"I have a positive attitude towards learning Song Ci with this Song Ci VR program."

	Number of respondents	% of respondents
Strongly agree	58	76
Agree	6	8
Neutral	12	16
Disagree	0	0
Strongly disagree	0	0

In terms of stimulating learning motivation, as shown in **Table 3**, only 12 out of 76 (16%) participants stated that VR can motivate their interest in studying classical Chinese. Through qualitative interviews, students thought: "The scene is not very realistic, and the animation is a bit rough." "The interactive elements are limited, and it ends within three minutes." "Although it's interesting, I felt dizzy and stopped after about ten to fifteen minutes."

Table 3

"I agree that using virtual reality technology can increase motivation in learning Classical Chinese."

	Number of respondents	% of respondents
Strongly agree	0	0%
Agree	12	9%
Neutral	54	71%
Disagree	10	0%
Strongly disagree	0	0%

An immersive experience for language and culture

According to three educators, VR headsets provide an immersive experience by simulating real-world scenarios. This technology allows students to visualize how the Song Dynasty celebrated the Lantern Festival. Consequently, they gain a deeper understanding of the context of Song poetry, which enhances their interest in learning.

"Even though the historical background is explained during the teaching of Song poetry, VR allows students to experience this context in a more immersive, realistic way. Compared to simply receiving background information, students are more proactive when learning this way."

Teacher 1

Teachers believe that the immersive nature of VR helps students comprehend the scenes, characters' emotions, and settings of the time more effectively. For instance, while studying this Song poem, students can experience the poet's perspective. They can understand how Xin Qiji of the Song Dynasty celebrated the Lantern Festival and his emotions during that period. This approach is more beneficial for students' understanding of the poem. Although teachers could explain the cultural background and content of the ci-poem without using the technology, learning through the VR program would allow learners to generate an idea of how people celebrated the Lantern Festival in the Song dynasty in terms of dimensions. The VR program provided the learners with an immersive experience that would motivate them to learn about Chinese classical literature.

Effective language acquisition

The teachers noted that Virtual Reality (VR) merges education and entertainment. It offers a multi-sensory method that can enhance students' understanding of ancient poetry and deepen their memory. This learning effect is hard to achieve solely through textbooks. The teacher also discussed how VR can offer a more immersive and interactive learning experience, particularly for second-language students:

"The imagery in this poem is complex and may be challenging for second language learners. VR provides game tasks to aid understanding. By completing these tasks, students can grasp the meaning of the words, thereby improving their learning efficiency."

Teacher 3

The VR program also applied several meaning-focused tasks which would help learners to overcome the language barriers of the ci-poem. Several metaphors were used in this ci-poem, which could be difficult for L2 learners to understand. The VR program set some meaning-based tasks for learners to use motion controls to find a specific image that matches the metaphor. These meaning-based tasks eliminated the language barrier and provided practicality

in terms of learning because learners would learn at their own pace, promoting effective learning.

The VR programme's limitations

The VR program was a single-player experience, which could not enhance interaction with other learners through synchronous text or voice functions. Most of the time, learners solely listened to a narrator's voice as they proceeded through the virtual tour. Moreover, they could only interact with a few virtual objectives, which may decrease their immersive capacity.

"This VR programme is a single-player game; students can't interact with others online. The limited interactive objects reduce immersion."

Teacher 1

"VR offers very limited language tasks, which can't help students understand the whole poem's meaning."

Teacher 2

The VR program offered only a few meaning-focused tasks, which might not fully present the content of the ci-poem. In the beginning, the VR program used 10 seconds to show the written form of the first sentence without any explanation or meaning-focused tasks. There were several images and metaphors that needed to be analyzed in this sentence. Without negotiated meaning tasks, learners might directly interpret "stars fell like rain," as they lacked a similar poetic conception.

Challenges in Integrating VR into curricula

Designing virtual reality courses presents a challenge for teachers. Current curriculum planning, which is heavily focused on exams, sees teachers and students primarily occupied with classes and exams. Integrating virtual reality can make learning more engaging for students, but it demands more teaching time from teachers. This could mean reducing teaching hours, ending classes early, or postponing class times to alleviate student stress. However,

without reducing the number of exam subjects, extending teaching hours to accommodate VR courses may deter teachers from using this technology.

Indeed, VR provides unforgettable learning experiences, but integrating it with traditional classrooms remains a challenge. Given the limited class hours, a VR learning experience could consume the entire class period. It may be feasible as a one-off teaching experience, but integrating it into the regular curriculum might be challenging.

Teacher 2

The teacher suggested that to maximize the benefits of VR for students and effective teaching, interdisciplinary courses should be considered. This approach allows teachers from various disciplines to collaborate on lesson preparation, creating more opportunities for VR use and enabling both teachers and students to experience its advantages.

Overcoming challenges and integrating the IB teaching approach with VR

This study highlights the enhancement of teaching methodologies through the effective integration of VR. When adding a VR program to a language class, teachers should first identify the desired learning outcomes. They should use a checklist (Chappelle, 2012) to assess criteria such as purpose, features, and practicability when choosing VR programs.

For example, when studying Chinese poetry with VR, start by introducing the VR program and its objectives. This should be followed by a pre-reading activity to preview the literary piece. As students explore the VR environment, guide them through key elements, facilitate discussions, and provide real-time feedback. Post-VR activities should include reflection on the VR experience and applying learned concepts to a new task, such as a writing assignment or group project.

The immersive and Interactive Ies VR offers align with the International Baccalaureate's (IB) concept-based learning objectives. VR transports learners to the poem's era and location, fostering a deeper understanding of its historical, cultural, and linguistic contexts. This aligns with the IB's emphasis on inquiry-

based, experiential learning, enhancing student engagement and fostering a deeper comprehension of the poetry's underlying concepts.

5. Study limitations

This study has certain limitations. First, the small sample size of teachers limits the scope, as the study assesses teachers' views on VR and its actual usage in classrooms. As a result, only three qualified teachers were included in the qualitative study, limiting further exploration of VR's application in real classrooms, such as differentiated teaching and classroom management.

Second, while the study considers both educators' and students' perspectives, it lacks research on VR teaching's effectiveness for students. Consequently, future research could explore changes in student performance under VR teaching and understand VR's learning effects through pre-tests and post-tests.

6. Conclusion

In conclusion, this research provides valuable insights into the potential of Virtual Reality (VR) as an effective tool for teaching and learning Chinese language and literature. The immersive and interactive nature of VR aligns with the IB concept-based learning objectives, fostering a deeper understanding of the cultural, historical, and linguistic contexts. However, the study also highlights several challenges, including curriculum planning and the limited interactivity of the current VR programs. Moving forward, it's essential to develop strategies for overcoming these challenges to fully leverage VR's potential in language education. Moreover, future research should consider a larger sample size and investigate the actual impact of VR teaching on student performance through pre-tests and post-tests.

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A Zonal Inclusion Analysis for the Empathic Marker *gei* in the *ba* Construction*

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This paper focuses on the emphatic marker *gei* in the *ba* construction. In the literature, various proposals argue for the existence of *gei* in the *ba* construction. The emphatic marker *gei* is proposed to be a head situated in a functional projection right above VP. However, it remains a puzzle why the emphatic marker has to be *gei*. Inspired by the Zonal Inclusion Analysis of Manzini and Franco (2016), I argue that syntax, not morphological coincidence, can provide an explanation. I adopt Dikken's (2020) revised version of the *ba* construction and link the emphatic marker *gei* with the preposition *gei* via the zonal inclusion proposal. This then provides us with a reasonable explanation for *gei*'s existence and its homonymy with the preposition *gei* in Mandarin Chinese.

Introduction

In the literature, the *ba* construction in Mandarin Chinese has received a lot of attention. For example, the syntactic status of *ba*, the structure of the *ba* construction, and the comparison of *ba* with the *bei* construction have been hot

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topics (i.e. Chao 1968, Hashimoto 1971, Huang 1982, Sybesma 1999, and Li 2006, to mention a few). In addition, researchers have also observed that an optional *gei* can appear right before the verb. An example is shown in (1).

(1) Zhagnsan ba Lisi (gei) da-le yi-duan.
Zhangsan BA Lisi GEI hit-ASP one-CL

'Zhangsan beat Lisi up.'

Li and Thompson (1981) propose that this optional *gei* is an emphatic marker in the *ba* construction. As for its syntactic position, although there are different proposals regarding the *ba* construction, a commonality is that *gei* is argued to be a head realization of a functional projection right above the VP. Several representative analyses are illustrated in **Error! Reference source not found.**, and the corresponding structures are shown in (3).

(2) a. Li (2006) (see also Huang, Li and Li 2009): the *Ba*P analysis
b. Travis (2010): the Inner AspP analysis

c. Kuo (2010): the TrP analysis

d. Jheng (2012): the ApplP analysis

e. Zhao (2021): the ApplPmid analysis

(3) a. [$_{baP}$ *ba* [$_{vP}$ NP [$_{v'}$ *v* [$_{VP}$ V XP]]]]
b. [$_{VP}$ *ba* [$_{AspP}$ NP [$_{Asp'}$ Asp [$_{VP}$ V XP]]]]
c. [$_{vP}$ *ba* [$_{TrP}$ NP [$_{Tr'}$ Tr [$_{VP}$ V XP]]]]
d. [$_{vP}$ *ba* [$_{ApplP}$ NP [$_{Appl'}$ Appl [$_{VP}$ V XP]]]]
e. [$_{vP}$ *ba* [$_{ApplPmid}$ NP [$_{Applmid'}$ Applmid [$_{VP}$ V XP]]]]

In (3a), *ba* is proposed to be a head of the *Ba*P, and the *Ba*P takes a *v*P as its complement. While the *ba* NP is in the specifier position of the *v*P, the emphatic marker *gei* is in the head position of the *v*P. Similarly, for each representative structure in (3), the complement projection following *ba* is right above VP, consistent with *gei*'s surface order preceding the main verb in the *ba* construction.

Past analyses have provided syntactic explanations for *gei*'s position in the *ba* construction. However, an interesting question arises: Why does the head of *ba*'s complement projection have to be realized as *gei*? We know that the light verb *ba* in the construction has undergone grammaticalization from a verb to a preposition in archaic Chinese, and that it becomes a light verb in modern Chinese (i.e. Zou 1995). However, for the emphatic marker *gei*, to the best of my knowledge, there seems to be no relevant discussion why it has to be *gei* in the literature.

In the following discussion, I explore why the emphatic marker is represented as *gei* in the *ba* construction. In Section 2, I first review an interesting comparison by Manzini and Franco (2016) between the homonymous *gei* preposition and differential object marking (DOM) in various European languages. In Section 3, I turn to the revised version of the zonal inclusion analysis for DOM by Dikken (2020). In Section 4, I examine the *ba* construction and explain why *gei* is used as an emphatic marker. I conclude the paper in the last section.

2. DOM and Prepositions

In Mandarin Chinese, the lexical item *gei* has various syntactic statuses. For example, it can function as a verb, as in (4), a preposition, as in (5), or an affective marker, as in (6) (i.e. Tsai 2015, 2017).

(4)	Zhangsan	gei-le	wo	yi-ben	shu.	(verb)
	Zhangsan	give-ASP	me	one-CL	book	

'Zhangsan gave me a book.'

(5) Zhangsan song-le yi-ben shu gei wo. (preposition)
Zhangsan give-ASP one-CL book to me

'Zhangsan gave a book to me.'

(6) Zhangsan juran gei-wo pao-le! (affective marker)
Zhangsan unexpectedly GEI-me run-ASP

'Zhangsan ran away unexpectedly and I was affected.'

Since *gei* has different usages, one might wonder if the emphatic marker *gei* in the *ba* construction can be linked to any of them. A similar question seems to be raised by Manzini and Franco (2016) in their discussion of homonymous differential object marking and prepositions in various European languages.

Differential object marking can be found in many European languages, and it is determined by the animacy and/or specificity of the object NP. There are different degrees of animacy and specificity; hence, there can be different combinations across languages. For example, in the Italian example in (7), the differential object marker *a* is determined by the following NP's specificity. When the object is definite, as in (7a), *a* must appear. If the object is indefinite, as in (7b), there is no differential object marking.

(7) a. camənə a mmi/tti/ɣiddə/kwedda femməna.
they.call to me/you/him/that woman

'They call me/you/him/that woman.'

b. camənə u kanə

they.call a dog

'They call a dog.'

(Manzini and Franco (2016): (1a, b, and c))

In European languages, it has been observed that the dative preposition is usually the same as the differential object marker. An Italian example is illustrated in (8).

(8) u rainə a mmi/tti/ɣiddə.
It they.give to me/you/him

'They give it to me/you/him.'

(Manzini and Franco (2016): (1d))

Manzini and Franco (2016) propose that this is not a morphological coincidence, but can be explained from a syntactic perspective. First, they propose that for a dative preposition, its basic meaning is 'inclusion'. In addition, this kind of 'inclusion' represents a kind of 'part-whole' relationship, since the basic function of prepositions is to link something to something/someone. Therefore, this can also be interpreted as a 'possessor-possessee' relationship. Based on this, Manzini and Franco (2016) propose a zonal inclusion analysis, using $\subseteq$ to represent the concept of inclusion. In their syntactic analysis of a typical dative construction in Italian, the preposition *a* is marked as P($\subseteq$), as shown in **Error! Reference source not found.**. Their zonal proposal is not very different from the traditional syntactic approach. A salient difference lies in the PP, where the 'inclusion' proposal has been integrated.

(9) 3
V PredP

dato 3

'give' DP PP($\subseteq$)

3 3

D NP (⊆) DP

il bicchiere a Gianni

'the' 'glass' 'to' 'Gianni'

(Manzini and Franco (2016): (24))

As for differential object marking in Italian, let us first examine the following data in (10).

(10) a. Mi/ti ha colpito/215arlato
(to.)me/you he.has hit/talked
'He hit/talked to me/you.'

b. Lo/*gli ha colpito
him/to.him he.has hit
'He hit him.'

c. Gli/*lo ha 215arlato
to.him/him he.has talked
'He talked to him.'

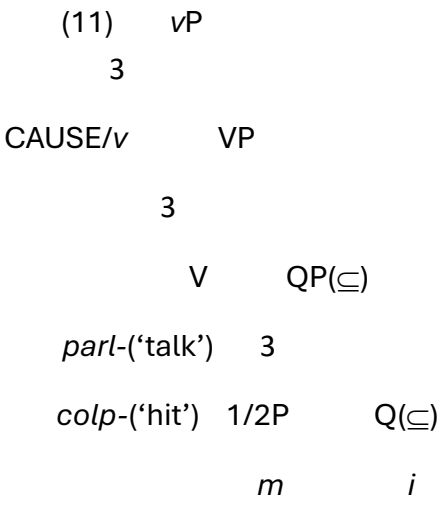
(Manzini and Franco (2016): (19))

In (10a), no matter whether the main verb is transitive ('hit') or intransitive ('talk'), the first person and second person pronouns are both clitics, and they combine with the preposition *i* ('to'). However, if we turn to the third person clitic, the syntactic behaviors are quite different. When the transitive verb *hit* is used, the third

person clitic has to be in an accusative form, as in (10b). On the other hand, when the intransitive verb *talk* is used, the third person clitic has to be in a dative form, as in (10c). Therefore, we can infer that the *i* ('to') in (10a) functions as a differential object marker when the verb is *hit*, and a preposition when the verb is *talk*.

Because the differential object marker is homonymous with the preposition, Manzini and Franco (2016) propose that DOM in Italian can also be explained via the inclusion proposal. That is, the $\subseteq$ idea can be incorporated into the syntactic structure of DOM. Below, the structure for (10a) is shown in (11).

(11)



(Manzini and Franco (2016): (31))

If *i* is used as a preposition, it denotes an inclusion/possession relationship as described above. As for its DOM usage, according to Manzini and Franco (2016), it also denotes an inclusion/possession relationship. In this way, this sentence is interpreted as 'He caused me/you (to have) hit'. In other words, the internal argument is understood as the possessor of the internal subevent. Under this proposal, the homonymous preposition and differential object marker are not a coincidence morphologically, but rather share the same syntactic structure.

The Revised Version

Although Manzini and Franco's (2016) proposal provides a nice explanation for the homonymy between the preposition and the differential object marker, the proposed structure for DOM seems to ignore a very important element in the formation of DOM.

Recall that differential object marking is determined by the animacy and/or specificity of the following object. The problem is that in a structure like (11), the object is placed inside a VP, and the VP-internal position is usually left for non-specific NPs. Specific NPs or generic NPs are proposed to be located outside VP (i.e. Diesing 1992). To address this problem, based on Manzini and Franco's (2016) idea of inclusion, Dikken (2020) proposes the revised version illustrated in (12).

(12) $[_{TP}$ <SUBJECT> [T $[_{VoiceP}$ <SUBJECT> [Voice $[_{vP}$ *v* $[_{RP}$ <OBJECT> [$R_{\subseteq}$ $[_{VP}$ V <OBJECT>]]]]]]]]

(Dikken 2020: (2b'))

In this structure, the functional projection of inclusion, originally a QP(⊆), is now a Relator Phrase (RP), and is proposed to be located right above VP. In addition, the object is proposed to be fronted and located in the Spec, RP position. As pointed out by Dikken, the functional projection R⊆'s appearance is required by the referential properties of the internal arguments.

Dikken proposes that the functional projection for inclusion represents a predicational relationship of set inclusion (part-whole). This relationship is essentially the same as that described in Dikken's (2006) Relator Proposal. Hence, the RP can be placed right above VP. In addition, the R⊆ can connect the VP and the preposed object directly, thus expressing their relationship more directly. Note that a salient difference is that under Manzini and Franco (2016), Q⊆ is an overt realization of DOM. For Dikken (2020), R⊆ is not an overt realization of DOM. It is simply a functional projection which connects the preposed object and the VP. Moreover, the existence of RP does not guarantee the appearance of DOM.

Take the Spanish example in (13) as an illustration. In Spanish, DOM is determined by the animacy property of the following object. The [+human] object in (13) has be to accompanied by the differential object marker *a*. In other words, the differential object marker *a* licenses a [+human] object in the Spec, RP position. Under Dikken's analysis, the differential object marker is also a preposition, and it forms a PP with the preposed object, as in (14). This proposal is in accordance with the traditional treatment of DOM and its following object in the literature.

(13) Juan busca **a** una secretaria.
Juan seeks DOM a secretary

'Juan is looking for a (particular) secretary.'

(Dikken 2020: (3b))

(14) ... [$_{vP}$ *v* [$_{RP}$ [$_{PP}$ **a** <OBJECT>] [R$_{\subseteq}$ [$_{VP}$ V <OBJECT>]]]]]

From the above discussion, if we adopt the zonal inclusion analysis by Manzini and Franco (2016), cross-linguistically, we can explain from a syntactic perspective why the differential object marker is homonymous with the preposition. Furthermore, with Dikken's (2020) revised version, the essence of the inclusion theory is preserved, and the properties of specific or generic objects can be linked by the different referentiality inside or outside the VP domain (i.e. Diesing 1992).

The *Ba* Construction

The structure in (14) is reminiscent of the *Ba* construction under investigation. Interestingly, Bergen (2006) and Yang and Bergen (2007) have proposed that *ba* is a differential object marker in the *Ba* construction, and the DOM behaviors can be seen from the animacy and the specificity properties of the *ba* NP. For example, when the

ba NP is a person, *ba* is required, as in (15). If the *ba* NP is inanimate, *ba* becomes optional, as in (16).

(15) Zhangsan *(ba) Lisi da-le yi-duan.
Zhangsan BA Lisi beat-ASP one-CL

'Zhangnsan beat Lisi up.'

(16) Zhangsan (ba) shu kan-wan-le.
Zhangsan BA book read-finish-ASP

'Zhangsan finished reading the book.'

Differential object marking in the *ba* construction is also sensitive to specificity. That is, when the *ba* NP is specific, as in (17), *ba* is optional. However, if the *b*a NP is indefinite non-specific, as in (18), no matter whether there is *ba* or not, the sentence is ungrammatical.

(17) Zhangsan (ba) zhe-ben shu kan-wan-le.
Zhangsan BA this-CL book read-finish-ASP

'Zhangsan finished reading this book.'

(18) *Zhangsan (ba) yi-ben shu kan-wan-le.
Zhangsan BA one-CL book read-finish-ASP

'Zhangsan finished reading a book.'

Based on the animacy and specificity properties of the *ba* NP, *ba* does behave like a differential object marker. However, *ba* is not considered a preposition, but rather a light verb in most recent analyses (i.e. Li 2006, Huang, Li an Li 2009). Although

differential object markers are prepositions in European languages, Seržant & Witzlack-Makarevich (2018) have shown that they can also be light verbs in some languages. Therefore, being a light verb does not exclude *ba* from being a possible differential object marker in Chinese.

If *ba* is a differential object marker, we seem to have found a way to explain the morphological similarity between the emphatic marker *gei* and the preposition *gei*. For the preposition *gei*, the structure is basically the same as the Italian example in (9), as shown in (19) (only the VP part is represented). It can be interpreted as follows: 'When someone gives me a book, the book will later be under my possession'. The inclusion property of *gei* should, therefore, be expressable by Manzini and Franco's (2016) proposal.

(19) ... VP
3
DO V'
yi-ben shu 3
V PP(⊆)
song 3
P(⊆) NP
gei *wo*

As for DOM in the *ba* construction, under the structure proposed by Dikken (2020), the differential object marker *ba* is assumed to be in the *v*P head position, and the *ba* NP is in the specifier of the RP. In this structure, the optional GEI is an overt realization of the R⊆ head. Importantly, the overt realization further supports the existence of RP(⊆). Finally, from the perspective of zonal inclusion, the preposition *gei* and the emphatic *gei* can be syntactically related.

(20) ... *v*P

3

Subject v'

Zhangsan 3

v RP(⊆)

ba 3

NP_i R(⊆)'

Lisi 3

R(⊆) VP

ggei 6

V t_i

da-la yi-duan

The current proposal also has the following application. It is well-known that *ba* constructions include the following kinds of examples with retained objects in (21) and (22). These examples are also referred to as having a part-whole relationship (see Cheng and Litter 1987). That is, the *ba* NP maintains a possessor-possessee relationship with the postverbal object. These examples clearly show the inclusion relationship, and Dikken's proposal nicely captures this property syntactically.

(21) Zhangsan ba juzi bo-le pi.
Zhangsan BA orange peel-ASP skin

'Zhangsan peeled the orange's skin.'

(22) Lisi ba na-ping jiu he-le yi-ban.
Lisi BA that-CL wine drink-ASP half

'Lisi drank the wine for half of the bottle.'

However, note that for the inclusion relationship in (21) and (22), the postverbal object is included in the *ba* NP object. According to the structural proposal in (20), the inclusion direction should be one in which the *ba* NP is included in the postverbal NP. Therefore, it might appear that the examples in (21) and (22) are counterexamples here.

It seems that the following proposal might provide us with a way out of this dilemma. Levinson (2011) use the English examples in (23) and (24) to show that *with* is a possible overt realization of $\supseteq$, the inverse of $\subseteq$.

(23) He presented his pictures to the museum.
(24) He presented the museum with his pictures.

In example (23), the pictures will belong to the museum eventually, so the inclusion direction is $\subseteq$. On the other hand, in example (24), after the giving process, the museum owns the pictures. Now the inclusion will be represented by $\supseteq$. Thus, we can see that both directions of inclusion exist in natural languages. In addition, Manzini & Franco (2016) also state that 'there is no reason why the present model could not encompass such an alternation' (Manzini & Franco 2016: 215). If the inversion of the inclusion direction is allowed, we could have the following alternative structure for the *ba* construction in (25).

(25) ... [$_{vP}$ *ba* [$_{RP}$ <OBJECT> [$_{R'}$ *gei*/$R_{\supseteq}$ [$_{VP}$ V <OBJECT>]]]]]

With the revision in (25), the typical *ba* construction can be explained, as well as the part-whole cases. In this way, the preposition *gei* and the emphatic marker *gei* can be linked and explained via the zonal inclusion analysis.

Conclusion

In this paper, I have tried to link the emphatic *gei* in the *ba* construction to the preposition *gei* in Chinese via the zonal inclusion analysis. Cross-linguistically, the *ba* construction in Chinese further supports the existence of the $R_{\subseteq}/R_{\supseteq}$ functional projection in the zonal inclusion analysis. The zonal inclusion analysis may also offer a simple way of explaining the part-whole relation in the *ba* construction.

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The polysemy of the Mandarin ditransitive *gei* and its implications for grammaticalization

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This paper investigates the polysemous word *gei* 'to give' and its uses in four different ditransitive related constructions in modern Mandarin Chinese. I analyze *gei* as a main verb, a bare root as part of a serial verb, an applicative head, and a prepositional dative marker in the four constructions respectively. Using Mandarin synchronic data, I shed light on a diachronic pathway of grammaticalization from verbs to prepositions through serial verbs observed by Li & Thompson (1973) and Lord (1973). I argue that the initial step in this grammaticalization process is similar to what Saito (2023) proposes for verbs of 'saying' grammaticalizing into complementizers. Namely, the main verb *gei* first loses its verbalizing head and becomes an acategorial bare root (in a serial verb), then grammaticalizes into different functional elements, in this case, an applicative head and a preposition.

Introduction

It has been widely observed that in many languages (Twi, Ewe, Akan, Yoruba, Thai, Vietnamese a.o.), 'give' is a word that is polysemous with different but related meanings and functions, where it can be used as a lexical verb, recipient marker, benefactive marker, causative marker, permissive marker, and so on (Hwang 2000; Iwasaki & Yap 1998; Lord et al. 2002; Newman 1996; Thepkanjana & Uehara 2008). Mandarin Chinese (henceforth Mandarin) is one such language where *gei*, though most commonly used as a ditransitive verb, meaning 'to give', has a multitude of other

functions including a passive marker, a causative marker, a permissive marker, and so on (Lin & Huang 2015). *Gei* as a standard ditransitive verb indicates an event of transfer of possession and appears in the double object construction (DOC) (1) where two internal arguments follow the verb, with the direct object (DO) *yi-ben-shu* 'one book' following the indirect object (IO) *Lisi*.

(1) Zhangsan **gei**-le Lisi yi-ben-shu.
Zhangsan give-ASP Lisi one-CL-books
'Zhangsan gave Lisi a book.'

In addition to being a main verb, some of *gei*'s other productive uses are broadly related to the ditransitive verb and the meaning of 'give', as shown in (2). In (2a), *gei* immediately follows another ditransitive verb and forms a complex serial verb/verbal compound with it. I will refer to this construction as the ditransitive serial verb construction (SVC).[48] In (2b), *gei* marks the indirect object when used with a different ditransitive main verb. This use of *gei* resembles the English prepositional dative marker *to*. In (2c), *gei* adds a benefactive argument *Lisi* to the intransitive predicate *gongzuo* 'to work'.

(2) a.Zhangsan song-**gei**-le Lisi yi-shu-hua.
Zhangsan gift-give-ASP Lisi one-CL-flower
'Zhangsan gifted Lisi a bouquet of flowers.'
b. Zhangsan ji-le yi-feng-xin **gei** Lisi.
Zhangsan send-ASP one-CL-letter to Lisi
'Zhangsan sent a letter to Lisi.'
c. Zhangsan **gei** Lisi gongzuo.
Zhangsan for Lisi work
'Zhangsan works for Lisi.'

[48] As Paul (2008) points out, the term SVC has been significantly abused in linguistic literature where it does not refer to a single construction crosslinguistically. Even in a single language like Mandarin, different authors use the term to refer to different constructions that have distinct structures. In this paper, I strictly use SVC to refer to constructions like (2a).

One property the sentences above have in common is that they all involve either more than one internal argument or additional applied/non-core arguments. One of the goals of this paper is to investigate if and how the different uses of *gei* with such similar meanings are related. In this paper, I propose that the different functions of *gei* in (2) are due to the morpheme instantiating respectively: an acategorial bare root in the serial verb (2a), a prepositional dative marker licensing a recipient or a goal argument (2b), and an applicative marker introducing a benefactive argument (2c). Based on the synchronic generalizations, I show that the functional uses of *gei* can be tied to the main verb 'give' through historical change. This study aims to provide a more precise theory of possible grammaticalization paths related to 'give' that others have observed, like the change from verbs to prepositions through serial verbs proposed by Li & Thompson (1973) and Lord (1973). Mandarin is an ideal language to investigate this grammaticalization process because synchronically, all the lexical, semi-lexical and functional uses of 'give' are retained, allowing us to study the properties of the different stages during the change directly. Crucially, I propose that the grammaticalization process of *gei* from a lexical ditransitive verb to functional elements not only involves an intermediate stage of SVC, *gei* in that stage is also an acategorial bare root, as observed by Saito (2023) in the case of verbs of 'saying' grammaticalizing into complementizers.

The paper is organized as follows: Section 1 discusses in more detail the properties of the sentences in (1-2) that need to be accounted for. Section 2 provides formal structural analyses of the DOC, the dative and the applicative constructions, as well as the SVC with *gei*. Section 3 offers a theory of potential grammaticalization pathway of *gei* that involves serial verbs and a bare root as an intermediate stage. Section 4 concludes the paper.

2. Multifaceted behaviors of *gei*

In this section, I will first discuss the preverbal and postverbal particle *gei* and show that the two constructions do not pattern in the same way with regard to the semantics of the non-core argument, and which verb *gei* can combine with, which I

will refer to as verb sensitivity. Then I turn to the SVC, which displays the same kind of sensitivity.

2.2 Asymmetries of the pre and post verbal *gei*

Let us first carefully examine the properties of (2a-b). Despite the similarities among the different uses of *gei* shown above, in (2a) and (2b), where the position of *gei* differs, the two constructions display asymmetric properties. Sentences in (3) show that when appearing preverbally, *gei* is allowed with both ditransitive verbs (3a) and non-ditransitive verbs (3b). And the non-core argument following *gei* can be interpreted either as a benefactive or a recipient, depending on the argument structure of the main verb.

(3) a. Zhangsan **gei** Lisi ji-le yi-feng-xin.
Zhangsan to Lisi send-ASP one-CL-letter
'Zhangsan sent a letter to Lisi.'
b. Zhangsan **gei** mama zuo-le yi-dun-fan.
Zhangsan for mom make-ASP one-CL-meal
'Zhangsan cooked a meal for his mom'

However, the same thing cannot be said for the *gei* in the postverbal position. When appearing postverbally, *gei* is only compatible with ditransitive verbs as in (2b), repeated here in (4a), but not allowed with a simple transitive or intransitive verb (4b-c).

(4) a. Zhangsan ji-le yi-feng-xin **gei** Lisi.
Zhangsan send-ASP one-CL-letter to Lisi
'Zhangsan sent a letter to Lisi.'
b. ?*Zhangsan zuo-le yi-dun-fan **gei** mama.
Zhangsan make-ASP one-CL-meal for mom

Intended reading: 'Zhangsan cooked a meal for mom.'
(cf. 3b)

c. *Zhangsan gongzuo **gei** Lisi.
Zhangsan work for Lisi
Intended reading: 'Zhangsan works for Lisi.' (cf. 2c)

Additionally, the interpretation of the argument following *gei* in the postverbal position is

restricted to recipients (or goals).[49] This asymmetry in the preverbal and postverbal particle *gei* will be straightforwardly accounted for by the analysis proposed in Section 2. Specifically, I will argue the ambiguity and lack of verb restriction of the preverbal *gei* seen in (3) is due to a structural ambiguity between a benefactive construction where *gei* is realized as an applicative head and a dislocated PP of a prepositional dative construction.

2.3 Verb sensitivity in the SVC

Mandarin allows a type of bimorphemic serial verb in a double object serial verb construction, as was shown above in (2a). In the SVC, *gei* immediately follows another verb. The two elements should be treated as one verbal predicate since *-le*, the perfective aspectual marker that usually follows a verb (or occurs in the sentence final position), appears after both *song* and *gei*.

(5) a. Zhangsan song-**gei**-le Lisi yi-shu-hua.
Zhangsan gift-give-ASP Lisi one-CL-flower
'Zhangsan gifted Lisi a bouquet of flowers.'

[49] With verbs like *ji* 'to send', a goal argument after *gei* is only marginally acceptable. In fact. Liu (2006) shows that words that can participate in the DOC but is not compatible with the dative construction (postverbal *gei*) take either a goal or a patient as an IO. However, motion verbs like *reng* 'to throw' has the opposite pattern: it is allowed in the dative construction, but not in the DOC. Inter-speaker variations also exist. In this paper, I focus on ditransitive verbs that take recipient arguments. I leave the issue of goal arguments for future research.

b. *Zhangsan gongzuo-**gei** Lisi.

Zhangsan work-give Lisi

Intended reading: 'Zhangsan works for Lisi.'

As the contrast of (5a) and (5b) suggests, while not a stand-alone ditransitive verb itself, *gei* here is limited to appearing attached to a ditransitive verb. That is, the first verb (V1) in the SVC is restricted to ditransitive verbs that can occur in DOCs on their own. Additionally, the IO following the complex serial verb must be a recipient. In fact, an ambiguous verb *jie* which can either mean 'to borrow (from)' or 'to lend (to)' in a traditional DOC can only be interpreted as 'to lend (to)' and the IO can only be interpreted as the recipient when used in an SVC with *gei* as illustrated below:

(6) a. Zhangsan jie-le Lisi wu-kuai-qian.
Zhangsan lend/borrow-ASP Lisi five-CL-money
i. 'Zhangsan lent five RMB to Lisi.'
ii. 'Zhangsan borrowed five RMB from Lisi.'
b. Zhangsan jie-**gei**-le Lisi wu-kuai-qian.

Zhangsan lend-give-ASP Lisi five-CL-money

'Zhangsan lent five RMB to Lisi.'

Therefore, the second verb (V2) *gei* in the complex serial verb is different from both the prepositional dative use of *gei* in (2b) and (4a) due to it appearing before the aspectual marker, and the applicative (valency increasing) use of *gei* in (2c) and (3b), as no argument is added here or interpreted as a benefactive. Any analysis of the SVC needs to account for the fact that: (i) *gei* is not a stand-alone lexical verb, (ii) *gei* here is not involved in any valency changing functions, and (iii) it can only occur with canonical ditransitive verbs with a recipient indirect object. I will propose in Section 2.3 that this light verb-like use of *gei* is the morphological realization of a functional head position in the verbal domain present in all double object constructions, which is otherwise null in Mandarin.

So far, I have shown that *gei*+NP in the postverbal position behaves like a traditional prepositional dative construction in allowing only recipients; the preverbal *gei*+NP is ambiguous between a dative PP and an applicative phrase with a benefactive NP; the serial verb *gei* is different from all other cases of *gei* but has the same restrictions on verb selection and argument interpretation as the dative construction. These different yet connected properties of *gei* will be accounted for with the synchronic analyses below.

3. Syntactic structures of *gei* constructions

3.1 DOC and the dative construction

In many languages, including English, ditransitive verbs that have two internal arguments (typically a theme and a recipient/goal), display two argument structures: the DOC where both internal arguments are marked with the same case (7a) (Citko et al. 2017) and the dative construction where the recipient is marked with a dative particle/preposition *to* (7b). This is referred to as the dative alternation or dative shift. In English, the IO immediately precedes the DO in the DOC, while in the dative construction, the DO precedes the IO and the IO is marked with *to*.

(7) a. John sent Mary a postcard. [V IO DO]
b. John sent a postcard to Mary. [V DO *to* IO]

DOC and the dative construction are also available in Mandarin, as shown below in (8).[50]

[50] Just like many languages (including English, Icelandic, Slovenian, Czech, etc), Mandarin also displays verb sensitivity asymmetry between the DOC and dative construction, where not all verbs that can participate in the DOC is allowed in the dative construction (Liu 2006).

(8) a. Zhangsan **gei**-le Lisi yi-ben-shu. [V IO DO]
Zhangsan give-ASP Lisi one-CL-book
'Zhangsan gave Lisi a book.'
b. Zhangsan ji-le yi-feng-xin **gei** Lisi. [V DO *gei* IO]
Zhangsan send-ASP one-CL-letter to Lisi
'Zhangsan sent a letter to Lisi.'

In Mandarin, the word orders of the two constructions are the same as in English. In fact, the construction in Mandarin with *gei*+NP appearing postverbally (4) and (8b) behaves just like the English ditransitive dative construction (7b) in that the argument following *to* can also only be interpreted as a recipient (or sometimes a goal) but not as a benefactive.

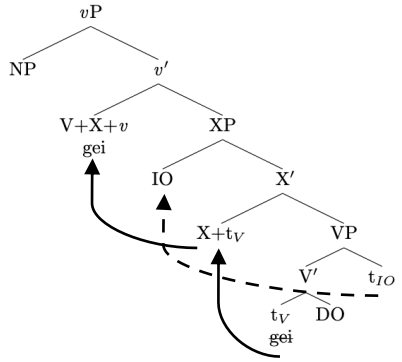
The syntax of the DOC and the dative alternation have long been debated In generative linguistics (see Emonds & Whitney (2006) and Harley & Miyagawa (2017) for overviews on this topic). Since the proposal of the VP shell by Larson (1988), almost all analyses of the DOC posit an additional functional verbal layer of some kind on top of the lexical VP to host/license a second internal argument, as well as head movement of the verb to yield the surface word order, regardless of the varying labels and technical details assumed for this extra verbal layer (Bruening 2001; Harley 1995; Marantz 1993 a.o.).

The properties of Mandarin ditransitive constructions can also be accounted for with such an approach. In this paper, I base my analysis specifically on Abels (2024) who draws on Gan & Tsai's (2020) experiment showing that in Mandarin, the dative construction only allows right to left scope where the IO takes wide scope over the DO, which is unusual for a surface scope language like Mandarin (Huang 1982). Based on additional scopal effects of ditransitives in Polish (a QR language) and Vietnamese (a scope rigid language), Abels (2024) and Abels & Grabska (2022) propose structures for DOCs and dative constructions that involve the Ios originating in a right specifier position of the verb. This allows them to account for

both word order and scopal interactions while keeping the internal structure of VP identical between the two constructions.

The structure I adopt of the DOC with *gei* as the ditransitive main verb (8a) is shown below in (9)[51]. Since the exact category of the functional projection on top of the lexical VP makes little impact on how the overall syntactic structure works, I will use XP to represent the projection. I define XP as an obligatory functional projection above VP in all DOCs. The silent X head selects the lexical VP as its complement and licenses the internally merged IO in its specifier. Paul & Whitman (2010) have proposed a similar structure of DOC for Mandarin with a raising high applicative head.

(9)



In this structure, the IO originates as a right specifier of the lexical verb but fails to be licensed in the base position,[52] as there is no head to check the ϕ-features for this additional internal argument. After the functional head X merges with VP, the IO must raise to the specifier of the closest head with unvalued ϕ-features in order to be licensed. The silent X^0 meets this requirement, which is why the IO moves to

[51] For the simplicity of the exposition, I only provide partial structural representations of the various constructions where aspectual information and VoiceP (if different from *v*P) are left out.
[52] I here assume that there is a distinction between introducing and licensing an argument, and in order for an argument to be licensed, its φ-features need to be checked via agreement by a nominal licensing head (Chomsky 2000, 2001).

Spec,XP. As with any VP shell analysis of the DOC, to arrive at the correct word order in SVO languages like Mandarin, the lexical verb *gei* undergoes head movement to X^0, and finally to v^0/Voice^0.

Since XP is required only for licensing the IO in DOCs, if a sentence does not have a ditransitive verb that requires licensing for two internal arguments, or the IO can be licensed in situ by some other head, there would be no need for an XP in the structure. Conversely, if there is a ditransitive verb in a sentence, and the IO bears the canonical theta role of a recipient with no overt licenser, then XP must be present in the structure. This aspect of the analysis will be crucial for the derivation of the other Mandarin ditransitive constructions in the continuation of this paper.

In the dative construction in Mandarin (8b), the order of the two internal arguments is different from the DOC, and additionally, the IO is preceded by *gei*. Even though the same morpheme *gei* from the DOC is also present in this sentence, it is categorially and functionally different from the ditransitive main verb in (8a). First of all, *gei* in the dative construction is not a verb. One of the simplest ways to verify the verbal status of a word in Mandarin is a compatibility test with the aspectual marker *-le*. *-le* is generally considered a perfective marker that indicates the completion of a telic event, or that an atelic event has taken place (Klein et al. 2000). It typically can only attach to main predicates. As we saw in (8a), the event of 'giving' can be marked with *-le*. However, when a separate verb *ji* 'to send' is followed by *-le*, and *gei* is in a postverbal position preceding the IO as in (8b), *gei* cannot bear this aspectual marking (10).

(10) *Zhangsan ji-le yi-feng-xin **gei**-le Lisi.
Zhangsan send-ASP one-CL-letter to Lisi
'Zhangsan sent a letter to Lisi.'

Note that some speakers find (10) acceptable, but only under a bi-clausal construal where there are two events: 'sending' and 'giving'. On the interpretation that there is strictly one event involved, the 'sending' event, *gei* is incompatible with *-le*, indicating that it is not a verb in dative constructions like (8b).

I argue that instead, when *gei* appears postverbally between the DO and IO, it is actually a prepositional dative marker, similar to the English *to* in the dative construction (see also Paul & Whitman 2010 for additional discussion of *gei* as a preposition in the dative construction). As mentioned previously, the use of 'give' as a dative marker is quite pervasive in various Asian and African languages. Under this analysis, the *gei*+IO sequence is predicted to form a constituent, and this is shown to hold in Mandarin in the following sentence by way of ellipsis. In (11), *gei Lisi* can be elided in the second clause while still having the interpretation that 'I' gifted a CD *to Lisi*, the recipient from the first clause. This shows that *gei*+IO, when appearing postverbally, indeed forms a constituent.

(11) Zhangsan song-le yi-ben-shu **gei** Lisi, wo song-le yi-ge-CD.
Zhangsan gift-ASP one-CL-book to Lisi, I gift-ASP one-CL-CD

'Zhangsan gifted Lisi a book, and I gifted him a CD.'

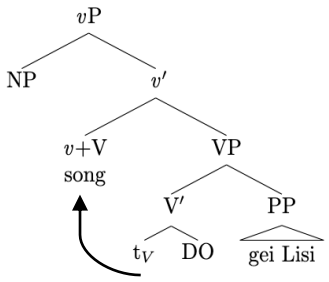
This prepositional dative marker analysis of *gei* is further supported by the fact that *gei* is used as a dative marker elsewhere in the language. In work in progress (Pan in progress), I show that *gei* together with the 1st person singular pronoun *wo* in Mandarin displays morpho-phonological, semantic and syntactic properties parallel to the ethical dative constructions found in languages like French, Spanish, German, Hebrew, and Romanian, among others.

The proposed structural representation for the Mandarin prepositional dative construction (8b) is shown below in (12). The right specifier IO in the structure of the DOC (9) above allows us to have a uniform structure of the lexical VP within the dative alternation of a ditransitive verb while accounting for the word order and scopal effects mentioned previously. In both the DOC and the dative construction, the DO is the

complement of the lexical verb, and the IO is in its right specifier c-commanding[53] the DO

in all stages of the derivations. The structure below is also in line with the idea proposed by Marantz (1993) that the DOC involves more structure than the dative construction (see also Bruening (2001) and Miyagawa & Tsujioka (2004) for relevant discussion).

(12)



Crucially different from the DOC, the IO here does not have to undergo movement for licensing. Since the argument is selected by the preposition *gei*, it is licensed in situ by the preposition. The functional projection XP is not present in the dative construction as there is no argument that requires additional licensing. The NP *Lisi* in the base right specifier position thus gives us the correct word order of the DO preceding the IO and the correct scopal relation, where IO out-scopes DO due to the former asymmetrically c-commanding the latter.

As shown in Section 1.1, the argument following the postverbal *gei* can only be interpreted as a recipient but not a benefactive, and is only compatible with ditransitive verbs. I argue that this is because of the subcategorization requirement of the verb. Only true ditransitive verbs denoting transfer of possession events subcategorize for a PP that contains a recipient (or a goal) argument. Another reason

[53] Bruening (2014) argues that PPs are not phasal nodes and thus do not play a role in preventing NPs inside from commanding out of PPs. We can see another case of NP c-commanding out of PP with the following English sentence (based on (Chomsky 1973):

(i) It seems to John$_i$ to appear to himself$_i$ that the Moon is flat.

In this case, even though *John* is embedded within a PP, it can still c-command out of the PP to bind the reflexive *himself* since there is no condition A violation.

why the postverbal IO cannot be interpreted as a benefactive is due to the fact that the benefactive introducing applicative *gei* cannot appear inside a VP which will be discussed in more detail in Section 2.3.

One part of the asymmetry discussed in Section 1.1 was that a recipient IO marked by *gei* can appear either preverbally or postverbally. In fact, it has been observed that in German, Japanese, Icelandic, and many Slavic languages, the dative construction allows both the IO>>DO and DO>>IO word orders (Anagnostopoulou 2003; Emonds & Whitney 2006; Citko et al. 2017; Holmberg & Platzack 1995; Stegovec 2024). I propose that when the preverbal *gei*-marked IO is interpreted as a recipient, the sentence involves a displaced PP, as the same ellipsis constituency test holds true (13), although the exact mechanism involved in the displacement of the dative PP requires more careful investigation.

(13) Zhangsan **gei** Lisi song-le yi-ben-shu, wo song-le yi-ge-CD.
Zhangsan to Lisi gift-ASP one-CL-book, I gift-ASP one-CL-CD
'Zhangsan gifted Lisi a book, and I gifted him a CD.' (cf.11)

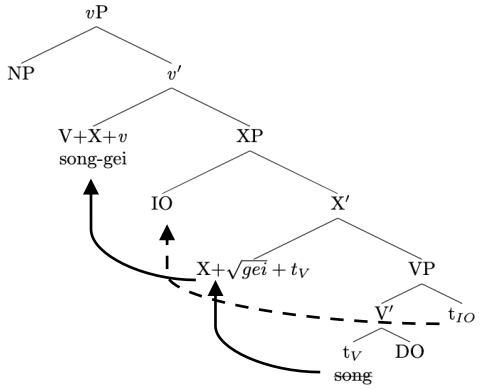
3.2 SVC with *gei*

I propose that the *gei* in SVCs (2a), repeated here in (14), is a variant of the DOC, where the structures of the two are nearly identical. As discussed above, the serial verb *gei* is still part of the verbal predicate as it precedes the aspectual marker *-le*. However, *gei* no longer acts like a main lexical verb since the two morphemes *song* and *gei* only describe a single event, and the core meaning of the predicate is conveyed through the first verb (V1) *song* in the serial verb.

(14) Zhangsan song-(**gei)**-le Lisi yi-shu-hua.
Zhangsan gift-give-ASP Lisi one-CL-flower
'Zhangsan gifted Lisi a bouquet of flowers.'

The proposed structure for the SVC with *gei* as V2, is shown in (15). Note that this structure allows us to account for all the generalizations established in Section 1.2. The *gei* in the SVC can only combine with already ditransitive lexical verbs that take a recipient argument.[54] Furthermore, *gei* does not increase or decrease the valency of the main predicate. Therefore, it should not be treated as a new valency-changing functional verb that is not present in the DOC with V1 alone. Luckily, in a VP shell analysis of the DOC, a position that can accommodate for such an element in the verbal domain already exists. I argue that *gei* as the V2 in a serial verb is an acategorial root inserted at or adjoined to X head while the rest of the structure of the SVC is identical to the DOC proposed above. It is a semi-lexical verb because it cannot function as a fully lexical main verb in (9). Assuming the main lexical verb *song* undergoes head movement in the same way as the lexical verb does in the DOC derivation, the verb picks up the root *gei* when it lands in X, forming a complex serial verb/verbal compound *song-gei* and deriving the correct word order.

(15)



(cf. 9)

Since the functional projection XP already exists in all DOCs, *gei* at X^0 will not change the valency of the predicate. The only difference from the DOC is that the root *gei* now

[54] Note that *gei* in (14) is optional. Without *gei*, the sentence (14) is a regular DOC with a ditransitive verb *song* 'to gift'. However, not every verb that has two internal arguments allow the V-*gei* serial verb. Specially, V1 is required to have a recipient IO (canonical transfer of possession ditransitive verbs) to participate in the SVC. See Liu (2006) for related discussion.

makes visible what was a silent functional head position. The verb sensitivity of the SVC then follows naturally with this structural analysis of *gei*. Because only DOCs with ditransitive verbs require XP for the purpose of licensing the recipient IO, sentences with intransitive and transitive verbs cannot host this *gei*, since XP is not present then.

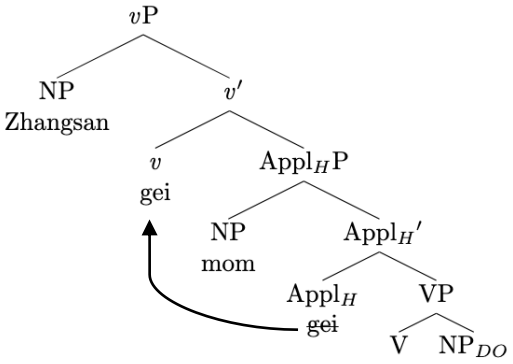
3.3 The benefactive construction

When *gei* and the IO appear preverbally, the argument can be interpreted as a benefactive as seen in (3b), repeated in (16).

(16) Zhangsan **gei**-(*le) mama zuo-le yi-dun-fan.
Zhangsan for mom make-ASP one-CL-meal
'Zhangsan cooked a meal for his mom'

Similar to the prepositional dative *gei*, the *gei* in (16) is also not a verb, shown by the incompatibility with the aspectual marker *-le*. I argue that this *gei* morpheme is instead a high applicative ($Appl_H$) head, in the sense of Pylkkänen (2008). The structure of the benefactive construction is shown in (17).

(17)



Gei as a high applicative head, selects the lexical VP as its complement, and assigns the benefactive theta role to the argument merged in its specifier position. *Gei* then undergoes head movement to a higher functional verbal projection, deriving the word order in (16). Though in both the dative and the benefactive constructions, *gei* and the IO are linearly adjacent, the structural analysis in (17) crucially predicts that when *gei* is followed by a benefactive NP, the two do not form a constituent, unlike the case with the dative PP. The ellipsis test below shows that when the sequence of *gei mama* is elided in the second clause, the sentence cannot be interpreted as 'Lisi washed clothes also for mom'. Only the pure transitive reading without a benefactive argument is available.

(18) Zhangsan **gei** mama zuo-le yi-dun-fan, Lisi xi-le yifu.
Zhangsan for mom make-ASP one-CL-meal Lisi wash-ASP clothes

'Zhangsan cooked a meal for his mom, and Lisi washed clothes (*for mom).'

In contrast with the ellipsis of the preverbal dative *gei* and the recipient argument in (13), the difference clearly demonstrates that while *gei* as a dative preposition forms a constituent with the recipient IO, it does not form a constituent with the benefactive argument when it is an $Appl_H^0$. The fragment answer test reveals the same results regarding the constituency of the dative vs. applicative *gei* and the following NP.

Now I return to the other side of the asymmetry of why the postverbal *gei*-marked NP cannot be interpreted as a benefactive. That is, why can the benefactive argument with *gei* only occur preverbally, as illustrated in (3-4)? I argue that the solution lies in the nature of what *gei* instantiates in the different constructions and positions. Assuming that all benefactive arguments in Mandarin are introduced by high applicative heads, we do not expect to see a benefactive argument and a high applicative head appearing in a postverbal position below VP. This is because of the selectional properties of $Appl_H^0$, namely that it requires VP as its complement (Pylkkänen 2008). Therefore, only the preverbal non-core argument marked by the high applicative head *gei* can receive a benefactive reading.

To summarize, I provided detailed structural analyses of the four ditransitive-related *gei* constructions in question. I proposed that when *gei* is followed by a recipient, it is a preposition, which has a flexible position (can appear both preverbally and postverbally). When *gei* is followed by a benefactive, it is a high applicative head, appearing exclusively preverbally. When *gei* immediately follows another verb in the SVC, it is a semi-lexical bare root inserted at X^0, a silent node that already exist in all DOCs. I also showed how the proposed analyses allow us to explain the asymmetries observed in Section 1.

3.4 Serial verb *gei* & implications on grammaticalization

It is reasonable to assume that synchronically related but distinct functional and lexical uses of an exponent have the same historical origin, since grammaticalization and historical change generally often involve semantic bleaching where a word with a lexical meaning becomes more abstract and functional over time (Roberts & Roussou 2003). In fact, many of the functional markers in Mandarin including *ba*, a preverbal object marker, and *bei*, the canonical passive marker, are argued to have been grammaticalized from lexical verbs (Chen 2003; Sun 1988, 2015; Tse 2013; Yin 2004 a.o.). Many authors have also studied the grammaticalization of the ditransitive *gei* in the Chinese languages (Hwang 2000; Iwasaki & Yap 1998; Lo 2012; Lord, Yap & Iwasaki 2002; Yin 2004, 2023 a.o.). However, no generative analysis of the grammaticalization process has been proposed so far. I provide below a possible pathway of the process that involves an intermediate step of SVC and a bare root.

Lord (1973) argues that in many African languages like Twi, and Ewe and Gã, prepositions are historically developed from serial verb constructions. Li & Thompson (1973) offers a similar argument for Mandarin coverbs and prepositions. I suggest that the Mandarin ditransitive morpheme *gei* is precisely the case of a verb changing into a preposition and other functional elements through SVCs. The fact that Mandarin has preserved all different kinds of uses of *gei* (lexical, semi-lexical, and functional) provides us with a perfect scenario to study this diachronic change aided by the synchronic structural analyses of the different constructions in question.

I will argue that the different instances of *gei* analyzed above are consistent with what has been proposed concerning a completely unrelated phenomenon: the grammaticalization of complementizers. Recently, Saito (2023) proposes that the grammaticalization process of verbs of 'saying' to complementizers involves the verb first losing its categorizing verbal head v^0 and thus becoming a bare root $\sqrt{\text{SAY}}$, followed by it gaining the status of a functional category, namely a C head. Crucially, the loss of v^0 makes the verb lose its ability to project an external argument, following Kratzer (1996). During this stage when 'say' verbs are acategorial bare roots, the original lexical verb's phonological and semantic information is still (partly) preserved, unlike in the final stage when they become C heads.

I propose that the V2 *gei* in the SVC is exactly an intermediate stage of the morpheme after the initial historical change started, consistent with both Lord's (1973) observation and Saito's (2023) proposal. First of all, like the acategorial root $\sqrt{\text{SAY}}$, the phonological form of the original lexical verb *gei* is preserved in the SVC. Even though *gei* in the SVC does not contribute additional meaning to the predicate, the transfer of possession meaning of the prototypical ditransitive verb 'to give' is already encoded in V1. Thus, part of the semantic information is also preserved. The restriction on which V1 the semi-lexical *gei* can combine with in the SVC can also be viewed as a remnant of the original meaning of the ditransitive verb. As discussed in Section 1 and 2, the presence of *gei* in the SVC with an already ditransitive verb does not change the valency, which is expected for an acategorial bare root that does not introduce any argument. Structurally, when the main verb *gei* loses its verbal categorizing head, it fails to function as a lexical verb, thus it cannot stay in the lexical V^0. The acategorial bare root $\sqrt{gei}$ is then inserted at a higher functional head that does not introduce any argument or assign any theta role and helps phonetically realize the otherwise silent X^0 in DOCs (15).

A historical study with corpus data from Lo (2012) further supports this proposal. The study shows that the V+*gei*+IO+DO sequence (SVC in this paper) was the first non-main verb usage of *gei* with its possible first appearance in the Western Han dynasty between 145-87 BC. The author observes that in the Ming dynasty (after 1368 AD), there is definitive evidence that the V1 and *gei* have been reanalyzed as a complex compound verb since the aspectual marker *-le* is now present following both elements. As for the dative and benefactive constructions, the author

shows that the postverbal dative *gei* followed by a recipient appeared next after the SVC, with regular usage at around 280s-290s AD. The dative use of *gei* appearing as the next stage after the lexical verb and the serial verb conforms to the general process of reanalysis during historical changes. The new structure/category after a reanalysis needs to be compatible with the current linear word order. Since in both the DOC and SVC, it is always a recipient that follows *gei,* the dative construction is the natural next step during the grammaticalization process. The preverbal dative use of *gei* appeared even later (in the Ming dynasty), as did its preverbal benefactive use (the end of the Ming dynasty). Lo argues that the late emergence of the preverbal benefactive use is connected to the late appearance of the preverbal dative use since the former is also likely reanalyzed from the latter. Under my analysis, the postverbal dative *gei*+recipient does not provide a compatible syntactic environment for this reanalysis of *gei* as a high applicative head. Only once PP displacement to the preverbal position has emerged, can the grammaticalization of *gei* into a high applicative marker take place. Therefore, the analysis proposed in this paper not only explains the synchronic generalizations in modern Mandarin, but also fits the observed patterns of historical change.

4. Conclusion

In this paper, I examined four ditransitive related constructions involving the morpheme *gei*. I argued that in those constructions, *gei* can be the realization of a ditransitive main verb, an acategorial root as part of a serial verb, a prepositional dative, and a high applicative head. Drawing on the synchronic patterns and analyses, I proposed a possible grammaticalization pathway of the ditransitive verb *gei* into its several non-lexical uses. I showed that the SVC is a crucial first stage of change in the process of the ditransitive verb becoming a functional element such as a prepositional dative marker or a high applicative head. I have also shown that the proposed analysis of Mandarin synchronic pattern aligns perfectly with Lord's (1973) observation that verbs often grammaticalize into prepositions through serial verb constructions. The proposed acategorial bare root *gei* in the SVC as the first stage of change is parallel to Saito's (2023) theory of verbs of 'saying' losing its categorizing verbal head and becoming an acategorial bare root before finally being

realized as a fully functional complementizer during historical change. The detailed generative analysis provided in this paper not only accounts for the synchronic patterns in Mandarin, but also explains the diachronic order of emergence of the different *gei* constructions observed by Lo (2012) in a historical corpus study. A natural extension of the synchronic and diachronic proposals from this paper would be to examine other Asian and African languages that show similar polysemous usages of 'give' and see how the different kinds of systems found in those languages can be explained in similar terms.

One question that remains open given this analysis of *gei* is: why is there so much uniformity across different constructions, where the exponent remains the same phonologically while realizing heads of distinct categories? Ideally, the different uses of *gei* should have something in common other than the exponent itself and the shared historical origin. There should be some way in which these distinct heads can form a natural class synchronically, not just diachronically. I want to suggest that it is indeed possible to analyze the different functional uses of *gei* as part of a unified syntactic class. Wood & Marantz (2017) argue that all argument-introducing heads can be unified by way of a category neutral head *i**. By combining with different category defining heads and obtaining different categorial features, *i** can yield syntactic categories as distinct as P^0, $Appl_H{}^0$, $Voice^0$, etc., though the core function of introducing an argument is given by the same *i**. This approach to argument-introducing heads makes possible an analysis where the different functional uses of *gei* can be analyzed in terms of a single unified syntactic property. That is, what the *gei* exponent realizes across its different functional uses is actually *i**. For reasons of space, the full details of this proposal cannot be provided here. See Pan (to appear) for details of this analysis and discussion of its further implications.

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The Acquisition of Chinese Potential Complements:

The Case Study of Early Intermediate English-speaking Learners of Chinese

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This empirical study examines the challenges faced by early intermediate Chinese learners in acquiring potential complements, using Construction Grammar and usage-based theories as a framework. Data were collected through a self-designed, two-part questionnaire administered to college-level learners. Findings reveal that these learners have yet to establish robust form-meaning mappings for potential complements. Common errors include avoidance, misplacement of "de/bu," and incorrect selection of resultative complements, though error types occur at similar frequencies. Notably, expressions frequently used in the classroom exhibit higher accuracy rates, suggesting that frequency may play a significant role in the acquisition of potential complements.

0. Introduction

As a notoriously versatile yet frequently used structure, Chinese potential complement stands out as a prevalent example of both avoidance phenomenon and a source of abundant amounts of errors in production of English-speaking learners of Chinese. This structure is very crucial and inevitable for Chinese native speakers in daily communication, thus introduced quite early to learners in classrooms. As a grammar structure that repetitively occurs in all-year Chinese textbooks, its importance is self-explanatory, though it remains an area of difficulty for English-speaking Chinese learners. Many researchers have investigated this issue through an error analysis approach. Common errors include avoiding using potential complements, replacing them with other structures such as ability

auxiliary *neng*, and using incorrect resultative or directional adverbs. However, error analysis has its limitations. According to Schachter[55] in An Error in Error Analysis,

'On the other hand, error analysis without apriori predictions simply fails to account for the avoidance phenomenon. If the student does not produce the constructions he finds difficult, no amount of error analysis is going to explain why' (Schachter 1974: 212).

Even though this method is tested to be useful in predicting the area of difficulty in Second Language Acquisition, it is incapable of accounting for the avoidance behavior of learners. The avoidance behavior of potential complements and its potential causes are still underexplored. In addition, the pedagogical methods to solve or reduce this avoidance phenomenon remains to be an issue that needs more investigation.

Under the framework of construction grammar, potential complements are used and consequently established to be a construction through natural selection of speakers. The generalizations about when and how to use this construction have been made intuitively to successfully enable the mapping the semantic meaning of the construction and the phonological items through 'sufficiently frequent' [56] exposure use of the potential complement constructions. This study seeks to answer the following research questions: (1) Do these learners tend to avoid using potential complements in their language production? (2) How does the frequency of this avoidance compare to that of native speakers in both naturalistic and prompted settings? Additionally, if avoidance is observed, what are the possible reasons for this failure of acquisition, and if avoidance is not observed, what factors may hinder the acquisition of these structures? (3) What pedagogical implications might these findings suggest? (4) what are the major categories of errors made by these learners, and what are the percentages of these errors among all occurrences? While answering these questions, this paper also seeks to understand their implications for language pedagogy.

1. Literature Reveiw

a. Potential Complement

[55] SCHACHTER, JACQUELYN. 1974. An Error in Error Analysis. Language Learning, 24, 205-214. http://dx.doi.org/10.1111/j.1467-1770.1974.tb00502.x

[56] GOLDBERG, ADELE. 2006. Constructions at Work: The Nature of Generalization in Language. Oxford University Press.

Potential complement is a unique grammar structure in Chinese that cannot be seen in any other languages. With both affirmative and negative forms, it is always paired with different result complements depending on the verbs being modified, indicating a possibility or potentiality of the subjects. Many linguists and grammarians have shed light on the character of Chinese potential complements regarding its categorization, semantics, and its usages.

Potential complement, compared with other structures in Chinese, is rather arbitrary and lacks a clear set of rules. Many Chinese linguists have mentioned its irregularity and asymmetry. Not all the verbs can be used in potential complement construction. The verbs used in potential complements are mostly monosyllabic[57]. Disyllabic verbs are restricted more in the grammatical sense than monosyllabic ones. For example, if synonymous disyllabic verb 燃烧 (*v.* to burn) and monosyllabic 烧 (*v.* to burn) are placed in the potential complement construction, 烧得着[58] is accepted to represent something that can be burnt or flammable while 燃烧得着[*sic*]is not accepted. Lu also lists other synonymous pairs, such as 办理 and 办, 保护 and 保, 招聘 and 招, etc. to exemplify the disyllabic verbs are more restricted than monosyllabic ones. Wangxi Zhang[59] finds out that it is easier for directional verbs to be the verb and positive adjectives to be in the position of the resultative complement in the construction, E.g. 看不清楚 & 看不模糊 [*sic*]. However, Luo argues[60] that the positivity is not the decisive factor for whether the adjective can be put in the position of the complement. Instead, 'the causal relation between the verb and the adjective' signals the completion of the construction. Hao[61] likewise proposes that negative adjectives or adjectives with negative sense can also be used in the place of complement. The

[57] LU, YUHUI. 2013. The Asymmetry of Mandarin Chinese Potential Complement. Foreign Language Research, 2013(06), 43-46.

[58] 着: resultative complement

[59] ZHANG, WANGXI. 1999. Hanyu Teshu Yufa de Yuyiyanjiu. Beijing Language and Culture University Press.

[60] LUO, CHUILIAN. (2007) 形容词作可能补语的情况考察. Ningxia University Journal. Vol. 4

[61] HAO LING. 2006. 再谈构成可能补语"V 得/不 C"的条件, Hanyu Journal, Vol.8.

choice depends on the speaker's take on 'what is the condition that is hard to accomplish' rather than the speaker's 'subjective wishes'.

The role of 得/不 also brings about debates for Chinese linguists. Most scholars categorized it as 'auxiliary word', where 得 means possible and 不 means impossible.[62] However, Wang[63] identifies de/bu as modal verbs, whereas Chao[64] identifies them as infixes between verb and complement. Researchers later, such as Huang et al. [65], likewise consider potential complements as infixation to words between the two predicates. Except for the identification, they also notice the inconsistency and the complexity within Chinese verb-complement structure. It mentions that the verb-complement compounds in Chinese are composed of two predicative words, where the first predicate is the head, and the second predicate describes and clarifies the outcome of the event described by the first predicate. In general cases, verb-complements are combined and recognized as 'segmentation units'[66], which is consistent with the linguistic intuition of their status as words. However, if the second predicate's structure is complex, the verb-complement compounds should be segmented as two parts, such as 整理清楚, 弄明白, etc. However, Huang et al.[67] indicate some potential complements do not have a 'predicate+complement' counterpart without an infix. For example, 来得及 (*tansls.* Have time to make it) or 来不及(*transls.*:don't have time to make it) does not have a 'predicate+complement' counterpart 来及 [*sic*]. Similar cases include 免得了/ 免不了, 划得来/划不来. They conclude that learners should consider them as one word

[62] DING, SHENG SHU. 1961. 补语Buyu. The Commercial Press.
[63] WANG, LI. 1943. 现代汉语语法 Xiandai Hanyu Yufa. The Commercial Press.
[64] CHAO, YUEN REN. 1968. A Grammar of Spoken Chinese. Univ of California Pr.
[65] HUANG, CHU-REN; HSIEH, SHU-KAI; CHEN, KEH-JIANN. 2017. Mandarin Chinese Words and Parts of Speech: A Corpus-based Study (1st ed.). Routledge. https://doi.org/10.4324/9781315669014
[66] Page 40
[67] HUANG, CHU-REN; HSIEH, SHU-KAI; CHEN, KEH-JIANN. 2017. Mandarin Chinese Words and Parts of Speech: A Corpus-based Study (1st ed.). Routledge. https://doi.org/10.4324/9781315669014

and one single segmentation unit, therefore questioning the necessity of using the concept of complement in general when teaching Chinese as a foreign language and proposing to demolish such concept and categorizes complements into part of object to benefit both teaching and researching in a more simple and efficient manner.

A number of scholars also mention that potential complements have variations, idiosyncratic and colloquial uses that is particularly difficult for second language learners. Lu[68] mentions that some idiosyncratic structure in Chinese where only the negative form of potential complement can be used. For example, in the sentence structures like 怎么 V 也 V 不 C (e.g. 怎么找也找不到), 再也 V 不 C (e.g.再也忍不住), 越 V 越 V 不 C (e.g.越看越看不懂), affirmative forms of the potential complement could never be used. This occurs when the verb is a continuous one where the repetition of the verb is restricted, which again contributes to the asymmetric character between the affirmative and negative forms of potential complements (e.g. 看书看得下去的时候[*sic*]). Lu thus concludes that potential complement is an arbitrary and asymmetric construction where plentiful exceptions are made by native speakers when using the structure.

The semantics of potential complement have Is been Ir Important yet controversial topic among Chinese linguists. Both Ding[69] and Chao[70] state that it is a structure to express possibility and potentiality. Chao named the construction as 'ability complement' *(neng xing buyu*). He first proposes that except for the ordinary forms of verbs in potential forms, there is also a category for lexical colloquial form of expression, such as 来得及, 犯不着, etc. Chao[71] implies in such categorization that some expressions, which are rather formed through a repetitive colloquial and casual use of the construction, could hardly be generalized in other categories with specific rules. On the other hand, Zhang[72]states that except for the potentiality, potential complement also embodies the desire, wish or expectation of the speaker. Thus, the verbs that can be used with potential complements must be volitional ones. The desire, wish or expectation is then represented by the volitional verbs. The potentiality, which is expressed by the complement in the structure, is the

[68] LU, YUHUI. 2013. The Asymmetry of Mandarin Chinese Potential Complement. Foreign Language Research, 2013(06), 43-46.
[69] DING, SHENG SHU. 1961.补语 Buyu. The Commercial Press.
[70] CHAO, YUEN REN. 1968. A Grammar of Spoken Chinese. Univ of California Pr.
[71] CHAO, YUEN REN. 1968. A Grammar of Spoken Chinese. Univ of California Pr.
[72] ZHANG, WANGXI. 1999. Hanyu Teshu Yufa de Yuyiyanjiu. Beijing Language and Culture University Press.

embodiment of the goal of that desire or wish. His take on the semantics of potential complement points out the implication that other linguists haven't touched upon in the past. He also notices that the negative form of the structure represents 'hope or desire something but subjectively or objectively couldn't achieve it' that it not only includes the meaning of 'can't' (*buneng*), but also expresses the speaker's wish to achieve the goal expressed in the structure. Whereas when potential complement is the modifier or descriptive predicate in the sentence, it only represents the meaning of 'can't' (buneng); when potential complement is the descriptive or modifying items, it inclines to the meaning more to the potentiality. Therefore, although a number of scholars have investigated potential complements in depth, there is no consensus achieved towards the exact meanings and concerning the nuances that it has with other forms that express potentiality.

From the aspect of SLA, there is no corresponding structure in English. More specifically, there is no morphological equivalents in English, which leads to the difficulty in not only the learning of the structure, but also the teaching, and writing of textbooks.

2. Theoretical framework

The theoretical framework of this empirical study lies in between Construction Grammar and the usage theory in SLA. Construction Grammar is a framework that emphasizes on form-meaning correspondences and considers constructions as the basic units of a language. A key researcher in the field of Construction Grammar Adele Goldberg[73] defines a construction as,

> Any linguistic pattern is recognized as a construction as long as some aspect of its form or function is not strictly predictable from its component parts or from other constructions recognized to exist. (Goldberg 2006: 3)

Compared to the mainstream Chomskyan framework, constructionist approach offers more insights and explanations to "peripheral language", viewing unusual patterns as being the subject to the same learning mechanisms as more general patterns. According to Goldberg, based on usage-based theory, constructions are generalizations that speakers make[74]. Therefore, potential complements are used and consequently established to be a

[73] GOLDBERG, ADELE. 2006. Constructions at Work: The Nature of Generalization in Language. Oxford University Press.
[74] GOLDBERG, ADELE. 2006. Constructions at Work: The Nature of Generalization in Language. Oxford University Press. Page. 26

construction through natural selection of speakers. Since native speakers of Chinese language gain "sufficiently frequent" exposure to this grammar, the generalizations about when and how to use this construction have been made intuitively to successfully enable the mapping the semantic meaning of the construction and the phonological items.

Another theoretical superiority of Construction Grammar is its inclusion of cross-linguistic anomalies. Constructionists believe that idiosyncratic constructions are expected cross-linguistically and at the same time advocate the notion that language can be learned without the need for innate hard-wiring, but learners need to be properly primed. Joan L. Bybee[75] notices that such priming could not be processed if people did not store in memory the specific syntactic patterns that a word is heard used with. She outlines that the mental grammar of speakers is shaped by repeated exposure to specific utterances and in which domain-general cognitive processes such as categorization and cross-modal association play a crucial role in the entrenchment of constructions. This aligns with the usage-based approach that highlights the importance of input in language learning. Its advocates mentioned that language learning is the learning of constructions and is highly input-driven[76].

In this empirical study, potential complement structure is treated as a construction in Chinese language. The construction then summarizes through usage as V. de/bu C. While both expressing potentiality and possibility, ability auxiliary neng is a totally different construction in Chinese language. Nuances between these two pairings of form-meaning are usually overlooked by some instructors and Chinese second language learners.

1. 他 能 吃 完 四十 个 饺子。
   He AUXI[77] eat RESULT.COMP.[78] forty M.W.[79] dumplings
   'He can eat up forty dumplings'
2. 他 吃 得 完 四十 个 饺子。
   He eat *de*[80] RESULT.COMP. forty M.W. dumplings

[75] BYBEE, JOAN. L. 1985. Morphology: A Study of the Relation between Meaning and Form (Typological Studies in Language) [E-book]. John Benjamins Publishing Company.
[76] ELLIS, NICK C.; WULFF, STEFANIE. 2014. Usage-based approaches to SLA. In B.
[77] AUXI: auxiliary verb
[78] RESULT.COMP.: resultative complement
[79] M.W.: measure words
[80] *de*: unique linguistic unit used in potential complements

'He can eat up forty dumplings'

3. 他 不 能 吃 完 四十 个 饺子。
He NEG. AUXI eat RESULT.COMP. forty M.W. dumplings
'He can't eat up forty dumplings'

4. 他 吃 不 完 四十 个 饺子。
He eat NEG.[81] RESULT.COMP. forty M.W. dumplings
'He can't eat up forty dumplings'

The ability auxiliary *neng* is a construction on the syntactic level, modifying the verb, which represents one's ability or possibility of something happened. When the subject is a person, the *neng* construction emphasizes the speaker's physical ability or physical constraints or rules of the circumstances. For example, sentence 1 indicates that he has the physical ability of finishing forty dumplings. On the other hand, potential complement construction, as infixes inserting between the verb and a resultative complement, Is on the lexical level. Sentence 2 represents the meaning that not only he has the ability to eat up the certain quantity of dumplings, but also, he actually has the intention or attempt to eat. Therefore, even though two constructions have very similar meanings, they are two separate constructions that could not be mixed up with. The form and meaning mappings of potential complements are apparently more computationally demanding for Chinese second language learners, therefore, requires more scaffolding to establish a firm form-meaning mapping for learners.

2. Avoidance

Avoidance behavior has been understudied in the field of SLA until recent decades. Considering the case of potential complement, one of the major phenomena that has been observed in the classroom is avoidance. Simply put, avoidance refers to a learning strategy in which learners tend to favor an alternative

[81] NEG.: negative

rather than the target structure to overcome a communicative difficulty [82] . L2[83]complexity, L1[84]-L2 similarity or difference have all been claimed to the possible causes. In addition, recent research also argues that avoidance might be the primary manifestation of Derivational Complexity Hypothesis, in which the learners encountered more computationally demanding structure and unsure about it in production, they choose to ignore the option, resorting to an alternative, less computationally demanding structure.[85]

The current works lie In the research about second language English learners and their area of avoidance, such as long island wh-question and phrasal verbs. Very few studies have touched upon the avoidance of English-speaking Chinese learners. However, the literature on avoidance offers insights on how researchers conceptualize avoidance differently and give inspiration on the questionnaire design on this study. As one of the earliest studies investigating the causes of avoidance, Laufer and Eliasson[86] show their comprehensiveness by testing the three causes at the same time and consider the possible interaction and influence between different factors, however, their conceptualization of avoidance as failure to acquire phrasal verbs and favor one-word form verbs shows a preliminary approach to this issue. In their translation test designed for Swedish students, the Swedish phrasal verb equivalents might possibly impact participants' performance for the similarity of Swedish equivalents and its English counterparts. (E.g. uppbackad-backed up). One-sentence multiple-choice questions might also lack enough context and resources for learners to choose from. As mentioned above, potential complements are unique in Chinese, and can be both flexible and arbitrary. Therefore, considering the case of potential complements, either the cross-linguistic factors or L2 complexity could not be ignored.

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[82] LAUFER, BATIA; ELIASSON, STIG. 1993. What Causes Avoidance in L2 Learning: L1-L2 Difference, L1-L2 Similarity, or L2 Complexity? *Studies in Second Language Acquisition, 15*(1), 35–48. http://www.jstor.org/stable/44487587

[83] L2: second language

[84] L1: first language

[85] SLAVKOV, NICOLAY. 2015; TURRERO-GARCIA, MARIA. 2017.

[86] LAUFER, BATIA; ELIASSON, STIG. 1993. What Causes Avoidance in L2 Learning: L1-L2 Difference, L1-L2 Similarity, or L2 Complexity? Studies in Second Language Acquisition, 15(1), 35–48. http://www.jstor.org/stable/44487587

Both focused on the avoidance of phrasal verbs, a much later study carried by Abby Ping Wang [87]takes a much more meticulous way in terms of conceptualizing avoidance. She chooses 15 adult British native speakers as a control group compared to 20 Chinese immigrants and 20 Chinese students who just arrived and enrolled in a British University. Among the 40 non-speaker participants, they are divided into four groups, respectively 10 Immigrants Advanced, 10 Immigrants Intermediate, 10 Students Advanced, and 10 Students Intermediate. The most frequently used figurative and non-figurative phrasal verbs are chosen for the test. In terms of the test design, she incorporates the chosen verbs into colloquial form multiple-choice questions to ascertain avoidance behavior and indicates the preference by the native speakers for later comparison, as shown by the percentage, which has been incorporated in the current study too. In addition, participants are also required to fill out a questionnaire that assess the length of their exposure to the target language environment. It includes personal information, level of education, exposure to media in the target language, conversation details (language, time, topics) at the workplace, with family members, and friends. But she shares the similar result with previous studies, that language proficiency significantly affects the L2 speakers' avoidance.

Apart from the multiple choice, later research gives the methodology a little twist to elicit more authentic production from the participants. Slavkov[88] designed an experimental task that involved elicited production in the form of a guessing game. The participants met one-on-one with the researcher, standing in front of a magnetic board in a way the researcher could not see it. The game involves 15 different situations where the characters are placed in different rooms and doing different activities, such as eating, drinking, watching TV, etc. The participants were elicited by the research to ask targeted biclausal questions like "where do you think John is?" Besides that, the targeted structures also include object (what, who) and adjunct

[87] WANG, ABBY PING. 2019. The avoidance of phrasal verbs by adult Chinese immigrants: the effective exposure to the L2 environment, language proficiency, and the causes of avoidance behaviour. The Asian Journal of Applied Linguistics (Editor Dr Derek Chan), 6(2), 118-137. Retrieved from https://caes.hku.hk/ajal/index.php/ajal/article/view/647

[88] SLAVKOV, NICOLAY. 2015. Long-distance wh-movement and long-distance wh-movement avoidance in L2 English: Evidence from French and Bulgarian speakers. Second Language Research, 31(2), 179–210. https://www.jstor.org/stable/26478186

(where) wh-extractions. Turrero-Gracia[89]'s study likewise gathered the data through a game-based elicitation technique that contains a scenario in which subjects need to solve a mystery theft, where a board, suspect cards, event cards, and "question words" cards are provided, aiming to elicit the target wh-islands from subjects. Before the game, all subjects are required to fill out a language background questionnaire about their L1 and L2 experiences and the gaming has also been recorded for later analysis. In the data analysis, not only the target production reveals the rate of correctness of the participants, but also the off-target utterances tell what questions instead are favored by the participants. As Turrero-Garcia[90] says,

'Avoidance can inform researchers not only of the difficulty faced by learners of a second language but also of the tools that are available for them in compensating their shortcomings' (288)

From the literature review above, the operationalizations of the studies show a tendency towards natural production of the target structure rather than traditional grammatical tests. Early studies usually involve the multiple-choice test or translation test with standardized answers without incorporating the preferences of native speakers. Interestingly, in later studies, participants were prompted to produce questions containing a wh-island through game-based elicitation tasks. By putting the target structure in real-life situations, participants focus less on the forms but more on the meaning, reflecting their competence in the target language and showing more authenticity to the test results. Moreover, even if unexpected non-target productions are obtained, the researchers can glimpse the learners' awareness of the linguistic target, their interlanguage and what alternative they choose to use. However, at the same time, more coding processes and analysis need to be developed as it is the authentic production of the learners. In addition, studies conducted later all considered the preferences of native speakers as a control group, which infers the ascertainment of theoretical conceptualization of avoidance. Later studies also added background questionnaires designed to collect the subjects' demographic information. Even though it is not reliable enough to measure the effective exposure and input, it is undeniably a valuable tool as a supplement to

[89] TURRERO-GARCIA, MARIA. 2017. Proficiency matters: L2 avoidance in Spanish complex Wh-production. *Borealis, 6*(2), 285-302.
[90] TURRERO-GARCIA, MARIA. 2017. Proficiency matters: L2 avoidance in Spanish complex Wh-production. Borealis, 6(2), 285-302. doi:http://dx.doi.org/10.7557/1.6.2.4098. Page 288.

control or eliminate other minor factors that might affect the results in the experiment, such as multiple L1s, multiple L2s, etc.

2. Research Design

This study investigates the acquisition of potential complements through a self-designed questionnaire with two sections to measure and quantify the performance of Chinese second language learners on the target structure. In the first section, employing from Slavkov[91] and Turrero-Garcia[92]'s methodology, images that simulates real-life scenario where the target structure should be used are provided to elicit natural production that allows more freedom to produce. The participants are asked to describe four images shown with no hint to examine their natural tendency to use potential complements. In the second section, 5 incomplete sentences with context along with the target verbs are provided. The participants are asked to complete the sentences by using and transforming the verbs. All the questions are designed in real life contexts. The study recruited 60 participants, divided into two groups for comparison. The first group consisted of 30 native speakers of Chinese, specifically from the Northern regions of China. These individuals were well-educated, with all participants holding at least a college degree. This group served as the control group for the study to validate the nuances in semantics of potential complements are perceived and passed on by native speakers in daily usages of the construction, providing a baseline for comparison against the second group. The second group included 30 intermediate-level Chinese learners, aged 18-24, all of whom were students from Columbia University. Their performance was compared against that of the native speakers. The questionnaires were distributed to them during the regular class time if they were willing to participate. They have 5 to 8 minutes to fill out the questionnaire. Using *pinyin* to complete the questionnaire is acceptable, and they are allowed to ask clarification questions if they don't understand any words or the procedure of the questionnaire.

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[91] SLAVKOV, NICOLAY. 2015. Long-distance wh-movement and long-distance wh-movement avoidance in L2 English: Evidence from French and Bulgarian speakers. Second Language Research, 31(2), 179–210. https://www.jstor.org/stable/26478186

[92] TURRERO-GARCIA, MARIA. 2017. Proficiency matters: L2 avoidance in Spanish complex Wh-production. Borealis, 6(2), 285-302. doi:http://dx.doi.org/10.7557/1.6.2.4098

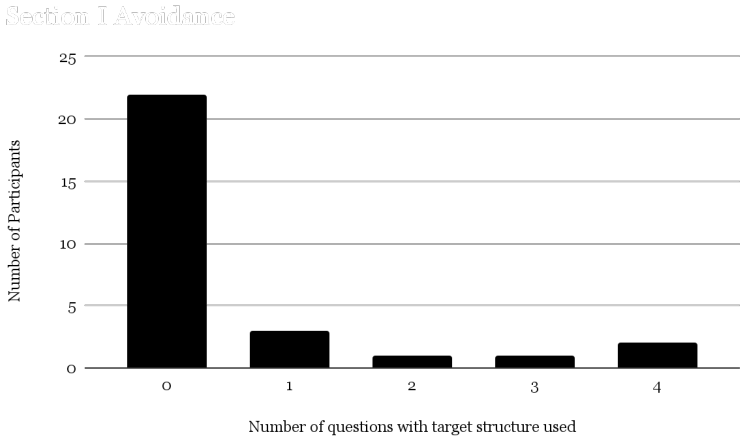
The data was analyzed through a self-designed rating scale, shown in Appendix II. Two sections in the questionnaire are designed to test different aspects of learners' linguistic competence. In section I, the test analyzes the participants' intuition and record their spontaneous response to use the target construction. The performance of the participants is quantified by their usage of potential complement in the answers. Therefore, answers that either contain "吃不完", "吃不了" or "吃不下" will be considered as successfully used the target construction. In Section II, each participant could get an overall score that reflects their linguistic knowledge about potential complement by adding up the score of all the questions in Section II. The rubric values the three aspects in learners' production: 1) whether they have the awareness or attempt of using potential complement. As for the explicit grammar test that provides the verb, it is very crucial for learners to realize which form to use. It shows that they have understood the situation and were aware the potential complement is the right construction to fit in the situation. (Type A Error) 2) If they correctly use *de/bu* in their answers, they will gain one point. As the major component that expresses the potentiality, *de/bu* used in the right location shows that the participants have acquired the basic knowledge of potential complement and are aware of *de/bu* should be used in the target construction. (Type B error) 3) If the participants choose the right resultative complement in the answer, they will gain one point. Since the selection of the resultative complement after the potential complement can be notoriously arbitrary, the proper use of the resultative complement shows the understanding of the participants that the proper resultative complement shows that the participants understand the goal of the action in the target construction is expressed through the resultative complement (Type C error). Therefore, these three aspects conclude the three points in each question in Section II. Each error in participants' answers will also be recorded and classified into A or B or C type errors that correspond to these three aspects, shown in Appendix II. Therefore, Full mark in Section II is 15 points. By calculating the average point of the participants, the results could provide a glimpse at the average level about their acquisition. In addition, the results also intend to show the possibility of different types of errors from calculating different classifications of error occurrences.

2. Findings and Discussion

According to the data collected by the questionnaire, the learners of the early intermediate stage are generally triggered by potential complement as hypothesized,

reflected from their performance. In Section I, the participants showed a very low rate of willingness or attempt of using potential complement when the scenario is provided shown in Figure 1. Only two participants described all four images using the target construction, while 22 of the participants never used the target construction in any of the images. Some showed the attempt to use potential complements but confused with other ability or potentiality constructions. For example, in describing the first image, one participant wrote, '他不能吃完了面[*sic*]' or '他不可能吃了他的晚饭[*sic*]'. Some participants showed their preference for simple S.V.O. structure to convey similar meaning, even if they have to use more characters to express similar meanings. For example, '他想吃他的饭，但是饭太多'. We can thus assume that efficiency might not be the priority for the learners when producing a spontaneous sentence. Instead, the grammatical accuracy and the reliability of the construction are two aspects they prioritize. Therefore, we can conclude that in the early intermediate stage, learners have not yet established the meaning and form mappings for potential complement yet. The common types of error include avoidance, wrong location of de/bu and the wrong choice of resultative complement. From the proportion of each category analyzed above, there is no significant difference between each category. Similar error occurrences indicate that the hypothesized area of difficulty does exist for learners.

The findings of this study indicate that the overall acquisition of potential complements by early-intermediate learners of Chinese is at a very preliminary



stage, as initially hypothesized. The learners have not yet firmly established the mapping between form and meaning for these structures. The errors observed predominantly fall into three categories: avoidance, incorrect placement of the particles "de" and "bu," and errors in the choice and/or location of the resultative complement. Interestingly, each of these error types occurs at a similar frequency. Furthermore, the phenomenon of avoidance is particularly prevalent, with learners showing an even higher tendency to avoid using potential complements in naturalistic settings compared to more controlled or prompted environments. Unexpectedly high accuracy has been discovered when the participants are prompted to produce 听得懂 (*lit.transls*.: to be able to understand by listening), since this particular construction is one of the most eminently frequently used expressions in the classroom setting. The storage of this construction whose exposure is "sufficiently frequent" made the learners to memorize it as "compositional prefabs and collocations"[93]. This might suggest that frequency could mitigate the avoidance phenomena of Chinese potential complement. It accords with the usage-based theory that high frequency and abundant input could facilitate the acquisition of a construction.

Figure 1. Learners' performance in Section I.

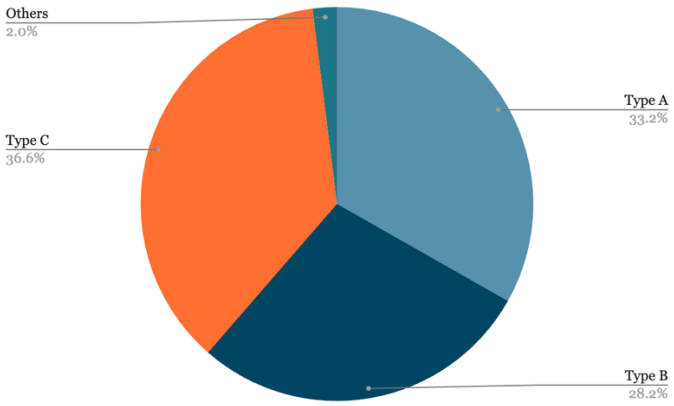


Figure 2. The proportion of different types of error occurred in Section II

[93] GOLDBERG, ADELE. 2006. Constructions at Work: The Nature of Generalization in Language. Oxford University Press.

From the data collected from Section II, as for the full mark of 15 points, the average grade for all the 30 participants is 8.67 points. In addition, each answer with errors from the participants are categorized into type A, B, and C. Errors that can't be classified is categorized into others. By calculating the proportion of each type of error in all error occurrences, what are the major types of errors that occurred in the early intermediate level of learners' production can be observed. From the pie chart above, Type A error represents that the learners rarely have the awareness or attempt to use potential complement, which is usually indicated by the learners' avoidance and replacement with other constructions, such as ability auxiliary or other constructions. Type B is identified as the wrong use of de/bu, including the wrong location placed in the sentence or omission of de/bu. In addition, type C is recognized by the wrong choice or inappropriate choice of resultative complement paired with the verb. From the data collected, these three types could almost embrace all the errors that participants made. The three of them almost occupy the same proportion in the total of 198 errors detected from 150 sentences produced by the participants. Type A error that accounts for the avoidance phenomena remains prevalent, which resonates with the results from Section I. Besides, the use of de/bu and the choice of resultative complement are another two common errors the learners make. Especially when participants realize that they should use potential complement yet since they are unfamiliar with either the meaning or form of the construction, Type B and Type C occur very often as individual errors, whereas Type A usually occurs with Type B or Type C or Type B and C together.

From these results, two pedagogical implications arise regarding the teaching of potential complements in Chinese second language classrooms. Constructionists suggest that highly practiced sequences tend to become 'routinized'[94] through repeated mental and cognitive processes. It echoes with the high accuracy found in the study of the highly frequent construction 听得懂 (*lit.transls*.: to be able to understand by listening). In addition, more metalinguistic instructions and focus on form practices should be provided for learners to facilitate

[94] BYBEE, JOAN. L. 1985. Morphology: A Study of the Relation between Meaning and Form (Typological Studies in Language) [E-book]. John Benjamins Publishing Company.

the establishment of form-meaning mapping. For example, instructors could help the learners to develop a more reliable form-meaning mapping by explaining the grammatical and semantic nuances between potential complements and ability auxiliary verbs and by giving explanations in addition to sentence translations from the textbooks.

Different error occurrences detected in this study could only reflect the area of difficulty for this specific level of students. This study has several limitations too. For example, this study does not collect demographical information from the participants, such as their first language, their daily exposure to the target language environment, or how long they speak Chinese per week. These factors might also account for the personal differences in their performances. In addition, the questionnaire is better carried out in a colloquial form to better test the learners' intuitive choice of construction. The participants who took the test might also have the priming effect due to the design of this questionnaire. If they could figure out one or more right answers with potential complement, they will have a higher possibility to conduct correct sentences with potential complement for the rest of the questions. A better way to elicit the authentic production of the learners might be to situate these sets of questions into a more comprehensive test that includes questions unrelated to the target construction. Furthermore, future research could employ longitudinal approach to test higher intermediate level learners or even advanced learners of Chinese with the same set of questionnaires, the results could not only indicate whether proficiency influences the acquisition of potential complement, but also shows whether the area of difficulty changes through the learning process or the area of difficulty remains so stubborn that could not be fixed with years of studying and practicing. This allows the scholars to compare longitudinally and to look for general trends of acquisition. Second, future research could shed light on how specific pedagogical practices could establish a firmer mapping between the target form and the meaning to facilitate the acquisition of potential complements. Third, qualitative methodology could be helpful to understand the reasons for avoidance and errors behind the phenomena. Interviews with the learners could be conducted for perceptions from the learners.

How to solve or reduce these errors or avoidance is another important topic that is overlooked in this paper yet is worth studying. The solutions need to be multi-

dimensional, that not only includes the aspects of classroom strategies, textbook revisions, and learning strategies, but also calls on for more theoretical research of potential complement to facilitate the learning of Chinese as a second language.

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APPENDIX I

The results of this test will be used in a research paper, but each participant's answer will remain anonymous. It takes 5-8 minutes to complete. (The percentage shown after each question is the percentage of native speakers choosing to use potential complement and it is not shown when the questionnaire is given to non-native speaker participants.)

I. describe each picture below in one sentence.



(95%)



(98%)



(90%)



(95%)

II. Fill in the blanks with the proper verb form.
黑板上字太小了，我_____。（看）(100%)
我已经为高考准备了三年，我相信我_____北大。（考）(93%)
上中文课的时候，你_____老师说话吗？（听）(100%)
因为COVID-19，很多航班（flights）都被取消（cancel）了，留学生都_____。（走）(83%)
地道的中国菜在中国才_____，麦当劳在哪儿都能吃。（吃）(93%)

APPENDIX II

Questionnaire Scoring Rubrics

The percentage of using potential complement for each question respectively collected from the control group has been indicated in the Appendix I.

Section I

This section assesses whether the participants would avoid using potential complement at where native speakers choose to use potential complement. The participants' score will be recorded if their answer includes the potential complement and their sentence is meaningful.

E.g.

Sample Answer	Score
他吃不完他的饭	+1 point
孩子吃不下饭	+1 point

Section II

This section assesses the participants' explicit use of potential complement.

Scoring Rubric

	Awareness to use potential complement	Used de/bu at the right location	Choice of the correct resultative complement
Score	+1 point	+1 point	+1 point
Error Type	A: use the wrong form、	B: wrong de/bu location	C: wrong choice of resultative

Sample Answer	Score	Error Type
*我不可以看黑板上的字	0	A,B,C
*我不可以看到黑板上的字	1	A,B
*我不看上黑板上的字	1	B,C
*我看黑板上的字不见	2	A
*我不看到黑板上的字	2	B

*我看不上黑板上的字	2	C
我看不见黑板上的字	3	No error

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A Collostructional analysis of the modal discrimination between *meibanfa* and *wufa* in Taiwan Mandarin*

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Compared with traditional case-by-case semantic interpretations, collostructional analyses allow to quantitatively validate the lexical collocations among near synonyms with the statistical significance. The strength of the lexical collocations reveals a subtle semantic discrimination between two high-frequent and near-synonymous modal verbs, *meibanfa* and *wufa*. Moreover, the lexical collocation co-occurring after *meibanfa* and *wufa* lies on the post-verbal preference to exemplify the respective preferred verbs even though preferred verbs can be overtly applied after *meibanfa* or *wufa*. Consequently, this paper contributes not only to present the lexical preference respectively for *meibanfa* or *wufa* as modal uses, but also to show the underlying verbal preference when a same verb co-occurs following *meibanfa* or *wufa*. The result of the collostructional analysis further derives available pedagogical suggestions given to enhance Chinese as second language learner's comprehension and application to Mandarin modals in colloquial usages.

1. Introduction

This paper aims to examine two negative modal verbs, *meibanfa* and *wufa*, on semantic peculiarities. Previous studies on Chinese as Second Language (CSL) learning have fruitful discussion about learning difficulties or mistakes on modal

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verbs. Yet, negative volitional modals have few been elaborated so far, especially for high-frequent modal verbs, *meibanfa* and *wufa* in daily talk. This point, thus, is the research niche that this paper would like to address.

In this paper, the semantic discrimination between *meibanfa* and *wufa* theoretically adopts collostructional analyses proposed by Gries and Stefanowitsch (2004) and Gries (2022) to quantitatively support my proposals with empirical corpus data from Corpus of Contemporary Taiwanese Mandarin (COCT).

Generally speaking, *meibanfa* and *wufa* share some common semantic properties. As shown in (1) and (2), both *meibanfa* and *wufa* express ABILITY/CAPABILITY's negation when they posteriorly collocate with *chengshou* 'to afford'.

(1) *Xiaonong* ***wufa*** *chengshou tai da de tianqi fengxian*.
Small.farmers ***WUFA*** afford too big GEN[95] weather risk.
'Individual farmers **cannot** afford too large weather risk.'
(COCT spoken 2019: DA2016NFYTDTD139J)

(2) *Ta zhege jiao* ***meibanfa*** *chengshou zhege yalì*.
She this.CLF feet ***MEIBANFA*** afford this.CLF pressure.
'Her feet **cannot** afford such a pressure like this.'
(COCT spoken 2019: DA2019SDZJD201J)

However, the collostructional analysis tells their semantic discrimination from the collocation words which are posterior to *meibanfa* and *wufa*. The post-verbal preference indicates that high/low dynamic verbs works on lexical selection of *meibanfa* and *wufa* even though *meibanfa* (MBF) and *wufa* (WF) as modal verbs are highly similar in most cases. The quantitative result in this paper, therefore, implicates some pedagogical suggestions for further CSL learning at the end of this paper.

The organization of this paper is summarized below. Section 2 is the literature review, including previous studies related to MBF and WF. Section 3 is a method

[95] The abbreviations used in this paper include BA for object marker, CLF for classifier, DCM for degree complement marker, DEM for demonstrative, GEN for genitive, LOC for locative, PASS for passive, and PRC for particle.

description how to manipulate corpus data retrieval to do a quantitative analysis in this paper. The result is also reported in Section 4. Section 5 is some advice for CSL learning regard of the result interpretation, and the concluding mark is made in Section 6.

2. Previous studies related to *meibanfa* and *wufa*

2.1 The grammaticalization of impossibility-*wufa*: Liu & Cuyckens (2023)

Liu & Cuyckens (2023) examines WF's grammaticalization of impossibility with an account of historical corpus data. They confirm following points. First, WF can be characterized by coalescence, paradigmaticization, obligatorification, fixation, desemanticization, decategorialization and divergence. Second, a structural reanalysis is followed by syntactic expansion and host-class expansion. Third, WF's diachronic grammaticalization, from root possibility to epistemic possibility, proves proposals from previous studies. At the same time, WF develops from participant-external possibility to participant-internal possibility due to the Chinese cultural preference for collectivism. Fourth, modal WF lexically is a verb-complement sequence rather than a single full verb (Liu & Cuyckens 2023: 733).

Below are some instances to present WF's modal and modality. (3a) shows WF's participant-internal possibility by addressing children's disability. (3b) tends participant-internal possibility because changes and risks from the external environment causes the company in a serious long-term debt-funds. A participant-external deontic necessity follows WF+*bu* to claim a strong obligation (i.e., must) when there is a double negation, WF+*bu*, in (3c). On the other hand, (3d) indicates a participant-external non-deontic necessity follows WF+*bu* to claim a cumstantial obligation (i.e., have to). A participant-external deontic impossibility follows WF because of a deontic source (e.g., social norms or ethical principles) as shown in (3e). (3f) presents an epistemic possibility to show speakers' assessment on the truth of the proportion (Liu & Cuyckens 2023: 744).

WF's modal uses in contemporary Mandarin: Liu & Cuyckens (2023: 744-745 (3)-(8))

(3) a. *Ruo you'er you yuyan zhangai, jiu* ***wufa*** *yu taren jinxing zhengchange de jiaoliu*.
If child have language barrier, then *WUFA* with others conduct normal GEN communication
'If a child has a language barrier, s/he **cannot** communicate with others normally.'
participant-internal possibility

b. *Dang xinxi bu duicheng wenti feichang yanzhong, weiyue fengxian juda shi, qiye* ***wufa*** *chouji changeqi zaiwu zijin*.
When information not asymmetry problem very serious, default risk huge, time, company *WUFA* raise long-term debt fund.
'When the problem of information asymmetry is very serious and the risk of default is huge, companies **cannot** raise long-term debt funds.'
participant-internal possibility

c. *Xueshengmen miandui laoshi de yisibugou, jingjingyeye, changchang gandao fujiu, tamen* ***wufa*** ***bu*** *nuli, bu renzhen*.
Students face teacher GEN meticulousness, conscientiousness, often feel guilty, they *WUFA* not work.hard, not serious
'The students often feel guilty when faced with the teacher's meticulousness and conscientious work. They **have to** work hard and be serious about their study.'
participant-external deontic necessity

d.	*Bijing women shi shenghou zai yi ge zuowei zhengti de* After.all we are live on a CLF as whole GEN *shijie shang, renmen **wufa bu** guanxin ziji zhouwei de* world LOC, people *WUFA* not care own surrounding GEN *shiqing*. things 'After all, we live in a world as a whole, and people **have to** care about the things around them.'	participant-external non-deontic necessity
e.	*Yaoqiu yisheng jieshu fuqin de shengming, dan youyu* Ask doctor end father GEN life, but because.of *lunli guannian ta **wufa** kaikou*. ethics notion he *WUFA* open.mouth '(He wanted to) ask the doctor to end his father's life, but was unable to say so because of ethics.'	participant-external deontic impossibility
f.	*Bu ai kan fanyi hou de waiguo zuopin, zong juede* Not like read translate after GEN foreign works, always feel *fanyi de zai hao ye **wufa** tixian yuan yuyan* translate DCM again good still *WUFA* reflect original language *de jingsui*. GEN essence '(I) don't like to read translated foreign works. I always feel that no matter how good the translation is, it **cannot** reflect the essence of the original language.'	epistemic possibility

[CCL, 20th century]

According to Liu & Cuyckens (2023: 745), it is reported that WF+VP has largely occurred in texts since 1949. Before contemporary Chinese, WF realizes its root possibility. In contemporary Chinese, WF, however, comes to express epistemic modality. When a speaker think it is impossible for an event to occur or for him/her not to do something, he/she may use a modal WF to express (Liu & Cuyckens 2023: 750). An example is provided to explain that someone cannot to prove his faith in (4).

Liu & Cuyckens (2023: 750 (19))

(4) *Yi wei xifang qingbao renyuan houlai pinglun shuo, "Zai yiselie, xiang*
A CLF west intelligence person later comment say, "In Israel, like

Andelie zheyang de fei youtai yimin yaoxiang zai he yanjiu
Andre this.kind GEN not Jewish immigrants want in nuclear research
*danwei zhao yi fen gongzuo genben bu keneng", yinwei "ta **wufa** zhengshi*
institute find a CLF job utterly not possible", because "he *WUFA* prove
ta de zhongcheng".
he GEN loyalty".
'A Western intelligence officer later commented that "In Israel, it may be impossible for non-Jewish immigrants like André to find a job in a nuclear research institute" because "He **may not** be able to prove his loyalty".
[Fujian Daily, 1992]

Liu & Cuyckens (2023) well examines WF's grammaticalization to present a main focus on diachronic development, while the research theme in this paper tends the synchronic interaction between WF and its alternation, MBF in contemporary Mandarin. A shift focus from a diachronic development to the synchronic tendency raises the educational importance in CSL learning because it is more practicable and available for CSL learners to properly apply modals in daily talk by acquiring/learning precise and adequate L2's lexical knowledge, especially for high frequent near-synonyms (e.g., MBF and WF).

2.2 Discourse marker function of *meibanfa*: Li (2019)

Li (2019) proposes two functions for MBF as a discourse marker. One is the causative cohesion in contexts, and the other one is for a modal use. She summarizes the syntactic discrimination from resultant conjunctions (e.g., *yushi*, *yinci*, and *suoyi*) when MBF is utilized as a causative cohesion. For example, (5) shows the causative cohesion implicating a temporal connection between a reason and its consequence. Pure causative cohesion is elaborated in (6). The last one is the causative cohesion implicating a prediction that speakers make as shown in (7). MBF can be replaced by *yushi* 'so' in these three examples when speakers purely express causality without speaker' attitude on events based on Li (2019:58).

Li (2019: 56)

(5) *Shuo jingfei jinzhang bu gei qianzi, ke caiwu shang fei yao you*
Say budget nervousness not give sign, but finance DEM not require have
yuanzhang pishi bu ke, shuo zhe shi guiding. ***Meibanfa,*** *wo jiu qu zhao*
dean approval not can, say this is rule. *MEIBANFA*, I just go find
ren yuanzhang, ta ting wo jiang wan yihou erhuamoshuo jiu pi le.
Ren dean, he hear I say finish after without.utterance just approve PRC
'(Someone) said because of the shortage of budget, it was a rule that financial applications required the dean's permission. **Therefore**, I turned to Dean Mr. Ren. After finishing my statement, he approved my application without hesitation.'

(6) *Qian liang nian qu linxialu jiedao fanying wenti, ye jiu shi ba*
Before two years go Linxialu street.road reflect problem, also just is BA
dangshi de wenti jiejue le, danshi meiyou jiejue genben wenti,
at.that.time GEN problem solve PRC, but not.have solve fundamental problem,
da 12345 dao xianzai ye meiyou renhe zuoyong, ***meibanfa*** *zhi neng gei nin*
call 12345 till present also not.have any work, MEIBANFA only can give you
liuyan, xiwang dedao jiejue.
leave.message, hope get solve
'Two years ago, I went to make a complaint on Linxia Rd. At that time, this complaint was tentatively solved, but the remained problem still went on. I called 12345 for help but in vain. **Therefore**, I just left you a message, and hoped this remained problem can be solved.'

(7) *Zhuanan gongqi tai jinzhang, xianchang zhende shi li bu kai*
Project engineering.period too nervous on.site really is leave not open
ren, ***meibanfa*** *jiehun de shi-er zhi neng wang hou tuo le*.
people, MEIBANFA marry GEN thing only can DEM behind postpone PRC
'The engineering schedule is really tensive in this project, and we need everyone on call here. **Therefore**, I have to postpone our wedding.'

On the other hand, Li (2019: 60-61) lists MBF's occurrence prosody in a case based on MBF's syntactic position when MBF serves as a modal verb. For instance,

speakers use first or second personal pronouns as a topic to reflect speakers' viewpoint or attitude on an event. Referent pronouns as a topic refer to the event that was previously mentioned. Moreover, adverbs pre-occur MBF to emphasize speakers' mood and modality, such as a sense of helplessness or flex (e.g., *zhen-shi* 'really'). Together, mood final particles support speakers' attitude (e.g., *a*, *ne*, *ya*, *la*, etc.) after MBF, but weaken speakers' moody emphasis as well.

Based on Li (2019), it is summarized that personal pronouns and verbal preference are revealed in MBF cases. In-/animate topics and verbs posterior to MBF/WF are, thus, listed as test items to examine MBF and WF semantic peculiarities in their behavioral profile.

Previous studies to qualitatively investigate either MBF or WF have been few addressed except for Liu & Cuyckens (2023) and Li (2019). Liu & Cuyckens (2023) examines the grammaticalization of WF as a modal from a diachronic view while Li (2019) investigates the discourse functions of MBF in contexts. Even though existing studies illustrates semantic, syntactic, and discourse features that MBF or WF holds, there has yet been studies to compare MBF and WF in colloquial usages in modern Mandarin, which results in a research gap to fulfill.

WF has existed to express the impossibility in ancient Chinese while MBF popped up in contemporary Mandarin, which leads to the asymmetrically lexical development for MBF and WF. Moreover, both MBF and WF have been varying and competing their lexical domain, so it is difficult to diachronically compare their respective lexical variety. Concerning the point mentioned above, I turn to analyze synchronic oral data to quantitively map their distribution of respective and sharing lexical collocation. Mapping the distribution of respective and sharing lexical collocation can be further provided with a collostructional analysis.

3. Method

3.1 Collostructional analysis: Gries and Stefanowitsch (2004) and Gries (2022)

A typical literature review with regard to collostructional analyses refers to Gries and Stefanowitsch (2004). Gries and Stefanowitsch (2004) specifically renews

an advanced distinctive-collexeme analysis for semantically similar grammatical constructions and their collocations. The collostructional analysis proposed can be applied to summarize distributional collexemes that prefer to a particular construction and its alternation when two near-synonymous constructions occur in a case. The Fisher exact test is particularly utilized as a statistical norm to examine collexemes (Gries and Stefanowitsch 2004: 101). This advantage better than traditional approaches benefits to identify subtle differences between a target construction and its alternation. Furthermore, the most discriminative strength that the collostructional analysis has follows quantitative calculations underlying a basis of a large account of empirical data rather than qualitied case studies in which frequencies of cases are quite low in reality.

Since near-synonymous constructions share common semantic domains and morphological patterns in most cases, it is difficult to explicitly distinguish their lexical definitions. Nevertheless, collostructional analyses allow to quantitatively present the respectively distinguishable nuances for a target construction and its alternation by retrieving native speakers' usages in natural languages, which is the primary reason why I operate this method to cope with the research theme in this paper.

Based on Gries and Stefanowitsch (2004), the collostruction strength to represent the correlation between a single verb (e.g., *zhuanxin*) and a target construction (e.g., *meibanfa*+VP) is transformed as numerals (i.e., (expected) frequencies in corpus) and calculated in a cross tabulation as the basis of statistical calculation in order to run a Fisher exact test via programming designed by Gries (2022). Table 1 is an example of a cross tabulation in MBF+VP construction. Take *zhuanxin* 'to pay attention' as an example. (Expected) Frequencies for a colloexeme and its respondent construction are listed in the cells of the table. The (expected) frequencies in the table are provided from the dataset (i.e., Corpus of Contemporary Taiwanese Mandarin).

Table 1. Cross tabulation of *zhuanxin* and *meibanfa*+VP construction

	zhuanxin	**¬ *zhuanxin***	**Row totals**
meibanfa+VP	75	4,135	4,210
¬ *meibanfa*+VP	10,202	319,691,695	319,701,897
Column totals	10,277	319,695,830	319,706,107

¬ means non-.

Access to (expected) frequencies of verbs and target constructions from the corpus, I collect and arrange them in an Excel file to load in the R-programming package supplied by Gries (2022) so as to run the collostructional analysis and to get the collostruction strength shown as the log-odds ratio. Within the log-odds ratio, it is available to map the distribution of respective and sharing (i.e., co-occurring post-verbs preference) lexical collocation for MBF and WF in Section 4.

3.2 Data collection

Because of contemporary Taiwan Mandarin that I want to investigate, I choose one of the biggest and the most available database in Taiwan, Corpus of Contemporary Taiwanese Mandarin (COCT) under National Academy for Educational Research (NAER) as the primary data source that I use in this paper. With the concern of normal sampling, COCT can fit my quantitative need since the advantage of COCT is balanced on a large number of contemporary Taiwan Mandarin texts (e.g., 3,171,000,000 written tokens and 34,400,000 spoken tokens). Tokens in COCT are mostly published and well-reviewed texts. The other advantage for COCT to be considered is an embedded POS system built in the search engine, which benefits users to specifically retrieve target items from an enormous database.

Regard of asymmetric proportion between MBF and WF in diachronic written data (MBF:WF=1:13.36), I turn to 6-year synchronic spoken data (MBF:WF=1:1.03) to randomly sample respective 500 tokens for MBF and WF (i.e., 1,000 tokens in total).

The data annotation is viewed in 3.2. Table 2 shows examples for search strings and constructions in COCT spoken 2019.

Table 2. Example for search strings and constructions in COCT spoken 2019[96]

Search string[97]	Target construction	Example
沒辦法(_V*)	*meibanfa*+VP	我沒辦法[幫你 VP]。 *Wo meibanfa* [*bang ni* VP] 。 'I cannot [help you VP].'
無法(_V*)	*wufa*+VP	我無法[動 VP]。 *Wo wufa* [*dong* VP]。 'I cannot [move VP].'

3.3 Data annotation

Table 3 and Table 4 show partial concordances for MBF+VP construction and WF+VP construction in COCT 2019 spoken corpus.

Table 3. COCT 2019 concordance for *meibanfa*+VP construction in oral context

#	left context	node	right context
1	水溝是	*meibanfa* 承受	這樣的雨量
2	我們當時是	*meibanfa* 進來	的
3	這個我們還	*meibanfa* 感受	的時候，我們就先好好愛

[96] COCT spoken 2019 corpus: https://coct.naer.edu.tw/cqpweb/bl2019/distribution.php?qid=0004zv&distOver=class%7E--text&progToChart=0

[97] Note I further do the data cleaning to pick out and to remove some improper instances (e.g., MBF+adjectives and MBF+adverbs) because of general POS tags for predicates in Mandarin (i.e., MBF+adj./adv./V.→ MBF+VP)

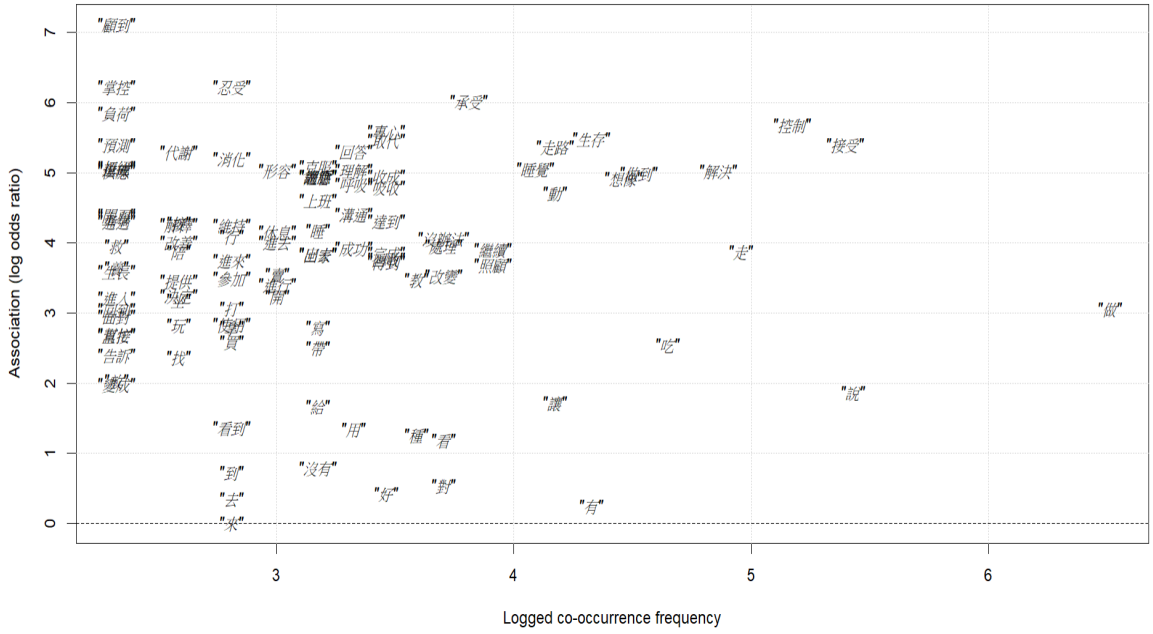
Table 4. COCT 2019 concordance for *wufa*+VP construction in oral context

#	left context	node	right context
1	作為一個人我	*wufa* 享受	其中
2	她絕對	*wufa* 想像	會有如此閒情逸致的生活
3	以前他們	*wufa* 想像	世界有多大

4. Analysis

In this section, I provide a collostructional analysis for MBF and WF in 4.1 and a posterior verbal preference in 4.2. Subsection 4.3 is the semantic comparison with other modals (e.g., *neng*, *hui* 'be able to') following the theoretical assumption in Xu (2017) and Li (2019). The interim summary of the data report is noted in 4.4.

Figure 1. The associated distribution of verbs posterior to *meibanfa* in oral contexts



4.1 Collostructional analysis

Figure 1 illustrates the associated distribution of verbs posterior to MBF in oral texts. Table 5 further presents spoken collexemes attracted to MBF to show the respective lexical collocation for MBF with the collostruction strength represented by the log-odds ratio according to Gries (2022). *Gudao* 'to take care of' in Table 5 represents the prior collocation with the highest collostruction strength (log-odds ratio =7.12, p <.001***).

I further report top 20 verbal collexemes attracted to MBF+VP construction with a statistical significance (3≤log-odds ratio, p<.001***) in Table 5 to help locate correspondent collexemes in Figure 1 so as to better overview the distributional nuance of attracted collexemes between MBF and WF in Figure 1 and Figure 2. In total, 75 verbal collexemes show extremely statistically significant (3≤log-odds ratio, p<.001***), another 13 verbal collexemes reach largely statistically significant (2≤log-odds ratio<3, p<.01**), and the other 6 verbal collexemes present statistically significant (1.3≤log-odds ratio<2, p<.05*).

Figure 2. The associated distribution of verbs posterior to *wufa* in oral context

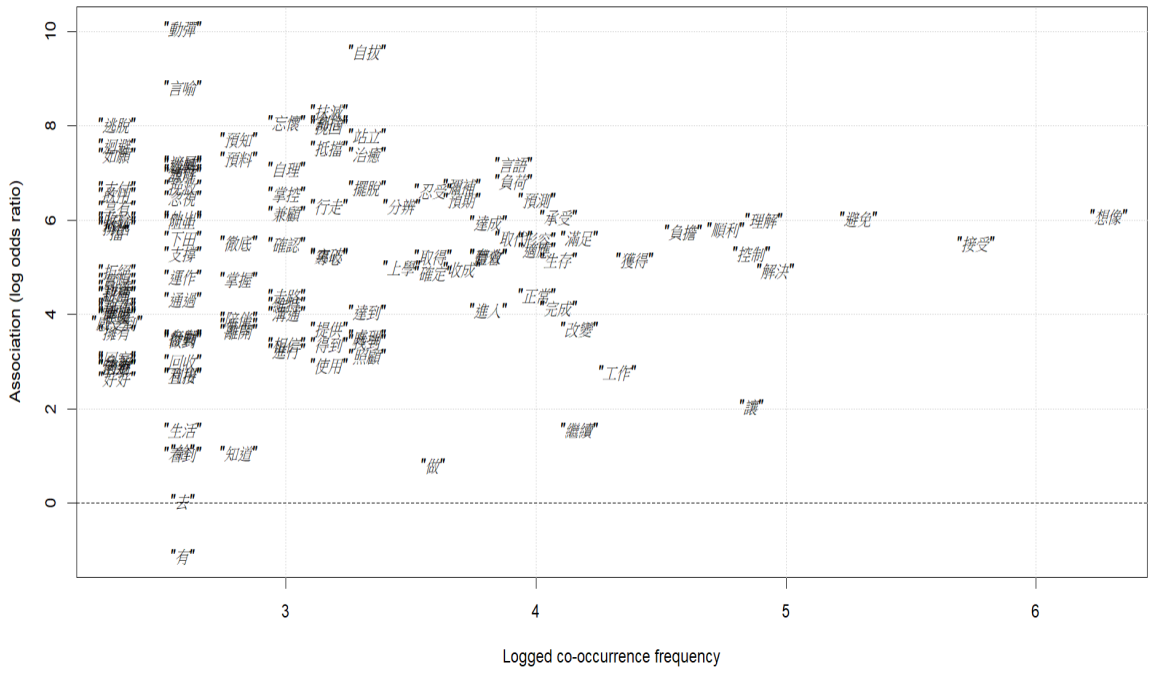


Table 5. Collexemes attracted to *meibanfa*+VP construction in oral context

attracted		repelled	
Collexeme	Collostruction strength (Log-odds ratio)	Collexeme	Collostruction strength (Log-odds ratio)
gudao 'to take care of' (5)	7.12***		
zhangkong 'to control' (5)	6.23***		
renshou 'to bear' (7)	6.23***		
chengshou 'to bear' (14)	6.03***		
fuhe 'to afford' (5)	5.85***		
kongzhi 'to control' (5)	5.85***		
zhuanxin 'to pay attention' (36)	5.68***		
shengcun 'to survive' (11)	5.60***		
qudai 'to replace' (20)	5.49***		
jieshou 'to accept' (11)	5.47***		
yuce 'to predict' (42)	5.41***		
zoulu 'to walk' (5)	5.40***		
huida 'to answer' (18)	5.37***		
daixie 'to metabolize' (10)	5.31***		
xiaohua 'to digest' (6)	5.30***		
kefu 'to overcome' (7)	5.21***		
jujue 'to refuse' (9)	5.09***		
shuijiao 'to sleep' (5)	5.08***		
dacheng 'to achieve' (17)	5.07***		
xingrong 'to describe' (5)	5.06***		
…	…		

Note *p*-value is transferred as a common logarithm (Log(x)) to present its significance. When $p < .05$*, $p < .01$**, and $p < .001$***, the number of collostruction strength are orderly presented as $1.3 \leq \text{Log}(x)^* < 2$, $2 \leq \text{Log}(x)^{**} < 3$, and $3 \leq \text{Log}(x)^{***}$ to show a statistical significance.

Figure 2 illustrates the associated distribution of verbs posterior to WF in oral texts. Table 6 further presents spoken collexemes attracted to WF to show the

respective lexical collocation for WF with the collostruction strength represented by the log-odds ratio according to Gries (2022). *dongtan 'to move'* in Table 6 represents the prior collocation with the highest collostruction strength (log-odds ratio =10.08, p <.001***).

I further report 20 collexemes attracted to WF+VP construction with a statistical significance (3≤log-odds ratio, p<.001***) in Table 6 to help locate correspondent collexemes in Figure 2 so as to better overview the distributional nuance of attracted collexemes between MBF and WF in Figure 1 and Figure 2. There is an exception (i.e., *you* 'to have') repelled to WF+VP construction without a statistical significance. In total, 109 verbal collexemes show extremely statistically significant (3≤log-odds ratio, p<.001***), another 9 verbal collexemes reach largely statistically significant (2≤log-odds ratio<3, p<.01**), and the other 2 verbal collexemes present statistically significant (1.3≤log-odds ratio<2, p<.05*).

Table 6. Collexemes attracted to *wufa*+VP construction in oral context

attracted		repelled	
Collexeme	Collostruction strength (Log-odds ratio)	Collexeme	Collostruction strength (Log-odds ratio)
dongtan 'to move' (6)	10.08***	*you* 'to have' (6)	-1.12
ziba 'to withdraw' (10)	9.58***		
yanyu 'to express with words' (6)	8.83***		
momie 'to obliterate' (9)	8.32***		
wanghuai 'to forget' (8)	8.09***		
geshe 'to let go' (9)	8.09***		
taotuo 'to escape' (5)	8.03***		
wanhui 'to retain' (9)	8.01***		
zhanli 'to stand' (10)	7.81***		
yuzhi 'to predict' (7)	7.73***		
huibi 'to avoid' (5)	7.60***		
didang 'to fend off' (9)	7.55***		
zhiyu 'to cure' (10)	7.42***		
ruyuan 'to come true' (5)	7.39***		

yuliao 'to predict' (7)	7.31***
zhefeng 'to shelter' (6)	7.24***
yanyu 'to speak' (15)	7.20***
nizhuan 'to reverse' (6)	7.18***
zili 'to handle by oneself' (8)	7.09***
...	...

Note *p*-value is transferred as a common logarithm (Log(x)) to present its significance. When $p < .05$*, $p < .01$**, and $p < .001$***, the number of collostruction strength are orderly presented as $1.3 \leq \text{Log(x)}^* < 2$, $2 \leq \text{Log(x)}^{**} < 3$, and $3 \leq \text{Log(x)}^{***}$ to show a statistical significance.

4.2 Co-occurring verbal preference posterior to *meibanfa* and *wufa*

A verbal preference posterior to MBF/WF is organized in Table 7 when the same post-verb co-occurs after either MBF or WF. I only list respective top 5 posterior verbs to MBF and WF. They are ***shuo* 'to say' (**log-odds ratio=2.75, ***p*<.01**), *zuo* 'to do' (**log-odds ratio=2.14, ***p*<.01**)**, *jiao* 'to teach' (log-odds ratio=1.87, *p*<.05*), *xiuxi* 'to take a rest' (log-odds ratio=1.46, *p*<.05*), and *zuodao* 'to achieve' (log-odds ratio=1.42, *p*<.05*) referent to in MBF +VP construction, while *fenbian* 'to distinguish' (log-odds ratio=-1.64, *p*<.05*), *manzu* 'to be content' (log-odds ratio=-1.73, *p*<.05*), *fudan* 'to afford' (log-odds ratio=-1.73, *p*<.05*), *gongzuo* 'to work' (log-odds ratio=-1.84, *p*<.05*), and ***bimian* 'to avoid' (**log-odds ratio=-2.52, ***p*<.01**)** highly occur after WF as a modal use. Table 7, therefore, reveals a distributionally different on co-occurring verbal preferences in talks when MBF and WF share the same grammatical construction with closely similar modality in a case ($2 \leq |\text{log-odds ratio}| < 3$, *p*<.01**; $1.3 \leq |\text{log-odds ratio}| < 2$, *p*<.05*).

Table 7. Verbal co-occurrence between *meibanfa* and *wufa* in oral context

Verb	N in *meibanfa*	N in *wufa*	Preference	Collostruction strength (Log-odds ratio)
***shuo* 'to say'**	43	3	*meibanfa*	2.75**
***zuo* 'to do'**	91	12	*meibanfa*	2.14**

jiao 'to teach'	12	2	*meibanfa*	1.87*
xiuxi 'to take a rest'	8	2	*meibanfa*	1.46*
zuodao 'to achieve'	23	6	*meibanfa*	1.42*
fenbian 'to distinguish'	2	11	*wufa*	-1.64*
manzu 'to be content'	3	18	*wufa*	-1.73*
fudan 'to afford'	4	24	*wufa*	-1.73*
gongzuo 'to work'	3	20	*wufa*	-1.84*
***bimian* 'to avoid'**	3	39	*wufa*	-2.52**

Note *p*-value is transferred as the absolute value of a common logarithm (Log(x)) to present its significance. When p <.05*, p <.01**, and p <.001***, the number of collostruction strength are orderly presented as $1.3 \leq |\mathrm{Log}(x)| < 2$, $2 \leq |\mathrm{Log}(x)| < 3$, and $3 \leq |\mathrm{Log}(x)|$*** to show a statistical significance. Note either a positive (+) or a negative value (-) does not affect a statistical significance and does not lead to a positive or negative correlation.

4.3 Comparison with other dynamic modals

According to Xu (2017) and Li (2019), speakers use MBF to express their own epistemic possibility on an event no matter which personal pronoun is located as a topic in a case. That means MBF shows a strong speaker's orientation or judgement underlying an event's possibility. Compared with other purely negative dynamic modals (e.g., *bu neng* and *bu hui* 'be unable to'), MBF and WF shift the negation from a pure loss/lack of capacity (i.e., *sb.* is unable to do *sth.*) to speaker's subjectivity projected to an event's possibility (i.e., (I think) *sb.* is unable to do *sth.*). During this shift process, the truth value of an event is still on (i.e., *sb.* is unable to do *sth.*), but the speaker's assessment on an event change when applying MBF and WF in a case. (8ab) shows a speaker's cognitive projection on an event's possibility like (9ab) while (8cd) expresses a pure loss/lack of someone's speaking ability different from (9cd). That is why I called MBF and WF negative volitional modal verbs in above.

(8) a. *Wo* ***meibanfa*** *shuo de geng qingchu*.
I MEIBANFA say DCM more clear
'I **am unable to** say it more clearly.'
(COCT spoken 2019: DA2016JDTVD36J)

b. *Wutai shang de houzi que bei po maiming yongyuan* ***wufa*** *shuo bu*.
Stage LOC GEN monkey however PASS force sell.life forever WUFA say not
'The monkey who is forced to work on the stage **is unable to** say NO forever.'
(COCT spoken 2019: DA2015DATSZBD45J)

c. *Gang lai dao Taiwan de anni* ***bu hui*** *shuo guoyu*.
Just come DEM Taiwan GEN Annie not able say Mandarin
'Annie who just came to Taiwan **is unable to** speak Mandarin.'
(COCT spoken 2019: DA2014ZTWZQD3J)

d. *Ta* ***bu neng*** *shuohua le*.
She not able say.words PRC
'She **is unable to** speak.'
(COCT spoken 2019: DA2014QQSYD407J)

(9) a. (*Wo renwei*) *Wo* ***meibanfa*** *shuo de geng qingchu*.
(I think) I MEIBANFA say DCM more clear
'(I think) I **am unable to** say it more clearly.'

b. (*Wo renwei*) *Wutai shang de houzi que bei po maiming*
(I think) Stage LOC GEN monkey however PASS force sell.life
yongyuan ***wufa*** *shuo bu*.
forever WUFA say not
'(I think) The monkey who is forced to work on the stage **is unable to** say NO forever.'

c. (*Wo renwei*) *Gang lai dao Taiwan de anni* ***bu hui*** *shuo guoyu*.
(I think) Just come DEM Taiwan GEN Annie not able say Mandarin
'(I think) Annie who just came to Taiwan **is unable to** speak Mandarin.'

d. (*Wo renwei*) *Ta* ***bu neng*** *shuohua le*.
(I think) She not able say.words PRC
'(I think) She **is unable to** speak.'

4.4 Interim summary

The verbal preference posterior to MBF/WF in 4.2 shows distributional different. I follow a verbal categorization proposed in (Stefanowitsch and Gries 2003:226) to categorize verbs in Table 8. As shown in Table 8, more action verbs and a communication verb prefer to MBF+VP construction, while three mental activity verbs follow in WF+VP construction.

Table 8. Verbal types of preferment verbs in MBF/WF+VP construction Stefanowitsch and Gries (2003:226)

Verbal categorization	preferment verbs	
action verbs (e.g. *do, give, work*)	*zuo* 'to do' *jiao* 'to teach' *xiuxi* 'to take a rest' *zuodao* 'to achieve'	MBF+VP
	fudan 'to afford' *gongzuo* 'to work'	WF+VP
transfer verbs (e.g. *give, hand*)	N/A	N/A
mental activity verbs (e.g. *believe, think, like*)	N/A	MBF+VP
	manzu 'to be content' *bimian* 'to avoid' *fenbian* 'to distinguish'	WF+VP
perception verbs (e.g. *see, feel*)	N/A	N/A
communication verbs (e.g. *tell, talk, say*)	*shuo* 'to say'	MBF+VP
	N/A	WF+VP

The other noticeable note which remains in this paper is the highly similar semantic distribution between MBF and WF, which reveals that they are interchangeable without respectively distinctive features in most cases. A subtle difference is their frequencies in usage domain. As shown in Table 9, the synchronic spoken data from 2014 to 2019 presents that TM speakers symmetrically use MBF

and WF, while the diachronic written data from 1986 to 2019 reveals WF asymmetrically overt use. That means MBF has raised after WF as a modal in contemporary Taiwan Mandarin, and it is possible for MBF to compete with WF over time from spoken contexts to written contexts. Nowadays, it has yet been clear to separate their semantic distinctive feature, but they may develop their individual lexical domain on semantic-pragmatic interface in the future.

Table 9. Tokens including *meibanfa* and *wufa* in COCT

Target	COCT spoken 2019 corpus	COCT written 2019 corpus[98]
MBF	4,188	16,992
WF	3,016	150,606
MBF+VP	2,466	9,219
WF+VP	2,533	123,176

Because of MBF and WF's ongoing semantic competition, how CSL learners learn and apply them deserves more attention and discussion. However, there have been few CSL or SLA studies to take a look. In next section, I further retrieve CSL learners' spoken data from a CSL corpus to compare their spoken usages with TM speakers'.

5. Some teaching suggestion for CSL learning

According to CSL standard application system[99]from NAER, WF categorized as the 5th level belongs to advanced vocabulary for CSL curriculum design, while MBF has yet been included into the vocabulary level. This point shows that CSL learners covertly acquires MBF in daily talk, and then they learn WF in overtly advanced le vel programs. Since MBF and WF are high frequent in daily talk, the teaching suggestion, is given for CSL teaching to downgrade WF's vocabulary level and to add MBF together with WF when teaching CSL learners in speaking programs.

[98] COCT written 2019 corpus: https://coct.naer.edu.tw/cqpweb/yl2019v3/
[99] CSL standard application system: https://coct.naer.edu.tw/standsys/

Based on the distribution in Table 8, CSL learners can select MBF or WF as a main modal in a case when it depends on verbal types in a construction. For instance, CSL learners select MBF as a modal use in a case when action verbs occur in the construction. Otherwise, CSL learners select WF in case of mental verbs in the modal construction. In addition, CSL instructors can provide CSL learners this guideline when they are confused on oral usages for MBF and WF.

6. Concluding mark

In this paper, the research objective is built on a subtle semantic discrimination from two high-frequent and near-synonymous modal verbs, *meibanfa* and *wufa*. This point is the research niche that this paper would like to address.

Compared with traditional case-by-case semantic interpretations that previous scholars had done, I theoretically adopt collostructional analyses proposed by Gries and Stefanowitsch (2004) and Gries (2022) to quantitatively support my proposals with empirical corpus data from Corpus of Contemporary Taiwanese Mandarin (COCT).

With the theoretical framework of Gries and Stefanowitsch (2004), the collostructional analysis that has been done in this paper tells MBF's and WF's semantic discrimination from the collocation words that are supported by statistical significances. The conclusion, therefore, lies on a collostructional analysis and its verbal preference for MBF and WF in Taiwan Mandarin daily talks. The available CSL pedagogical suggestion is also given based on the result of the analysis to enhance CSL learner's comprehension and application to Mandarin modals in the future. Further research suggestion related to the topic is to recruit written corpus data to holistically compare the nuance between written and spoken usages providing fully understanding the register-specific preferences in post-verbal collocation for both WF and MBF.

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Approximation on Numerals

Insights from the Grammar of Approximating Number Pairs (ANPs) in Mandarin Chinese

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Approximating number pairs (ANPs), like in 'twenty or thirty people', appear cross-linguistically and usually indicate an approximate range rather than a precise disjunction of either twenty or thirty. This paper explores the syntax and semantics of well-formed ANPs in Mandarin Chinese, proposing generalizations in semantic types and scopes of approximation across various approximative numeral expressions in Mandarin Chinese. I propose that approximative expressions on numerals are independent of the specific numerals chosen and the only variable parameter in the construction would be the range specific to the concrete approximative expression used.

0. Introduction

Mathematically well-defined numerals display different semantic behaviors in natural languages to convey more complex and nuanced meanings (Bylinina and Nouwen, 2020). Given the typical uncertainties of discourse, languages employ strategies to express approximate quantity and measure. One such strategy is to use

pairs of numerals, namely Approximating Number Pairs (ANPs), for a more precise description of the extent of uncertainty involved (Eriksson et al., 2010).

Approximating number pairs (ANPs) are a kind of range-approximation-like expression which takes a pair of numbers and expresses a quantity close to the pair. Examples in English include:

(1) There were **twenty or thirty** people in the hallway.

Despite taking the form of a disjunction, ANPs do not express a literal disjunctive meaning of 20 ∨ 30 in (1). Rather, it expresses a rough range between 20 and 30 (Solt, 2018). We could further observe that the roughness of the range is a necessary part of its meaning: we note that (1) is not equivalent to *There were between twenty and thirty people in the hallway*.

In addition, there are constraints on the structure and choice of numerals: while expressions like 'six or seven books' and 'three or four thousand participants' are commonly used, 'twenty- or thirty-six cats' and 'thirty or fifty biscuits' are either anomalous or denote a precise disjunction rather than being approximative.

The phenomenon of ANPs is observed cross-linguistically (Solt, 2018); in Mandarin, expressions like 二三十 'twenty or thirty', 六七百万 'six or seven million' present similar effects. However, constructions of ANPs have only been thoroughly described in English, French, German and Dutch as in Pollmann and Jansen (1996); experimental studies have been conducted in Swedish and English (Eriksson et al., 2010), and formal semantics analyses have been done on English ANPs based on the theory of granularity (Solt, 2018). Few studies have been conducted on similar or equivalent concepts in languages that are structurally further from the aforementioned languages. It is notable that these constraints are not only mathematical but also grammatical, as mathematically equivalent number pairs do not necessarily produce the same meaning. For instance, Solt (2018) observed that ANPs are not interchangeable with sentential disjunctions (e.g. *There were twenty people there or there were thirty people there*).

This paper will begin in section 1 with an overview of relevant literature on the syntax and semantics of numerals, theories of approximation, and characterizations of ANPs in other languages. Section 2 will focus on the grammar of the number-generation system and nominal classifiers in Mandarin Chinese. Then, in section 3, I will make key observations on the features of ANPs in Mandarin Chinese that will support an analysis of the grammatical structure of well-formed ANPs in section 4. From the grammatical structures, the meanings of ANPs and how they connect with other approximative numeral expressions in Chinese will be highlighted in sections 4-7. Finally, I will present some limitations of this paper and explore future directions of research in sections 8-9.

1. Current analyses of the construction of ANPs

Based on the corpora of the four languages Pollmann and Jansen (1996) analyzed, the restrictions on number choices are summarized as follows by Eriksson et al. (2010):

(2) Rules for well-formed ANPs:

1. the two numbers must be in ascending order;
2. the gap between them must be a divisor of both values;
3. the gap must be a so-called favored number, being of the form {1/2/2.5/5}*10;
4. the gap must be at least 5% of the second value.

The aforementioned rules applied on >90% tokens in the corpora; more recent corpus analyses done by Eriksson et al. (2010); Solt (2018) using the Swedish PAROLE corpus and/or Corpus of Contemporary American English (COCA; Davies 2008- as cited) also largely corroborated the above descriptions. However, we note that such rules focus on the mathematical properties of numbers such as divisibility, but not

the grammatical construction of ANPs. In addition, these corpus analyses are all carried out in number-marking languages (Scontras, 2013) that do not systematically make use of nominal classifiers. Due to the unclear composition of the classifier with the numeral in [Num Cl NP] constructions (Jiang et al., 2022), it is of interest to see if classifier languages like Chinese exhibit any deviations to these rules (Her et al., 2022).

In addition to the construction, current semantic analysis of ANPs characterized mainly by Solt (2018) assumes that the function of the "or" between the two numbers in the ANP like the one in (1) could be viewed as an ordinary disjunction. This assumption is questionable due to ANPs not being interchangeable with sentential disjunctions. In addition, the "or" is simply not observed in many other languages, as shown in the German and Mandarin Chinese examples in (3).

(3) a. German:

fünfzig, sechzig Meter

fifty sixty meters

fifty or sixty meters

b. Chinese:

五六十米

wu liu shi mi

five six 10 meters

fifty or sixty meters

Secondly, Solt (2018) approaches the roughness of the range through considering the set of alternatives of a numeral based on granularity, which characterizes the coarseness and fineness of uncertainties of the numeral (e.g. we

can say that 30 has a larger granularity of 10 compared with 33, to which we could set the granularity as 1). The choice of granularity is quantified by the *gran* unit, which are chosen to be powers of tens, halves and doubles of tens, or by cultural conventions. The Ruler Model (Solt, 2018, p. 10) was proposed, where the set of alternatives of a numeral (or a pair, in which case the alternatives is the union of the two sets of alternatives individually) ALT_{gran} is then the set of integer multiples S_{gran} of *gran*. Then, for a number to be considered approximate enough to the truth (and hence the proposition judged semantically true), it needs to be closer to the truth than any other alternatives in the set S_{gran}. I demonstrate a concrete example illustrating this model is in (4).

(4) Consider the proposition: There are **fifty or sixty** people.

Let *gran* = 10. Hence, S_{gran} = {… , 30, 40, 50, 60, 70, … }.

We observe that the alternatives for this ANP excluding themselves would be

$$ALT_{gran}(\text{fifty or sixty}) \setminus \{50, 60\} = \{\dots, 30, 40, 70, \dots\}$$

Example: Say now there are 47 people. We observe that $|47-50| \leq |47-\alpha|$ for any $\alpha \in ALT_{gran} \setminus \{50, 60\}$. Hence, it is closer to one of the numerals in the ANP than any alternatives based on the granularity of 10. It can be concluded that the proposition is true if the fact is that there are 47 people.

Non-example: Say there are 69 people. We note that $|69 - 70| = 1 < |69 - 60|$ and $|69 - 70| < |69 - 50|$. This means that there exists an alternative 70 that is closer to 69 than either of 50 or 60. Therefore, the proposition would be judged false according to the Ruler Model.

Offering us with a systematic way to derive the acceptable ranges of quantities approximated by ANPs, this analysis did not provide justifications for how the unit

gran is chosen other than divisibility concerns and social conventions. Moreover, the rule for determining whether a quantity would be considered true involves complicated calculations with all alternatives. Whether there could be a grammar-motivated and simpler explanation for the semantics of ANPs is still to be investigated.

Finally, ANPs are far from the only form of approximative numeral expressions; the English expression of ***Thousands*** *of people* also denotes an approximate order of magnitude rather than precise multiples of the number 1000. Similarly, Mandarin expressions like 七百多 [seven 10^2 DUO] also simply vaguely denote more than 700. Current analyses of ANPs are, to my knowledge, not connected with other approximative expressions. Therefore, it would be meaningful to also look into the grammatical commonalities of ANPs with other approximative numeral expressions.

Before diving deep into the complex constructions, semantics and pragmatics of ANPs, we shall look at some characteristics of Mandarin Chinese to obtain clues on how numerals and ANPs might function in this language.

2. Features of Mandarin Chinese numerals and classifiers

Mandarin Chinese numerals employ the decimal system of counting (He and Zhang, 2021), with the ten unique simple numerals displayed in (5); the numerical bases are {十，百，千，万，亿，兆}, translating to numerals {10, 10^2, 10^3, 10^4, 10^8, 10^{12}}.

(5) Ten simple cardinal numbers in Chinese

零，一，二，三，四，五，六，七，八，九

ling yi er san si wu liu qi ba jiu

0, 1, 2, 3, 4, 5, 6, 7, 8, 9

The simple numerals, like the ones in English, are unsystematic and have no rules for generation (Ng and Rao, 2010). However, unlike English using more irregular number names (e.g. *eleven* for 11) or attach the morphemes of numerical bases to form larger numbers (e.g. *forty* formed by attaching the morpheme '-ty' for 10), Chinese numerals are generated systematically by placing a simple digit **multiplier** before the numerical base **multiplicand** to express the product from multiplication as in (6a), or gluing the digit after the base to express the sum from addition as in (6b).

(6) a. 五十

wu shi

5 10

fifty (50 = 5 × 10)

b. 十五

shi wu

10 5

fifteen (15 = 10 + 5)

c. 四千三百五十八

si qian san bai wu shi ba

4 10^3 3 10^2 5 10 8

four thousand three hundred and fifty-eight (4358 = 4 × 10^3 + 3 × 10^2 + 5 × 10 + 8)

One thing we should note here is that despite using the same mathematical notations of + and × as defined for integers, the implied addition and multiplication when generating Mandarin numerals are not exactly the same as that in mathematics. We observe that such operations are not commutative in Mandarin, as the multiplier × multiplicand sequence could not be reversed. Specifically, only bases given in the set {10, 10^2, 10^3, 10^4, 10^8, 10^{12}} are licensed to occupy the multiplicand position, whereas simple numerals {0, 1, 2, 3, 4, 5, 6, 7, 8, 9} can only occupy the multiplier position (e.g. 四十 [4 10] 'forty' is felicitous, but *四七 [4 7] is not due to 7 not allowed in multiplicand positions).

Moreover, Chinese is also a classifier language, which means that it requires **nominal classifiers** in the presence of numerals in order to count the referents of nouns (Scontras, 2013). There are still some ongoing investigations in the classification of different kinds of classifiers (Li, 2011; Gerner, 2014; Zhang, 2011; Her et al., 2022; Jiang et al., 2022). This paper is going to proceed being less concerned about the different kinds of classifiers, but more about how they combine with numerals and nouns.

In addition, the syntactic structure of classifier phrases is still under debate. Specifically, regarding how the [Num CL NP] sequence combines, there is strong evidence corroborating both the [Num [CL NP]] hypothesis (Scontras, 2013; Jiang et al., 2022) and the [[Num CL] NP] hypothesis (Her, 2017; Jiang et al., 2022). The most recent comprehensive analysis by Jiang et al. (2022) argues that both structures above are needed to describe all the data observed, but both also have certain limitations and issues.

The [Num [CL NP]] structure is more semantically favorable; as Chierchia (1998) argued, the nouns in Mandarin are number-neutral and denote the kinds of referents, which are incompatible with numerals, since a 'kind' cannot be counted. This differs from the count nouns in number-marking languages like English, where the noun refers to each individual object defined with measures. For instance, while the unmarked noun 'cat' would default to a concrete individual cat in English and other number-marking languages, it would be referring to an abstract "kind of thing that is named 'cat'" in Mandarin. Chierchia (1998) then proposes that numeral classifiers are functions converting kinds to atomic predicates and hence are of a

semantic type $\langle e, \langle e, t\rangle\rangle$. We observe that the fact that classifiers perform a type-converting operation on the proceeding NP argues in favor of the [Num [CL NP]] hypothesis.

However, various historical word order and cross-linguistic observations have argued otherwise (Her, 2017). In addition, when classifiers internally encode a quantity, they still combine multiplicatively with the numerals, which makes the [Num CL] constituency favorable. Furthermore, He and Tan (2019) also made observations that certain approximative expressions in Mandarin support the [[Num CL] NP] structure.

Building on top of the coexistence of both hypotheses, this paper makes use of both the type-converting and the number-denoting properties of nominal classifiers. That is, I assume that a classifier's type-converting property acts on the NP and ensures that the combination of numerals and nouns is grammatical, while simultaneously its number-denoting property would still act on the numeral multiplicatively to denote the correct quantity. While the choice of syntactic structure is still under debate, the coexistence of the type-converting and the number-denoting properties in classifiers is to a great extent built on sound ground.

Despite the inconsistencies in the subcategorization of nominal classifiers in Mandarin, there are several main subcategories that could accommodate all current theories (Jiang et al., 2022). For instance, it is generally accepted that the subcategory of measure classifier describes a standard unit of measurement, such as 一斤土豆 'a **kilo** of potatoes'; group classifiers collect individuals into aggregates, such as 两束花 'two **bunches** of flowers' (Jiang et al., 2022).

From these examples, we could note that the classifiers internally encode a quantity; in English, 'Two **kilos** of potatoes' is certainly not the same as 'two potatoes', but instead means the number 'two' multiplied by the quantity implicitly encoded in the classifier of 'kilo'. This multiplicative process also applies to classifiers as in (7).

(7) Multiplication continues with container/measurement/group classifiers:

二十打鸡蛋

er-shi da jidan

two-10 dozen egg

twenty dozen eggs (2 × 10 × 12 = 240 eggs)

Hence, we see that classifiers could also be a multiplicand in continuation of the numbers preceding them. We could further extend this to also include individual classifiers, whose function is roughly to individuate nominal concepts and to provide counting units[100]. In this case, the implicitly encoded number would simply be 1 unit for each individual.

Despite both functioning as multiplicands, nominal classifiers and number bases are distinct in that classifiers have the ability to convert the following nouns from *kinds* to atomic predicates to be counted. In contrast, bases do not have such function and cannot directly precede nouns in modern Mandarin without a classifier. This difference is illustrated in (8).

(8) a. *三十书

san-shi shu
three-10 book

Intended: 30 books

b. 三十本书

san-shi ben shu

three-10 CL book

[100] Another theory argues that individual classifiers provide a count/mass distinction for nouns, the existence of which is still currently debated. For more details about the two analyses, see Jiang et al. (2022, Section 24.2.4)

30 books

c. 三打书

san da shu

three dozen book

3 dozen of books (3 × 12 = 36 books)

To summarize, Table 1 draws the three-way comparison between the functions of simple digits, bases and nominal classifiers in Mandarin. These similarities and distinctions become useful when we consider the scope of ANPs as well as other approximative constructions in Mandarin.

Table 1: Features of simple digits, bases and nominal classifiers in Mandarin

	simple digits	bases	nominal classifiers
Multiplier	√	×	×
Multiplicand	×	√	√
Type conversion	×	×	√

3. Empirical observations

Based on four European languages, Pollmann and Jansen (1996) came up with restrictions on the constructions of ANPs as formulated in (2). While making statistically successful predictions in the select number-marking languages, the rules generally govern the mathematical properties of numbers rather than their syntactic and semantic roles. This becomes especially worthy of note when it comes to Mandarin, in which the construction of numbers is a highly regular and productive process generated by the additive and multiplicative patterns as discussed, incurring many distributional constraints for the simple numbers and bases. As a start, we

make some empirical observations of under which circumstances well-formed and invalid ANPs would form.

The first thing we note is that the construction of Mandarin ANPs **prohibits the reduplication of bases**, as the repeated base in (9b) results in ungrammaticality. Adding the disjunction 或 'or' in (9c) and (9d) restores the grammaticality, but subsequently eliminates the intended approximation meaning and results in the meaning '**precisely** 200 or 300', which makes the phrase no longer an ANP construction. Hence, the two numbers also need to be immediately **concatenated without conjunctions**.

(9) a. 两三百只猫

liang-san-bai zhi mao
two-three-10^2 CL cat

Two (hundred) or three hundred cats

b. *两百三百只猫

*liang-bai san-bai zhi
mao two-10^2 three-
10^2 CL cat

Intended: Two (hundred) or three hundred cats

c. 两百或三百只猫

liang-bai huo san-bai zhi mao
two-10^2 or three-10^2 CL cat

(Precisely, either) two hundred or three hundred cats

d. 两或三百只猫

liang huo san-bai zhi mao
two or three-10^2 CL cat

(Precisely, either) two hundred or three hundred cats

I will refer to the two immediately concatenated simple digits before a base as a **concatenated pair**. The only well-formed concatenated pairs in Mandarin occur when the two numbers chosen are consecutive and increasing. That is, the concatenated pairs **must be of the form (n, n + 1)** with n being a simple digit. For example, *十五二十 'fifteen or twenty' is ill-formed in Mandarin since it could not be written as a pair of the form (n, n + 1) multiplied to an existing base.

One might point out that certain common expressions like the one in (10a) do not follow the (n, n + 1) rule, as the second number is greater than the first one by 2. However, we note that (10a) is in fact not an ANP: the meaning is roughly to 'a few' in general and not correlated with the magnitudes of the numbers. As far as I know, such expressions are also no longer productive: shifting both numbers in the pair as in (10b) would not result in a similar meaning. Idiomatic expressions as such are therefore outside of the scope of this analysis.

(10) a. 三五个人

san wu ge ren
three five CL people

a few people (ungrammatical if 'three or five people')

b. *四六个人

si liu ge ren
four six CL people

However, having a concatenated pair of the form $(n, n + 1)$ alone does not guarantee a well-formed ANP. It also seems to be required that the concatenated pair replaces the **multiplier of the final summand** in a number. If we observe the examples in (11), only (11c) is unnatural.

(11) a. 四百六七十万

si-bai liu-qi-shi wan

four-10^2 six-seven-10 10^4

four million, six or seven hundred thousand[101]

b. 两三千万

liang-san-qian wan

two-three-10^3 10^4

twenty or thirty million

c. *两三百二十一

*liang-san-bai er-shi yi

two-three-10^2 two-10 one

*two or three hundred twenty one

[101] This might sound unnatural in English, but this is due to English lacking a concise base word for 10^4, which subsequently makes the phrase extremely hard to phonologically realize. However, such a problem is not present in Mandarin and the phrase sounds natural.

Using the base-final multiplicative and additive generation mechanism as discussed in section 2, we could rewrite the ANPs in (12) into a numerical form representing the generation mechanism:

(12)
- Number in (12a): $(4 \times 10^2 + \mathbf{[\![(6, 7)]\!] \times 10^1}) \times 10^4$
- Number in (12b): $\mathbf{[\![(2, 3)]\!] \times 10^3 \times 10^4}$
- #Number in (12c): $\mathbf{[\![(2, 3)]\!] \times 10^2} + 2 \times 10^1 + 1 \times 10^0$

Here, we could observe that the concatenated pairs inhabit different **terms** in the multiplicative and additive structure, where I define terms to be the segments separated by the addition symbol + as canonically defined for polynomials in mathematics. Each of these terms to be added can be called a **summand**. In (11a), the entire number in the parentheses is in the end multiplied by the base 10^4; inside the parentheses, we note that there are two summands 4×10^2 and $[\![(6, 7)]\!] \times 10^1$, where the concatenated pair occupies the second summand position as highlighted in the example. In (11b), there is only one summand $[\![(2, 3)]\!] \times 10^3 \times 10^4$ due to there being only multiplicative structures. In (11c), we see that there are three summands present: $[\![(2, 3)]\!] \times 10^2$, 2×10^1 and 1, but the concatenated pair $[\![(2, 3)]\!]$ appears in the first of all three summands. We thereby make an observation that the two concatenated numbers seem to have to **occupy the final summand** in the internal structure of a numeral.

Based on the empirical observations, we can start to analyze the structure of well-formed Mandarin ANPs.

4. ANP as one inseparable numeral

We could make a few hypotheses based on these observations. First, I propose that there is not an underlying disjunction between the two numbers in the approximating pair, since the meanings of the 'or'-inserted concatenated pair in (9d) and the 'or'-absent pair in (9a) are **contrastive**, with only the 'or'-absent pair having

the approximative meaning. Second, reduplicating the numeral base would force us into either syntactic anomaly or the precise disjunction, meaning that we cannot form valid ANPs whenever we try to separate the two simple numerals in the number pair and attempt to attach the base to each one of them (i.e. two-three-10 → two-10 or three-10). In fact, we note that the only valid way to form an ANP is to concatenate two simple numerals from the set {1, 2, ..., 9} and then add a base as needed. Effectively, the two concatenated simple numerals **replace the position of a single numeral** (i.e. two-10 → two-three-10).

This leads us to question the constituency of the individual numbers inside each Mandarin ANP construction. We observe that the two simple numerals in the pair are not separable to individually combine with their shared base, and the concatenated pair as a whole has roughly the same distribution as a single simple numeral. In terms of construction, these observations come down in favor of the hypothesis that the concatenated pair in an ANP is in fact a single, **inseparable constituent** that functions like a single numeral that could further multiplicatively combine with bases to form the final ANP number, which then could be multiplicatively combined with classifiers. Consequently, we conclude that a Mandarin ANP is not two separate numbers connected by a disjunction, but simply one number where the last multiplier is a concatenated pair.

5. Uniqueness of the approximation range

Based on the constituency analysis, we observe that a precise numeral and an ANP only differ on whether the multiplier of the final summand is a simple digit or a concatenated pair. Since the bases and classifiers themselves are not approximative, the approximative meaning is created by the concatenated pair. For each simple digit $n \in \{1, ..., 9\}$, the only concatenated pair it could form is $(n, n + 1)$. Hence, there is only one available size of the range of approximation by concatenated pairs independent of number choice. Denote this range as R_{cp}. Then, the numbers that would be considered in the range of $(n, n + 1)$ would be the range $\{n + r \mid r \in R_{cp}\}$. For demonstration purposes, I temporarily assume $R_{cp} = [-\frac{1}{2}, 1\frac{1}{2}]$, as it roughly corresponds to the range of "slightly smaller than the lower number to slightly greater

than the higher number"; moreover, we note that this is also mathematically consistent with the Ruler Model proposed by Solt (2018) as discussed in section 1. Thus, this assumption is sufficient for the purpose of the following analysis but could have some limitations. I will discuss this more in the future work section.

We also note that, although the range of approximation R_{cp} is created by concatenated pairs and is independent of the specific number chosen, bigger numbers still have larger approximation ranges due to further multiplication of the R_{cp} with the base. That is, since the approximation only scopes over the concatenated pair, the numeral is converted into a range before multiplication by bases or classifiers. The meaning of the entire numeral is, nonetheless, always interpreted as a whole on the surface level, so the range magnifies and/or shifts accordingly after multiplications and further additions. Hence, we now need to derive how the pair (n, n + 1) scoped by the approximation range semantically combines with the rest of the segments in the numeral.

6. Connections to other approximative numeral expressions

As discussed in section 1, ANPs are far from the only form of approximative numeral expressions. Nonetheless, current analyses of ANPs, such as the four rules by Pollmann and Jansen (1996), are idiosyncratic to ANPs and not connected with other approximative expressions. Therefore, while we are investigating the semantics of ANPs, it is also of interest to look at the semantics of other approximative numeral expressions that also map precise numbers to ranges in general.

We approach this by looking at the example of the behavior of the particle 多 *duo* 'more than' in expressions like 七百多 [seven 10^2 DUO]. Luo (2018) observed the puzzle that constructions involving the particle *duo* exhibit different meanings when the particle attached before or after classifiers such as 杯 *bei* 'cup', as illustrated in (13):

(13) a. 十多杯水

shi duo bei shui

10 **DUO** CL (cup) water

More than ten cups of water (Between **10 and 20** cups of water)

b. 十杯多水

shi bei duo shui

10 CL (cup) **DUO** water

More than ten cups of water (Between **10 and 11** cups of water)

According to the theories of Luo (2018), the reason the *duo* exhibits a 10-interval when added before the classifier but a 1-interval when after is that the *duo* particle means a *subportion* and can only scope over the single unit-morpheme immediately preceding it. Luo called this the *immediacy constraint*. This implies that (13a) means 10 cups plus a *subportion* of 10 cups, while (13b) is 10 cups plus a *subportion* of one unit cup. The ill-formed example in (14a) further illustrates how this rule applies: as the *duo* scopes over the immediately preceding morpheme 'six', it violates the constraint that the number it acts on must be a 'round number', or a 'multiplicand' in the terminology of this paper. This constraint is, therefore, no longer violated when the *duo* particle moves after the classifier.

(14) a. *六多杯水

liu duo bei shui

six DUO CL(cup) water

Intended: Between 6 and 12 cups of water

b. 六杯多水

liu bei duo shui

six CL(cup) DUO water

More than six cups of water (Between 6 and 7 cups of water)

Based on the observations above, Luo (2018) proposed the denotation of the approximative expression *duo* to be that in (15):

(15) $[\![duo]\!] = \lambda m.(\lambda n.(\lambda x.(\mu_{CARD}(x) = (n + r) \times m)))$

(where r is a real number between 0 and 1, i.e. $r \in [0, 1]$; μ is a map outputting the cardinal quantity of the referent nouns x; m must be a 'round number'.)

To prepare for generalization, we could rewrite this denotation by letting the set $R_{duo} = [0, 1]$ be a set of quantities between 0 and 1; in this case, we could write an denotation equivalent to (15) in (16):

(16) $[\![duo]\!] = \lambda m.(\lambda n.(\lambda x.\mu_{CARD}(x) \in (n + R_{duo}) \times m))$

(where the set $(n + R_{duo}) \times m$ is defined as the collection of $(n + r) \times m$ for all $r \in R_{duo}$, i.e. $(n + R_{duo}) \times m = \{(n + r) \times m \mid r \in R_{duo}\}$.)

"The cardinal quantity of the referent is between $n \times m$ and $(n + 1) \times m$."

Here, we see that the proposed formulation for ANPs in this paper is compatible and generalizable to that for the *duo* particle. Like how ANPs are approximating concatenated pairs combined with any chosen multipliers and multiplicands, the denotation of the *duo* particle here reveals that *duo* is also simply a unique approximating range R_{duo} combined with any multipliers n and any multiplicands m. The final range of approximation, as seen on the surface form of the whole number, would also be scaled and shifted by n and m like ANPs. To go from ANPs to *duo*-containing expressions, we only need to substitute $R_{cp} = [-\frac{1}{2}, 1\frac{1}{2}]$ with

R_{duo} = [0, 1]. That is, the only variable parameter in the construction would be the range or set R specific to the concrete approximative expression used, whether it be concatenated pairs, the *duo* particle or other such constituents.

7. Formal denotation of ANPs

From the analyses so far, ANPs should convert simple-digit multipliers into a fixed range to then multiply by respective multiplicands; in addition, this operation should be independent of the specific number chosen.

Hence, we could first attempt to formulate the denotation of the concatenated pair $(n, n + 1)$ in the same way as that for the *duo* particle:

(17) $[\![(n, n + 1)]\!] = \lambda m.(\lambda n.(\lambda x.\mu_{CARD}(x) \in (n + R_{cp}) \times m))$

(where the set $(n + R_{cp}) \times m$ is defined as the collection of $(n + r) \times m$ for all $r \in R_{cp}$, i.e. $(n + R_{cp}) \times m = \{(n + r) \times m \mid r \in R_{cp}\}$.)

"The quantity of the referent is between $(n - \frac{1}{2}) \times m$ and $(n + \frac{1}{2}) \times m$."

This gives us a good initial formulation of the denotation of ANPs. However, we note that this formulation gives us a small problem when it comes to numbers with multiple summands. Consider 两百二三十 [two 10^2 two three 10] 'two hundred twenty or thirty'; if we attempt to derive its denotation by applying (17), we encounter problems:

(18) $[\![liang\ bai\ er\ san\ shi]\!]$ = $((\lambda n.[\![(n, n + 1)]\!])([\![liang\ bai\ er]\!]))([\![shi]\!])$ (*)

≡ $((\lambda n.[\![(n, n + 1)]\!])(220))(10)$

= $(\lambda n.(\lambda m.(\lambda x.\mu_{CARD}(x) \in (n + R_{cp}) \times m))(220))(10)$

= $\lambda x.\mu_{CARD}(x) \in (220 + R_{cp}) \times 100$

≡ $\lambda x.\mu_{CARD}(x) \in [219.5 \times 10, 221.5 \times 10]$

First, the resulting final denotation is certainly an incorrect interpretation of what 'two hundred twenty or thirty' means; in addition, as early as in the step marked with (∗), we already observed that $[\![liang\ bai\ er]\!]$ is not a proper Mandarin numeral construction in the first place, with the meaning '220' quite coerced. In fact, this problem is also present for the duo construction. Therefore, we need to make the denotation take another variable s denoting the sum of all other summands preceding the last summand, where the approximation scopes over. Hence, I revise the definition given in (17) in (18) and re-derive 两百二三十 'two hundred twenty or thirty' in (19), which gives the desired meaning provided that the assumption $R_{cp} = [-\frac{1}{2}, 1\frac{1}{2}]$ is correct:

(18) $[\![(n, n+1)]\!] = \lambda m.(\lambda n.(\lambda x.\mu_{CARD}(x) \in s + (n + R_{cp}) \times m))$

"The quantity of the referent is between $s + (n - \frac{1}{2}) \times m$ and $s + (n + \frac{1}{2}) \times m$."

(19) New denotation of *liang bai er san shi* using the proposed denotation:

$[\![liang\ bai\ er\ san\ shi]\!]$ = $((\lambda n.[\![(n, n+1)]\!])([\![er]\!]))([\![shi]\!])([\![liang\ bai]\!])$

≡ $((\lambda n.[\![(n, n+1)]\!])(2))(10)(200)$

= $(\lambda n.(\lambda m.\lambda s.(\lambda x.\mu_{CARD}(x) \in (n + R_{cp}) \times m))(2))(10)(200)$

= $\lambda x.\mu_{CARD}(x) \in 200 + (2 + R_{cp}) \times 100$

≡ $\lambda x.\mu_{CARD}(x) \in [200 + 1.5 \times 10, 200 + 3.5 \times 10]$

≡ $\lambda x.\mu_{CARD}(x) \in [215, 235]$

We see that this proposed formulation gives us multiple advantages. First, while the hypotheses in section 4 result in surface forms of well-formed ANPs largely

congruent to the statistical generalizations described in (2), the entire additive and multiplicative structure of Mandarin Chinese numerals is preserved, with each semantic argument having constituency and well-defined denotations. The resulting denotation is also extendable to other approximative numerals.

8. Limitations

As an attempt to characterize the grammar of ANPs in Mandarin, this analysis still has a few limitations and some data that it could not account for. The most present among them being the assumption of the range R_{cp}, as we are still left with the question of whether this is a suitable and justifiable approximation range of ANPs. The current assumption is made as a special case of the granularity and Ruler Model proposed by Solt (2018); in Solt (2018), it is proposed that a granular unit is chosen for a given number, and the approximation range would be consisting of any number that is closer to the given number than other alternative numbers with the same granularity as explained in (4). However, Solt's proposal is based upon the fact that the approximation is done on the entire numeral instead of only on the simple numeral multipliers. As such, the granular units are chosen differently depending on the number itself. In this paper, I proposed that the scope of approximation is only on the concatenated pair, and hence the granularity is always chosen to be 1 due to the pair consisting of integers 1-9. An arithmetic calculation would yield that the range $R_{cp} = [-\frac{1}{2}, 1\frac{1}{2}]$ would give us the set of numbers closest to n and n + 1 than any other alternatives in the set of integers.

However, this range faces some empirical challenges. For one, the R_{cp} presented here is a very clear-cut closed interval, whereas we do not empirically have a precise judgment that e.g. it is definitely false to say 'there are twenty or thirty people' when there are 14, but it is definitely true when there are 15. This judgment also heavily depends on the specific contexts that subject different tolerances to imprecisions.

As such, an alternative theory is the Pragmatic Halo by Lasersohn (1999). This theory proposes that a halo of a numeral would be the set of values that are not meaningfully different from the value itself under a given context. Under this theory,

we could make our R_{cp} be the set theoretic union of the halo of the two numbers n and n + 1 under the given context, as Lasersohn proposed that halos of complex expressions are derived compositionally from the halos of their constituents. As halos are pragmatic, they do not alter the truth value of the propositions, but a proposition could be considered felicitous if some element in its halo is true, even if the proposition itself is not.

Nonetheless, as Solt (2018) pointed out, this theory commits us to analyzing a large proportion of what speakers say using numerical expressions as strictly false. Solt used the example of "probably no rope in the world is 50 meters long without a deviation of even a few millimeters," showing that the Pragmatic Halo theory forces us to make the claim that most statements we consider felicitous are logically false, which is a big philosophical commitment. Hence, which theory of imprecision could be implemented to describe R_{cp} might still be worth some further investigations.

In addition, this paper focused on the case where numerals are quantifiers over degrees taking the "exactly" reading (type $\langle dt, t\rangle$). This denotation is formalized in (20a). However, as the paper by Solt (2018) pointed out in the footnote, numerals could also take a lower-bounded "at least" reading via a generally applicable type shift illustrated in (20b) formalized as in Bylinina and Nouwen (2020).

(20) a. $[\![twelve]\!] = \lambda P.\ \max(P) = \{12\}$ (type $\langle dt, t\rangle$)

Twelve denotes a set of degree properties, namely those properties whose maximal value is 12.

b. IOTA(BE($[\![twelve]\!]$)) = 12 (type d)

Denotes the number in the set of degrees that each interval in $[\![twelve]\!]$ shares.

Numerals systematically get both readings described above. This could be seen through the example discourse in (21):

(21) Bylinina and Nouwen (2020, extracted from examples (30) and (31)):

Q: Did John take ten biscuits?

A_1: Yes, he took eleven.

A_2: No, he took eleven.

We could observe that A_1 in (21) takes the *at least* meaning of the number, whereas A_2 takes the *exact* reading, both of which are felicitous. The question becomes, thus, whether the two readings could persist if we replace the numerals with ANPs. In particular, whether there exists a contrast between the available readings of precise numerals and that of ANPs in Mandarin Chinese discourses is yet to be discussed.

9. Other observations and future directions

From investigating ANPs, some other observations are made along the way. One future path of exploration would be how ANPs or approximative expressions in general play out in non-decimal languages. By the proposed analysis, the approximation only scopes over the simple numerals that could then be combined with bases. Hence, it would be interesting to see if non-decimal (i.e. non-base-10) languages also exhibit the same patterns such that the ANPs would mathematically still have multiples-of-bases differences between them. One non-base-10 language that has a very similar numeral generation mechanism with Mandarin is Iñupiaq, an Inuit language with a base-20 number system (MacLean, 2014), where the number 380 is constructed as *akimiakipiaq sisamakipiaq* '15×20 + 4×20'. There also exist base-32 and base-60 languages (Comrie, 2021). Investigations of ANPs in these languages would require more data.

10. Conclusions

In this paper, I explored approximations as effects on numerals in Mandarin Chinese through the syntax and semantics of ANP expressions. Through looking at the features of ANPs, the constituency and structure of well-formed ANPs and the semantics of them, I presented an analysis on the grammar of ANPs that is generalizable to other approximative numeral expressions. Prior to this paper, existing studies are restricted to corpus studies of select European languages and general mathematical characterizations of the choice of numbers used in ANPs, but I observe that the construction and meaning of ANPs in Mandarin have deep roots in grammar and are not entirely mathematical.

Empirically, this paper records the observation and categorization that numerals in Chinese are generated additively and multiplicatively in general, with clear categorical differences between **multipliers** and **multiplicands**. I also observed that ANPs in Mandarin are formed by replacing the **multiplier** in the final summand of the numeral with a **concatenated pair** of form $(n, n + 1)$ for some simple digit n, which is crucial for making the theory extendable to other approximative numeral expressions.

Analytically, I conjecture in this paper that ANPs are **not disjunctions**, unlike formerly hypothesized, and that the concatenated pairs in them are underlyingly an inseparable syntactic constituent. I hypothesize that the source of range approximation in Mandarin ANPs is concatenated pairs, and that there is only one kind of range R_{cp} specific to ANPs, but it could be translated and/or magnified in the surface form through the additive-multiplicative generation process of numerals. Finally, I note that the analyses across different approximating expressions in Mandarin Chinese should mostly only differ in the range R, which is specific to the kind of expression and not to the numbers. Upon these hypotheses, I claim that approximative numeral expressions are numerals **affected** by the approximation operation, as their approximative meanings and well-formedness are, in fact, independent of the specific numbers chosen.

This study still has a few limitations regarding the choice of the range of approximation, the exhaustivity of numbers and cross-linguistic generalizability.

Future research could be conducted on these issues, in addition to investigating whether the proposed analyses are applicable to non-base-10 languages.

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Realis as a Strong Assertion:

Exploring *yǒu* as a Realis Marker in Taiwan Mandarin through Communicative Epistemic Modality

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This paper proposes that *yǒu* in the *yǒu* + VP construction functions as a realis marker, grounded in the framework of communicative epistemic modality. Recognizing *yǒu* as a device for realis assertions clarifies its diverse usage in Taiwan Mandarin, where *yǒu* is used to strongly assert propositions as true based on speaker's communicative goals and subjective certainty rather than real-world occurrences. This perspective challenges the previously identified collocational restrictions of the *yǒu* + VP construction, demonstrating its compatibility with future settings, the perfective marker le_1, the sentence-final particle le_2, and the imperfective marker *zhe*. However, the *yǒu* + VP construction does not uniformly appear in all future contexts, indicating that its role as a realis marker is recent and evolving.

0. Introduction

In Modern Mandarin, *yǒu* is a verb that indicates possession or existence and typically takes noun phrases (NP) as objects (Chao 1968, Zhu 1982). *Yǒu* preceding a verb phrase (VP) was once seen only in southern Chinese varieties such as Cantonese, Chaozhou, and Southern Min (Li & Thompson 1981, Shi 1996, Tan 2012). However, it now occurs extensively in Modern Mandarin (Fu 2007, Sun 2003, Tan 2012). Scholars agree that Taiwan Mandarin borrowed this usage from Taiwan

Southern Min, also known as Taiwanese, through long-term contact and spread it to Mainland China via Taiwan's popular culture (Fu 2007, Sun 2003, Yang & Dong 2003). In *yǒu* +VP construction, *yǒu* indicates the speaker's confirmative attitude and certainty about the event (Cheng 1985, Fu 2007, Sun 2003, Tan 2012, Tsai 2002, Tsao & Cheng 1995).

Previous studies primarily focused on the semantics and syntax of the *yǒu* + VP construction, identifying three main usage restrictions. First, the *yǒu* + VP construction cannot be used in future contexts, as the VP event must have already occurred before speech time (Chao 2001, Liu 2011, Tsai 2011). Second, it rarely co-occurs with the verb-final perfective marker le_1 or the sentence-final particle le_2, later referred to as CRS[102] le_2 (Chao 1968, Tan 2012, Tsai 2011, Wang 2012). Third, *yǒu* + VP is incompatible with the imperfective aspect marker *zhe* due to a semantic contradiction (Tsai 2011).

However, recent research (Collart 2018) and data from this paper[103] suggest a decline in these restrictions.

Drawing on Givón's (1995) framework of communicative epistemic modality, this paper argues that yǒu functions as a realis marker, allowing speakers to strongly assert a proposition as true. The distinction between realis and irrealis no longer solely depends on the event's actual occurrence in the real world but rather on the speaker's belief in the situation's likelihood and their intention to convey certainty to their interlocutors. Thus, the *yǒu* + VP construction can be employed in future contexts and is compatible with all aspect markers, which are also used in realis assertions in Modern Mandarin (Sun 2022).

The structure of this paper is as follows: Section 1 introduces the languages discussed: Taiwan Mandarin, Putonghua, Southern Min, and Taiwan Southern Min. Section 2 reviews previous research on the collocational restrictions of the *yǒu* + VP construction and realis modality marking in Taiwan Southern Min. Section 3 outlines the data, theoretical framework, and proposed hypothesis. Section 4 presents data analysis demonstrating how *yǒu* functions as a realis marker in the *yǒu* + VP

[102] CRS stands for "currently relevant state," as defined by Li and Thompson (1981).
[103] Details of data source are provided in Section 2.

construction, challenging the three previously claimed usage restrictions. Section 5 discusses limitations. Section 6 concludes the paper.

1. Language

Four languages mentioned in this paper: Taiwan Mandarin, Putonghua, Taiwan Southern Min, and Southern Min. In this section, a brief introduction is provided to clarify their relationships.

Taiwan Mandarin, the focus of this paper, is the lingua franca spoken in Taiwan (Her 2010). Both Taiwan Mandarin and Putonghua, the official language of the People's Republic of China, are based on the Beijing dialect's pronunciation (Li & Thompson 1981). Due to interaction with Taiwan Southern Min and separation from Putonghua, Taiwan Mandarin has developed distinct phonology, lexicon, and syntax while remaining mutually intelligible with Putonghua (Her 2010).

Southern Min, the largest branch of Min Chinese, is mainly spoken in southeastern China. Introduced to Taiwan by early immigrants from Mainland China during the 16th century, it gave rise to Taiwan Southern Min. Despite some differences in pronunciation and lexicon, Taiwan Southern Min and Southern Min share significant similarities (Yang 2007).

Taiwan Southern Min is not mutually intelligible with Taiwan Mandarin. Initially lacking an independent writing system, it relied on Chinese characters (Chang 2015). Before the 1956 Mandarin promotion campaign by the Kuomintang, Taiwan Southern Min was the mother tongue for over 80% of the population (Cheng 1985, Her 2010). It significantly influenced Taiwan Mandarin through language contact, as seen in the *yǒu* + VP construction in Taiwan Mandarin, shaped by the *ū* + VP construction in Taiwan Southern Min (Yang 2007). Mandarin *yǒu* and Taiwan Southern Min *ū* are semantic equivalents, both written as 有.

2. Literature review

This section examines the three most discussed collocational restrictions of the *yǒu* + VP construction in Taiwan Mandarin and Putonghua, along with their explanations in Section 2.1. Section 2.2 then reviews how *ū* is linked to realis modality marking in Taiwan Southern Min.

2.1 The collocational restrictions of *yǒu*

The three most discussed collocational restrictions of the *yǒu* + VP construction in Taiwan Mandarin and Putonghua are: (1) limited to past and present settings, (2) rare co-occurrences with the perfective marker le_1 and CRS le_2, and (3) incompatibility with the imperfective marker *zhe*.

RESTRICTION 1: LIMITED TO PAST AND PRESENT SETTINGS

It is widely held that in Taiwan Mandarin, the *yǒu* + VP construction cannot be employed in future contexts (Chao 2001, Liu 2011, Shi & Li 2001, Tsai 2002, Tsai 2011, Wei 1995). Even in Taiwan Southern Min, considered origin of the *yǒu* + VP construction, the *ū* + VP construction is similarly believed to be unsuitable for expressing future events. Tsao and Cheng (1995) argue that it is logically impossible to confirm events in the future, as they have not yet occurred, and events that have occurred are typically completed actions in the past. Therefore, the *ū* + VP construction is predominantly used in past settings. In Tsao (1998), it is emphasized that the *ū* + VP construction cannot occur in future settings unless it is part of conditional sentences.

In Taiwan Mandarin, Tsai (2002) claims that *yǒu* denotes a terminated or completed event, while Wei (1995) asserts that *yǒu* is an existential marker indicating an action or event that has occurred in the past. Liu (2011) considers *yǒu* in Taiwan Mandarin to be a realis marker, indicating an event or state perceived as actually occurring or having occurred. Despite these varied explanations, the studies agree that the *yǒu/ū* + VP construction cannot appear in future settings.

However, this claim does not hold when examining empirical data. For instance, in example (1), a reporter's Instagram post, it states that she will be working the next day, even though it is a Saturday, and invites readers to message her for a chat. Apparently, the event *shàngbān* 'to work' has not occurred yet.

(1) Instagram (11.18.2022)[104]

míngtiān wǒ **yǒu** shàngbān

tomorrow 1SG[105] **yǒu** work

'I (will) go to work tomorrow.'

huānyíng sī xùn wǒ liáoliáo xiǎo gùshì

welcome privately text 1SG talk small story

'Welcome to message me to chat about stor(ies).'

It is noteworthy that how (1) challenges the perspective of *yǒu* as a realis marker, as proposed by Liu (2011). According to the traditional understanding of realis modality, the distinction between realis and irrealis relies on events being 'real' or 'unreal.' Thus, the event in (1) should be classified as irrealis, prohibiting their co-occurrence with *yǒu*.

In response, Collart (2018) questions the validity of realis and proposes that *yǒu* functions as a factual marker, meaning that "the situation asserted by *yǒu* is presupposed as being true by the speaker". Following Gosselin's (2005) definition of prospective futurity, Collart (2018) claims that for a planned situation, the beginning boundary of the situation time is linked to the end boundary of speech time. Due to the proximity of the two boundaries, the situation belongs in part to a factual assertion. That is, for a planned event, beyond being merely imagined, the situation can be considered factual, rendering it entirely compatible with the auxiliary *yǒu*. In example (2), Collart argues that recording a TV program involves an agreement between two parties, categorizing it as a planned event rather than a mere imagined

[104] Source: https://www.instagram.com/p/ClGY8K6juhb/. All examples reference the data sources. 'Attested' is used for instances observed in natural interactions.
[105] Abbreviations: 1, 2, 3 person; IMP imperfective marker; NEG negation; NOM nominalizer; PFV perfective aspect marker; Q question marker; SG singular

one. Therefore, the situation can be viewed as factual, and the auxiliary *yǒu* is completely compatible with this interpretation.

(2) Adopted from Collart (2018)

yìrén míngtiān **yǒu** lù jiēmù

artist tomorrow **yǒu** record TV program

'The artist (will) record a TV program tomorrow.'

However, this argument regarding "planned event" lacks a clear definition. If *lù jiēmù* 'to record a TV program' in (2) is considered a planned event, what basis is there to assert that *xǐ yīfú* 'to wash clothes' in (3) is not? Planning can be an individual's independent action and does not necessarily require collaboration. One may plan to do the laundry tomorrow independently. Thus, *xǐ yīfú* 'to wash clothes' in (3) should also be a planned event and viewed as factual. However, (3) is considered unacceptable by Collart (2018). Hence, whether the event is planned or not should not determine the occurrence of *yǒu* in a future setting, making the categorization of *yǒu* as a factual marker problematic.

(3) Adopted from Collart (2018)

*míngtiān tā **yǒu** xǐ yīfú

tomorrow 3SG **yǒu** wash clothes

'*He wash (the) clothes tomorrow.'

RESTRICTION 2: RARE COOCCURRENCES WITH THE PERFECTIVE MARKER *le*$_1$ AND CRS *le*$_2$

The second restriction on the *yǒu* + VP construction is its limited, or infrequent, usage in combination with the perfective marker *le*$_1$ or the CRS *le*$_2$, as noted by Wang (2012), Chao (1968), Tan (2012), and Tsai (2011).

To address this restriction, Wang (2012) proposes that in Putonghua, the co-occurrence of a VP with *le*$_1$ or *le*$_2$ serves a declarative function, describing a change in state or action. In contrast, a sentence employing the *yǒu* + VP construction carries a quasi-judgmental nature, requiring an assessment of whether the action or situation has occurred. Consequently, the use of the *yǒu* + VP construction alongside *le*$_1$ or *le*$_2$ violates a cooperative principle. The ambiguity regarding whether the sentence is descriptive or judgmental violates the Maxim of Manner (clarity) in Gricean maxims (Grice, 1975). Wang (2012) supports this argument with examples (4) and (5), contending that *yǒu* + VP construction contradicts pragmatically with *le*$_1$ and *le*$_2$, rendering it unacceptable.

(4) Perfective aspect marker *le*$_1$

a. Zhāngsān mǎi le$_1$ shuǐguǒ

Zhāngsān buy PFV fruit

‘Zhāngsān bought (the) fruit.’

b. *Zhāngsān **yǒu** mǎi le$_1$ shuǐguǒ

(5) Sentence-final particle CRS *le*$_2$

a. Lǐsì qù Běijīng le$_2$

Lǐsìgo Běijīng CRS

‘Lǐsì went to Běijīng.’

b. *Lǐsì **yǒu** qù Běijīng le$_2$

In Taiwan Mandarin, the co-occurrence of *yǒu* and l *le*$_1$ is infrequent. Tsai (2011) and Tan (2012) attribute this to their overlapping functions, as both convey the perfective meaning, making their combination redundant. Tan (2012) claims that *yǒu* initially expressed the existence of a person, thing, or situation and later expanded to indicate a resulting state or the completion of an action. However, its core meaning still revolves around existence, and its perfective aspect function has gradually returned to *le*$_1$. The relatively low frequency of the *yǒu* + VP + *le* construction compared to the *yǒu* + VP construction results from the incomplete grammatical differentiation between *yǒu* and *le* in Taiwan Mandarin.

Nonetheless, based on my intuition and experience as a native Taiwan Mandarin speaker, sentences (4b) and (5b) are not only acceptable but also sound natural without any sense of redundancy. This may suggest that the previous restrictions on the cooccurrences of *yǒu* + VP construction with *le*$_1$ and *le*$_2$ are disappearing in Taiwan Mandarin. More supporting and corroborative evidence is elaborated upon in Section 4.

RESTRICTION 3: INCOMPATIBILITY WITH THE IMPERFECTIVE MARKER *zhe*

Tsai (2011) claims that in Taiwan Mandarin, the absence of co-occurrence between the *yǒu* + VP construction and *zhe* is due to potential ambiguity. The *yǒu* + VP construction may suggest an 'interruptible continuous' state or habitual behavior, while *zhe* marks an ongoing process. Their simultaneous use creates ambiguity, making it unclear whether the sentence denotes an ongoing action or habitual behavior. In Putonghua, Wang (2012) suggests that durative markers in Min, Yue, and Hakka dialects, differing from *zhe* in form and origin, contribute to the current unlikelihood of integrating *yǒu* + VP with *zhe* into Mandarin. However, data such as (6) reveal instances where *yǒu* + VP does grammatically coexist with *zhe*.

Example (6) is a post on PTT, Taiwan's largest terminal-based bulletin board system. In the post, a user asks if anyone else has the habit of wearing a watch. Another user responds, stating that she habitually wears a watch, except while showering and sleeping, using *yǒu* to express certainty about the continuous state

of “wearing a watch.” Thus, the contention that *yǒu* is incompatible with *zhe* no longer holds true.

(6) PTT (12.16.2015)[106]

xiánliáo : yǒu dài biǎo de xíguàn ma???? ‘Gossip: Have the habit of wearing a watch? ’

sandy8123:	xǐzǎo	shuìjué	bù	dài	qíyú	dū	yǒu	dài	zhe
	shower	sleep	not	wear	the.rest.of	all	yǒu	wear	IMP

‘(I do) not wear (a watch when) showering and sleeping. (In) the rest of (the time), (I am) always wearing (it)’

To sum up, the restrictions on the occurrence of the *yǒu* + VP construction identified in previous studies (Chao 1968, Chao 2001, Liu 2011, Shi & Li 2001, Tan 2012, Tsai 2002, Tsai 2011, Wang 2012, Wei 1995) are challenged by the current data, suggesting a potential shift in its usage that may defy previous constraints. Therefore, a more nuanced and extensive analysis is necessary to explain the increasing prevalence of the *yǒu* + VP construction in Taiwan Mandarin.

2.2 *ū* as a realis marker in Southern Min and Taiwan Southern Min

This paper proposes to analyze *yǒu* as a realis marker echoing previous research on *ū*. Whether explicitly termed as a realis marker or not, *ū* is widely recognized for indicating the existence of events or situations in the real world (Cheng 1985, Li 1986, Lien 2015, Tsao 1998). In Cheng (1985), it is proposed that in Taiwan Southern Min, *ū* can be optionally used to mark realis modality, serving as an emphatic confirmation of an event’s existence or its occurrence in the past or

[106] Source: https://www.pttweb.cc/bbs/WomenTalk/M.1450258702.A.249

present. Li (1986), while not using the term 'realis', argues that *ū* and its negative counterpart *bô* in Southern Min confirm or negate the occurrence of an action or quality, irrespective of when it happened or whether it was completed.

Tsao (1998) further contends that in Taiwan Southern Min, *ū* expresses the speaker's observation of a present situation or a past state or event from a present perspective, establishing a 'realis' context. The presence of *ū* indicates that the situation was indeed realized or occurred. To indicate future events or actions, *ū* can only be used in conditional clauses. This idea is supported with example (7) where *nā* 'if' forms a conditional clause, allowing *ū* to cooccur with the future time expression *bînátsà* 'tomorrow morning'.

(7) Adopted from Tsao (1998)

i	bînátsà	nā	**ū**	lâi…
3SG	tomorrow.morning	if	ū	come

'If he/she comes tomorrow morning…'.

Similarly, Shi (1996) asserts that in Southern Min, the function of *ū* is to confirm the objective reality of the situation described by the following predicate. Specifically, the meaning of *ū* is 'to confirm the existence of a situation', which means confirming that such a thing exists. He points out although the events expressed by *ū* +VP are often assumed to have already occurred; they do not exclude the possibility of them happening in the future. However, the examples he gives are all conditional sentences, which are consistent with Tsao (1998) that *ū* can only appear in conditional clauses to indicate future events or actions. In Lien (2015), *ū* in *ū* +VP construction is also considered expressing the speaker's epistemological stand and indicating existence or realization of a certain event. Overall, scholars generally agree that regardless of treatments of *ū* as a realis marker or not, it functions to indicate the existence of a state, an action, or an event in the real world.

It is noteworthy that habitual actions, although they do not refer to any specific event occurring at a particular time, are also marked by *ū* (Cheng 1985, Lien 2015, Shi 1996, Tsao 1998). As illustrated in (8a) and (8b), *ū* is used to question and confirm whether the interlocutor habitually eats beef or not (Cheng 1985, Tsao 1998). In (8c), *bô*, the negative counterpart of *ū*, is used to negate the existence of the smoking habit. Given that *ū* is considered a realis marker, it is evident that habitual actions are categorized as realis events in Southern Min.

(8) a. Adopted from Cheng (1985)

lí **ū** tsia̍h gûbah bô

2SG**ū** eat beef ū.NEG

'Do you eat beef?'

b. Adopted from Tsao (1998)

i **ū** tsia̍h gûbah

3SG**ū** eat beef

'He/she eat(s) beef.'

c. Adopted from Lien (2015)

i **bô** tsia̍h hun

3SG**NEG** eat cigarette

'He/she (does) not smoke.'

3. Data and methodology

To better elucidate the contemporary usage of the *yǒu* + VP construction, this study collects specific data from various sources, ensuring that the credibility of the findings pertains to real-world usage. Section 3.1 provides an overview of the

sources of the collected data, while Section 3.2 discusses the theoretical framework and elaborates on the hypothesis proposed in this paper.

3.1 Data

The primary source of data for this paper is the PTT Bulletin Board System, the largest terminal-based bulletin board system (BBS) in Taiwan. The PTT platform has become a vibrant forum for in-depth discussions on a wide range of topics, often leading to heated debates with significant social repercussions. Its growing influence has prompted mainstream media outlets, such as newspapers and television networks, to report on the BBS and deploy journalists to monitor it for the latest developments in public opinion.

In addition to PTT, this research integrates data from various social media platforms, including Facebook and Instagram, as well as newsletters. It also incorporates direct attestations from daily conversations with native Taiwan Mandarin speakers. Moreover, this paper utilizes the National Chengchi University (NCCU) Corpus of Spoken Taiwan Mandarin (http://spokentaiwanmandarin.nccu.edu.tw/), a collection of daily face-to-face casual Mandarin conversations among family members, friends, and colleagues in Taiwan since 2006. Participants engaged in hour-long conversations on topics of mutual interest, recorded by a visible camera. Selected segments, lasting 20 to 40 minutes, feature participants speaking at ease.

However, it is noteworthy that although 50 conversational excerpts are available on the NCCU website, there is an apparent lack of supporting instances for the three diminishing collocational restrictions of the *yǒu* + VP construction. Further discussion on this topic is continued in Section 5.

3.2 Methodology

To define *yǒu* in the *yǒu* + VP construction in Taiwan Mandarin as a realis marker, it is crucial to note that the concept of realis extends beyond traditional understandings tied to occurrences in the real world. Instead, it aligns with the communicative redefinition of epistemic modality proposed by Givón (1995), signifying a strong assertion that asserts what the speaker believes to be true.

GIVÓN (1995) COMMUNICATIVE EPISTEMIC MODALITY

Givón (1995:114) reinterprets the four traditional epistemic modalities—necessary truth, factual truth, possible truth, and non-truth—in light of pragmatic theories of language use. He delineates four communicative epistemic modalities as follows:

Traditional epistemic modalities	Communicative modalities
necessary truth	presupposition
factual truth	realis assertion
possible truth	irrealis assertion
non-truth	negation-assertion

Givón (1995) contends that epistemics is not fundamentally about truth or certainty but about willful human interaction. In communicative epistemic modality, critical considerations include factors relevant to the hearer, such as potential challenges, supporting evidence, power dynamics, and control and authority. Within this framework, the first modality involves presupposition, where the proposition is assumed true by definition, prior agreement, cultural convention, obviousness, or being unchallenged by the hearer after the speaker's utterance. The second modality, realis assertion, strongly asserts the proposition as true. Challenges from the hearer are appropriate, but the speaker has evidence or other grounds to defend their strong belief.

In contrast, the third modality, irrealis assertion, weakly asserts the possibility, likelihood, or uncertainty of a proposition, or its necessity, desirability, or undesirability. The speaker is not ready to support the assertion with evidence or strong grounds, and challenges from the hearer are readily entertained, expected, or solicited. The fourth modality, NEG-assertion, strongly asserts the falsity of a proposition, usually contradicting the hearer's explicit or assumed beliefs. The

speaker anticipates challenges and has evidence or other grounds to back up their strong belief (Givón 1995).

By proposing *yǒu* as a realis marker, this paper addresses the limitations of prior research, such as Liu (2011), where realis is defined as states or events occurring in the real world, which fails to explain the use of *yǒu* in future contexts where the event has not yet occurred. Loosening the ties between realis and real-world occurrences also avoids the debatable definition of 'planned events' advocated by Collart (2018). From the perspective of communicative epistemic modality, an event yet to happen can be marked as real not because it is planned, but rather due to the speaker's unwavering confidence in its occurrence.

THE VALIDITY OF REALIS MODALITY

In Collart's (2018) critique of Liu's (2012) assertion regarding *yǒu* as a realis marker, a primary concern arises regarding the validity of realis, given that what is encoded as realis in one language may be perceived as irrealis in another language. Nonetheless, Givón's earlier work (1995) had shed light on this issue by highlighting that the distribution of realis/irrealis modal categories is largely predictable across languages. Despite variations in the marking of realis/irrealis among different languages, a noteworthy correlation exists between tense-aspect and modality. Givón (1995:116) summarizes these correlations as follows:

Correlations between tense- aspect and modality

a. Past/perfective → realis (or presupposition)
b. Perfect → realis (or presupposition)
c. Present-progressive → realis
d. Future → irrealis
e. Habitual → irrealis or realis

As evidenced in the summary, the most inconsistent marking of realis/irrealis modality lies within the habitual category, as it may be grouped with either realis or irrealis. Givón (1995:166) elucidates that the status of the habitual, "a swinging model category par excellence" as he named it, is inherently murky for valid reasons. From a communicative perspective, habitual-marked clauses often carry strong assertions, resembling realis pragmatically. However, semantically speaking, habitual clauses bear resemblance to irrealis, as they do not refer to any specific event occurring at a particular time. Additionally, the reference properties of NPs under the scope of habitual resemble those of NPs under the scope of irrealis. NPs within habitual-marked assertions may be non-referring, akin to the reference properties of NPs within irrealis assertions, where reference is also non-referring. Given the mixed functional properties of the habitual, it is unsurprising that some languages group it with realis and others with irrealis. When a functional category is complex, involving both semantic and pragmatic features, languages may categorize it based on semantics in some cases and on pragmatic features in others (Givón 1995:167).

Aligned with (Givón 1995), Sun (2022) identifies that in Putonghua, realis assertions are coded by the four aspect particles: the preverbal progressive *zài*, the suffixal imperfective *zhe*, perfective *le*$_1$ and experiential *guò*. The negator for realis assertions is unambiguously *měi(yǒu)*. On the other hand, irrealis assertions, which encompass hypothetical, intentional, and projected future declaratives, are typically unmarked or marked by modal auxiliaries such as *kéyǐ* 'may'and *yīnggāi* 'should'. The negator for irrealis assertions is consistently *bù*. Additionally, certain verbs such as *shì* 'to be', *suànshì* 'be considered', *juéde* 'to feel', *yǐwéi* 'to think (mistakenly)', are lexically presupposed to be true and cannot cooccur with any aspect particle; they can only be negated by *bù*. Moreover, habitual behaviors in Putonghua are classified as irrealis assertions, and their negator is also *bù*.

Similar to Putonghua, habitual actions in standard Taiwan Mandarin are also treated as irrealis assertions, being unmarked and negatable by the irrealis negator *bù*. In standard Taiwan Mandarin, the habitual assertion *wǒ chī niúròu* 'I eat beef' is unmarked in (9a), and to negate it, the irrealis negator *bù* is used, as shown in (9b). Conversely, as recalled in Section 2.2, Southern Min and Taiwan Southern Min categorize habitual actions as realis assertions, presenting a clear departure from

the categorization in Putonghua and standard Taiwan Mandarin, where habitual actions are considered irrealis.

However, with the incorporation of the *ū* + VP construction in standard Taiwan Mandarin, habitual actions can now also be marked as realis, mirroring the usage in Taiwan Southern Min. In (9c), the habitual action 'I eat beef' is marked by *yǒu*, transforming it into a realis assertion. To negate it in (9d), the realis negator *měi(yǒu)* is employed. The adoption of the *ū* + VP construction from Taiwan Southern Min does not eliminate the original usage of employing an unmarked form to express habitual actions. Examples (9a) and (9c) are both acceptable in Taiwan Mandarin, conveying the same proposition—that the speaker habitually eats beef. However, since (9a) is presented as a weak irrealis assertion, and (9c) as a strong realis assertion, they carry distinct pragmatic nuances.

For example, in a scenario where the speaker is consuming beef at a party and someone questions, 'I thought you do not eat beef,' the speaker's response, aimed at dispelling doubts, is more likely to be (9c) rather than (9a). As highlighted in Shi (1996), there is no direct equivalent for the *ū* + VP construction in Putonghua. Consequently, speakers of dialects such as Min and Cantonese often incorporate *yǒu* when speaking Putonghua to convey their intended meaning more thoroughly. The co-existence of (9a) and (9c) in Taiwan Mandarin underscores the importance of interaction in discussions of epistemic modality. Depending on speakers' communicative goals, they can choose to state habits as either irrealis or realis events.

(9) Attested data (2023)

a. wǒ chī niúròu[107]

1SG eat beef

'I eat beef.'

b. wǒ **bù** chī niúròu

1SG **NEG** eat beef

'I (do) not eat beef.'

c. wǒ **yǒu** chī niúròu

1SG **yǒu** eat beef

'I eat beef.'

d. wǒ **měi(yǒu)** chī niúròu

1SG **NEG** eat beef

'I (do) not eat beef.'

4. Data analysis

This section incorporates supplementary data to substantiate the hypothesis regarding *yǒu* as a realis marker in Taiwan Mandarin and its enhanced explanatory power concerning the three diminishing restrictions of *yǒu*, namely its limitation to past and present settings, its rare co-occurrence with the perfective marker le_1 and CRS le_2, and its incompatibility with the imperfective marker *zhe*.

First, example (10), an excerpt from a sport newspaper, provides supporting evidence that the *yǒu* + VP construction can be used in future settings and is not

[107] (9a) has another irrealis interpretation as 'I will eat beef', and (9d) has another realis interpretation as 'I (did) not eat beef'. Since these interpretations are beyond the scope of the current discussion, they are not included in the translation provided in (9).

limited to conditional clauses. In (10), the contestant tells the reporter that his middle school-attending nephew will be participating in the triathlon event the following day. In line 03, he uses *yǒu* to strongly assert the event regarding his nephew's future involvement in the triathlon to be true. In this context, the speaker uses *yǒu* as a realis marker based on his belief rather than objective reality.

(10) Don 1 don sports news (04.13.2021)[108]

01 běn cì sàishì chú le Xǔ Rénmào zìjǐ,

'In this competition, in addition to Hsu Jen-mao himself,'

02 tā de xiǎopéngyǒu yě yǒu cānjiā bǐsài,

'his children (will) also participate in the race.'

03 "guózhōng de zhízi míngtiān **yǒu** cānjiā biāotiě

middle.school NOM nephew tomorrow **yǒu** participate triathlon

'My middle school nephew (will) participate in the triathlon tomorrow,'

04 zìjǐ xiǎohái yě cānjiā mínǐ tiěrén,

'my own child (will) also participate in the mini triathlon.'

05 ràng tāmen qù wán yī wán,

'Let them have some fun,'

06 bùrán dōu kàn bàba bǐsài"

'otherwise, they (will) just be watching Dad (, me,) compete.'

Second, example (11) and (12) illustrate how the *yǒu* + VP construction collocates with the perfective marker *le*$_1$ and CRS *le*$_2$. In (11), the BBS user responds

[108] Source: https://www.don1don.com/archives/150014/150014

to an author by stating that the most poorly written article he has ever seen is one in which the author uses the character *hōng*, an onomatopoeia for loud sounds like thunders and bomb explosions, on a page filled with battle scenes. In line 02, *yǒu* is employed to strongly assert the event (namely, using the onomatopoeia *hōng* throughout the entire page) as true, representing a realis event. Meanwhile, the perfective aspect marker le_1 is used to signify the completion of the action *xiě* 'to write.' Since both *yǒu* and le_1 are used to mark realis modality, their co-occurrence is expected not to cause any grammatical conflicts.

(11) PTT (01.22.2022)[109]

xiánliáo : dàjiā jìdé zuì shuǐ de zhāngjiē shì?

'Gossip: The most poor-content paragraph you remember is?'

01 liajtm1030: mǒugè shùzì kāitóu de zuòjiā

some number begin NOM writer

'Some writer (whose pseudonym) begin(s) (with a) number'

02 **yǒu** xiě **le** yī zhěng yè de hōng miáoshù zhàndǒu

yǒu write **PFV** one whole page NOM hōng describe battle

'has written a whole page of 'hōng' to describe battles'

In example (12), the three participants, M, F1, and F2, are chatting about F2's hosting experience. In line 155, F2 uses *yǒu* to strongly assert the action, *yǒu chuān ānquánkù* le_2 'wear safety shorts,' as true. The CRS marker le_2 indicates that the state of wearing safety shorts is relevant to the current situation, contrasting with what F1 assumed.

To sum up, example (11) and (12) indicate that the second restriction: "Rare co-occurrence with the perfective marker le_1 and CRS le_2," may no longer hold true.

[109] Source: https://ptthito.com/cfantasy/m-1642802693-a-430/

Viewing *yǒu* as a realis marker explains their co-occurrence since sentences with the perfective marker le_1 or CRS le_2 are also in realis mode.

(12) NCCU-TM049-CN-MFF

152 M: ..nà nǐ gānmá chuān qúnzǐ

that you why wear skirt

'Then why (did) you wear a skirt? '

153 F2: ..yīnwéi tā shuō wǒ nà tiān shì zhǔchírén yào chuān

because he say I that day COP host have.to wear

'Because he said I was the hostess that day (I) had to wear (it)'

154 F1: ..nà nǐ chuān ānquánkù

that you wear safty.shorts

'Then you wear safety shorts'

155 F2: ..wǒ **yǒu** chuān ānquán [[kù **le**]] dàn tā huán shì zhěnggè fēi

I **yǒu** wear safty.shorts **CRS** but it still COP whole fly

'I had worn safety shorts already but it still totally blew up'

As for the Restriction 3, which claims the 'Incompatibility with the imperfective marker *zhe*', it is also contested. In example (13), a discussion about the suitability of toddlers sliding down a slide on their stomachs, the poster expresses agreement and support for the author's perspective. In line 02, *yǒu* marks the event in realis modality, signifying the poster's strong belief regarding the ongoing state of the parents carefully watching their child. This example effectively

demonstrates that the *yǒu* + VP construction can indeed co-occur with the imperfective marker *zhe*.

(13) PTT (05.02.2021)[110]

bǎobao: pā zhe liū huátī ‘Baby: tummy down the slide?’

01 anniekinki : méi yǐngxiǎngdào biérén,

NEG affect other.people

‘(The author did) not hinder others’

02 jiācháng zìjǐ **yǒu** hǎohǎo kàn **zhe**,

Parent oneself **yǒu** properly watch **IMP**

‘(The) parent herself (keeps) watching (her child) carefully’

yǒu guānxì má?

exist matter Q

‘(Does) it matter?’

It's worth noting that, in contrast to the abundant data available on the internet, the entire NCCU corpus yielded no instances of the *yǒu* + VP construction with the perfective marker *le*$_1$, and only one instance each with the imperfective marker *zhe* and CRS *le*$_2$ (as shown in (12)). Since the NCCU corpus was compiled in 2006, this suggests that approximately 20 years ago, such co-occurrences were not widely used. However, evidence from BBS and internet media indicates that they are not rare now. This observation may suggest that the use of *yǒu* as a realis marker is a more recent development, still evolving over time.

5. Limitations of the study

[110] Source: https://ganfanren.tw/i/babymother~2WZM

Thus far, it has been demonstrated that all the three collocational restrictions of the *yǒu* + VP construction are no longer valid in contemporary Taiwan Mandarin. Viewing *yǒu* as a realis maker through communicative epistemic modality well explains why *yǒu* can appear in the environments that were believed to be incompatible, resulting in the diminishing of these restrictions.

However, as rightly observed by Collart (2018), not every future event can cooccur with the *yǒu* + VP construction. Data collected in this paper suggest that it tends to cooccur more frequently with certain actions, such as *shàngbān* 'to go to work; to be on duty' and *kāi* 'to be open for business', compared to others. Sentences like **wǒ míngtiān yǒu chī zhōngfàn* '*I (will) eat lunch tomorrow' or **wǒ míngtiān yǒu xǐzǎo* '*I (will) take a shower tomorrow' are not found in the collected data, and native Taiwan Mandarin speakers reported them as unacceptable despite these events being part of their daily routines and speakers having confidence in their occurrence.

One possible explanation is that these daily routines are considered regular behaviors that are commonly accepted as true. Consequently, there is no need for a strong assertion, as no listener would ever challenge their truthfulness. As a result, these events are disqualified from being used with the *yǒu* construction to form strong assertions. It is difficult to imagine a situation in which speakers would need to strongly assert to their interlocutors that certain daily routines will definitely be realized. To be more specific, people may need to claim their habits as realis to dispel doubts, to confirm with his interlocuter, but under what circumstances would a speaker need to strongly claim that he will surely eat lunch or take a shower tomorrow to dispel doubts? If such a need does not exist, it is natural that these cases would not be observed in the collected data.

Another possible explanation is that the use of *yǒu* as a marker of realis is a relatively new development and has not yet been widely applied in every situation. While the data collected in this paper indicate that the *yǒu* + VP construction can be used in future settings, most previous studies suggest that it can only be used in past or present contexts (Chao 2001, Liu 2011, Shi & Li 2001, Tsai 2002, Tsai 2011, Wei 1995). It is unlikely that previous scholars collectively ignored the evidence. Moreover, as mentioned in Section 4, the 2006 compiled NCCU corpus lack

instances of the co-occurrence of the *yǒu* + VP construction with *le*$_1$, *le*$_2$ and *zhe*. Therefore, it is reasonable to consider that the use of *yǒu* as a marker of realis has emerged more prominently in recent times and is still evolving.

In my previous research of the origin of the *ū* + VP construction in Southern Min (Tsai 2020), examining Early Southern Min data from 1566 to 1782 CE, only one instance of *ū* seems to resemble the confirmative use today. In the remaining instances of *ū* + VP construction, *ū* still functions as a verb denoting the existence of the described state, action, or event. There is no evidence indicate that *ū* conveys the speaker's subjective certainty. Therefore, it is concluded that the use of confirmative *ū* appears to be a recent development. If the confirmative use of *ū* was not established in the late 18th century, it is likely that the extended use of *ū* as a marker of realis was formed much later. Supposedly, as Tsao and Cheng (1995) point out, individuals can confirm events that have already taken place but cannot confirm events in the future, as they have not yet occurred. However, if *ū/ yǒu* is undergoing a gradual evolution from a verb to a realis marker, then it logically follows that it can gradually be employed in future settings now. Throughout this evolutionary process, it is understandable that individuals may not readily use *yǒu* in every future event, despite having strong confidence in the occurrence of the event.

In summary, while this study significantly contributes to our understanding of the evolving usage of the *yǒu* + VP construction, the limitations identified underscore the need for further research. Exploring the constraints on its applicability to future events and understanding the broader linguistic context will enhance the depth and comprehensiveness of future studies.

6. Conclusion

In conclusion, this study challenges existing perspectives in the literature and asserts the role of *yǒu* in the *yǒu* + VP construction as a realis marker. Grounded in Givón's (1995) redefined communicative epistemic modality, recognizing *yǒu* as a realis device for strong assertion offers a comprehensive explanation for its diverse usage in Taiwan Mandarin. Instead of solely relying on real-world occurrences, speakers use *yǒu* based on their subjective certainty and communicative goals,

strongly asserting the propositions to be true. This characteristic makes *yǒu* compatible with future settings and various aspect markers.

Nevertheless, the study also reveals that *yǒu* + VP construction does not uniformly appear in all future settings; rather, it tends to co-occur more frequently with specific verbs, such as *shàngbān* 'to go to work; to be on duty' and *kāi* 'to be open for business.' Furthermore, its infrequent co-occurrence with the perfective marker le_1, the CRS le_2, and the imperfective marker *zhe* in the NCCU corpus suggests that the utilization of *yǒu* as a realis marker may be a relatively recent phenomenon still undergoing changes and developments over time. These findings underscore the need for further research to delve into the evolving nature of *yǒu* as a realis marker. The exploration of its usage in diverse linguistic contexts and analysis of pragmatic functions across speech communities will contribute to a more comprehensive understanding of *yǒu*'s role in Mandarin Chinese.

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Linguistic and Social Aspects of Sibilant Palatalization in Homeland and Heritage Cantonese

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This paper investigates the linguistic and sociocultural factors that influence sibilant palatalization among Cantonese speakers from two different speech communities, namely Hong Kong (homeland) and Toronto (heritage). We analyzed naturalistic speech data of 36 speakers from the HLVC corpus, including homeland (Gen-0) speakers from Hong Kong, as well as first- (Gen-1) and second-generation (Gen-2) immigrants from Toronto. Our findings highlight that linguistic factors including vowel roundedness, vowel height, and sibilant type (fricative vs. affricate) significantly impact palatalization patterns. Generation emerged as an important sociocultural factor, with Gen-2 speakers producing a higher ratio of palatalization and widening its phonological context. Ethnic identity and language use are further found to influence palatalization patterns within the heritage community. Overall, there is evidence showing that the two speech communities are at different stages of the sound change, and that the contact with English might be contributing to such difference.

1. Introduction

One major question in variationist sociolinguistics is how sound change is conditioned by linguistic and socio-cultural factors. This paper contributes to this issue by a corpus-based study on an ongoing sound change process in two Cantonese speech communities. In particular, we investigate the variation of sibilant palatalization in Hong Kong (homeland) and Toronto (heritage) Cantonese, using data collected in a naturalistic setting in the Heritage Language Variation and Change (HLVC) corpus (Nagy 2011).

Present-day Cantonese is known to have only one set of phonemic sibilants /s,ts,tsʰ/ (e.g., Bauer & Benedict 1997, Zee 1999). However, the sibilants display variability between alveolars [s,ts,tsʰ] and post-alveolars/palato-alveolars [ʃ,tʃ,tʃʰ]/[ɕ,tɕ,tɕʰ] depending on the phonological contexts. The allophonic variation is usually referred to as “palatalization” (Hashimoto 1972, Bauer & Benedict 1997, Cheung

2002, Lee & Zee 2010, Yeung & Havenhill 2023) or sometimes as "postalveolarization" (Chan 2007). Notably, the variability is suggested to reflect a sound change split that started from the late 20th century (Cheung 2002; see also Bauer & Benedict 1997 and Liu 2010). The time overlaps with the largest immigration wave from Hong Kong to Toronto in the late 1980s and early 1990s. Therefore, we have a case where the same sound change process was carried over from a homeland speech community to a heritage speech community. This case offers a window for us to observe whether the sound change may be developed differently among different speech communities, and if yes, what factors are responsible for the variation in change, specifically concerning the socio-cultural difference between Hong Kong and Toronto.

There are two reasons why this case study is particularly interesting, from both perspectives of Cantonese linguistics and variationist sociolinguistics. First, most well-studied Cantonese sound changes are *mergers* instead of *splits* such as consonant mergers (Zee 1999, Cheng, Babel & Yao 2022, among others) and tone mergers (Mok, Zuo & Wong 2013, Fung & Lee 2019, among others), with a rare exception on vowel splits by Tse (2016b, 2019). Consonantal splits are relatively understudied, especially for heritage Cantonese. To the best of our knowledge, this study is the first systematic study on sibilant palatalization in heritage Cantonese. Second, as pointed out by Nagy and Meyerhoff (2008), the role of *language contact* is also largely understudied in variationist sociolinguistics. Since Hong Kong is a Cantonese-dominant community whereas Toronto is an English-dominant community,[111] it allows us to probe the question of how language contact affects and conditions sound change.

1.1 Sibilant palatalization in Cantonese

The synchronic variability of sibilant onsets in Cantonese is well-documented, but there is no consensus on what exactly the conditioning linguistic factors are. Two main phonological contexts have been identified: (i) consonant types (i.e., fricative /s/ vs. affricate /ts,tsʰ/) and (ii) following vowels (i.e., backness, height, and roundedness), the latter of which receives the most attention.

Vowel roundedness is said to play a crucial role. As observed as early as by Wong (1941), [s,ts,tsʰ] turn to [ʃ,tʃ,tʃʰ] when followed by the high front rounded vowel /y/. Kao (1971) adds that mid-front rounded /œ/ also triggers the variability. The vowel context is extended to all rounded vowels (i.e., /y,u,œ,ɵ,ɔ/) in the descriptions by Cheung (2002), Chan

[111] In Hong Kong, over 90% of the population consider Cantonese as their usual spoken language tongue (Census and Statistics Department, 2021), but only around 4% of the population in Toronto consider Cantonese as their mother tongue (Statistics Canada, 2021).

(2007), and Liu (2010). Other authors, however, claim that consonant types and vowel height and/or backness also play a role. Hashimoto (1972) suggests that apart from /y/, unrounded /i/ also induces palatalization, and that only affricates are palatalized. Bauer & Benedict (1997:28-30) note that fricatives are only palatalized before both /i/ and /y/, but affricates are palatalized before /i,y/ and other rounded vowels /œ,ɵ/. In the recent acoustic study by Yu (2016) that focuses on fricatives, both high vowels and rounded vowels are said to facilitate palatalization with considerable individual variations.[112] The acoustic and articulatory results in Yeung & Havenhill (2021) indicate that palatalization only occurs for affricates, but not for fricatives, before rounded vowels. The phonological contexts are summarized in Table 1.[113]

Table 1. The Phonological Contexts of Sibilant Palatalization in Cantonese

	Consonant types	**Following vowels**
Wong (1941)	Fricatives and affricates	High front rounded V
Kao (1971)	Fricatives and affricates	Front rounded Vs
Hashimoto (1972)	Affricates	High front Vs
Bauer & Benedict (1997)	Fricatives Affricates	High front Vs High front *or* non-back rounded Vs
Cheung (2002)	Fricatives and affricates	Rounded Vs
Chan (2007)	Fricatives and affricates	Rounded Vs
Yu (2016)	Fricatives(affricates not discussed)	High Vs *or* rounded Vs
Yeung & Havenhill (2021)	Affricates	Rounded Vs

On the other hand, palatalization also varies across different social groups, pointing to its sound change status. Cheung (2002) observes that the vowel context of palatalization is extended to all rounded vowels after 1995. He proposes the following diachronic change, where two sets of *phonemic* sibilants were merged in the mid-20th century (see also Zee 1999), and started to split into two sets of *allophonic* sibilants in the late-20th century.

[112] Yu (2016) also examines autistic traits, which he suggests to be responsible for the individual differences.

[113] Lan (2017) also proposes that back vowels favor palatalization. However, 3 out of 5 items designed to include back vowels do not have back vowels as their main nucleus in Lan's paper.

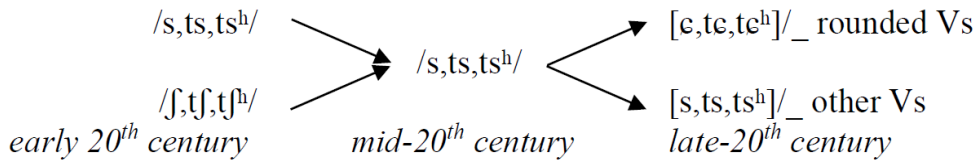


Figure 1. Sound change trajectory proposed by Cheung (2002:30).

Such impressionistic observations are further supported by the diachronic study of Liu (2010), who analyzes Cantonese songs from the 1970s to the 1990s, as well as by the age effects found in the synchronic studies. Chan (2007) finds out that younger speakers produce more post-alveolar affricates than older speakers in Guangzhou and Zhaoqing, though not in Hong Kong. Age effects for Hong Kong speakers are however confirmed in Lan (2017) and Yeung & Havenhill (2021). Female speakers are also found to have a higher degree of palatalization in Yu (2016) and Yeung & Havenhill (2021), which is consistent with the proposed sound change. The change has also been proposed to be due to contact with English (Liu 2010, Lan 2017; see also Havenhill, Liu & Li 2023 for Hong Kong English), but no systematic sociolinguistic study has yet been conducted to examine this claim.

1.2 The current paper

This paper investigates the linguistic and sociocultural factors of sibilant palatalization. We approach the topic from two novel angles: (i) comparing homeland and heritage Cantonese communities (as opposed to dialectal comparisons, e.g., Chan 2007), and (ii) using corpus data collected in a naturalistic setting (as opposed to data collected in a laboratory setting, e.g., Chan 2007, Yu 2016, Lan 2017, Yeung & Havenhill 2021). We have two main research questions:

(i) What are the phonological contexts that favor sibilant palatalization?

(ii) Does the change develop in different ways in Hong Kong (homeland) and Toronto (heritage) Cantonese? If yes, why? Do other social factors have an impact?

The first question addresses the discrepancies in the literature, and identifies the stage of sound change across communities by examining differences in phonological conditioning, as related to the second question. One might expect the context of palatalization to be further generalized to all vowels if the sound change reaches a later stage. As for the sociocultural factors, different from previous studies that focus on age

and gender, we ask whether generation, ethnic identity, and language use also affect palatalization. This is only possible when heritage language communities are considered, and further allows us to examine the hypothesis that Cantonese sibilant palatalization is an English-contact-induced change.

2. Method

2.1 Data

As mentioned above, this study examines sociolinguistic interview data from the Heritage Language Variation and Change (HLVC) corpus (Nagy 2011), which records linguistic usage and change in ten non-official languages spoken in Toronto, including Cantonese.

Our dataset consists of 36 Cantonese speakers from three generations. Gen-0 consists of homeland speakers living in Hong Kong, where Cantonese is both their mother tongue and dominant language. Gen-1 includes individuals who were born in Hong Kong and moved to the Greater Toronto Area after age 18. For this group, Cantonese is their mother tongue, but most of them speak at least some English, with varying levels of proficiency and exposure to different varieties of English. Gen-2 speakers were born in the Greater Toronto Area whose parents are Gen-1, or moved there (from Hong Kong) before age 6. For this group, both English and Cantonese were acquired early, but English is their dominant language.

Each generation contains 12 speakers. Table 2 provides a list of the speaker samples, with each speaker identified by a unique speaker code. The code is structured as follows:

- The first letter, “C”, represents “Cantonese”.
- The second character indicates the generation: “X” for Gen-0, “1” for Gen-1, and “2” for Gen-2.
- The third letter represents the speaker’s gender: “F” for female and “M” for male.
- The following number indicates the speaker’s age.
- The final letter differentiates speakers with the same demographic characteristics.

For example, the code “C1F50B” refers to a Gen-1 female speaker who is 50 years old, and “B” indicates that there is another 50-year-old Gen-1 female speaker in the corpus labeled as C1F50A.

Gender distribution is balanced within each generation group. Age distribution between young speakers (<40 years old) and old speakers (≥40 years old) is balanced as much as possible. However, due to the dataset constraints and how Gen-1 is defined in the corpus, while age for the Gen-0 group is roughly balanced

(young:old=5:7), Gen-1 only has old speakers (n=12) and Gen-2 has more young speakers (young:old=9:3).

Table 2. Speaker Sample

Generation	Females	Males	Total
Gen-0	CXF16A CXF19A CXF25A CXF43A CXF49A CXF77A	CXM17A CXM20A CXM46A CXM50A CXM52A CXM64A	12
Gen-1	C1F50A C1F50B C1F58A C1F78A C1F82A C1F83A	C1M52A C1M52B C1M59A C1M61A C1M62A C1M87A	12
Gen-2	C2F16A C2F16B C2F20A C2F21B C2F22A C2F41A	C2M17B C2M21D C2M21B C2M27A C2M44A C2M51A	12
Total	18	18	36

In addition, for all speakers, each interview in this corpus includes an Ethnic Orientation Questionnaire (EOQ), which gathers information about the speakers' ethnic identity and language use. The questionnaire for Gen-0 is different from that for Gen-1 and Gen-2, and therefore is not used in this study. Table 3 presents some sample questions included in the EOQ for heritage speakers. The speakers' response to each question was coded as 0, 1, or 2. For ethnic identity (EthnicID), a score of 0 indicates a stronger Canadian identity, 2 indicates a stronger Chinese identity, and 1 represents an intermediate response. For language use (LangUse) score, 0 indicates English dominance, 2 indicates Cantonese dominance, and 1 represents a balance between the two. To examine the possible effect of these two factors on sibilant palatalization, we used the average EthnicID score and average LangUse score of each speaker from Gen-1 and Gen-2.

Table 3. EOQ Question Sample for Heritage Speakers

	Sample questions
Ethnic Identity	1. Do you think of yourself as Chinese, Canadian, or Chinese-Canadian? 2. Are most of your friends Chinese? 3. Are people in your neighborhood Chinese? …etc.
Language Use	1. Do you prefer to speak Cantonese or English? 2. Do you prefer to read and write in Chinese or English? 3. What language does your family speak when you get together? …etc.

2.2 Annotation

The HLVC corpus provides time-stamped transcriptions linked to the corresponding .wav files of the interview recordings. Sentences and tokens were transcribed in *Jyutping* using ELAN. Sibilant tokens were then identified by searching through these transcriptions.

There are in total four annotators who are all phonetically trained. For each sibilant token, two annotators classified it as either palatalized (Yes) or not (No) auditorily and blindly to each other, and any disagreements were resolved by a third annotator. The first 25 minutes of each interview were annotated for each speaker. Tokens with background noises were excluded. Finally, 21,879 tokens from the 36 speakers were included in the analysis.

2.3 Data analysis

We conducted logistic regression models using R (R Core Team, 2023), taking palatalization percentage as the dependent variable and incorporating both linguistic and social factors as independent variables in our analysis. The three sibilants were categorized into two consonant types: fricative (/s/) and affricates (/ts/ and /ts^{h}/). Vowels were classified based on frontness, roundedness, and height. Cantonese has a total of nine vowels: /y, u, œ, ɵ, ɔ, i, ɛ, ɐ, a/. The vowels with specific features are listed below:

[+front]: /y, œ, i, ɛ/

[+high]: /y, u, i/

[+round]: /y, u, œ, ɵ, ɔ/

We also included social factors including generation, age, gender, ethnic identity, and language use in our analysis. For the analysis involving the ethnic identity and

language use score, we only included the data collected from Gen-1 and Gen-2. Consequently, we did two rounds of data analysis. The first round involves data from all three generations and the factors considered were consonant type, vowel frontness, vowel roundedness, vowel height, generation, age, and gender. The second round only involves Gen-1 and Gen-2 speakers, with EthnicID score and LangUse score being added to the analysis. Three speakers in Gen-2 have missing EthnicID and LangUse scores. Their data were consequently excluded from the second round of analysis.

We conducted a stepwise backward model selection approach for both rounds, starting with the most intricate model encompassing all independent factors and their interactions. Predictor variables were then removed one at a time until the model reached a specified lower threshold (palatalization percentage ~ 1). The optimal models selected from this procedure were used for the analysis.

3. Results

In this section, we present the results of our analysis. We will first focus on the linguistic factors that influence sibilant palatalization, and then move on to the sociocultural factors, as well as the combination of the two groups of factors.

One major linguistic factor at play is the following vowels, and more specifically, the roundedness, height, and frontness of the vowels. Our regression analysis shows that sibilants preceding rounded vowels (/y, u, œ, ɵ, ɔ/) are significantly more likely to be palatalized than those preceding unrounded vowels (/i, ɛ, ɐ, a/) ($p < 0.001$) as also shown in Figure 2a. We further looked at the percentage of each sibilant (Figure 2b) and confirmed that the effect of the vowel roundedness is consistent across all three sibilants.

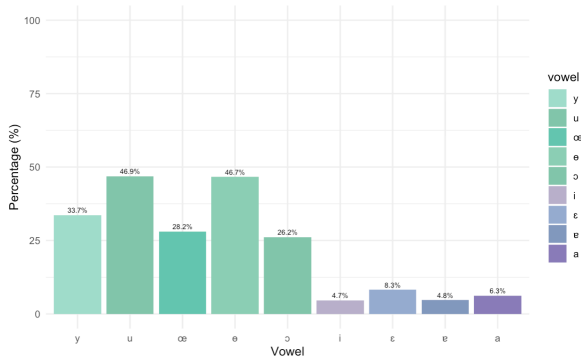


Figure 2a. Percentage of palatalization by following vowels.

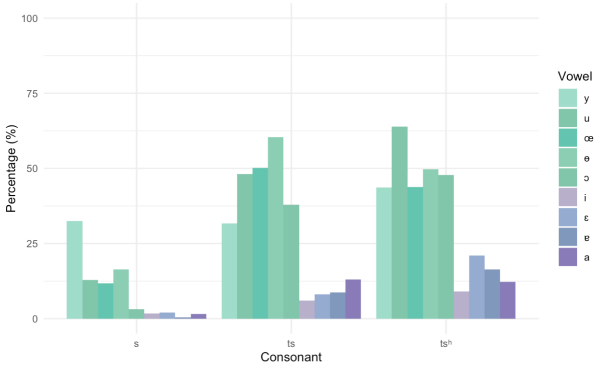


Figure 2b. Percentage of palatalization by following vowels by sibilants.

Vowel height is also found to have an effect: palatalization is more likely to happen when the sibilant is followed by a high vowel (/y, u, i/) than a non-high vowel ($p < 0.05$). However, vowel frontness is not statistically significant ($p=0.48$), and the percentage of palatalization is similar for sibilants preceding front (/y, œ, i, ɛ/) and non-front vowels.

In addition to vowels, the sibilants themselves also influence the likelihood of palatalization. Looking at Figure 3a, there is a clear difference between the fricative /s/ and the two affricates, /ts, tsʰ/. Only less than 5% of /s/ is palatalized, while the percentage for /ts, tsʰ/ is above 20%. Such a difference is significant statistically ($p < 0.001$).

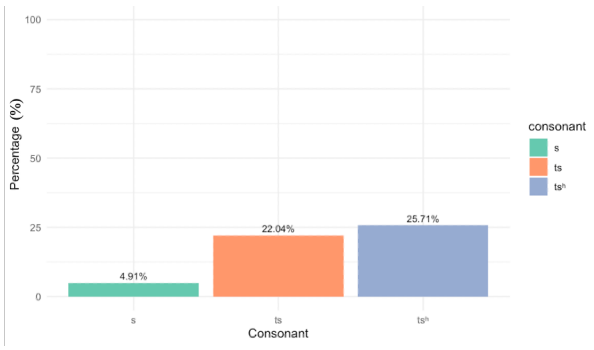


Figure 3a. Percentage of palatalization by sibilants.

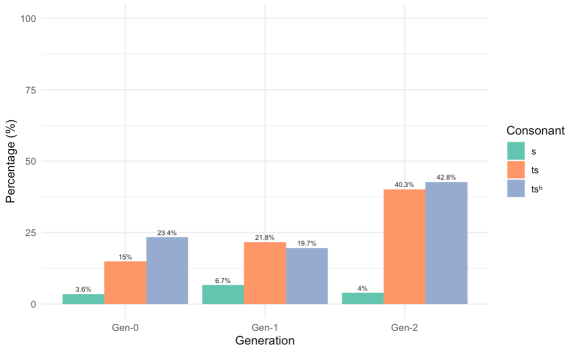


Figure 3b. Percentage of palatalization by sibilants by generation.

Further breaking down the statistics of each sibilant into different generation groups reveals more on the (non-)changes of the sibilants. As shown in Figure 3b, the ratio of palatalization of /s/ remains fairly constant across generations, whereas that of /ts, tsʰ/ shows a clear difference. For /ts/, the ratio is lowest in Gen-0, and higher in Gen-1, and the highest in Gen-2. For the aspirated /tsʰ/, while Gen-0 and Gen-1 have a similar ratio, Gen-2 has a much higher ratio.

To quickly sum up, by closely examining the linguistic factors influencing sibilant palatalization, we found out that vowel roundedness, vowel height, and sibilant type have significant effects. Next, we will report the analysis of the sociocultural factors. This includes generation, ethnic identity, language use, as well as gender and age.

The ratio of palatalization of Gen-1 is not significantly different from Gen-0. However, Gen-2's palatalization ratio is significantly higher than both Gen-1 and Gen-0 speakers. As indicated in Figure 4a, Gen-2's ratio (26.05%) is more than double compared to Gen-0 (11.82%). Across generations, we not only observed a change in the percentage of palatalization, but also a widening of the phonological contexts, as illustrated in Figure

4b. While Gen-0's palatalization occurs almost exclusively before rounded vowels, the ratio for *unrounded* vowels is slightly higher for Gen-1 and considerably higher for Gen-2.

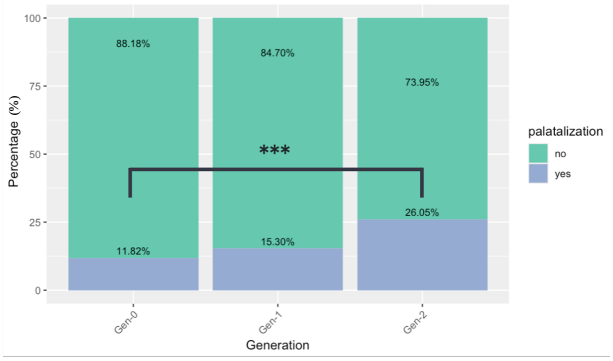


Figure 4a. Percentage of unpalatalized vs. palatalized sibilants by generation.

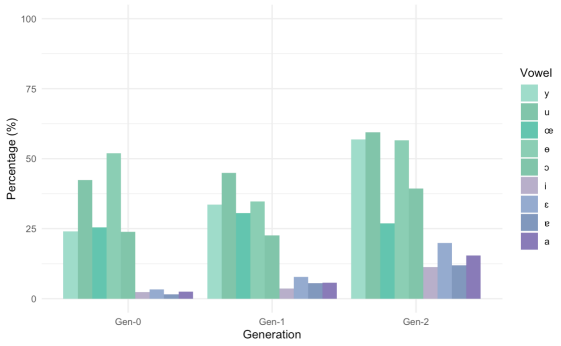


Figure 4b. Percentage of palatalization by following vowels by generation.

Gender and age have been found to play a role in sound changes, so we also included them in our analysis. However, neither is found to be significant, which could be due to the relatively smaller sample size (12 speakers per generation), and unbalanced sample for age. Nevertheless, some trends can be observed visually. In Figure 5a, female speakers all produce an equal or higher percentage of palatalized sibilants than male speakers across all generations. In Figure 5b, the ratio of palatalization is lower for old speakers in Gen-0 yet higher in Gen-2 than the young speakers in the same generations.

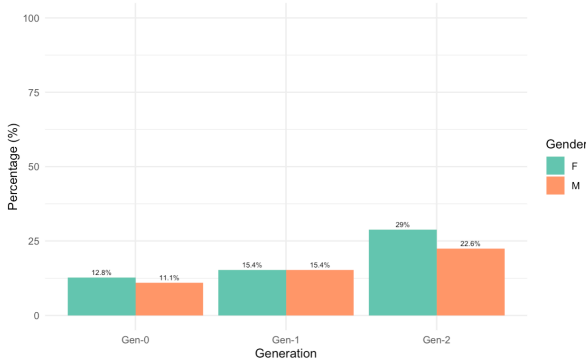


Figure 5a. Percentage of palatalization by gender by generation.

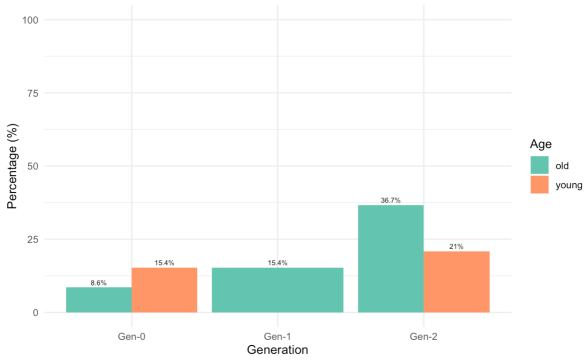


Figure 5b. Percentage of palatalization by age by generation.

For the analysis involving the EthnicID score and LangUse score, we only included the data collected from Gen-1 and Gen-2. The average scores of both groups are reported in Table 4. Meanwhile, the percentage of palatalization by the distribution of the two

scores is visualized in Figure 6. Overall, Gen-1 speakers tend to receive higher scores on both measurements, and the distribution is also less scattered. In contrast, the distribution for Gen-2 speakers is more spread out, especially for the EthnicID score. The overall scores are also lower than Gen-1.

Table 4. Averaged EthnicID and LangUse Scores of Gen-1 and Gen-2 Speakers

Generation	Averaged Ethnic Identity Score (0-2, higher = stronger ethnic identity towards Chinese over Canadian)	Averaged Language Use Score (0-2, higher = more usage/preference of Cantonese over English)
Gen-1	1.50	1.53
Gen-2	0.97	0.80

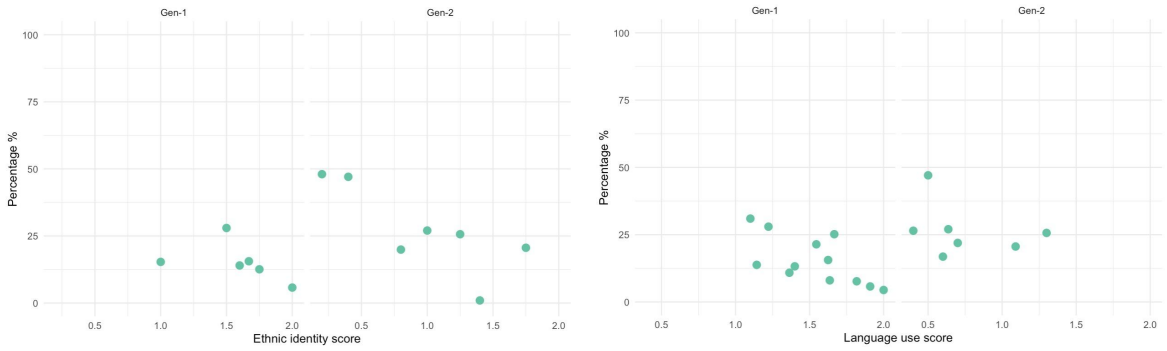


Figure 6. Percentage of palatalization by EthnicID scores (left) and LangUse scores (right) for different generation groups. The x-axis is the scores, and the y-axis indicates the average percentage of palatalization for speakers that received the same score.

The second round of data analysis shows that for both Gen-1 and Gen-2 speakers, EthnicID and LangUse scores are both significant: the higher the score, the lower the palatalization ratio. This is to say, when a person identifies more as a Chinese instead of a Canadian, or uses more Cantonese than English in life, her sibilants are less likely to be palatalized.

To quickly sum up, generation is a significant sociocultural factor that influences palatalization. Gen-2 speakers not only produce a higher percentage of palatalized sibilants, but also produce them before both rounded and unrounded vowels. For Gen-1 and Gen-2 speakers, ethnic identity and language use also make a significant difference. However, neither age nor gender is statistically significant.

4. Discussion

In the following, we discuss how the results answer the two research questions, namely, what are the phonological contexts for sibilant palatalization, and whether sibilant palatalization is developed differently in homeland and heritage communities as well as what the socio-cultural factors are.

Considering the first research question, first, our results indicate that vowel height, vowel roundedness and consonant types all have effects on palatalization. Different from what earlier authors observed (Cheung 2002, Chan 2007, Yeung & Havenhill 2021), we find out that rounded vowels are not the only phonological context for palatalization. High vowels also lead to more palatalization, supporting the findings in Yu (2016). One possible explanation is that the phonological context is indeed widened from only rounded vowels to both rounded vowels and high vowels (i.e., [+round] *or* [+high]), as a result of the sound change. This is similar to what Cheung (2002) proposes for the change in the late 20th century, namely that the vowels were generalized from high front rounded /y/ to all other rounded vowels. In other words, sibilant palatalization has developed to a later stage in the present day.

Second, we find out that the palatalization of fricative /s/ has rather different phonological contexts from affricates /ts, tsʰ/: overall, /s/ (i) has a much lower ratio of palatalization, (ii) is predominantly palatalized before /y/ (as compared to other rounded vowels), and (iii) is not palatalized before unrounded vowels. Moreover, the ratio does not change across generations, unlike affricates which display a gradual difference (Gen-2 > Gen-1 > Gen-0). Several authors have also noted the special status of /s/, ranging from claiming that it does not undergo palatalization (Hashimoto 1972, Yeung & Havenhill 2021) or has a narrower vowel context than affricates (Bauer & Benedict 1997), to that its change was developed much slower than affricates diachronically (Liu 2010). Both Liu (2010) and Yeung and Havenhill (2021) propose that it is due to the articulation differences between fricatives and affricates. Concretely, Yeung and Havenhill suggest that the frication phase of affricates is shorter than fricatives, and thus affricates have more gestural overlap with the following vowels for co-articulation, hence the higher degree of palatalization. While it explains why /s/ has a lower ratio, it remains unclear how to account for the predominance of /y/ and the resistance to unrounded vowels. This raises the question of whether /s/ really undergoes the same phonological process as /ts, tsʰ/ do. If the process were really the same, one might expect to see a much higher ratio for both /s/ and /ts, tsʰ/ in Gen-2 (vs. Gen-1 and Gen-0), contrary to the results. We will return to this issue from the perspective of English contact below. For now, we conclude

that the sound change for /s/ might be of a distinct nature from /ts, tsʰ/ given the differential speed and phonological conditions.[114]

Third, Gen-2 speakers have a considerably higher ratio of palatalization for unrounded vowels, including non-high vowels (/ɛ, ɐ, a/, besides /i/). It indicates that the phonological conditioning is broadened from rounded (and/or high) vowels to other unrounded vowels. We suggest that the sound change is already in a much later stage for Gen-2 speakers than Gen-1 and Gen-0. Therefore, we can conclude that sibilant palatalization is developed differently among communities (i.e., Hong Kong's Gen-0 vs. Toronto's Gen-2) in relation to our second research question, as discussed in more detail below.

The data collected from Hong Kong and Toronto show that palatalization is happening in both communities. However, differences are observed not only between the two communities, but also within the Toronto community, i.e., between Gen-1 and Gen-2 immigrants, suggesting that this further development of sound change is not simply geographic but also generational. Given that Gen-2 and Gen-1 grew up in different communities in their critical period, the explanation for the different paces of sound change should be considered with the languages that they acquire.

This leads to the idea of language contact with English, which is of a greater extent for Toronto Cantonese than Hong Kong Cantonese. For affricates, English only has postalveolars /dʒ/ and /tʃ/ both phonetically and phonemically, whereas Cantonese has two sets of allophonic variants[ts, tsʰ] and [tʃ, tʃʰ]. If a speaker uses more English and less Cantonese, the more familiar she might be with the English affricates, and that may influence her production of the Cantonese affricates, making them more English-like. This hypothesis has been raised by many other scholars including Yeung & Havenhill (2021), Chan (2007), and Liu (2010). In a study on the production of Cantonese vowels, Tse (2016b) used the same corpus and found the splits of /iː/, /ɔː/ and /ɛː/ in heritage speakers due to influence from English. For instance, the Cantonese /iː/ is pronounced as [ɪk/ɪŋ] when preceding velar consonants and as [iː] elsewhere due to the 'seek' vs. 'sick' contrast in English, and the distinction is becoming more obvious among Gen-2 speakers. It makes sense that such influence from English is found not only in Cantonese vowels, but sibilants as well. Lan (2017) examined the two Cantonese affricates produced by homeland speakers of different ages, and found that younger speakers tend to palatalize more. The author attributed the reason to contact with English, describing palatalization as a way to "assimilate to the Western way of speaking". Here, we do not have direct evidence proving whether such assimilation is a deliberate choice, or happens without the speaker even realizing it, although we do believe that language contact is at play. We

[114] We thank Dr. Holman Tse and Dr. Jonathan Havenhill for inspiring us to think in this direction.

further suggest that the influence is greater when both English and Cantonese are L1 (i.e., Gen-2 speakers), as opposed to English being L2 and Cantonese being L1 (i.e., Gen-1 speakers). On another note, language contact may also help explain the lack of change for the fricative, because the two languages share the same fricatives ([s] and [ʃ]), unlike the case for affricates.

Another piece of evidence that supports language contact is the role of LangUse scores. Zooming into the speakers in the heritage community, we noticed that the more a speaker (or her friends/family) uses/prefers English,the higher percentage of palatalized sibilants she produces. This is consistent with sociolinguistic studies of other languages. For instance, Nagy, Chociej and Hoffman (2013) examined a combined dataset of Italian, Russian and Ukrainian and found 6 out of 8 questions under language use[115] are significant for predicting the voice onset time (VOT). In another study looking at the same languages, The statistical significance of LangUse score offers direct support for the role of English contact in palatalization. We suggest that English "accelerates" the sound change in Toronto Cantonese, manifested as higher palatalization ratio and wider phonological contexts.

We also found a significant effect of ethnic identity on sibilant palatalization among heritage speakers. Since Labov's 1963 Martha's Vineyard study, the relationship between ethnicity and language variation has been increasingly studied. Hoffman and Walker (2010) developed an ethnic orientation survey that included questions on various aspects of ethnic identity to explore its role in language variation within multicultural Toronto. Their findings suggest that even within the same ethnic group, individuals may have varying degrees of ethnic orientation, which in turn influences language use. Nagy, Chociej, and Hoffman (2013) further showed that 3 out of 5 questions related to ethnic identity were significant predictors of voice onset time (VOT). Speakers who orient more toward Canada exhibit more English-like VOT. Our results, therefore, further support the role of ethnic identity in language variation.

It is important to note that while their Ethnic Orientation (EO) score aggregates responses from the entire questionnaire, we chose to examine ethnic identity and language use separately to assess their individual impact. We found that these two scores are moderately correlated, as confirmed by a Pearson correlation test (coefficient = 0.41). This indicates that these variables are not entirely independent of each other, and

[115] Language use is a combination of the Language and Language Choice subcategories in their work. The two subcategories have 12 questions in total, but only 8 have sufficient responses for testing their effects.

the effect of the LangUse score may not directly reflect the extent of English contact influencing palatalization.

Gender and age have also been included in various previous studies, although they are not consistently shown to be significant. For our data, neither factor turned out to be significant. Despite that, the pattern for gender is consistent across all three generations: females palatalize as much as, if not more, than males. This is consistent with Yu (2016) and Yeung & Havenhill (2021) as well as a lot of sociolinguistic research showing that the female usually drives sound changes. On the other hand, findings on age in the literature are less consistent. Lan (2017) found that younger speakers tend to palatalize more. Yeung & Havenhill (2021) found a similar trend, but only for younger females instead of males. Chan (2007) found that younger speakers in Zhaoqing and Guangzhou generally palatalize more than older speakers. However, in Hong Kong, no difference was found between the two groups for affricates. Moreover, older speakers are found to palatalize more than younger ones, which is exactly the opposite from the other two cities as well as other works. Interestinglyold Gen-2 speakers in our dataset also have a much higher ratio of palatalization than young speakers. However, one major reason for such a result is that there are only 3 old speakers in Gen-2, and the possibility of having outliers is large. Another potential reason is that the young Gen-2 speakers who communicate with their grandparents in homeland can receive a good amount of input that contains less palatalization, while such communication opportunities are rarer or happened a long time ago for old Gen-2 speakers, leaving them even less familiar with Cantonese. Moreover, the young speakers are mostly in their 20s, and still stay relatively close to their parents (in fact, some of them still live in the same house as their parents do according to the interviews), whereas the older speakers are likely to live in their own place away from their parents. The lack of connection to Cantonese may result in a higher percentage of palatalization, which is consistent with the result for language scores.

5. Conclusion

In this study, we explored the linguistic and sociocultural factors that influence the sibilant palatalization of homeland (Hong Kong) and heritage (Toronto) Cantonese speakers. We annotated the naturalistic speech data of 36 speakers in total, including homeland speakers (Gen-0) from Hong Kong, as well as first- (Gen-1) and second-generation (Gen-2) immigrants from Toronto. We then analyzed the data together with the ethnic orientation information provided in the HLVC corpus.

Our analysis revealed that linguistic factors including the roundedness (rounded vs. unrounded) and height (high vs. non-high) of the following vowel, as well as the sibilant type (fricative vs. affricate) significantly affect the palatalization of the sibilant. As for the sociocultural factors, gender and age did not end up being significant for this dataset. However, generation turned out to be a strong and consistent factor. A clear increasing

trend has been observed in the percentage of palatalization from Gen-0 to Gen-1 and then to Gen-2 speakers. Meanwhile, Gen-2 speakers are found to palatalize significantly more than Gen-0, and allow palatalization to happen with a larger range of vowels. Within the heritage community in Toronto, a speaker's ethnic identity and language use significantly influence palatalization. These findings lead us to believe that the contact with English is likely to be facilitating palatalization, especially that of the two affricates.

The present study adds to the current literature on Cantonese linguistics by closely examining the ongoing sound change of sibilant palatalization, which as a consonant split, is a relatively understudied phenomenon in Cantonese. Meanwhile, by comparing speakers in Hong Kong and Toronto, this study enriches our knowledge about language variation in different communities, and how language contact plays a role in it. To better understand the acoustic features of palatalization, more precise measures of acoustic details are necessary. We are currently working on the analysis, and the preliminary results are reported in our poster presentation at LabPhon 19 (Li et al. 2024). With more future work including language contact into the investigation of language variation, we hope to better answer the question of how and why the sound system of one language can be influenced by, intertwined with or integrated into that of another.

Acknowledgment

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What Color does "Qing 青" Represent for Modern Mandarin Speakers?

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Abstract: Berlin and Kay (1969) proposed a universal hypothesis on basic color terms, suggesting that languages with fewer than eleven basic terms categorize colors in predictable ways. Liu (1990) applied this hypothesis to Modern Mandarin, identifying eight basic color terms and noting that "*qing* 青" was not among them. However, according to the dictionary managed by the Ministry of Education of Taiwan, "*qing*" can express green, blue, and black, with examples ranging from past to current times. This pilot study explores whether modern Mandarin speakers associate "*qing*" more with the color blue or green. Through multi-analysis, it was found that references to the human body and plants were most frequently collocated with "*qing*" in the corpus data. In the questionnaire, native Mandarin speakers predominantly linked "*qing*" with the color green across various categories, except for cases like bruises and bricks, which rely heavily on personal experiences.

1. Introduction

According to the *Revised Mandarin Chinese Dictionary* developed and managed by the Ministry of Education of Taiwan, the character "青 (*qing*)" can be expressed as green, blue, and black in the real world. For instance, "青山 (green mountains)," "青天 (blue sky)," and "青絲 (black hair)." It can serve as both an adjective and a noun. The usage of modern Mandarin Chinese "*qing*" is potentially

influenced by ancient Chinese culture, which used “*qing”* as a general color term for green, blue, and black (Jin, 2009).

In the so-called Sinosphere, where languages are strongly influenced by Chinese culture in both oral and written forms, such as Japanese, Korean, and Taiwanese, the character “*qing*” also reveals different color meanings. For example, it can express “blue sky” as “青い空” and “green traffic light” as “青信号” in Japanese. Similarly, “청색 (青色) 바다” means “blue sea,” and “청색 신호등” means “green traffic light” in Korean. Lee (2014) concluded that the meaning of “green” generally collocates with words related to the natural or biological system, while “blue” is often used to describe the sky and water in Taiwanese. In short, “*qing*” can express different colors, especially green and blue in modern Sinosphere world.

Nevertheless, Liu (1990) examined the study of Berlin and Kay (1969) and concluded that there are 8 basic color terms in Modern Mandarin Chinese: Black, white, red, yellow, green, blue, purple and grey. “*Qing*” is excluded from the list. However, “*qing*” is still commonly used in modern Mandarin Chinese conversation. This study aims to explore whether modern Mandarin speakers associate “*qing*” more with the color blue or green, and to provide L2 pedagogical suggestions based on the results.

2. Literature Review

In this section, we first introduce the basic color terms theory proposed by Berlin and Kay (1969). Then, we primarily explore Chinese character “*qing*” from ancient literatures to modern research in terms of its meanings and crosslinguistic functions.

Berlin and Kay (1969) proposed a predictable developmental continuum for color vocabulary in languages worldwide and hypothesized that this developmental continuum is universal. They studied 98 languages by interviewing native informants from twenty unrelated languages and by using comparative literature materials (Berlin & Kay, 1969). They concluded that although the number of color terms varies across languages and the segmentation of the spectrum differs arbitrary and independently, the basic color terms of any language do not exceed the range of eleven words (Berlin & Kay, 1969). The eleven basic color categories are white, black,

red, green, yellow, blue, brown, purple, pink, orange, and gray. In Berlin and Kay’s (1969) research, the “term” refers to basic color lexicon. According to their findings, all languages have white and black as the first or second color terms. The third color term is always red. The fourth term will be either green or yellow, or both green and yellow in a five-color term language. The sixth color term is blue, and the seventh is brown. Purple, pink, orange, gray, or some combination of these color terms are included in languages with more than eight color terms (Berlin & Kay, 1969).

Above all, green terms appear earlier than blue terms in the abovementioned predicable universal developmental continuum based on Berlin and Kay’s theory. Nonetheless, the Chinese character “*qing*” has appeared in the “*Book of Rites* (禮記)” according to Xu’s (1994) research of color terms in ancient Chinese. Xu (1994) mentioned that ancient Chinese people divided colors into “primary colors (正色)” and “secondary colors (間色)”. In her research, “*qing*” is one of five primary colors, and “*lu* (綠, green)” is one of five secondary colors. Furthermore, three primary colors in the *Book of Rites*, “*chi* (赤, red)”, “*huang* (黃, yellow)” and “*qing*” are the three-primary colors (三原色) in modern society (Xu, 1994). Taking together, “*qing*” represents the blue color in the *Book of Rites* according to Xu’s description. The use of primary and secondary colors in ancient Chinese language reflects the conceptualization of ancient Chinese people and its impact on their lives. The development of color terms approximately followed a cyclical process in language formation. This cyclical process generally began with observations from daily life, then became a habit within the community, and eventually, the color terms were normalized into language rules (Xu, 1994). The *Book of Rites,* referenced in Xu’s (1994) work, originally existed in the early Han dynasty (206 B.C.-A.D. 220) (Chan, 1969). This document predates the materials in the *Dictionary of Chinese Character Variants* [116]managed by the Ministry of Education of Taiwan, which adopts the *Shuowen jiezi* to document the development of Chinese characters. The *Shuowen jiezi*, compiled in the late Han dynasty (A.D. 25-220) and completed in A.D. 100, is the oldest and one of the most important character dictionaries in ancient China (Theobald, 2018).

[116] Online version of Dictionary of Chinese Character Variants: https://dict.variants.moe.edu.tw/

According to the *Shuowen jiezi* and the *Dictionary of Chinese Character Variants*, “*qing*”, “*lu*”, and “*lan* (blue)” are documented and explained as follows:

(1) 大徐本：青，東方色也。木生火，从生、丹。

[117]Version of the older Xu: 青(*qing*) means the color of the East. Wood produces fire, from “birth (生)” and “ red stone (丹)”.

(2) 大徐本：綠，帛青黃色也。从糸、录聲。

Version of the older Xu: 綠 (*lu*) means the silk of “*qing*” and “*huang* (yellow)” color. From “a thin thread (糸)” and the phonetic “录”.

(3) 大徐本：藍，染青艸也。从艸監聲。

Version of the older Xu: 藍(*lan*) refers to a plant used for dying the color “*qing*”. From “grass” and the phonetic “監”.

From the *Shuowen jiezi*, it is evident that the meaning of the Chinese character “*lan*” transitioned from originally denoting a plant used for dyeing to primarily representing a color in modern usages. This change explains why color terms like “*qing*” and “*lu*” were categorized as primary and secondary colors in ancient Chinese, whereas “*lan*” was not. In this case, “*qing*” serves as primary color representing blue and has the capability of producing other colors by combing with other primary colors, such as combing with “*huang*” to produce “*lu*”. The feature and function of character “*qing*” spread and influenced Sinosphere world in ancient times. In short, the meaning of “*qing*” has shifted over historical development. It first served as a primary color, representing blue in the *Book of Rites*. Later, it became associated with the color of the East, originating from the observation of producing fire as described in *Shuowen jiezi*.

Huang (2008) indicated that the segmentation of color terms in Korean and Chinese is influenced by the “five element theory (五行)” and the concept of five directions (east, south, center, west, north), each corresponding to five colors: *qing*,

[117] The translation style and format refer to Theobald (2018).

chi, *huang*, *bai* (白, white), and *hei* (黑, black), same as the primary colors described in the *Book of Rites*. However, Huang (2008) explicitly defined “*qing*” as the green color and mentioned that the Korean translation “푸르다” represents “*qing*”, “*lu*”, and “*lan*” due to the lack of distinction in Korean. Lin (2009) also mentioned that some color terms in Chinese and Japanese share similarities in terms of character shape, part of speech, and meaning, such as “*qing*”. In Japanese, “青” can also express green, blue, and black depending on the context. For example, it usually represents the color blue when associated with the semantics of sky and sea, while it denotes green when collocated with plant words (Lin, 2009). Taken together, both studies acknowledged the influence of Chinese color terms on their usage in Korean and Japanese. The color meaning of “*qing*” is ambiguous due to the lack of clear distinctions and its restriction to fixed expressions.

Liu (1990) examined the applicability of the aforementioned basic color term theory in modern Mandarin Chinese from six different perspectives. For example, in terms of format, which refers to the word or word phrase in Mandarin Chinese, only monosyllabic words that can function as color terms themselves, like “*hei*” and “*bai*”, are considered basic color terms. Semantically, “*qing*” is excluded from the basic color terms of modern Mandarin Chinese because its meaning has been replaced by “*lu*” and “*lan*,” and its reference function is limited compared to its usage in ancient Chinese. In conclusion, Liu (1990) identified eight basic color terms in modern Mandarin Chinese: black, white, red, yellow, green, blue, purple, and grey.

Above all, the Chinese character “*qing*” originated as a color term, and its semantics and functions influenced the Sinosphere world in ancient times. However, with historical development, the character “*qing*” retained some fixed expressions as color terms and extended the meaning of green to include “fresh,” “new life,” and “peace” (Huang, 2008) through metaphorical mechanisms. Similarly, Lee (2014) found that “*qing*” is typically to describe colors similar to grass, and it extends to express concepts like raw, fresh, and even terrifying emotions such as shocked and scared in Taiwanese. The color meaning of “*qing*” has largely been replaced by the more specific color terms “*lu*” and “*lan*” in modern Mandarin usage.

Nonetheless, the aforementioned statements regarding the color meaning of “*qing*” are mostly based on written explanations. These explanations are not

straightforward and can easily cause ambiguity. Huang (2008) indicated that color terms are used to denote the color of “real objects” as people actually see them. This implies that speakers may have different interpretations of what they see, and listeners may have different imagined colors of what they hear due to the color terms rely heavily on individual’s cognition (Jameson & Webster, 2019). Sun and Chen (2018) noted the importance of providing a palette of color samples when collecting data in regards to color discussion because it can reduce participants’ confusion when responding. Berlin and Kay (1969) adopted a roughly uniform palette of color patches from a system developed by Albert Munsell as their methodological tool. They asked informants from different languages to label the colors based on the palette (cf. Sun & Chen, 2018). This approach helps scholars investigate, compare, and evaluate color naming and color perception cross-culturally. In short, providing a palette to collect data is a scientific and objective method to explore color meanings for individuals.

3. Research Questions

From the literature review, “*qing*” can be used to represent different colors cross-linguistically, but the color meaning is ambiguous. Liu (1990) excluded “*qing*” from the basic color terms in modern Mandarin Chinese, yet its usage to describe specific color phenomena in the modern world is frequently observed. Therefore, the research questions for this study primarily focus on which color “*qing*” represents for native Mandarin speakers: green or blue? Additionally, what pedagogical implications can be drawn from the results?

4. Methodology

This research adopts a multi-analysis methodology. First, written language corpus data are collected and analyzed to identify expressions that use the color meaning of “*qing,*” as well as other semantic usages in modern society. Based on the corpus results, the researcher then creates questionnaires focusing on the color meaning of “*qing*” for native speakers to answer the research question one of this study.

4.1 Corpus Data

To confirm the usage of “*qing*” in modern Mandarin Chinese, the researcher first looked up data in the Sinica Corpus 4.0 using the keyword, the Chinese character “*qing*”. The results show 152 sentences containing “*qing*” in different modern formal written media, such as newspapers, books, and so forth. The coding method and categorization of this study adopt the “family resemblance” approach mentioned in Yuan (1995). Since the attributes of an entity form a continuous scale, the boundary between categories is not binary but rather vague. Family resemblance approach addresses this issue by accommodating both “prototype” (sharing more similarity) and “non-prototype” (sharing less similarity) members within a single category (Yuan, 1995). In this study, the author first categorizes words containing “*qing*” based on semantic family resemblance.

After manually examining the data, 33 sentences were eliminated due to duplication. In this research, duplication includes not only exactly identical sentences but also repeated usages in one context, such as “*qingniao* (青鳥, blue bird)”, “*qingshizi* (青柿子, green persimmon)”, and “*qinglian yaoguai* (青臉妖怪, green-faced monster)”, which are main characters in children’s books. The researcher counted these kinds of usages as one instance and excluded the duplicated examples from the analysis. Meanwhile, the remaining 119 sentences were manually coded and sorted into semantic categories.

All examples were categorized into four groups based on semantic similarity: physical color, proper noun, metaphor, and Taiwanese. Examples such as “*biqing* (鼻青, bruised nose)”, “*qingguang* (青光, green light or blue light)”, and “*qingbai xiaohua* (青白小花, greenish white small flowers)” were categorized as “physical color” because “*qing*” purely represents color in these contexts. Examples like “*gaoshanqing* (高山青, song name)”, “*qinghaisheng* (青海省, a province in China)”, “*qingdang* (青黨, party name)”, and “*qingniao* (青鳥, book name)[118]” were categorized as “proper noun” because they typically refer to specific entities and lack productivity.

[118] In this research, 青鳥 was coded as both a “proper noun” and a “physical color” due to its varied semantics and usages in contexts. It was counted once for each category.

In phrases such as “*laozhongqing* (老中青, old, middle-aged, young)”, “*qingzibei* (青字輩, young generation)”, and “*maiqing* (賣青, undersell crops)”, “*qing*” does not represent color but carries an extended meaning through metaphorical mechanism. Therefore, these examples were categorized as “metaphor” in this study. Since the Sinica Corpus 4.0 develops in Taiwan, some examples reflect Taiwanese Mandarin usage, such as “尚青 (siōng tshinn, fresh)”, where Mandarin characters are used to represent Taiwanese pronunciation. These instances were categorized as “Taiwanese”. Data in the three latter categories were not analyzed further as they were not relevant to the current study’s goals, apart from the physical color category. As revealed in cross-linguistic studies, “*qing*” can represent various colors depending on contexts. The researcher further categorized examples under the “physical color” category to ascertain which types of words are more frequently collocated with “*qing*” in modern usage. These usages are generally fixed expressions. Hsieh (2013) indicated that the meaning of the fixed expressions came from the observations of real world, and it is so-called underlying conceit (Hsieh, 2013). This concept along with family resemblance but the semantic scope narrowed down to phrase or word level. Therefore, the researcher further categorizes the words under “physical color” category based on the semantic similarity of themes (objects) and the contexts described by “*qing*”. Table 1 lists 14 subcategories identified by the researcher.

Table 1. Subcategory under “physical color” for current study

Subcategory	Examples
Human Body	一個鼻青，一個眼腫。兩人一路爭吵 One has a bruised nose, the other has a swollen eye. The two have been arguing all the way.
Plant	從前的窗口曾有一簇青竹 There used to be a cluster of green bamboo outside the window.
Nature Substance	感傷之下打開了禮盒，一股青煙裊裊，恢復了他蒼老的容貌 Feeling sentimental, he opened the gift box. A wisp of blue smoke curled up, restoring his aged appearance.
Animal	樹上的青蟲鳥糞掉了滿桌 The green caterpillars and bird droppings from the tree fell all over the table.
Architecture	望遠處西山腳下那座小學青硬圍牆

	Looking through the telescope, I saw the sturdy green wall of the elementary school at the foot of the western hills.
Color	赤（紫紅）、黃、青是顏料的三元色
	Red (magenta), yellow, and blue are the three primary colors of pigments.
Cloth	青箬笠，綠蓑衣，斜風細雨不須歸
	Wearing a green bamboo hat and a green raincoat, there’s no need to return home despite the slanting wind and drizzling rain.
Food[119]	龍井還是四毛錢一兩的青茶
	Longjing is still a green tea priced at forty cents per tael.
Mineral	尼泊爾出產深紅色水晶、黃玉、海藍寶石、青金石等均物美價廉。
	Nepal produces high-quality and affordable gemstones such as deep red crystals, topaz, aquamarine, and lapis lazuli.
Culture	動作生動活潑，咬紅包、咬青、配合文場音樂節奏
	The movements are lively and energetic, biting into red envelopes and green objects, in sync with the rhythm of the music in the performance.
Medicare	急診處幾乎每天都有吐血或瀝青便的病人
	The emergency room almost daily has patients with symptoms of vomiting blood or black, tarry stools.
Vitality	懷抱這等「獨留青塚向黃昏」的悲情
	Harboring such sorrowful sentiment as ‘only the green tomb remains towards the dusk’.
Religion	鳩摩羅什譯為『一切處』十一切處觀：青、黃、赤、白、地、水
	Kumarajiva translated it as 'All Places' and the 'Eleven Places' meditation: green, yellow, red, white, earth, and water.
Time Period	不以為意的拍下那段青黃的考卷歲月
	Carelessly snapping a photo of those exam years of green and yellow.

4.2 Questionnaire Design

To answer the main research question of this study, a questionnaire on Google-form for native Mandarin speakers were created. The questionnaire comprises of three parts. The first part is acknowledgement and response demonstration. The second part is personal background information. The third part is the formal questions based on the data in corpus, which means that the native Mandarin speakers will read Mandarin Chinese sentences retrieved from the Corpus

[119] To prevent from the coding difficulty and miscellaneous category, drink is categorized in Food, as a non-prototype member based on the concept of family resemblance and underlying conceit.

which includes “*qing*” and judge the color based on those sentences. Sun and Chen (2018) indicated that a palette of color samples is important to collect data efficiently and that the color palette should include a complete set of colors with uniform perceptual distribution to reduce participants’ confusion when responding. Putting the main purpose of this study and the diverse color perception of the participants into consideration, the researcher decided to provide a color palette of “*qing*” divided into six zones to assist the color judgement. The participants were also asked to type out the color name based on their intuition and to provide the reason for their responses. The design of the palette for this study is based on the findings of Berlin and Kay (1969). The color terms categorized under the dark-cool partition (including black, green, and blue) are to be developed and presented in the first stage (cf. Jameson & Webster, 2013). The color definition of the dark-cool partition aligns with the target color terms in the current study. Therefore, the researcher adopted the dark-cool partition palette from Berlin and Kay (1969) as the color judgment tool, adjusting the format to suit the study's goals. Participants are expected to identify the zone number on the color palette designed by the researcher and provide a precise written response along with their reasoning. Refer to Appendix A for a demonstration of the formal questionnaire.

4.3 Analysis of Questionnaire

In this study, the zone numbers on the color palette are treated as nominal variables, which implies that traditional statistical methods such as calculating means or assessing normal distribution may not be applicable. To determine the predominant initial color choice among native speakers, the researcher counts the frequency of each zone number selected and identifies the “mode”—the most frequently chosen number—as the most widely accepted color for subsequent analysis. Additionally, while written responses offer valuable qualitative insights, they are challenging to quantify and use as straightforward statistical evidence. Overall, this study employs basic frequency analysis for nominal color zones to discern participants’ initial color preferences and a qualitative approach to explore the underlying reasons behind the color palette choices.

5. Results

In this section, the results of the corpus data about “*qing*” will be demonstrated, followed by the results of the questionnaire for the native Mandarin speakers.

5.1 Corpus Data

This section exhibits the distribution of the examples with “*qing*” in the corpus first and then further explores the subcategories under the category of “physical color”. Briefly, two distribution analysis are similar to quantitative analysis.

Table 2 shows the distribution of the remaining 119 sentences containing “*qing*” in the Sinica Corpus 4.0. They were categorized according to the semantic categories of this study. The category “physical color” comprises 75% of the corpus data, preserving the initial function and meaning of “*qing*.” The second most frequent usage, found in 17 sentences, is “metaphor,” which often represents young people. Eleven sentences were categorized as “proper noun,” typically used as titles for books, songs, or provinces. The least frequent usage, observed in 2 sentences, is in the Taiwanese context, where “*qing*” represents the meaning of “fresh” and the pronunciation is similar to that in Mandarin.

Table 2. Semantic distribution of examples with “*qing*” in Sinica Corpus 4.0

Category	Tokens	Percentages
physical color	89	75%
metaphor	17	14%
proper noun	11	9%
Taiwanese	2	2%
Total	119	100%

Moreover, 89 sentences categorized as “physical color” were re-categorized based on the 14 semantic subcategories suggested by themes and objects to further

confirm the collocation type of “*qing*” in modern Mandarin Chinese, as shown in Table 3. Among the 14 subcategories, “Human Body” and “Plant” are the most prevalent, with nineteen (21%) and eighteen (20%) sentences, respectively. The “Human Body” category includes parts such as the face, palms, and legs, while “Plant” encompasses trees, bamboo, vegetables, and more. “Nature Substance,” “Animal,” and “Architecture” each account for around 10% of the usage. In “Nature Substance,” smoke and light are commonly represented. In “Animal,” snakes, birds, and crabs are counted twice. In “Architecture,” bricks are the most frequently mentioned, appearing three times. The “Color” subcategory pertains to colors in painting, such as RGB and CYM color models. Five sentences related to ancient Chinese apparel were categorized under “Cloth.” The remaining seven subcategories each contain fewer than 3 examples. See Table 3 for more details.

Table 3. Distribution of subcategory of Physical Color

Subcategory	Tokens	Percentages	Subcategory	Tokens	Percentages
Human Body	19	21%	**Food**	3	3%
Plant	18	20%	**Mineral**	3	3%
Nature Substance	11	12%	**Culture**	2	2%
Animal	9	10%	**Medicare**	2	2%
Architecture	8	9%	**Vitality**	2	2%
Color	5	6%	**Religion**	1	1%
Cloth	5	6%	**Time Period**	1	1%
			Total	89	100%

5.2 Questionnaire for Native Mandarin Speakers

To answer the main research question of this study, an online questionnaire consisting of sentences with “*qing*” categorized under “physical color” was designed. The link to this questionnaire was posted on social media, inviting all native Mandarin speakers to participate voluntarily. After one week, 12 responses were received. Among these volunteer participants, two were from China and ten from Taiwan. Due to the unbalanced participant backgrounds, dialect or geographical language

differences will not be considered in further discussion. All participants confirmed that their mother tongue is Mandarin and that they received their education in China or Taiwan. Table 4 presents the results of the 12 responses.

Table 4. The color zone[120] on palette of “*qing*” chosen by the native Mandarin speakers

Objects to be judged / Subcategory	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Mode Zone
1. 新茬口露出青白之色/ Plant The newly cut surface reveals a *qing*-white color.	7	2	2	0	1	0	1
2. 青白小花/ Plant *Qing*-white small flowers	5	2	4	0	1	0	1
3. 瘀青/ Human Body Bruise	0	2	0	3	4	3	5
4. 面孔一下青一下白/ Human Body The face alternated between *qing* and white.	4	2	2	0	3	1	1
5. 青毛蟹/ Animal *Qing* crab	2	6	0	2	0	2	2
6. 青鳥/ Animal *Qing* bird	3	1	4	4	0	0	3 or 4
7. 白壁青瓦/ Architecture White walls and *qing* tiles	0	3	0	2	0	6	6
8. 青石磚/ Architecture *Qing* bricks	1	4	2	4	0	0	2 or 4
9. 長刀青光閃閃/ Nature Substance The long sword gleamed with a *qing* light.	4	2	3	0	0	3	1
10. 虎燈眼露青光/ Nature Substance The eyes of the tiger lantern emitted a *qing* light.	2	0	5	0	3	1	3
11. 午炊的青煙/ Nature Substance The *qing* smoke from the midday cooking.	4	6	1	1	0	0	2
12. 綠山青水間戲水/ Nature Substance Playing in the water among the *qing* mountains and blue rivers	0	5	0	2	1	4	2

[120] Some participants answered 0 to express that they don’t find the color they want on the color palette (refer to Appendix A). Therefore, total numbers for each example might be less than 12.

13. 內穿青紗中單/ Cloth Wearing a *qing* gauze undershirt	1	2	2	3	0	4	6
14. 穿著青衣服/ Cloth Wearing *qing* clothes	4	5	0	1	1	1	2
15. 火青指其湯色/ Food “Fire *qing*” refers to the color of tea soup.	0	10	0	0	0	2	2
16. 青獅動作活潑/ Culture The *qing* lion's movements are lively	2	5	0	4	0	1	2
17. 瀝青便的病人/ Medicare A patient with tarry stools	0	10	1	0	0	1	2
18. 半圓青塚/ Vitality Semi-circular *qing* mound	6	6	0	0	0	0	1 or 2
19. 玉虎紋佩，為青黃色/ Mineral Jade pendant with tiger pattern, in *qing* and yellow	2	4	1	3	0	2	2
20. 青黃的考卷歲月/ Time Period The exam years of *qing* and yellow	7	4	0	1	0	0	1
Total	54	82	27	30	14	30	237[121]

From Table 4, it can be seen that zones 2 and 1 on the color palette are most frequently selected for 20 sentences containing the word “*qing*” by native Mandarin speakers. This suggests that for these speakers, “*qing*” in these sentences typically represents either dark green or light green. In other words, when native Mandarin speakers read “*qing*” in a sentence, they associate it with the green color, according to the results. Consequently, this study assumes that in modern Mandarin Chinese, “*qing*” has evolved to primarily denote green, which contrasts with its use in the “*Book of Rites*,” where “*qing*” represents one of the five primary colors: blue. The results also reveal some tendencies and differences by subcategories.

Take the subcategory of “plant” for example. Participants tended to choose green colors (zones 1-3 on the palette) for two objects described by “*qing*.” In total, seven participants chose zone 1, and four of them provided reasons for “object 1,” indicating that “green is a color associated with nature” and “the newly cut part of a plant usually looks green and white.” One participant selected zone 5 for object 1, noting that zone 5 is pale purple and matched the color of a newly cut plant in his

[121] The total number of responses from native Mandarin speakers in this study is 240, but 2 responses of architecture and 1 response of smoke are responded as 0, which means the participants cannot find the color they cognized on the palette.

impression[122]. Though zone 1 was also the most selected color for object 2, the selection decreased to five times. On the other hand, zone 3 was selected four times. In other words, participants processed “*qing*” in “青白小花” as a color between light green and light blue. The color meaning is not generalized as one color due to the close association between these two colors. As five participants explained, “green flowers with a little bit of blue” and “blue flowers usually come with a little bit of green.” It is hard to distinguish the specific color exactly. Notably, not all objects categorized in the same subcategory have the same color association for native Mandarin speakers, such as the subcategories of the human body, animals, architecture, clothing, and so forth. The results are illustrated below by subcategories.

For the subcategory “human body,” objects 3 “bruise” and 4 “face” have the most selected color zones as zone 5 and zone 1, respectively. Pale purple and pale green are defined for these zones in this study. Nevertheless, if we closely examine participants’ responses and explanations, it becomes evident that object 3 is much more associated with “dark colors,” which should be represented by zone 4 or zone 6. In other words, “*qing*” in object 3 represents purple and dark colors for the participants. This association is generally based on participants’ personal experiences, such as “I selected 5 because I get bruises all the time” or “I selected 6, dark purple, because bruises on skin are usually purple.”[123] However, the situation is reversed for object 4. Most participants selected light color zones like zones 1, 3, and 5 for “face.” Unlike object 3, it is also difficult to find a specific color term for object 4 from the participants’ responses. For instance, two participants selected zone 1 and provided the color terms “green” and “blue with white,” explaining that “it is close to the color of blood vessels and maybe that is the color shown on a person’s face.”[124] Three participants selected zone 5 and provided three color terms: “pale purple,” “white,” and “*qing* with white and a little bit red.” In brief, these responses

[122] Original response from participants: 「淡紫色。印象中新茬口一般是白中**带**紫。」

[123] Original responses: 「5，根據本人常見的瘀青情況。」and「6 深紫色，因為皮膚上的瘀青通常是紫的。」

[124] Original responses: 「1.綠綠的。」and「1，藍中帶白，和血管顏色比較接近，可能會是人臉出現的顏色」

demonstrate that the color terms for the human body are strongly connected to blood vessels and personal experiences.

For the subcategory of “animal,” “crab” and “blue bird” were chosen as objects 5 and 6, respectively. The results reveal that “*qing*” collocated with crab represents the color green (zone 2), while it represents blue when collocated with blue bird (zones 3 and 4). Six participants selected zone 2 for crab, indicating the color term as “green” or “green with gray.”[125]. For “blue bird,” zones 3 and 4 were both selected by four participants, and these zones are closer to blue. Three participants chose zone 1, which is closer to green. Most participants used blue color terms for object 6 in their explanations, with some mentioning fairy tales they have read[126]. Nevertheless, one participant named zone 1 as pale blue in their explanation, which differs from the design of this study. Interestingly, one participant selected zone 2 and described it as “翠羽” (green feathers). In summary, when “*qing*” is associated with crab, it represents green, while it represents blue when associated with blue bird, according to the responses from participants.

For the subcategory of architecture, the “roof tile” of Chinese Hui style architecture and the “stone brick” of Renaissance style architecture were chosen as objects 7 and 8. The results show that participants tended to associate the colors with these objects in real-world. This association is related to individual background knowledge, as indicated by the responses collected. For the roof tile of Chinese Hui style (object 7), five out of twelve participants indicated that the color of “*qing*” is black in their responses. This is the first item in this study where participants associated the color black with the character “*qing*.” However, the researcher noticed that while participants named “*qing*” as black, they selected different zones on the palette[127]. Besides black, dark blue was the most associated color term for the roof tile, with dark color zones such as 2, 4, and 6 being frequently selected. No bright

[125] Original responses: 「2.綠綠的。」,「2, 青灰色。印象中生蟹的颜色既青又灰。」and 「2, 青毛蟹色澤偏綠。」

[126] Original responses:「1, 淡蓝色。印象中鸟类的颜色比天空颜色再淡一些。」,「3 淺藍色, 童話中的鳥多為藍色, 給人的可愛輕鬆的感覺」and「4, 深藍羽毛的鳥, 但帶有光澤感」

[127] Original responses:「6, 黑色。印象中徽派建筑的瓦多偏黑色。」,「0 黑色」

zones like 1, 3, or 5 were selected for object 7. In contrast, more than half of the participants chose zone 6 for object 7, but no participants selected zone 6 for the “stone brick” of Renaissance style architecture (object 8). It was difficult to identify a specific color term for object 8 from the responses. Zones 2 and 4 were each selected by four participants. In this study, zone 2 represents green and zone 4 represents blue, matching the color terms provided by the participants. One participant indicated that “stone bricks” are usually dark grey and answered[128], meaning they did not find the color of “*qing*” on the palette. Another participant chose zone 1 and described it as dark green. Two participants selected zone 3 but provided different color terms: green and white.

For the subcategory of “natural substance,” zone 1 and 3 were mostly selected for “lights” (objects 9 and 10), and zone 2 was frequently chosen for “smoke” (object 11) and “water” (object 12). Participants provided a variety of color terms in this subcategory, including green, blue, black, grey, white, and silver. Most participants mentioned that their choices were influenced by the reflection or refraction of light or water. Interestingly, two participants provided the color term “blue-green” (藍綠色) for zones 1 and 2 when judging object 11. This color term does not indicate whether the color leans more towards green or blue, but it is commonly used in modern Mandarin Chinese.

The results for the subcategory “cloth” (objects 13 and 14) are similar to those for the subcategory of “human body.” They revealed different color perceptions of “*qing*” based on personal experiences in the real world. Participants provided a variety of color terms for objects 13 and 14, including green, blue, black, and blue-purple (藍紫色). For object 13, most participants selected zones 4 and 6, indicating that dark colors represent royalty and elegance. However, it is difficult to find a specific color term from their explanations. Participants claimed that their impression of royalty for object 13 comes from the attire of the imperial family in Chinese historical TV dramas[129]. For object 14, most participants selected zone 6 and

[128] Original responses:「0, 深灰色。印象中石**砖**多**为**深灰色。」

[129] Original responses: 「4, 宝石**绿**色。印象中**电视剧**里**较**多此**颜**色穿着。」, 「2, 綠色, 印象中宋朝服飾是綠色」

denoted the color as black or dark blue[130]. Upon closer examination, the researcher assumes that the different results between objects 13 and 14 are due to the influence of context, not just the objects themselves. The sentence for object 13 is “the empress’s ceremonial attire in the Song Dynasty required wearing a phoenix crown on the head, a *qing* gauze undershirt, and a dark-colored apron at the waist (宋代皇后禮服，頭上必須戴鳳冠，內穿青紗中單，腰飾深色蔽膝),” which explicitly reminds participants of the attire seen in TV dramas. This impression did not apply to the more general context of object 14, described as “a person wearing *qing* clothes, hurrying on their way without an umbrella (一位穿著青衣服，急於趕路而沒有傘)”.

The remaining seven subcategories each include only one example, from object 15 to object 20. It is not possible to identify a pattern or paradoxical situation between the color zones and color terms as seen in the aforementioned subcategories. Notably, objects 19 and 20 both explicitly use the same color words, “*qing*-yellow (青黃)”, to describe different objects, yet the results show different color meanings for participants. Object 19 is a concrete and visible object, a jade pendant, while object 20 represents an abstract and invisible time period, or a metaphorical item. The color zone selection for object 19 is more centered than for object 20 and denotes a green color due to it is a jade[131]. Most participants indicated that the color of object 20 represents the meanings of “young” or “old time” through a metonymy mechanism, whereas the color of object 19 is based on their personal background knowledge of its real color.

6. Discussion

According to the results of the questionnaire, this study assumes that “*qing*” has evolved to represent the color green in modern Mandarin Chinese, rather than its original meaning of blue as documented in the *Shuowen jiezi*. The development of the color term “*qing*,” based on the results of this study, does not fully support Berlin and

[130] Original responses: 「6，黑色。一般说的青衣应该是黑色。」,「 6，深藍色」

[131] Original responses: 「1，玉珮感覺會偏輕透綠。」,「1 淺綠，玉佩的顏色加上跟黃色較為相近」

Kay’s theory that the color term blue comes after the color term green cross-linguistically. However, it aligns with Liu’s (1990) finding that “*qing*” does not serve as a basic color term in modern Mandarin Chinese. Although the category of “physical color” still comprises the majority of the corpus data in this study, the color-denoting function of “*qing*” has diminished and been replaced by other specific color terms.

From the color judgments on the palette and explicit color term indications, the performance of the participants demonstrates that color cognition relies heavily on personal experiences in the real world. Participants provided different color terms for the same color zones or selected different color zones for the same objects. This paradoxical situation reveals individual differences in color terms and the importance of context, such as in the case of objects 13 and 14, which may influence color cognition. The questionnaire results also shed light on Xu's (1994) study, which found that color terms generally begin with observations from daily life, are then accepted within the community, and eventually become normalized into language rules. “*Qing*” initially served as a color term based on the observation of the color of fire, but this color is not easily measurable and visible to human eyes. In physical optics, the wavelength ranges for colors are as follows: blue is 460-500 nanometers, green is 500-570 nanometers (Tokyo-doctor, 2023), and “*qing*” falls between blue and green. This evidence shows that “*qing*” can simultaneously represent the color terms green and blue, making it hard to distinguish between the two. Nevertheless, despite these rules, individual differences and experiences primarily drive the perception and cognition of color in the real world, leading to the observed paradoxical situation. For example, participants with color vision deficiency perceive physical color differently from those without such deficiencies. According to the dictionary, “*qing*” can represent different color terms. However, in modern Mandarin Chinese, its color-denoting function has been gradually replaced by specific basic color terms like “*lu* (green)”, “*lan* (blue)”, and “*hei* (black)”, as these terms are easier for speakers to process and perceive. Nowadays, the function of “*qing*” is more limited and less productive compared to other color terms in modern Mandarin. In contrast, ancient Chinese and modern Southern dialects use “*qing*” for both green and blue, reflecting a broader semantic range (Liu, 1990). This situation is reflected in the corpus data, where the majority of instances of “*qing*” appear as fixed expressions, depending on contexts and metaphorical mechanisms.

Among the 119 instances examined from the corpus data in this study, 89 are categorized under “physical color.” The phrases with “*qing*” generally follow the patterns of “*qing* + object” or “object + *qing*” to describe color. The latter pattern is primarily used for facial expressions or skin color in various contexts. In the former pattern, “*qing*” acts as an adjective to describe the object that follows, and its color meaning varies depending on the object and context. For example, “*qing*” generally represents green when referring to grass but denotes blue when describing the sky or beach. Xing (2008) noted that color terms in Mandarin evolve from their original meanings to more extensive and then abstract meanings, with new meanings extending through metaphors and visual cognition. Since objects are concrete and have physical colors, native speakers use their perception and knowledge to determine color terms. As a result, different color terms can be used for objects even within the same subcategory, with the real-world context influencing their usage.

Seventeen instances are categorized as “metaphor,” and two examples are categorized as “Taiwanese.” In the former category, “*qing*” often serves as a metaphor to describe young ages, drawing on the image of fresh plants. Examples include “*laozhongqing* (老中青, old, middle-aged, young)” and “*qingzibei* (青字輩, young generation).” The examples in the category of “Taiwanese” share this metaphorical association feature as well. This study suggests that this metaphorical association has influenced the color cognition of modern Mandarin users, leading participants to generally associate the color green with “*qing*.”

7. The L2 pedagogical implication of “*qing*”

Based on the results of this study, it is suggested to start with the green meaning of “*qing*” to introduce the metaphor mechanism and provide specific, frequently-used exceptions for scaffolding. This approach helps avoid overwhelming students with too many linguistic rules or meanings initially. First, the instructor should scaffold students' use of “*qing*” by introducing fixed expressions denoting the green color of concrete objects and frequently-used metaphorical usages through image association. For instance, introducing “*qingcao*” (green grass) and “*qingnian*” (adolescents) with visual aids, such as authentic items or pictures, can be effective. Instructors should explicitly explain the metaphorical associations of “*qing*” and

provide more related examples, such as “*qingzhuangnian*” (young adults) and “*laozhongqing*,” to reinforce cognitive usage. Later, the instructor can ask L2 learners to describe their skin or face using color terms to introduce the blue meaning of “*qing*,” explicitly explaining that this association is due to blood vessels, thus restricting the blue color meaning to this subcategory.

Subsequently, instructors can ask learners to describe their skin or face using color terms to introduce the blue meaning of “*qing*,” explaining that this association is due to blood vessels, thereby restricting the blue meaning to this subcategory. In addition to semantic rules, fixed expressions of “*qing*” generally follow the pattern of “*qing* + object” or “object + *qing*” to describe color in corpus data. In the former pattern, “*qing*” serves as an adjective describing the object that follows. This chunk pattern, corresponding with semantic subcategories, is beneficial for expanding learners’ wordnet and lexicon. For instance, the green color meaning comes from plants, as in “*qingshan* (green mountain)” due to the trees on the hill, and “*qingzhong* (green grave)” due to the grass on the grave. The latter pattern mainly applies to the subcategory of body, especially for the face, such as “*biqing* (bruised nose)” and “*mianqing* (pale face)”, where the color comes from blood vessels and varies by person, potentially being associated with green, blue, or purple.

Moreover, some phrases, like “*yuqing* (bruise),” cannot be broken down into singular words. It is suggested to introduce such vocabulary as a single phrase, and it can be used to demonstrate Chinese linguistic features, such as one-character carries meaning, form and phonetics, as well as double syllables restriction in modern Mandarin, and to develop L2 learners’ word net. Lastly, an advanced pattern of “*qing* + measure word” or “measure word + *qing*” can be introduced. Unlike adjectives or nouns phrases, “*qing”* in the pattern with measure words also functions as a verb to express temporary color changes over a range, such as *qing yizhen* (青一阵), *qing yikuai* (青一块), and *yixia qing, yixia bai* (一下青，一下白), that usually be discovered in the subcategory of body, which require the instructors to explicitly explain in the class.

8. Conclusion and limitations

In brief, the results of this study reveal that the color-denoting function of “*qing*” has been replaced by other specific color terms in modern Mandarin Chinese. According to the questionnaires, native Mandarin speakers often associate “*qing*” with the color green. The linguistic development of “*qing*” aligns with previous studies, such as Liu (1990), Xu (1994), and Xing (2008). The results of this study further confirm the importance of individual cognitive differences and the contexts that influence people’s understanding of color terms. However, due to the small sample size of this study, future research with a larger sample size and control groups, such as informants of L2 learners, is required.

The design of the color palette in this study and the color terms provided by the participants demonstrate the differences between visual perception and cognition of color terms. Nonetheless, the color palette in this study should be adjusted to finer color zones, and the questionnaire needs to be modified to a simpler format to shorten the response time, such as using multiple-choice questions listing specific color terms to be explored.

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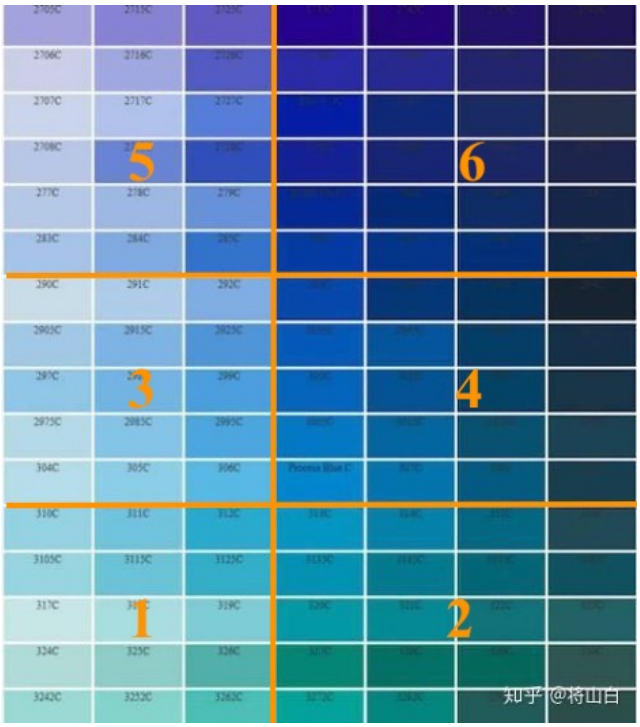
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Appendix A – the demo of questionnaire utilized in this study

請參考以下青色色卡完成本次任務。請閱讀句子後，就句子中的「青」給您的顏色作答。



6. 1) 刈麥般倒下一片，新茬口露出青白之色 *

7. 2) 只有不怕冷的幾點青白小花，零星開著 *

8. 3) 醫師會開消腫藥褪淤青等，術後前 3 天宜冰敷 *

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Embedded *ma*

New data and analysis for Mandarin polar questions

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Mandarin has more than one way to form a polar question, and the properties of different polar questions vary. This study focuses on the polar questions with sentence-final particle (SFP) *ma* (hence, MaQs). Previous research regards ma a functional head for clause-typing, which is parallel to English *whether* (Cheng 1991). However, unlike regular question particles, the occurrence of *ma* in embedded questions are subject to additional restrictions. That is, only a certain type of embedding predicates can take a MaQ as its complement. I argue, following the line of Bhatt & Dayal (2020), that *ma* is generated out of the ordinary CP, which corresponds to the Perspective Phrase (PerspP, à la Dayal 2023).

1. Introduction

This study concerns the Mandarin sentence-final particle (SFP) *ma*, which appears only in polar interrogatives. Though frequently considered as the run-of-the-mill polar questions in Mandarin, questions with *ma* are not as simple as they seem. This study tries to address a set of data considering questions with *ma* (MaQs) in embedding environments (as in (1)), which are not fully described or explained in previous studies.

(1) Varying embeddability:

a. Mali xiang zhidao [$_{CP}$ ta keyi chi pingguo **ma**↑[132]]
Mary want know 3sg can eat apple MA

'Mary$_i$ wants to know, can she$_i$ eat apples?'

b. *Mali zhidao [$_{CP}$ ta keyi chi pingguo **ma**↑]
Mary know 3sg can eat apple MA

Intended: 'Mary$_i$ knows if she$_i$ can eat apples.'

The peculiarity of MaQs could be made more salient by comparing it to other forms of polar questions in Mandarin, especially those which make use of devices inside the scope of a clause (e.g., A-*not*-A questions; see Tsai & Yang 2015 for an analysis), and those which make use of SFPs (e.g., questions with *a*; see Zhu 1982). On the one hand, MaQs are not as freely embeddable as typical interrogative clauses, shown by the contrast in (2). On the other hand, force-marking SFPs typically show root effect (Pan 2019). That is, they are banned in embedding environments and have to be construed with the matrix clause, as shown in(3)a (3a) and (3b). Therefore, the fact that MaQs are sometimes embeddable (repeated in (3c)) are not yet well captured in the literature.

(2) A-*not*-A questions vs. MaQs:

a. Tamen zhidao [Yuehan mingtian **lai-bu-lai**]
3Pl know John tomorrow come-not-come

'They know whether John will come tomorrow.'

b. *Tamen zhidao [Yuehan mingtian lai **ma**]
3Pl know John tomorrow come MA

[132] A note on the notation of this paper: * stands for ungrammaticality, which means the sentence cannot be naturally uttered in any context; # stands for infelicity, which means that the sentence feels unnatural in the current context; ?? and ? stand for marginal ungrammatical cases, where the former is used for sentences that are marginally ungrammatical and the latter for roughly grammatical ones. I use ↑ to indicate the rising intonation that is seen in canonical questions in Mandarin, whatever the phonetic realization (regarding its actual pitch contour) might be.

Intended: 'They know whether John will come.'

(3) Questions with *a* vs. MaQs:

a. *Tamen xiang zhidao [Yuehan mingtian lai **a**]
3Pl want-to know John tomorrow come FORCE

Intended: 'They want to know whether John will come tomorrow.'

b. Tamen xiang zhidao [Yuehan mingtian lai] **a**
3Pl want-to know John tomorrow come FORCE

'Do they want to know whether John will come tomorrow?'

c. Tamen xiang zhidao [Yuehan mingtian lai **ma**]
3Pl want-to know John tomorrow come MA

'They want to know whether John will come tomorrow.'

In this paper, I propose a syntactic account for the embeddability pattern of MaQs, following the line of the Cartographic approach (Rizzi 1997), which treats CP as a multi-layered domain that has fine inner structure. Such an approach has been applied in many studies on Mandarin SFPs (Li 2006; Tang 2010; Paul 2014; Pan 2019; a.o.), which more or less agree in treating *ma* as a force marker above CP, as opposed to a CP-internal clause-type marker. I will start by arguing that such a dichotomy of force marker vs. clause-type marker is not sufficient to account for the distribution of embedded MaQs, and that neither is the correct position where *ma* is generated. Then, building on insights from Bhatt & Dayal (2020), I propose an additional layer for *ma* between CP and ForceP (also referred to as Speech Act Phrase in previous studies). I try to push the proposal further by suggesting this special layer for *ma* in fact corresponds to the Perspective Phrase in Dayal (2023).

2. Empirical Generalizations

In this section, I establish some core distributional properties that should be considered to give a proper account of MaQs. In section 2.1, I show that *ma* is non-optional in a polar question if no other polar question morpheme is present. Then, in

section 2.2, I explicate how *ma* is restricted to polar questions, and is incompatible with other polar question morphemes. Last but not least, I turn to embedded clauses in section 2.3 and explore under what conditions MaQ could be subordinated without causing deterioration. The evidence put together show that *ma* is neither a force head nor a typical clause marker.

2.1. Non-optionality

Ma exhibits non-optionality in polar questions. By non-optionality, I mean it contributes an essential part to the denotation of a polar question; the presence or absence of it affects the sentence meaning.

As a piece of background knowledge, Mandarin questions do not involve the inversion of the subject and the main verb. They generally rely on a combination of question-related morphemes (e.g., *wh*-words, A-*not*-A construction), rising intonation, and question SFPs. Especially, combining the interrogative intonation with a sentence of declarative form results in a declarative question (DecQ), a noncanonical question, as in (4), which has many properties that don't belong to a MaQ (see Rudin 2022).

(4) Declarative question:
Yuehan chi pingguo↑
John eat apple
'John eats apples?'

To be more specific, removing *ma* from a MaQ changes the question into a DecQ, which could be teased apart with canonical questions under certain diagnostic contexts, such as the context in (5).

(5) (Context: S_1 and S_2 plan to buy some fruits for John. S_1 doesn't know anything about what fruits John likes to eat and thinks S_2 might know. Before they go to the market, S_1 asks,)

a. S_1: Yuehan xihuan shenme shuiguo↑ Ta chi pingguo **ma**↑
John like what fruit he eat apple MA

'What fruits does John like? Does he (like to) eat apples?'

b. S_1: Yuehan xihuan shenme shuiguo↑ #Ta chi pingguo↑
John like what fruit he eat apple

'What fruits does John like? #He eats apples?'

In the context of (5), S_1 is completely ignorant of what fruits John like. S/he uttered the first question (*What fruits does John likes*) to seek for information, and then follows up with a polar question, to further discuss one of the possible answers. While the MaQ is natural to occur in such a context, the DecQ feels odd because it seems to implicate that the speaker somewhat has supporting evidence for *John eats apples*. A conflict with the context thus arises, leading to unnaturalness. The contrast in their felicity status could only be attributed to *ma* appearing in only one of them. In other words, that MaQs are canonical questions is due to the presence of *ma*.

2.2. Incompatibility with other Q-morphemes

Mandarin *ma* can only appear in polar questions. When wh-words co-occur with *ma*, they could only be interpreted as indefinites. The sentence eventually surfaces as a polar question, as shown by the contrast in (6a) and (6b):

(6) Constituent question: not compatible

a. *Yuehan xihuan shenme ma ↑
John like what MA

Intended: 'What does John like?'

b. Yuehan xihuan shenme ma ↑
John like what MA

'Is there anything that John likes?'

Alternative questions are incompatible with *ma*, just as constituent questions. The examples in (7) illustrate such a restriction. Notice that Mandarin has two disjunction markers, *huozhe*, and *haishi*. Only *haishi* could be used for an alternative question, whereas *huozhe*, the default disjunction marker, is used in other contexts. As in (7b), *huozhe* is compatible with *ma*, but the question surfaces only as a polar question, not an alternative question.

(7) Alternative question: not compatible

a. Yuehan xihuan pingguo **haishi** li **(*ma)**↑
John like apple OR.Alt pear MA

'Does John like apple or pear?' (Alternative question)

= 'Which does John like, apple or pear?'

b. Yuehan xihuan pingguo **huozhe** li **ma** ↑
John like apple OR pear MA

'Does John like apple or pear?' (Polar question)

= 'Is it the case that John likes apple or pear?'

Even in polar questions, *ma* cannot occur if the sentence already has another polar question morpheme, as in (8). The underlined forms in (8) are treated as containing polar question morphemes in Chinese literature (see Chao 1968, and Zhu 1982 for detailed depictions). (8a) and (8b) exemplify two types of A-*not*-A questions that are formed with different syntactic structures (cf. Tsai & Yang 2015), namely, V-not-V questions (VNVQ) and *shi*-not-*shi* questions (SNSQ). The question in (8c) superficially resembles English *or-not* questions, with *meiyou* 'not.Past (lit. not-have)'. The co-occurrence of these forms with *ma* results in ungrammaticality.

(8) *Ma* with other polar question morphemes:

a. Yuehan <u>xi-bu-xihuan</u> pingguo **(*ma)** ↑
John like-not-like apple MA

'Does John like apples?' (plain V-not-V question)

b. Yuehan shi-bu-shi xihuan pingguo **(*ma)** ↑
John yes-not-yes like apple MA

'Is it true that John likes apples?' (biased *shi-not-shi* question)

c. Yuehan chi pingguo mei-you **(*ma)** ↑
John eat apple not-have MA

'Has John eaten the apple(s)?' (*meiyou* polar question)

Though not explicitly stated in previous studies, the non-optionality and incompatibility of *ma*, when put together, often call for and do result in an analysis that treat *ma* as a functional head whose contribution is to turn a [-wh] clause into its [+wh] counterpart. Therefore, *ma* is analyzed as either a clause-typing head (i.e., a C head; Cheng 1991) or an interrogative force head (as in the Cartographic approach; Paul 2014; Pan 2019, 2022), without too much attention put on its syntactic nature. In the following section, I present a piece of novel data that shows *ma* is actually neither of the two and calls for more thorough investigations.

2.3. (Un)Embeddability

A generalization of *ma* in previous studies is that *ma* doesn't surface in embedding environments, and I agree that the generalization holds in most cases: It is well-established that MaQs cannot be embedded into relative clauses or sentential subjects (Li & Thompson 1981; Paul 2014; Pan 2019).

In (9a), for example, a MaQ (in square brackets) is embedded into a relative clause headed by *de*. This alone leads to ungrammaticality. The same generalization holds for sentential subjects, as shown in (9b).

Regarding complement clauses, however, the embeddability of *ma* varies in response to the matrix predicate. For some predicates, MaQs are not embeddable candidates, which is consistent with the previous generalization. For instance, the contrast in (10a) and (10b) shows that when the main predicate is *zhidao*, *ma* can only be construed with the matrix clause instead of the embedded clause.

(9) Relative clause and sentential subject: non-embeddable
a. *[Yuehan xihuan pingguo **ma**] de yingxiang bu zhongyao.
John like apple MA Rltv effect not important

Intended: 'The question of whether John likes apple is not important.'

b. *[Yuehan mingtian lai **ma**] qishi hen zhongyao
John tomorrow come MA actually very important

Intended: 'Whether John will come is actually very important.'

(10) MaQ in complement clauses:
a. Tamen zhidao [Yuehan lai] **ma**↑
They know John come MA

'Do they know John will come?'

b. *Tamen zhidao [Yuehan lai **ma**↑]
They know John come MA

Intended: 'They know whether John will come.'

Under certain contexts, however, embedded MaQs seem rather acceptable to my informants. Consider the sentences in (11). In this case, *ma* is construed with the embedded clause, but the sentence is not significantly deteriorated.

(11) Embedded MaQ:
(?)Tamen xiang zhidao [Yuehan jiehun-le **ma**↑][133]
They want know John marry-Pfv MA

[133] I am aware that in Pan (2019), a sentence of similar structure is marked as ungrammatical. After consulting with several native speakers of Mandarin, I conclude that my observation is quite robust. Hongkong Mandarin may differ from Northern Mandarin in this aspect, and I leave a more detailed study on variations for further research.

'They want to know if John is married.'

Notice that *zhidao* allows for a complement clause that has [+wh] feature. In (20)**Error! Reference source not found.**, the [+wh] feature of the complement clause is spelled out by the overt polar question construction V-not-V (*lai-bu-lai* 'come-not-come'). The sentence is perfectly grammatical; hence, it is clear that the selectional restriction of the main predicate is not at play here.

(12) Embedded [+wh] clause:
Tamen zhidao [$_{+wh}$ Yuehan **lai-bu-lai**], (ni bu yong gaosu tamen)
They know John come-not-come you not need tell them
'They know if John will come (, so you don't have to tell them).'

A point worth noticing is that the embedded MaQ is not a direct quotation. The pronominal binding test (McCloskey 2006; Bhatt & Dayal 2020; Dayal 2023) illustrated by (13) can be extended to Mandarin to tease the embedding of MaQs and quotations apart, as and (14)[134].

[134] Another piece of evidence might from the behavior of reflexive pronoun *ziji* 'self', the behavior of which clearly differentiates embedded MaQs from quotations, as follows:

(1) Mei ge ren$_i$ dou xiang zhidao Yuehan$_j$ gei ziji$_{i/?j}$ mai shui le ma
Every Cl person all want know John for self buy water Pfv MA
'Everybody$_i$ wants to know has John$_j$ bought water for himself$_{i/?j}$.'
(2) Mei ge ren$_i$ dou wen: "Yuehan$_j$ gei ziji$_{*i/j}$ mai shui le ma?"
Every Cl person all ask John for self buy water Pfv MA
'Everybody$_i$ wants to know, "has John$_j$ bought water for himself$_{*i/j}$?"'

The sentence in (1) shows that when subordinated by *xiang zhidao* 'want to know, wonder', the most prominent reading of *ziji* 'self' is to be co-indexical to the subject of the main clause, *mei ge ren* 'everybody'. In this reading, the sentence is only true when everybody is wondering if he is going to get water from John. By contrast, direct quotation blocks the speaker from binding *ziji*.

(13) Pronominal binding test (Dayal 2023):

a. Mary asked [whether **she/I/you** should leave]
⇝ **she** = Mary, **I** = speaker, **you** = addressee

b. Mary asked, "[shoud **she/I/you** leave?]"
⇝ **she** ≠ Mary, **I** = Mary ≠ speaker, **you** = the one who Mary asks ≠ addressee

(14) Pronominal in embedded MaQs:

a. Mali xiang zhidao **ta/wo/ni** keyi chi pingguo ma↑
Mary want know 3sg/I/you can eat apple MA

'Mary wants to know, can she/I/you eat apples?'

⇝ **she** = Mary, **I** = speaker, **you** = addressee

b. Mali wen: "**ta/wo/ni** keyi chi pingguo ma↑"
Mary ask 3sg/I/you can eat apple MA

'Mary asks, "can she/I/you eat apples?"'

⇝ **she** ≠ Mary, **I** = Mary ≠ speaker, **you** = the one who Mary asks ≠ addressee

The sentence in (13a) shows the binding behavior of pronouns when embedded in a standard subordinating context. In such context, *she* refers to the matrix subject *Mary*, *I* refers to the speaker, and *you* refers to the addressee. By contrast, in a direct quotation, *she* is not co-referent to the matrix subject, i.e., the person who uttered the quoted sentence. *You* and *I* do not refer to the interlocuters who are having a conversation about Mary. Instead, they refer to the participants of the quoted speech act.

The contrast shown in (13) is replicated in data concerning embedded MaQs. As shown in (14), we could clearly see the binding patterns of embedded MaQs in (14a) are in parallel to standard subordination in (13a), instead of direct quotation in (14b) and (13b).

Hence, *ziji* cannot be co-referential with *mei ge ren*. The sentence in (2) would only be true if everybody is wondering if **John** has bought water for John.

Therefore, we could conclude that what we see here is not quotation, but a special kind of subordination.

Other instances could be found where MaQs are embedded by specific constructions, as in (15). The most stable case across consultants is illustrated in (15), where the verb *guanxin* 'care about' surfaces as the main predicate of a subjective nominal clause. The *de* in (15) is taken as a nominalizer, as in Zhu (1982). When combined with *Mali guanxin* 'Mary cares about …', they form a nominal clause, namely 'what Mary cares about'. Most consultants believe such a copular clause could embed MaQs without deterioration.

(15) *Guanxin de shi* 'what one cares about is…':

Mali guanxin de shi, Yuehan xihuan yuyongxue **ma↑**

Mary care Nmlz be John like pragmatics MA

'What Mary cares about is whether John likes pragmatics.'

Again, the MaQ is not embedded as a direct quotation, as shown by the pronoun binding test in (16) that aligns with standard subordination. Notice that it is not an isolated case led by the selection of a specific predicate. Other semantically similar predicates, including but not limited to *xiang zhidao* 'want to know', *haoqi* 'be curious about', and *yilun* 'talk (about)', could also co-occur with *de shi* and then embed a MaQ. By contrast, *jide* 'remember' fails to embed a MaQ, but can take a A-*not*-A clause as its complement, as shown in (17).

(16) Pronominal binding test for *guanxin de shi*:

Mali guanxin de shi, **ta/wo/ni** yinggai chi pingguo ma↑

Mary care Nmlz be 3sg/I/you should eat apple MA

'What Mary cares about is, should she/I/you eat apples?'

⇝ **she** = Mary, **I** = speaker, **you** = addressee

(17) *Jide de shi* 'what one remembers is…'

a. *Mali jide de shi [Yuehan xihuan yuyongxue **ma]**
Mary remember Nmlz be John like pragmatics MA

Intended: 'What Mary is clear about is whether John likes pragmatics.'

b. (?)Mali jide de shi [Yuehan **xi-bu-xihuan** yuyongxue]
Mary remember Nmlz be John like-not-like pragmatics

'What Mary remembers is whether John likes pragmatics.'

Bhatt & Dayal (2020) also brought up an interesting example of embedded MaQs, where the temporal references (traditionally analyzed as subjects) surface at the end of the embedded chunk. The embedding pattern is replicated when I confirmed with my informants, as shown in (18).

(18) Examples and extensions from Bhatt & Dayal (2020):

a. Yuehan xiang zhidao xiayu-le **ma** zuotian
John want know rain-Pfv MA yesterday

'John wants to know whether it rained yesterday.'

b. *Yuehan zhidao xiayu-le **ma** zuotian
John know rain-Pfv MA yesterday

Intended: 'John knows if it rained yesterday.'

c. Yuehan zhidao **xia-mei-xiayu**[135] zuotian
John know rain-not.Pfv-rain yesterday

'John knows if it rained yesterday.'

One could go on listing constructions that embed MaQs, but I believe the data above are sufficient to prove that MaQs could be embeddable. I am also aware that different speakers' grammaticality judgement to the sentences shown above may vary, but a

[135] Here I take a simplified view that *mei* 'not' is a portmanteau form for *bu* 'not' and *le*, a perfective marker (see Wang, 1965). Therefore, V-*mei*-V is of similar questioning function as V-*bu*-V, except that V-*mei*-V only appears when questioning about past events. I will refer to the two forms uniformly as V-not-V questions.

rather robust intuition is that (11) and (18a) are less degraded than (10b) and (18b). This intuition leaves us confronted to a primary question: Why simply adding *xiang* 'want-to' to the main predicate leads to a shift in grammaticality when a MaQ is embedded? To answer this question, I believe, a closer investigation on the nature of *ma* is a good place to start. Therefore, in the following section, I try to discuss what *ma* is not and what *ma* might be.

3. What *ma* is not and might be

Following the motivation to account for the non-optionality of *ma* and its incompatibility with other Q-morphemes, I assume in the same vein as the Cartographic approach that *ma* should be a functional head.

In the following section, I first give more arguments for why this functional head is neither C head nor Force head. Then I point out a candidate for this head proposed in Dayal (2023).

3.1. What *ma* is not

Let us start with the C head analysis. For example, Cheng (1991) assumed in her typological investigation that both *ma* and A-*not*-A are Yes/No particles realized inside a clause. Such a kind of account will naturally predict that, since neither of *ma* and A-*not*-A exceeds the scope of CP, they should be both embeddable. The prediction isn't borne out, as the sentences in (19) shows that the very same predicate (*zhidao*, 'know') can embed an A-*not*-A question but not a MaQ.

(19) MaQ vs. A-*not*-AQ: complement clause

a. *Tamen zhidao [Yuehan lai **ma**↑]
They know John come MA

Intended: 'They know whether John will come.'

b. Tamen zhidao [Yuehan **lai-bu-lai**↓]
They know John come-not-come

'They know whether John will come.'

Different accounts for A-*not*-A questions may vary, but I think it is safe to say that they agree on the very basic point that A-*not*-A questions are derived without going beyond CP. In the same spirit, in (13b) we see that the presence of A-*not*-A inside a clause, together with whatever the underlying representation is, do not require the clause to be realized as a questioning move in conversation. The matrix clause is uttered as an assertion, while the [+wh] CP marked by A-*not*-A is embedded inside of it. That *ma* fails to surface in the same context, as in (13a), simply excludes the possibility of treating *ma* as the same kind of C head that marks the clause type.

Another seemingly possible analysis is to treat *ma* as an illocutionary force head, but it also fails to cover the empirical facts. An interrogative force head marks the sentence as an interrogative, and by uttering a sentence as an interrogative, the speaker puts the addressee under the obligation of addressing the question. Naturally, this head is assumed to be higher than the clause-typing CP, and in general, such projections should be subject to more restrictions when they are to be embedded. For example, Pan (2019) stipulated that higher SFPs are harder to embed because they encode more information about speaker's subjectivity. The notion of illocutionary force, by definition, falls into the concept of subjectivity, and therefore, if *ma* is a force marker, that it doesn't easily embed seems to come for free[136].

The force head analysis, however, is challenged by our new piece of evidence. Other force heads, such as *ne* (Yuan & Hara 2013) and *a* (Pan 2019), typically lead to a more serious degradation when they are embedded, as in (20), whereas embedded MaQs are acceptable for many informants.

(20) Typical force markers:

a. Mali guanxin de shi, ??Yuehan **xi-bu-xihuan** yuyongxue **ne**↑

[136] I am using the word *embed* in a syntactic sense, i.e., ForceP's surfacing as a complement clause or so. A consequential prediction is that only predicates of direct quotations can embed ForcePs, like *say*, *ask*, and *order*. I am aware of the fact that from a more semantic point of view, a speech act should be able to serve as an argument of certain operators, as proposed in Krifka (2014). I believe these two ways of thinking are not contradictory.

Mary care Nmlz be John like-not-like pragmatics FORCE

Intended: 'What Mary cares about is whether John likes pragmatics.'

b. Mali guanxin de shi, *Yuehan **xi-bu-xihuan** yuyongxue **a**↑
Mary care Nmlz be John like-not-like pragmatics FORCE

Intended: 'What Mary cares about is whether John likes pragmatics.'

c. Mali guanxin de shi Yuehan **xi-bu-xihuan** yuyongxue
Mary care Nmlz be John like-not-like pragmatics

'What Mary cares about is whether John likes pragmatics.'

Now we can briefly depart from interrogatives to imperatives. (15a) demonstrates an imperative with *ya*, an SFP often considered an imperative marker. I take that it belongs to one of the force heads. The contrast between (15b) and (15c) shows that a ForceP is unembeddable unless directly quoted. Notice that the sentence structure of (15c) is exactly parallel to (21), where an embedded MaQ occurs. The difference in embeddability indicates that embedding a ForceP is more restricted than embedding a MaQ.

(21) Imperative marker *ya*:

a. (Ni) chi **ya**!
You eat FORCE

'Eat!'

b. Yuehan mingling dao: "(Ni) eat **ya**!"
John command say you eat FORCE

'John commands: "Eat!"'

c. *Yuehan mingling Shanmu de shi, chi **ya**
John command Sam Nmlz is eat FORCE

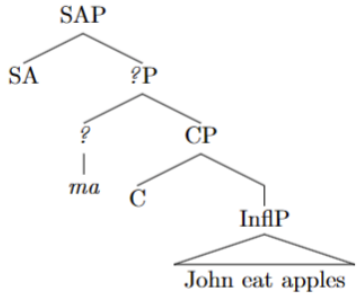
Intended: 'John commands Sam to eat.'

Compared with typical force heads such as *ne*, *a* and *ya*, it seems that *ma* has properties different from an interrogative force marker. But then, what is the nature of *ma*? We can go one step further along the Cartographic approach by saying that *ma* is generated in between CP and ForceP.

3.2. What *ma* might be

Given that a MaQ is easier to embed than an ForceP but harder to embed than a CP, one could further suggest that *ma* should be sitting somewhere between a C head and a force head. Naming it *?* head for now, we now have a 3-layered interrogative left periphery in Mandarin.

(22) Part of the left periphery in Mandarin:



Setting a *?*P between ForceP and CP helps us account for the systematic distinction between predicates that can embed a MaQ (*care about*, *want to know*, *discuss*, and so on) and those that cannot (*know*, *tell*). The distinction between these predicates seems to align with the distinction between the notion of responsive predicate and rogative predicate. A responsive predicate could take a complement regardless of its wh-feature, whereas a rogative predicate could only take a [+wh] complement, as shown in (23).

(23) Responsive *know* vs. rogative *wonder*:

a. Mary knows that$_{[-wh]}$/whether$_{[+wh]}$ John likes apples.

b. Mary wonders *that$_{[-wh]}$/whether$_{[+wh]}$ John likes apples.

I follow the lines of McCloskey (2006), Bhatt & Dayal (2020), and Dayal (2023) and assume that these predicates differ in their ability to take complements that are larger than CP. This idea is first proposed to account for English embedded inversion: English responsives cannot take an inverted question as its complement. According to McCloskey's analysis, an additional functional layer is involved in subject-predicate inversion. It is this additional C that prevents responsives from embedding inverted questions.

(24) Responsive vs. rogative (from Bhatt & Dayal 2020):

a. Responsive: ... [$_{CP1}$ ...
I found out how they got into the building.

*I found out how **did** they get into the building.

b. Rogative: ... [$_{CP2}$ ... [$_{CP1}$ ...
I asked him from what source the reprisals could come.

I asked him from what source **could** the reprisals come.

Bhatt & Dayal (2020) and Dayal (2023) applied this analysis to Hindi-Urdu *kyaa*, an optional particle that is less restricted in matrix clauses than in subordinated clauses. *Kyaa* can occur in the complement of most rogative predicates but not in the complement of any responsive predicates in matrix declarative sentences. This is shown by the contrast in (25). *Jaan-tii* 'know' is a typical responsive predicate, whereas *jaan-naa caah-tii* 'want to know' as a whole serves as a rogative predicate.

(25) Hindi-Urdu *kyaa* (Bhatt & Dayal 2020):

a. *Anu jaan-tii hai [ki kyaa tum caai piyoge]
Anu.F know-Hab.F be.Prs.Sg that Q you tea drink.Fut.2.M.Pl

Intended: 'Anu knows whether you will drink tea.'

b. Anu jaan-naa caah-tii hai [ki kyaa tum caai piyoge]

Anu know-Inf want-Hab.F be.Prs.Sg that Q you tea drink.Fut.2.M.Pl

'Anu wants to know whether you drink tea.'

Connsidering the corresponding pattern of embedded MaQ, repeated in (26), it seems plausible to assume the distinction between rogatives and responsives also exists in Mandarin.

(26) Embedding MaQs: responsives ×; rogatives √

a. *Mali qingchu de shi [Yuehan xihuan yuyongxue **ma]**
Mary clear Nmlz be John like pragmatics MA

Intended: 'What Mary is clear about is whether John likes pragmatics.'

b. Mali guanxin de shi, [Yuehan xihuan yuyongxue **ma**↑]
Mary care Nmlz be John like pragmatics MA

'What Mary cares about is whether John likes pragmatics.'

(27) Epistemic bias: responsive vs. rogative (adapted from Ye 2021)

a. Tamen zhidao Lisi shi-bu-shi xihuan yuyongxue.
They know Lisi yes-not-yes like pragmatics

'They know whether it is pragmatics that Lisi likes.'

⇝They conjecture that Lisi may like pragmatics.

b. Tamen xiang zhidao Lisi shi-bu-shi xihuan yuyongxue.
They want know Lisi yes-not-yes like pragmatics

'They want to know whether it is pragmatics that Lisi likes.'

⇝They conjecture that Lisi may like pragmatics.

Such an assumption is not *ad hoc*, for it may help capture other linguistic phenomena aside from embedded MaQs. For example, Ye (2021) reported that a positive epistemic bias could be conveyed by embedded *shi-not-shi* questions only when the matrix

predicate is rogative, as in (27): (27a) and (27b) forms a minimal pair: they differ only in the main predicate. Again, *zhidao* 'know' belongs to responsives, whereas *xiang zhidao* 'want to know' is a rogative. The contrast between (27a) and (27b) could only be attributed to the difference in what is embedded. That is to say, a group of predicates systematically takes complements larger than CP, with embedded MaQs being one specific case.

To wrap it up, analyzing *ma* as the head of a phrase above CP and below ForceP helps account for the fact that Mandarin MaQs replicate what has been observed on Hindi-Urdu embedded *kyaa* and English embedded inversion.

4. Conclusions and future directions

In this paper, I argued that *ma* is generated as a functional head in between the clause-typing phrase and the illocutionary phrase, based on a set of embeddability tests. I think now is the proper time to discuss a speculation mentioned in Bhatt & Dayal (2020) and Dayal (2023).

Bhatt & Dayal (2020) considered *ma* a candidate of polar question particles, which are represented by Hindi-Urdu *kyaa*. Dayal (2023) further proposed *kyaa* is semantically vacuous and selects for a singleton set of propositions, postulating that *kyaa* is a particle in the Spec of PerspectiveP, right above CP.

Is *ma* generated in the same layer (i.e., PerspectiveP)? For now, I have not too much evidence. We see that some predicates filter the speaker's bias carried by embedded clauses, as shown in (27). This do suggest that the embedded constituent might be a perspective phrase. In matrix clauses, the perspective phrase links to the speaker, conveying speaker's bias, whereas in embedded clauses, such linking is blocked by the matrix subject, which is not necessarily the speaker.

Is *ma* a polar question particle? The answer is *yes* and *no*, depending on what the essential properties a polar question particle should possess. *Ma* is similar to *kyaa* in the sense that it is generated outside the clause-typing phrase, as proved in section 3. Nevertheless, in the current analysis, *ma* is generated as a functional head instead of a specifier. Considering their contribution to sentence meaning, *ma* is needed for the composition of a polar question, because it exhibits non-optionality, but *kyaa* is just optional. As we have seen in (4), removing *ma* from a MaQ results in a

DecQ, not a canonical polar question which one would expect if s/he assumes *ma* is semantically vacuous.

Zooming out from the study of *ma*, the sentence-final particles in Mandarin are a curious cluster of words worth a closer look. They generally work as functional heads in the proposition-discourse interface (the wording is from Rizzi 1997). On the one hand, they are sensitive to the propositional content inside the sentence. On the other hand, they look out to the superordinate structure and help articulate the sentence into discourse. Especially, SFPs are essential syntactical parts of the sentences. Native speakers share the intuition that they are not like question tags or additional discourse markers, which are fragments loosely attached to a sentence. They should be a part of the syntax, with their semantics, and used in a way that follows certain pragmatic mechanisms. This study only touched on the syntactic properties of one single SFP, namely *ma*. There is more to work on. A proper theory for particles should come as an interfacial one. Trying to capture the behavior of particles with a single approach might sometimes lead to a dilemma: one either faces the risk of pushing the limits too far to wire everything down into a single module, or one leaves some of the essential and interesting phenomena untouched. I hope this research exhibits the necessity of looking into different modules. Let us go to the interface.

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How to 'Become'? The Morphosyntax of Chinese *hua*

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This paper investigates the multifunctionality of the Mandarin Chinese item *hua* and proposes a unified account of its morphosyntactic and semantic properties. The '-*hua*' in 'X-*hua*' construction has a fixed position and an abstract meaning: 'property change'. Hence, in the literature, '-*hua*' has been widely identified as a distinct item, e.g. a 'verbal suffix' (Tang 2002), 'affixoid' or 'verbalizer' (Deng 2020). However, this study presents an empirically-based counterargument that there is only one *hua*. Following the spirit of Distributed Morphology, I argue that the Vocabulary Item *hua* can be inserted into diverse syntactic terminal nodes, including: (a) a Root node that can be directly categorized, or root-Merge (Hu & Perry 2018) with another root; as well as (b) a functional head position. Furthermore, '-*hua*' serves as a semantic head that exerts a semantic coercion on 'X', but it does not function as a categorizer.

1. Introduction

In Mandarin Chinese, the item *hua*(化) has diverse functions. It can serve as a verb, or a component in compounds with idiosyncratic meanings, as shown (1) and (2). It can also occur as an element in constructions, conveying an abstract sense of 'become', as in (3) and (4).

(1) *bing hua le*. 雪化了。
ice HUA LE

'The ice melted.'

(2) a. *jin-hua* 进化
advance-HUA

'(for creatures) to evolve';[137]

b. *fen-hua* 分化

split-HUA

'(for cells, interpersonal relationships…) to split up';

c. *zuo-hua* 坐化

sit-HUA

'(for respectable Buddhist monks) to pass away'.

(3) *women yao hua beitong wei liliang.* 我们要化悲痛为力量。
1sg.PL should HUA grief be strength

'We should turn grief into strength'.

(4) a. *ou-hua* 欧化
Europe-HUA

'to become having European features; to Europeanize';

[137] Note that, the glossing for words only represents one possible interpretation and is not exhaustive. For example, glossing a word as 'to do sth.' does not mean that it can only be verbal in Chinese. The glossing is in line with the Leipzig Glossing Rules, except for several language-specific particles, the exact grammatical meaning of which is beyond the scope of this study: (1) *le* 'LE' is an aspectual or temporal particle, (2) *de* 'DE' can be a possessive marker or adverbial phrase marker.

b. *chang-xiao-hua* 长效化

long-effect-HUA

'to become long-lasting in effect';

c. *zui-da-hua* 最大化

most-big-HUA

'to become largest';

d. *shi-lao-hua* 适老化

suit-old-HUA

'to become suitable to aging' (a name of government policy).

Specifically, in cases like (4), *hua* is always located on the right, and stably expresses an abstract meaning of 'property change'. Besides, the words formed by such *hua* have a canonical use as verbs. Thus, *hua* in a word like (4) (henceforth **'X-*hua*' construction**) is often analyzed as a verbal suffix, and is regarded as the Chinese equivalent of English suffixes '*-ize, -ify*' in the literature (Wang 1980; Tang 2002; Deng 2020).

However, *hua* is not simply the Chinese counterpart of the English suffixes, it actually exhibits more intriguing properties. To mention one, *hua* is an element that has a more complicated distribution than English verbal suffixes. English '*-ize, -ify*' have a relatively stable distribution and meaning. In contrast, *hua* occurs in different positions while retaining the core meaning, which can be roughly summarized as 'transformation into another form or property' -- but the interpretation may vary, e.g. 'melt' in (1) and 'pass away' in (2c). Properties like this clearly need an explanation.

In previous studies, the multifunctionality of *hua* has been attributed to its multifaceted nature, e.g. as being different roots and verbalizers (Deng 2020). Such

accounts are insufficient to capture the semantic core among in *hua*'s different usages.

Summarizing, some questions need to be further answered: why can *hua* occur in such heterogeneous morphosyntactic environments? How does it realize different meanings: when is it interpreted as an abstract 'become', and when can it convey a slightly different meaning? (Is there a systematic pattern of meaning negotiation?) How to account for the properties of *hua* in 'X-*hua*' construction?

The remaining sections are organized as follows. Section 2 provides a more detailed description of *hua* and briefly reviews previous analyses. Section 3 outlines the theoretical toolkit. Section 4 presents a unified account of the occurrences of *hua*. Section 5 concludes.

2. Description of 'hua' and previous analysis

2.1. An overview of 'hua'

Despite occurring in different environments, the phonological form of *hua* remains the same, i.e. /xua^{51}/. Therefore, from the perspective of *form*, the only thing we can refer to is the distributional contexts. The occurrences of *hua* can be classified into two basic types: simplex form '*hua*' and component of complex form ('X-*hua*', '*hua*-X', etc.). The examples in (5) demonstrate *hua* in simplex forms.

(5) 'Simplex verb' *hua*.
a. *xuegao hua le*. 雪糕化了。
ice.cream HUA LE
'The ice cream has melted.'
b. *xuegao hua cheng naiyou le*. 雪糕化成奶油了。
ice.cream HUA become cream LE
'The ice cream has turned into cream.'
c. *qianyanwanyu hua zuo yi ju xie-xie*. 千言万语化作一句谢谢。

thousands.of.words HUA be one CL thank.you
'Thousands of words are reduced into a 'thank you'.'

d. **qianyanwanyu hua (le).* *千言万语化（了）。
thousands.of.words HUA LE
'(intended.) Thousands of words are reduced.'

e. *qiye bu-de-bu hua zheng wei ling, fensan jingying.*
企业 不得不 化 整 为 零，分散 经营。
entreprise have.to HUA whole be part separate run.business
'The enterprise has to divide the whole into parts and run separately.'

All the *hua* in (5) can be analyzed as verbs, with only differences in complexity of predicates. Additionally, in (5a) to (5d), the subject is the theme argument, while in (5e) the subject is an external argument such as an agent.

Starting with the simplest cases, in (5a), the *hua* serves as the predicate verb, indicating a melting event from solid to liquid. When *hua* is used independently as the predicate, in normal cases, it can only be interpreted as 'to melt' and must take an argument that is of solid material. However, when the predicate contains additional material, the meaning of *hua* can be slightly different. In (5c), *hua* no longer indicates a melting event, but a 'reducing' event. Comparison between (5c) and (5d) shows that *hua* is insufficient to express meaning other than 'melt' all by itself. In sentences like (5e), the meaning of *hua* is not 'melting' but a 'splitting/reducing/transforming' event. The interpretation of *hua* varies depending on its context, but native speakers feel that all interpretations of verbal *hua* share a core meaning of 'transformation into a state/form', or simply put, 'become'.

Hua can also serve as the component of complex words. Generally, complexes with *hua* can be divided into types according to the relative position of *hua* in the word. If we, for the sake of simplicity, ignore words with highly idiosyncratic

meaning[138], idioms, and technical terminologies, then there are just words in 'X-*hua*' form left. Some examples are shown in (4), and (6) below.

(6) *Hua* in a complex word. (excerpted from Tang 2002)
a. *qi-hua* 汽化
vapor-HUA
'to vaporize';
b. *zhidu-hua* 制度化
system-HUA
'to institutionalize';
c. *minzhu-hua* 民主化
democracy/democratic-HUA
'to democratize';
d. *gouzaidui-hua* 狗仔队化
paparazzi-HUA
'to become (like) paparazzi';

Words in (6) generally have compositional meanings: all of them can convey a meaning of property change, and the direction of this change is indicated by 'X'. Therefore, they can be seen as examples of 'X-*hua*' construction.

However, not all words in a 'X-*hua*' form belong to the 'X-*hua*' construction. Examples in (7) illustrate a systematic ambiguity.

[138] To list a few: '*hua*-X' words like *hua-zhuang*化妆 'make up', *hua-yuan*化缘 'to ask for alms', *hua-xue*化工 'chemical industry'; 'X-*hua*' words like *wen-hua*文化 'culture', *zao-hua*造化 'nature', *jiao-hua*教化 'to civilize; civilization', *yu-hua* 羽化 'become celestial and immortal'(Taoism), *zuo-hua*坐化 in (2c), *bian-hua*变化 '(to) change', *zhuan-hua*转化 'to transform; transformation', *rong-hua*融化 'to melt', *rong-hua*溶化 'to dissolve', *xiao-hua*消化 'to digest', *huo-hua*火化 'to cremate', *fen-hua*焚化 'to incinerate', *feng-hua* 风化 'weathering'.

(7) Structurally ambiguous 'X-*hua*' words
a. *xiao gou meng-hua le wo de xin*. [resultative]
小 狗 萌 化 了 我 的 心。
little dog cute-HUA LE 1sg. POSS heart
'The little dog is so cute that my heart is going to melt.'
b. *ta meng-hua le ziwo xingxiang.* (src: BCC corpus) [X-*hua* construction]
他 萌化 了 自我 形象。
he cute-HUA LE self image.
'He makes his image cute (win the support of young people).'
c. *wo yao re-hua le*. [resultative]
我 要 热化 了。
1sg. be.to hot-HUA LE
'I am going to melt down due to hotness.'
d. *fangzhi fangdichan guodu re-hua*. (src: BCC corpus)[X-*hua* construction]
防止 房地产 过度 热化。
prevent real.estate excessive hot-HUA
'Prevent that the real estate market from becoming overheated.'
e. *yachi yao tian-hua le*. [resultative]
牙齿 要 甜化 了。
teeth be.to sweet-HUA LE
'The teeth is going to melt due to sweetness.'
f. *xiaorong zhujian tian-hua*. [X-*hua* construction]
笑容 逐渐 甜化。
smile gradually sweet-HUA
'The smiles gradually become sweeter.'

As shown in the glossing, words in 'X-*hua*' form can be interpreted as words in 'X-*hua*' construction, but they can also be regarded as resultative compounds. In a resultative compound, generally the right component denotes the caused event, while the left component indicates the causing event. Note that not all resultative 'X-*hua*' are ambiguous; (8) shows one example of 'pure' resultative verbs.

(8) *taiyang shai-hua le xue*.
太阳 晒化 了 雪。
sun shine.upon-HUA LE snow
'The sun caused the snow to melt by shining upon it.'

In a resultative 'X-*hua*' verb, the meaning that *hua* can convey is stable and limited to 'melt' (if we count in the rhetorical use) -- the exact same meaning of *hua* used independently as the predicate verb.

The systematic interpretative difference of 'X-*hua*' complexes above suggests that 'X-*hua*' complexes can be assigned with different structures. In section 4, I will propose an analysis for these structures, and also for *hua* in other functions including verb, and the component of a complex with idiosyncratic meaning.

2.2. Same item or not?

In the literature, the multifunctionality of *hua* has usually been described as functions of separate *hua* items. Previous studies pay most attention to the 'X-*hua*' constructions (usually termed as 'derivative verbs', while the rest of complexes containing *hua* are regarded as 'compounds'). As mentioned before, '*hua*' in 'X-*hua*' constructions is analyzed as a verb ending/suffix/affixoid (Wang 1980; Tang 2002; Deng 2020). While researchers disagree on the endogeneity/exogeneity of the suffix-like '*-hua*', they agree on identifying '*-hua*' as a distinct item first.

However, there are still reasons to regard the so-called different *hua* as the uses of the same single item. Not only are they phonologically the same, but they also share a certain degree of semantic unity. As Tang (2002) recognized, the lexical conceptual structures (LCS) of the compound component *hua* and the suffix *-hua* are inherited from the LCS of the verb *hua* 'to become'. Moreover, the other uses not mentioned in Tang's work, such as the verb *hua* 'to melt' and the resultative 'X-*hua*', also preserve the core meaning 'transformation'.

2.3. Zooming into 'X-hua' construction

This section will begin by outlining some widely recognized generalizations about the 'X-*hua*' construction in the literature. Then I will propose some new observations.[139]

According to previous research (Wang 1980, Tang 2002, and subsequent works), the suffix '*-hua*' can be attached to a nominal or adjectival stem to form a verb, expressing the transformation of a property or state. The stem 'X' indicates the direction of this transformation, and it can just be a 'hint' that is very euphemistic, semantically indirect:

(9) *yi jiao xing-lai sangzi baojuan-hua le*. (coinage in weibo)
一 觉 醒来 嗓子 宝娟化 了。

one sleep wake.up throat proper.name-HUA LE

'When [I] woke up, [my] throat becomes sore and I am unable to speak.'

In (9), X is the name of a character in a famous TV series, but the word can indicate 'to become unable to speak due to sore throat'. That is because the name *baojuan* appears in a classic line: *baojuan, wo de sangzi* 'baojuan, my throat (is broken)'. Thus, although *baojuan* can always speak, her name can be a hint to a sore throat. My native speaker consultants all have an immediate understanding of the neologism, demonstrating the psychological reality of the 'X-*hua*' construction.

[139] About the methodology: I used a Python program to retrieve posts containing '*hua*' from Internet social platforms. Then I examined the data and picked out the complexes in 'X-*hua*' form. Thousands of 'X-*hua*' neologisms are collected, including coinages on Weibo (April 2022 to May 2023), Douban (Jan to May 2023), Southern Weekly (April 2022 to April 2023).

Previous studies have been mostly concerned about the morphosyntactic properties of 'X-*hua*' constructions. We have observed that most 'X-*hua*' words can be used as verbs, which may be the reason why the construction has been (hastily) classified as verbal in most of the literature. However, 'X-*hua*' words can function as 'nominal' or 'adjectival', too. See (10), which are not canonical uses for a 'verb' in Chinese grammar.

(10) 'X-*hua*' not used as a verb predicate.

a. *guanxi biande duoyang-hua le.* [serving as the complement of '*biande*']
关系 变得 多样化 了。
relationship become diverse-HUA LE
'The relationships become diversified.'

b. *yonghu pianai gexing-hua shezhi*. [modifying the object nominal]
用户 偏爱 个性化 设置。
user prefer individuality-HUA setting
'The users prefer personalized settings.'

c. *ni bu neng jiandan-hua de yigaierlun.* [modifying the predicate with '*de*']
你不 能 简单化 地一概而论。
2sg. not can simple-HUA DE generalize.
'You cannot generalized it in a (over)simplified way.'

d. *shidai huhuan gongye-hua*. [serving as the object]
时代 呼唤 工业化。
era call.for industry-HUA
'The era calls for industrialization.'

Zhang (2002), Tang (2002) made some generalizations about how the number of syllables, meaning, and 'category' of X influence the overall 'verbal property' of the whole word, e.g. when X contains more syllable, it is harder for 'X-*hua*' to take a direct

object.

Nevertheless, some points in the previous generalizations need further considerations. First, Chinese lacks morphological clues to indicate the category of a word, so the notion 'category' should undergo more careful consideration. Second, it is doubtful whether the 'X' part bear a categorial feature. Examples in (4a) (6a) have already shown that 'X' can be a root. Actually, 'X' can also be a non-word like (4d), or 'phrases' like (4c). Besides, even when 'X' can independently stand as a free form elsewhere, it might be assigned to different categories. For example, in *ji-xie-hua*, the 'X' can be seen as a noun 'machine' or an adjective 'rigid like a machine'. Some studies recognized this phenomenon as 'X being a multi-category word(兼类词)', but we should consider the possibility that there is no such category at all.

Earlier studies focused on the morphosyntactic properties of the 'X-*hua*' construction and paid less attention to its semantic properties. I follow the generalization that 'X-*hua*' expresses a change of property whose direction is denoted by X, but I also propose that the construction employs a semantic coercion mechanism, extracting a PROPERTY meaning from the component 'X' to fulfill the semantic requirements of the entire construction, even if 'X' does not inherently denote a property.

(11) 'X' inherently denotes a property. (selection)
ruo-hua 弱化
weak-HUA
'to become weak';

When X can inherently denote a property, then saying 'X-*hua*' simply means 'certain property of someone/something changes towards X'. Note that X does not necessarily have a category of 'adjective'.

In other cases, what 'X' inherently denotes is not a property, but an entity or action. In a 'X-*hua*' construction, such 'X' is coerced to generate a 'property' meaning related to it. In (12), X refers to a concrete or abstract 'thing', but 'X-*hua*' does not mean that 'to really become this thing'; in (13), X refers to an action or a situation, but 'X-*hua*' does not mean that 'to perform this action / undergo this situation'.

(12) 'X' inherently denotes an/a kind of entity. (coercion)
a. *sui-pian-hua* 碎片化
fragment-HUA
'(for study time) to become fragmentary';
b. *die-hua* 爹化
dad-HUA
'to become fatherly; to become male chauvinist'(Internet neologism);
c. *ren-ge-hua* 人格化
personality-HUA
'(for a non-human being) to become to have personality';
d. *bian-yuan-hua* 边缘化
edge-HUA
'to become marginal, situated at the edge'.

(13) 'X' inherently denotes an action/situation. (coercion)
a. *tiao-yue-hua* 跳跃化
jump-HUA
'(for way of thinking)to become jumping, non-linear';
b. *ding-zhi-hua* 定制化
customize-HUA
'to become customized';
c. *fang-shou-hua* 防守化
defend-HUA
'(for a player's role) to become defensive' (Internet neologism)'.

Examples above show possible ways of generating a property meaning. In

cases where 'X' refers to a THING, we can extract the PROPERTY entailed in the proper meaning of 'X', such as in (12a); use encyclopedia knowledge (dependent on the sociocultural context) to extract the characteristic property of 'X', such as in (12b); or, add some predicate to 'X' to form an appropriate 'property' meaning for the intended theme, as shown in (12c) (12d). In cases where 'X' refers to a SITUATION/ACTION, we can either extract the internal characteristic property (manner, result, etc.) of 'X', or 'repeat' 'X' to make it a function or characteristic for the intended theme.

Researchers seldom discuss how 'X' conforms to the overall requirement of meaning of the word (if any discussion, see Hu 1982, Tang 2002), and the existing analyses about the semantics of 'X-*hua*' are problematic in two aspects. First, 'X' is subclassified according to its 'category' which I argue to be nonexistent (at least inside 'X-*hua*' words). Thus, the analysis based on this classification is also dubious. Second, little attention has been paid to the cases where 'X' denotes an action or a situation (and if any 'category' in the traditional sense, X may be a 'verb'). However, such cases are non-accidental in actual use. Therefore, the mechanism I proposed here is empirically superior to former accounts.

To summarize this section, I propose that apparently 'different' *hua* are in essence the same item occurring in different environments, based on the observation that they share the same phonological form and a core meaning. I also observe that compositional 'X-*hua*' words may be assigned with two different structures, i.e. 'X-*hua*' construction and resultative compounds. The meaning of '*hua*' in the latter structure is closely related to the meaning of *hua* serving as an independent verb. Finally, I argue that the 'X' in 'X-*hua*' construction do not have a categorial feature. Meanwhile, 'X' is subject to semantic coercion: it is selected by the construction in terms of its semantic type.

3. Theoretical Toolkit

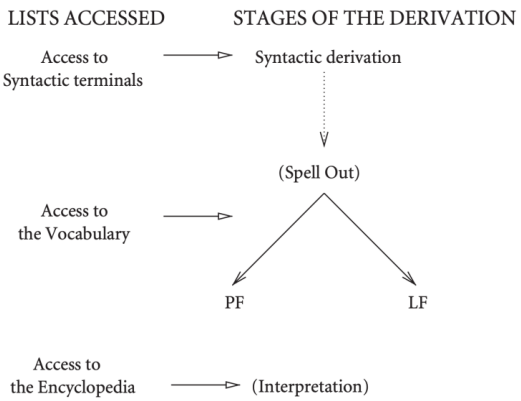
In this section, I will outline the basic theoretical assumptions which will be adopted in the subsequent analysis, including essentials of Distributed Morphology

(DM, see Halle & Marantz 1993, Marantz 1997, Harley & Noyer 1999, Embick & Noyer 2007, Bobaljik 2017 a.o.) and its assumptions about Roots. Then I will briefly introduce a previous account for *hua* which adopt the same general theoretical framework.

3.1. Distributed Morphology and Categorization Assumption

Distributed Morphology is a syntactic approach to word-formation. According to DM, the generative system deriving the internal structure of words is the same one deriving the syntactic structures, i.e. there is only one generative system. Word formation is 'distributed' in the architecture of Grammar (see (14)), in which the hierarchical syntactic structures are derived by the syntax, and sent to the interfaces after spell-out.

(14) The Architecture of Grammar, with lists (from Embick & Noyer 2007)



As shown above, in DM's framework, the unified 'lexicon' which combines phonological, syntactic, and semantic information no longer exists, but is replaced by three separate lists that are accessed at different stages of derivation: (a) the list of syntactic terminals, accessed during the syntactic computation; (b) the Vocabulary, accessed in PF branch after spell-out, more specifically in the

Vocabulary Insertion; and (c) the Encyclopedia, accessed during the interpretation.

Specifically, the three lists are as follows. in the first list, the terminals on which syntax operates are divided into two types: abstract morphemes and Roots. Abstract morphemes do not carry phonological features but only grammatical (synsem) features, and get their exponents in the Vocabulary Insertion in PF branch. Roots are represented in a form like √CAT, and do not carry any grammatical feature. Whether Roots carry phonological features from the beginning is still under discussion. Items stored in the second list are called Vocabulary Items (VIs). VIs are essentially rules which stipulates the grammatical features (and contexts) needed for inserting a phonological form into a syntactic node. The third list, Encyclopedia, contains idiosyncratic meanings that need to be memorized. By separating different kinds of information in three lists, DM aims to account for the derivation of word-internal structures in terms of universal syntactic operations (i.e. Merge and Move).

Specifically, DM proposes a general assumption that Roots are themselves category-neutral, and cannot appear 'bare' without being categorized. In other words, Roots must be assigned with categorial features so that they can appear (the Categorization Assumption, see, e.g. Marantz 1997, Embick & Noyer 2007). In languages like English, Roots are categorized by being in a local relationship with some category-defining functional heads (*n, v, a*). The category-defining heads, or 'categorizers', may be overt in phonological forms, such as in '*verbalization*' ('*-al*' as *a*, '*-ize*' as *v*, '*-ation*' as *n*); or it can be null, such as in '*walk*' (combined with *v* or *n*). It is not clear yet whether Chinese has similar phonologically overt category-defining functional heads. Hu (2024) takes the stance that Chinese does not necessarily have counterparts of English category markers, because what DM assumes to be universal is 'the categorial features' (at least N and V), but not markers of them. Therefore, it is also possible for Roots to be categorized in other ways than by a category-defining head; for example, categorized by the structure it enters.

3.2. Possible ways to Merge a Root

The nature of Root as a terminal node is closely related to the possible ways it can get Merged.

De Belder et al. (2015) proposed that Roots are defined structurally. Specifically, it is the first Merge operation (named Primary Merge) in each cyclic domain which creates a 'Root' node, which is a radically empty position (marked as Ø) at the foot of the hierarchical structure. In Vocabulary Insertion, this Root position Ø can be inserted with a VI which does or does not have grammatical features; but in either case Ø cannot project. That means the grammatical features which VI possibly carries will not have any syntactic effect in a Ø position.Note that according to De Belder et al. (2015), the syntactic operation Merge is always asymmetric, including the Primary Merge which creates the Root node. This stance seems to leave no room for a Merge which happens *symmetrically* between two roots.

However, Hu & Perry (2018) proposes that symmetric root Merge does exist, which is evidenced by non-compositional compounds (NCCs) in Yixing Chinese. In such NCCs, the acategorial roots are not merged asymmetrically, so the overall meaning of the word and relative linear order of morphemes are both argued to be determined post-syntactically, offered by Encyclopedia entry. It is also mentioned that these non-compositional compounds resulted from diachronic reanalysis of a compositional structure. This way of combination of two acategorial roots offers a viable account for compounds which have non-compositional meaning[140]. From a synchronic point of view, the root Merge seems distinct from symmetric Merge: the latter derives a hierarchical structure which gets labelled and linearized in a systematic way, while the former must resort to the Encyclopedia for its overall meaning, label, and linear order. Hence, it seems feasible to extend the root-Merge account to the non-compositional compounds in Mandarin.

[140] It seems to me that the root Merge does not 'generate' a 'structure' in traditional sense. I wonder whether it can still be called a 'Merge' operation. So, I just call it 'way of combination'.

3.3. Analysis in Deng (2020)

Deng (2020) analyzed *hua* in Mandarin Chinese from a DM perspective and compared them to the English suffix '*-ize*'. His basic idea about *hua* is that *hua* should be divided into Root √HUA and verbalizer v_{HUA}.

As the alleged two different *hua* cannot be differentiated phonologically, Deng offered a method to identify these morphemes: In a complex word, if *hua* is located on the left, then it is a Root; if *hua* is located on the right of a multi-syllabic word (syllable number >=3), then it is a verbalizer; for those bi-syllabic 'X-*hua*' words, those with Roots can be exhaustively listed, and the *hua* in the rest are verbalizers.

The proposal seems problematic in several ways. First, resultative 'X-*hua*' verbs have not been considered. Since the resultatives are also compositional in meaning, cannot be exhaustively listed and may be more-than-three-syllabled (e.g. *ke-ai-hua* roughly equals to *meng-hua* in (8a-8b)), the way to identify them in Deng (2020) is invalidated.

Second, the analysis is inconsistent: it is assumed that the 'X' in 'X-*hua*' in some cases are category-less, but in other cases have syntactic categorial features. For example, Deng argues that the ambiguity of *ji-xie-hua* '①(for troops) to become mechanized; ②(for moves) to become rigid' comes from the difference of categories of *ji-xie* 'machine; be machinery'. But it is likely that the 'X', when combined with *hua*, is not at all categorized and does not have a fixed denotation either. Besides, the ambiguity does not necessarily come from the category, e.g. *die-hua* in (12b) can also have multiple meanings, because there exists more than one characteristic property related to *die* 'dad'.

Third, no solid argument is provided to support the claim that *hua* functions as a verbalizer in 'X-*hua*' construction. And if 'X' indeed has syntactic category in 'X-*hua*', then in some cases 'X' can itself be a verb, as in (13b), and there is no need to verbalize what is already a verb. We can actually find the contribution of *hua* in other aspects:

(15) X vs. X-*hua*
a. *siwei tiaoyue le.* 思维跳跃了。
thinking jump LE
'The thinking jumps.'
b. *siwei tiaoyue-hua le.* 思维跳跃化了。
thinking jump-HUA LE
'The (way of) thinking becomes jumping, non-linear'
c. *fuwu dingzhi le.* 服务定制了。
service customize LE
'The serviced is customized.'
d. *fuwu dingzhi-hua le.* 服务定制化了。
service customize-HUA LE
'The service becomes (more) customized.'
e. *zhe ge qianfeng qiuyuan fangshou le.* 这个前锋球员防守了。
this CL forward player defense LE
'This forward player defensed.'
f. *zhe ge qianfeng qiu-yuan fangshou-hua le.* 这个前锋球员防守化了。
this CL forward player defense-HUA LE
'This forward player becomes defensive (in terms of his function in the game).'

'X' only denotes a situation, different from 'property change' in people's minds expressed by 'X-*hua*'. The meaning difference between a verbal 'X' and a verbal 'X-*hua*' in (17) demonstrates that *hua* has significant semantic effects. Therefore, a unified analysis of *hua* is needed to explain the different behaviors of *hua* in different environments.

4. A Unified Analysis of 'hua'

Based on the description and the theoretical assumptions outlined in Section 2 & 3, I will propose a unified account for the item *hua*. As a starting point, I will

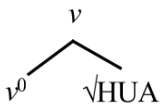
assume that there is only one single Vocabulary Item *hua* which can be inserted in different positions.

4.1. Inserted in a Root node

The VI *hua* can be inserted in a Root node. The Root may be directly categorized (say, verbalized), or have to combine with another Root before categorization. In the latter case, what we get is an idiosyncratic complex (like words in footnote 138). The former case usually yields a syntactic object meaning 'to melt', which can either serve independently as a simplex verb predicate, or further participate in the derivation of a resultative.

(16) *hua* inserted in a Root, which is directly categorized: normally 'to melt'.

a. verbalized *hua* 'to melt';

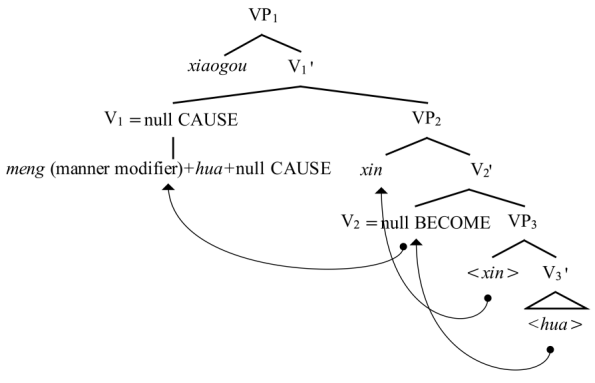


b. *meng-hua* 'to cause sth. to melt by being cute' (tentative)

xiao gou menghua wo de xin. 小狗萌化我的心。

little dog cute-HUA 1sg. DE heart

'The little dog melted my heart by being cute.'

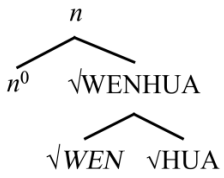


When *hua* is inserted into a Root which is subsequently categorized (always verbalized), it regularly yields a meaning of 'to melt': this explains why *hua* is always interpreted as 'to melt' when it serves as a component of resultative verb. Regarding the structure of resultative verb, the syntactic tree in (16b) is just a tentative version (I referred to Huang (2006)). The internal structure of resultatives is beyond the scope of this research.

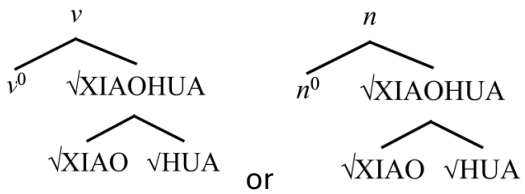
The non-compositional complexes consist of two roots. Their category label and meaning are retrieved from the Encyclopedia knowledge. Structures: see (17).

(17) *hua* inserted in a Root, which undergo root Merge: idiosyncratic meaning.

a. *wen-hua* 文化 'culture'



b. *xiao-hua* 消化 'to digest; digestive system'



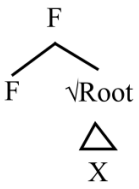
4.2. Inserted in a functional node

The VI *hua* can also be inserted in other positions. Consider the 'X-*hua*' construction. The following proposal is based on the findings mentioned above: (a) the meaning of the construction is compositional; (b) there is a semantic coercion

mechanism which requires a property meaning, which seems related to the semantic of *hua*; (c) *hua* has no categorial requirement for the 'X' it combines with.

The findings have the following implications. Since the meaning is compositional, the operation combining *hua* and 'X' cannot be something like 'root Merge' proposed by Hu & Perry (2018). Besides, *hua* behaves like a semantic head, indicating that the two components are not in symmetric status. Moreover, the 'X' is likely to be inserted into a Root position, which need to be categorized by some functional head. What can be that functional head? One possible answer is that *hua* itself is exactly that head, which is not adopted here. I propose that there is a functional head (marked as 'F') which should be distinguished from the inserted Vocabulary Item *hua*.

(18) A possible structure for the 'X-*hua*' construction.



The asymmetric Merge combines the functional head and the Root node. Thus, F projects as the head while 'X' does not. As the VI *hua* is inserted in F, it projects as the head, and is able to exert semantic effects (i.e. coercion) on what it combines with.

Then, the remaining question turns into how is the 'X-*hua*' words categorized. If 'X-*hua*' is not necessarily assigned with a verbal categorial feature, then the categorization process should be separated from *hua* and the functional node F. The most discreet version is that the categorization happens elsewhere, for example, determined in a larger context.

So far, we have accounted for the relationship between several structural environments where *hua* occurs and the interpretation we get. When *hua* is inserted in a functional head F, it behaves like a functional item and retains an abstract semantic structure like 'BECOME []'. Only the core meaning 'change of property' remains. But when *hua* is inserted in a Root node, it has more interpretive freedom. The most usual interpretation is a melting event of solid (e.g. ice). If the meaning 'melt' is not compatible, it accommodates itself to the context but still retains the core meaning.

The last use of *hua* to be explained is the constructions like '*hua* X wei Y' (causative) or 'X *hua wei/zuo/cheng* Y' (inchoative). In these constructions, *hua* is always verbal, and has an abstract meaning 'to transform'; the direction of transformation is specified by Y, so the transformation is not necessarily a 'melting' event. In the sense of abstractness of meaning, these constructions are similar to 'X-*hua*' constructions. What differs is that, the 'X' and 'Y' in '*hua* X *wei* Y' (or similar constructions) are more constrained, for example, they cannot be proper names, otherwise the construction will mean 'X really turned into Y' (e.g. ??*hua bai-deng wei te-lang-pu* 'to turn Biden into Trump').

Besides, it is obvious that the linear order (between *hua*, and the constituent which denotes the direction of change) differs. One possible account is that in '*hua* X *wei* Y' and similar constructions, each constituent is already categorized before merging with *hua*. But in the 'X-*hua*' construction, 'X' is not categorized when it merges with *hua*, so 'X' and *hua* are more integrated to each other. Assuming that in such a complex in Chinese, the head is located on the right by default, then the head *hua* comes naturally after 'X'.

In summary, it is proposed in this section that: *hua* represents a single VI, and the structural position where it is inserted influences its interpretation systematically: (a) when *hua* is inserted in a Root position, (i) if the Root combines with another root before categorization, then we will have an idiosyncratic meaning; (ii) if the Root is directly categorized, then *hua* is interpreted as 'to melt' (if there is no other

specification for the direction of 'transformation', otherwise it is interpreted as 'to become'); (b) when *hua* is inserted in a functional, head-like position which created a Root node, it is interpreted as 'property change', a meaning close to 'to become', but also exerts a semantic coercion.

5. Conclusion

In this paper, I use the item *hua* in Mandarin Chinese to instantiate that a single Vocabulary Item can be inserted into different morphosyntactic environments. The case of *hua* also illustrates the difference between Merge and root Merge proposed by Hu & Perry (2018).

The current study also provides evidence against Deng (2020), who proposed that Chinese has verbalizers just like English. Instead, this study supports the stance taken by Hu (2024) (who argued that the affix *-zi* in Mandarin is also not a nominalizer) that it is the categorial features, but not the overt category markers, that are universal across languages.

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联绵词可解及内部结构规律

曾江

Independent Scholar

摘要：历来都认为联绵词是双音节单纯词，两个字只表示读音，不可分训。汉语是通过改变声母、改变韵母、改变声调或改变写法造区别词、造新词。Error! Reference source not found.本文通过因声求义，对联绵词上下字在各地方言中的音韵变化分析、对比以及写法的变化，对联绵词上下字进行了探源、分训和内部结构规律分析，得出以下结论：联绵词可以分训，每个字可探出词源，能解释联绵词每个字的义，进而发现其内部结构的六种规律。

关键字：联绵词；分训；探源 ；方言

Explaining separately and Internal Structural Rules of two-syllable terms

Jiang Zeng

Independent Scholar

It has always been believed that two-syllable terms are monosyllabic words consisting of two syllables, and the two characters only represent pronunciation and cannot be explained separately.

Chinese creates distinguishing words and new words by changing the initial consonants, vowels, tones, or writing styles. [1] This article analyzes, compares, and analyzes the phonological changes of the upper and lower characters in two-syllable terms in ancient sounds and dialects, as well as the changes in writing styles, based on the analysis of their phonetic meanings. It explores, trains, and analyzes the internal structural rules of two-syllable terms. It reveals that two-syllable terms are formed through the phonetic changes of the upper and lower characters and the borrowing relationship of the characters. The following conclusion is drawn: two-syllable terms can be explained separately, and each character can reveal its etymology, which can explain the meaning of each character in two-syllable terms and discover six rules of its internal structure.

Keyword：two-syllable terms; explaining separately; etymology; dialect

有别于其他多语素语言，汉语一直被认为是单语素语言，但是在联绵词这个问题上出现了无法解释的问题，即，上下两个字是否能分训，如果不能分训，被认定为双音节单纯词。汉语是单音节有声调的语言，如果有不能拆开解的词，即有不含语素的双音节词，那汉语的语言类型的定义要重新定了。有关联绵词上下词是否可

分训，不同历史时期的各汉语语言学大家都表达了各自不同的观点，如果可以被分训，那么上下字都是何义？连绵词组合内部组合规律又是什么？

徐振邦在《联绵词概论》指出：“联绵词在西周中后期的金文里已被记录下来。”Error! Reference source not found.先秦时期，《诗经》《楚辞》及先秦诸子散文中联绵词数量开始增加。上古汉语音节结构的自然简化导致了汉语史上的音步转型，而音步转型又直接带来了汉语的双音化。Error! Reference source not found.秦汉之后，进入汉语词汇发展的派生大发展时期，随着词汇表达的丰富性需求，汉语的双音化成为造词的主要手段，联绵词随之大量涌现。

古人在提出联绵词概念时，并没有给出科学的定义。只是大致的说明其特点是不可以分解，不可以从字面进行解释，多双声叠韵。

清代著名语言学家和文献学家王念孙首先指出：“训诂之旨，本于声音”，中国文字学始于许慎的一千多年来的刻舟求剑式的重形不重音的研究终于开辟了新的方向，这是训诂学史上的革命。音韵学（的发展）自清代后一片繁荣，成果蔚然。王念孙在《读书杂志汉书第十六连语》中对联绵词给出直接的定义，“凡连语之字，皆上下同义，不可分训。说者望文生义，往往穿凿而失其本指”，[4]正是由于王念孙的学术地位和这句话的不同解读，使得后续的众多学者产生了“联绵词-双音节单纯词”的概念和联绵词-双语素合成词的观念纷争。源起于王念孙，目前学界主流认同的观点：联绵词是双音节-单纯词，不可分训。

吕叔湘先生 1942 年在《中国文法要略》讲述衍音复词时明确提出，“‘联绵字’……就是‘合两个音缀（写成两个字）成一个词，具有单一的意义’。所谓单一的意义，就是不能再分析。这类词往往是双声（声母相同）或叠韵（韵母相同），但也有非双声叠韵的。”Error! Reference source not found.

王力先生在其主编的《古代汉语》中提到：“单纯的复音词，绝大部分是联绵字”，“连绵字中的两个字仅仅代表单纯词的两个音节，古代注释家有时把这种联绵字拆成两个词，当作词组加以解释，那是绝大的错误。”Error! Reference source not found.

徐振邦将学界对联绵词的不同界定总结为“双音节单纯词”，在其著作《联绵词概论》中认为：“现今界定联绵词为双音节单纯词，也称作单纯性双音词。具体地说，联绵词中的两个字仅是一个词素，不能分拆为两个词素。”Error! Reference source not found.

陆宗达、王宁进一步指出“联绵词又称连语或连字，是古代汉语里的一种特殊的双音节单纯词。它的语音结构就其原始形态来说，或双声，或叠韵，它的词义发展常伴随着有规律的音转。”Error! Reference source not found.

蒋礼鸿、任铭善在《古汉语通论》中提出：“用两个音节表示一个整体意义的双音词，其中只包含一个词素，不能分拆为两个词素的，古人管这种词叫做謰语或连绵字。”Error! Reference source not found. 近代学者王国维亦曾着《联绵字谱》三卷，提出“联绵字，合二字以成一语，其实犹一字也”的观点，Error! Reference source not found.随着对联绵词研究的深入，学界开始出现另一种观点，即联绵词并非完全不可拆分，甚至出现对联绵词“双音节单纯词”定义的质疑。

综而观之，学界目前对联绵词研究中争论最大的分歧点就在于联绵词究竟是不是双音节-单纯词，其上下字究竟是否可以分训？

“文字根于言语，言语发乎声音，则声音者，文字之钤键，文字之贯串。故求文字之系统，既不离乎声韵；而求文字之根源，又岂能离乎声韵哉？”因此要厘清联绵词的上下词义和组合规律，对上下字的音韵解读、探源成为关键。从古音活化石宝库的各地方言中线索，掌握古人造词的方法和音变规则，探求出联绵词上下字的词源，联绵词的内部结构的各种形式也会清晰展现。

解读联绵词的两种路径：其一，上下字词源及上下字声母、韵母变化的规律。其次，对联绵词中前后字的用字变化。

结合联绵词的词源探讨和音韵规律，我们对联绵词进行分训并对其组成类型做出以下总结：

1.本来就是双音词：盘亘、徘徊、蹒跚、婆娑、扶疏、童蒙、僮蒙、恍惚、酩酊……

从字面上徘、徊、踌、躇各个单字都无解。于是历来都认为联绵词不能拆开解释。汉语是单音节有声调的语言，如果有不能拆开解的词，即有不含语素的双音节词。那汉语的语言类型的定义要重新定了。如果我们能因声求义，我们都能解所有联绵词的词，而且能解释联绵词每个字的义。如：“徘徊”它源于盘环，也写盘桓。这两个字就是转的意思。“盘”山西运城临猗 p^hã53，晋山西太原阳曲 p^hæ43，晋陕西榆林神木 p^hɛ44，n 韵消失。an 的韵在河南洛宁一带和滑县都念成 ai，an 阳声韵失 n 韵，对转为阴声韵 ai。你写个“弯”字叫他们都念成“歪”，“弯”山西临汾乡宁 uæ53，晋山西吕梁中阳 uæ24，n 韵彻底消失，浙江杭州建德 uɛ53。向南一

直到河南洛阳往南才有 n 韵尾出现，歪亦有弯曲扭伤义，《红楼梦》：方才大老爷出去，被石头绊了一下，歪了腿。歪脚就扭脚，脚踝弯了下，于是有“歪”字。海参崴就是海参湾。舞“翩跹”，翩跹是盘旋。跛者走路左右摆动说“蹒跚”，去 i 介音。大腹便 pian 便 pian 即大腹盘 pan 盘 pan，大腹便便就是肚子很圆，肥满貌。汉・张衡《西京赋》：便旋闾阎。便旋，徘徊义。明・马中锡《中山狼传》：先生仓卒以手搏之, 且搏且却, 引蔽驴后, 便旋而走。便旋，回转，打转转。 “蹒跚”，蹒《韵会》蒲官切，音盘。《玉篇》蹒跚，旋行貌，也源于“盘旋”。《史记・平原君列传》：“民家有躄者，盘散行汲。” 盘通盘，盘绕；屈曲。《后汉书・班彪传》：增盘业峨。班固《西都赋》：增盘崔嵬。“婆娑”源于“蹒跚”，委婉曲折义。《文选．王褒．洞箫赋》： “风鸿洞而不绝兮，优娆娆以婆娑。”婆娑就是蹒跚的阴声韵，所以有“婆娑”醉态蹒跚义。晋葛洪《抱朴子・酒诫》：“汉高婆娑巨醉，故能斩蛇鞠旅。”又有逍遥义：晋葛洪《抱朴子・崇教》：“若夫王孙公子，优游贵乐，婆娑绮纨之间，不知稼穑之艰难。”又有“扶疏”：《淮南子・修务训》：“龙夭矫，燕枝拘，援丰条，舞扶疏。”高诱注：“扶疏，盘跚貌。”

有的双音词被复杂化了，以致于难懂。如：“懵懂”，“懂”是“童”的复杂化。懂的异体字懂，童也是其组件，不但有取其音，亦取其义，懂和童在闽语中音韵一致，只声调不同。童在福建廈門发 tɔŋ35 音；懂在福建廈門发 tɔŋ53 音。儿童智力还没有发达，还无知，叫“童蒙”、僮蒙。进而转酩酊，喝醉了，头脑就会发懵，韩愈《归彭城》“遇就即酩酊，君知我为谁。”“彷徨”，又《集韵》彷徉，徘徊也。“彷”是“纺”，《仪礼・聘礼》贿用束纺。【注】纺，纺丝为之，今之缚也，缚是纺的入声韵。“徨”是“逛”，《正韵》彷徨，犹徘徊也。《盐铁论》嫫母饰姿而矜夸，西子彷徨而无家。又徊徨。《梁武帝孝思赋》夕独处而徊徨。都是转的意思。所以“彷徨”有盘旋的意思。《庄子・天运》：“风起北方，一西一东，在上彷徨，孰噓吸是？”（风起于北方，一会儿西一会儿东，在天空中盘旋飘动，是谁吐气或吸气造成了云彩的飘动？）《诗・王风・黍离序》：“闵周室之颠覆，彷徨不忍去，而作是诗也。”有谓坐立不安的意思。汉班固《白虎通・宗庙》：“念亲已没，棺柩已去，怅然失望，彷徨哀痛。”《孔雀东南飞》：“行人驻足听，寡妇起彷徨”，自然就有犹豫不决义。鲁迅《两地书・致许广平六四》：“就只怕我一走，玉堂立刻要被攻击，因此有些彷徨。”

“髣髴”的“髣”是“纺”，“髴”是“脖”，【集韵】或作佛。隋唐拟音董同龢系统 pjuət，“脖”隋唐拟音董同龢系统 bʰuət，脖福建南平建瓯读 pɔ24，脖也是转的意思，关节都可以转动，所以膝关节也叫波罗盖（波罗盖）。圆的东西都一样，只是半径不一样。“仿佛”……是它的异形。 汉语有唇音转成喉音的例子，飞机福建念灰机，飞, 文读 hui，福建厦门方言飞 hui55，福建三明大田方言飞 hui33

(文。～机)。如遐方又作遐荒，蛮方又作蛮荒，远方又作远荒。又髣髴又作仿弗、放物、方物、荒吻。见《辞通》。荒吻以后又写成慌惚。两个唇音字都转成喉音。荒吻在实际的语言中有转成慌惚，另有其他书写形式如：方弗、放弗、放物、髣拂、放佛、怳欻等。

“恍惚”“恍”是光一闪，如：恍然大悟；恍若隔世。“惚”源于“昏”。“恍惚”是一亮一暗。表示所感不清楚。如：《老子》第二十一章：“道之为物，惟恍惟惚。(“道”作为一种存在物是蒙蒙不清的。)

恍惚其他的书写方式有怳忽，慌惚，芒芴，惚慌、惚恍等。

“方羊”的“方”是“彷徨”的“彷”,【集韵】蒲光切，音旁。彷或作方。闽南区泉漳片厦门 paŋ55 阴平 白读。《前汉・扬雄传》方皇于西清。【注】方皇，犹彷徨也。晋・ 陶渊明《归园田居》：方宅十余亩，草屋八九间。 “羊”是“荡漾”的“漾”。于是有犹豫不安的意思。《左传・哀公十七年》：“如鱼窥尾，衡流而方羊。”(像一条浅色的红尾鱼，穿过急流而犹豫不安。)

“方洋”还有四处转的意思。又《前汉・礼乐志》双飞常羊。【注】犹逍遥也。《屈原・离骚》聊逍遥以相羊。【注】逍遥，相羊，皆游也。《汉书・吴王刘濞传》：“吴王内以晁错为诛，外从大王后车，方洋天下，所向者降，所指者下，莫敢不服。”(吴王对汉廷的目的是为了除去晁错，对诸侯则跟随在大王之后，驰骋于天下，走到哪裏，哪里就投降；军队攻打哪裏，哪裏就崩溃，没有人敢不服从。)

琵琶：东汉许慎撰《说文解字》尚无“琵琶”二字，宋人徐铉校字《说文解字》增加了这两个字并说：“义当用枇杷”。《释名》曰：“推手为琵，引手为琶。”取其鼓时以为之名也。”琶源于〔拨〕琵琶。拨弦乐器。见“琵”。或单用“琶”。宋晁端礼《满庭芳》：“减轻琶面，新样小鸾凰。”清袁枚《随园诗话》卷十三引《秦淮夏集》：“傍晚纷纷载酒卮，有筝琶处过船迟。”

2.一个（语素）字通过双音化构成两个字：彳亍、蹢躅、踌躇、首鼠、犹豫、犹与、容与、夷犹、 蹉跎、差池……

有的双音词是一个（语素）字的双音化。今天的“走”古人说“行”。“行”字由“彳亍”组成，表示两条腿。“蹢躅”就是“彳亍”的表音。“彳亍”表示走，源于“蹢”。“踵”也源于“蹢”。在动物叫蹄。

《庄子·秋水》：“本乎天，位乎得；蹢躅而屈伸，反要而语极。”（立足于自然的规律，居处于自得的环境，能进能退，能屈能伸，也就返归大道的要冲而可谈论至极的道理。）

“蹢躅”表示行进。行是先迈左腿还是先迈右腿？于是“蹢躅”成了表“犹豫”的词。而“蹢躅”先转成“踟蹰”、“踌躇”，变擦音成“首鼠”，去声母成“犹豫”。正因为两字不过是“蹢”的双音化。一个意思。

古人或单用：《楚辞·九章》：“壹心而不豫兮”，或分开来用：《老子》第十五章：“豫兮若冬涉川，犹兮若畏四邻。”（这里的“豫、犹”都表示谨慎。）《淮南子·兵略训》“击其犹犹，陵其与与”（迅速攻击并压倒犹豫不决之敌。）《史记·淮阴侯传》：“猛虎之犹豫，不若蜂虿之致螫；骐骥之蹢躅，不如驽马之安步；孟贲之狐疑，不如庸夫之必至也；虽有舜禹之智，吟而不言，不如瘖聋之指麾也。”（猛虎犹豫下决，反不如黄蜂、蝎子的毒刺厉害；骏马徘徊不前反不如劣马稳步前进；孟贲般的勇士狐疑不决，反不如庸夫一定要到达目的的决心。虽然有舜、禹那样的智慧，如果闭口不言，反不如聋哑人用手势比画。）《礼记·三年问》：“（大鸟兽）过其故乡，翔回焉，鸣号焉，蹢忽焉，踟蹰焉，然后乃能去之。”（到曾路经住过的地方时，或者盘翔号叫，或者徘徊良久，然后才肯离去。）

犹豫后来文人又进一步转写“犹与、容与、夷犹……”。“容与”的“容”是“犹”的阳声韵。“夷犹”是“犹与”的倒说。“夷”是“与”的齐齿。唐代颜师古注曰：“犹，兽名也。……此兽性多疑虑，常居山中，忽闻有声，即恐有人且来害之，每豫上树，久之无人，然后敢下来，须臾又上，如此非一，故不决者称‘犹豫’焉。一曰，陇西俗谓犬子为‘犹’，犬随人行，每豫在前，待人不得，又来迎候，故云‘犹豫’也。” 这种古注以类传说的形式载于古籍中，可视为注释者的臆想，后人不足为引用。

表行进的“蹢躅”还转成“蹉跎”，如：岁月蹉跎。《世说新语·自新》：“欲自修改，而年已蹉跎，终无所成。”唐张九龄《照镜见白发》：“宿昔青云志，蹉跎白发年。”

“踌躇”是左右不定，也就是左右摇摆，于是有“踌躇满志”这词语。再如：“知了”是“蜩”的双音化。 蜩又蜩甲，蝉蜕也。《庄子·寓言篇》予蜩甲也。“蜩”源于“裼”，“裼”是脱衣服，蝉年年脱壳。

裼，婴儿的包被：乃生女子，载寝之地，载衣之裼。《诗·小雅·斯干》。毛传：“裼，褓也。”裼，袒也。从衣，易声。《说文》裼，脱衣见体也。《玉篇》襢裼暴虎。《诗·郑风·大叔于田》襢裼，肉袒。《尔雅》徒裼以趋敌。《史记·张仪

传》闻战，顿足徒裼。《战国策·初见秦》曹君袒裼而观之。《韩非子·十过》袒裼(袒、裼都指脱去衣服，露出上身，但袒还指脱去衣袖露出上臂，问吉凶露左臂，受刑露右臂)；裼裘(古行礼时，袒外衣而露裼衣，且不尽覆其裘，谓之裼裘。非盛礼时，以此为敬)。

“拉皮条”是拉“嫖”。皮条是嫖的音节双音化。

3.由一个（语素）字+零声母字：荡漾、徜徉、相羊、逍遥、潇洒、芍药、逶迤、委蛇、涟漪……

“逍遥”源于“荡漾”。风吹过水面，水面就荡漾起来。“漾”是“荡”的零声母。“荡漾”是“荡”通过加个零声母的叠韵字而构成。荡漾的水纹是不断摇摆的。“荡漾”的塞擦音“徜徉”，再转为擦音“逍遥”及其各种变体都是摇摆的意思。人得意时就左右摆动地走，逍遥法外是自由自在不受法律拘束。

《庄子·天运》:“古之至人，假道于仁，托宿于义，以游逍遥之墟。”（古代道德修养高的至人，对于仁来说只是借路，对于义来说只是暂住，而游乐于自由自在、无拘无束的境域。）

“荡漾”音变成“徜徉”，也写作“相羊”。“逍遥”是它的擦音的阴声韵。“潇洒”是“逍”变的。“潇洒”就是举止大方，行为自如。“雍容大方”的“雍容”是一个“徉”的双音化。也说“雍容华贵”。“悠然自得”的“悠”是“漾”的韵变。荡秋千也说“打悠悠”。一个“荡”字道出了它们的源。做事吩咐慢点儿说“悠着点儿”。很得意的形态说“悠然自得”。“采菊东篱下，悠然见南山”深表陶渊明悠然自得的心境。

“溶溶荡荡”的“溶”就是“漾”。“溶溶荡荡”是水波浮动。《红楼梦》第十七回:“只见水上落花愈多，其水愈加清溜，溶溶荡荡，曲折萦纡。”也有“溶漾”水波荡漾。杜牧《汉江》诗:“溶溶漾漾白鸥飞，绿净春深好染衣。”

姑娘美闽南说“姹”t^{h}iak。“婥约”1,柔美。《本草纲目·草部·芍药》:“芍药，犹婥约也。婥约，美好貌。此草花容婥约，故以为名。”2,妇人软弱貌。唐慧琳《一切经音义》卷七十九引《考声》:“婥约，妇人耎弱貌。”“婥约、芍药”第二个音节是前字的是零声母。

“涟漪”是小波纹，源于“鳞”，水纹像鱼鳞状。“漪”本来是语气词，后加氵，成了“漪”。

“逶迤”是“委”加韵尾 i 音节“迤”。《诗·召南·羔羊》中的“委蛇”陆德明《释文》：“‘虵’，本又作‘蛇’，同音‘移’。”“委蛇”一词在现存典籍文献中最早出现于《诗经·召南·羔羊》：“退食自公，委蛇委蛇。”郑玄笺 注:“委蛇，委曲自得之貌。”从古至今的典籍文献中，“委蛇”一词的写法异形一直在变化，符定一的《联绵字典》中“委蛇”的 异写多达 76 种，堪称是联绵词异写之最。“委蛇”一词中有通假字的存在。典籍文献的训诂过程中，词语因“形近而讹”或音同音近而误的 别字而产生异形。这类异形还有“威夷”“倭夷”“委移”“逶移”等。说明其字形不重要，重要的是其声音。此皆为文字之变易，要寻求文字的系统与根源，声音是关键。

4.零声母字+语素字：婀娜、旖旎、窈窕、

有的联绵词零声母在前，如：“婀娜”，“婀”是“娜”的零声母。娜【唐韵】奴可切【集韵】乃可切，婀女字也。从女可声，读若阿。乌何切，婀，曲也，形容女子多用曲、宛，尤等形如女子的柔美。1）《楚辞·悯上》:“众多兮阿媚，骫靡兮成俗。”王逸注：“阿，曲。”（2）《文选·班固〈西都赋〉》:“周阿而生。”李善注：“阿，庭之曲也。”（3）《汉书·礼乐志》:“汾之阿。”颜师古注：“阿，水之曲隅。”妸娜，美貌。亦作袅娜。李白诗，花腰呈袅娜。亦作阿那。

“旖旎”、“迤逦”的结构同“婀娜”。“窈窕”的结构也同上。“窈窕”“窕”源于“周”，转的意思。姑娘做出忸怩的姿态才迷人。“窈窕”第一个音节是零声母。“窈窕”就是婀娜多姿的意思。

《孔雀东南飞》:“云有第三郎，窈窕世无双”的“窈窕”就是“倜傥”。倜傥”的“倜”是“荡”的入声韵。“倜傥”是指举止大方，不拘束，有风度。

又：婀娜多姿。《诗·周南·关雎》“窈窕淑女，君子好逑。”（多姿多态的好姑娘，是小伙子的好对象。）又：窕 ：美；美色。《方言》卷二：“窕，美也。楚周南之间曰窕，自关而西，秦晋之间，凡美色或谓之好，或谓之窕。”

5.改变韵母：坎坷、参差、倆勉、仓促、缤纷、磅礴、尴尬、崎岖、蹊跷、霹雳、溟蒙……

人生坎坷，“坎坷”坎是坑，“坷”是“坎”的阴声韵。“参差”的参源于“插”，如：参天大树。“差”源于“促”，参差不齐是长短不齐的意思。

“僶勉”是“勉”通过元音曲折造的双音词。“勉”今天我们说“卖力”，“卖”是“勉”的阴声韵。

“仓促”的“仓”是“匆”、源于“葱”。葱的叶稍是尖的，尖的物刺入快，快都用表示尖的词表示。如表示快的“疾”与蒺同源。“仓促”是阴阳对转的本义词。

“缤纷”也是元音曲折的双音词。

“磅礴”是阴阳对转的两个字。磅与庞同义，大的意思。

“尴尬”源于“合”。在交合的时候给别人巧遇了，那罢还是不罢，场面太尴尬了。

忸=狃=复=还也，人害羞时身就转到背后。文献说“忸怩”。《国语·晋语八》：“君忸怩，乃趣赦之。”（平公感到羞惭，就赶紧赦免了竖襄。）《后汉书·蔡邕传》：“公子仰首降阶，忸怩而避。”“忸”源于“扭”，“怩”是“忸”的细音。忸，《荀子·议兵篇》忸之以庆赏。【注】忸与狃同。《尔雅·释言》狃，复也。复，还也。《诗·小雅》言归思复。《书·大传》复，旦复旦兮。《论语》言不可复也。《说文解字注》(复)往来也。夂部曰：返，还也。还，复也。皆训往而仍来。“恧”《康熙字典》又或作忸，也源于“忸”。鲍照《代贫贱愁苦行》：“俄顷不相酬，恧怩面已赤。”（短时间无法酬答，惭愧得脸都红了。）

有的 i 音节的字在前头。“角”今北京口语说“掎角”。掎《集韵》隐绮切，音倚。“崎岖不平”，“岖”源于“曲”，“崎”是前加的齐齿双声字。“蹊跷”，“跷”是翘起来。木板变形了，不平了，就翘棱了。“蹊跷”就是不平，有怪。罗贯中《三国演义》第九十五回：“若参军欲在山上下寨，可分兵与我，自于山西下一小寨，为掎角之势。”

霢霂即小雨。汗流貌。微雨飘洒貌。微细貌。《尔雅·释天》：“小雨谓之霢霂。”“霢”《说文》作“霡”。《说文》：“霡霂，小雨也。”段玉裁注：“霡霂，溟蒙之转语。”

溟源于蒙，汉扬雄《太玄·少》：“上九，密雨溟沐，润于枯渎，三日射谷。”范望注：“雨之细者称溟沐。”（细细的雨丝轻轻灌溉着，滋润了干枯的水渠，庄家也得到了灌溉。三日，应当是虚指。）

古代对雨的形容有“霡霂”“溟蒙”两词，溟入声沐，霡是溟的阴声韵，霡霂溟蒙蒙诸字皆为同源词，古人是对韵母的改变，通过造词以丰富对事物的表达，汉语词汇也通过单音节向双音节发展的，汉语表达的词汇不断丰富。

6.语素字+-l-音节：玲珑、辘轳、橄榄、伶俐、粗鲁、淋漓……

“玲珑剔透”的“玲珑”是透明的意思，源于“灵”，（剔是澈）。“玲珑”是改变元音成的双音词。它表示聪明和镂空的工艺品。

玲珑穿屡折，诘曲通三湘。（唐·佚名《纪游东观山》）

红染桃花雪压梨，玲珑鸡子斗赢时。（唐·元稹《寒食夜》）

似见楼上人，玲珑窗户开。（唐·陈羽《公子行》）

玲珑开户牖，落落明四目。（唐·刘长卿《游四窗》）

窗棂以明透为先，栏杆以玲珑为主。（明·李渔《闲情偶寄·居室部》）

“八面玲珑”的“玲珑”源于“碌”表示转，“八面玲珑”是各方面都能很周全。“小巧玲珑”因其小而圆而可爱。

但看着章秋谷这样的身材灵便，手脚玲珑，晓得他一定是个精通拳棒的惯家，便也不敢去惹他。（清·张春帆《九尾龟》）

此时东方亮手下从人，玲珑的早已逃命，痴呆的还在那里动手。（清·佚名《小五义》）

“橄榄”源于“含”，它是含着吃，不是嚼着吃。“辘”源于“碌”。辘：辘轴(石做的圆柱形农具，两端有洞，加轴，外加框，用牲口拉着打场、平场);辘轴退皮(碌碡脱皮。比喻根本不会有的事或非常怪异的事)《广韵》辘轳，圆转木也。井上汲水木。或作櫖栌。

“粗鲁”源于“粗”，“淋漓”也是这种结构。既然“伶俐”源于“灵”“聪明伶俐”伶是“灵”，“俐”是“伶”的阴声韵，灵也有灵活的意思，人死了，身体僵硬了，关节转动困难，即关节不灵活了，凡事物坏了，上海都说“勿灵了”。很会说话说“伶牙俐齿”元张国宾《合汗衫》第二折：“你休听那厮说短论长，那般的俐齿伶牙。”

“朦胧”一词最早的用例出现在汉代，朦，月朦胧也。（汉·许慎《说文解字·月部》）其他书写形式有“蒙笼、蒙胧、蒙眬、蒙眬”等。眊，《唐韵》亡报切《集韵》《韵会》《正韵》莫报切，音帽。《说文》目少精也。一曰不明貌。《孟子》胷中不正，则眸子眊焉。《前汉·息夫躬传》愦眊不知所为。《封龙子御对篇》眊眊乎其犹醉也。

眊，目不明也，胸中不正,则眸子眊焉。—《孟子·离娄上》。注:眊者,蒙蒙目不明之貌。又如:眊目(眊眼。昏花的眼睛);眊眩(眼睛迷乱失神);眊昏(眼力昏花)

又与耄同。言老而视眊也。《前汉·武帝纪》哀夫老眊。《注》眊，古耄字。老称也。朦与眊同源（源于盲，蒙），与耄、蒙 、懵、眬皆为同源词。

结语：

联绵词是两个（语素）字组合成的合成词，上下字都可以探其语源，因而可以分训。汉语是通过改变声母、改变韵母、改变声调或改变写法造区别词、造新词。联绵词的造词方法及其内部的六种结构也是符合其汉语的变化规律，后人由此可知古人是如何创造新词，汉语是如何不断地衍生，创造出如此之多的表达词汇。

注释及参考文献

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