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Where have all the sound changes gone? Examining the scarcity of evidence for regular sound change in Australian languages

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Abstract

Almost universally, diachronic sound patterns of languages reveal evidence of both regular and irregular sound change, yet an exception may be the languages of Australia. Here we examine a long-observed and striking characteristic of diachronic sound patterns in Australian languages, namely the scarcity of evidence they present for regular sound change. The Australian situation presents a problem for theory and methodology, since the assumption of the existence of regular sound change is fundamental to the comparative method and to theories of linguistic change. We examine this from two angles. We identify potential explanations for the lack of evidence of regular sound change, reasoning from the nature of synchronic Australian phonologies; and we emphasise how this unusual characteristic of Australian languages may demand new methods of evaluating evidence for diachronic relatedness and new thinking about the nature of intergenerational transmission itself. We refer the reader also to Bowern (this volume) for additional viewpoints from which the Australian problem can be examined. The Australian 'problem' raises an interesting challenge for theory, and meeting this challenge is likely to put Australian languages centre stage in the revision of working assumptions in historical linguistics and in the development of novel methods of analysis.

Keywords: regular sound change, irregular sound change, synchronic phonology, language transmission, Australian languages, comparative method, historical linguistic theory

1. Introduction

The fundamental existence of regular sound change, even if it takes some effort to discover, is taken to be a universal of human language diachrony (Labov 1981, Labov 2020). That one large set of languages has strikingly low evidence of regular sound change therefore presents an interesting challenge for linguistic theory. Here we examine a paucity of evidence for regular sound changes across the Australian continent that has long been noted in the literature (Capell 1956; Austin 1990; Crowley 1997; O'Grady 1998; Miceli 2015; Miceli and Dench 2016; Miceli 2019; Bowern this volume). We discuss its theoretical implications and attempt to identify some potential contributors to this perplexing absence.

2. The expectation of regular sound change

Since the nineteenth century there has been debate regarding the fundamental nature of sound change: whether it is regular, affecting the realisation of phonemic categories consistently across many lexemes at once, or irregular, targeting the pronunciation of individual words,

affecting them either one by one or to varying degrees depending on frequency. In the past fifty years, studies of sound change in progress have confirmed the empirical existence of both types of process. In a recent paper, Labov (2020) lists a number of studies reporting sound change by lexical diffusion (starting with the chapters in Wang [1977]), and then goes on to provide clear evidence of regular sound change in the case study of /eyC/ raising in Philadelphia, which has been documented over a period of one hundred years. Accordingly, when we look at diachronic sound patterns we expect to find evidence of regular sound change and some irregularity, and this is indeed what historical linguists typically find.

The existence of regular sound change is relied upon by historical linguists when making inferences about relatedness and subgrouping. The central tool for determining these genetic relationships is the comparative method, which is founded on the assumption that regular change will have been a significant factor shaping synchronic data (Harrison 2003). Adopting this assumption enables us to account for regular sound correspondences in terms of regular sound change. Moreover, once the method is applied, the results will also highlight clearly what is not regular. Thus, the existence of regular change is central even to the study of irregularity. As Campbell writes, "the general assumption of regularity is necessary in order to recognize the potentially exceptional forms" (1996: 86).

It should be emphasised that for the comparative method to be capable of establishing genetic relationships, corresponding items in languages under comparison need to contain not merely segments that correspond, but segments that both correspond and are systematically divergent. Without divergence, both the detection of subgroups and the sorting of loans from common inheritances are impossible. Though this point might be obvious once it is stated, it is not often made explicit, since typically there is no shortage of divergent correspondences. For example, Baldi (1992: 12) writes: "Invariable correspondences as [m : m : m : m and n : n : n : n] are more the exception than the rule". However, if any language family were to have abundant invariant correspondences while generally lacking systematic divergences, then the successful application of the comparative method, at least as we normally understand it, might be placed in doubt.

3. The Australian problem

The languages of Australia present precisely the confounding situation that we foreshadowed above. Lexemes in related Australian languages are frequently either (near-)identical or simply not similar at all. Moreover, correspondences entailed by the near-identities are frequently not systematic and regular. For this reason, when doing comparative work, it seems almost unnecessary to extract sound correspondences (Capell 1956), and when they are extracted, the resulting patterns repeatedly involve identical segments if they are regular, suggesting no regular sound change, or correspondences that are irregular, or simply not recurrent enough to furnish convincing instances of regular sound change (see e.g. discussion in Crowley 1997; for examples of irregularity in lower level and higher level comparison respectively see Austin 1990, O'Grady 1998; for an example of insufficient recurrence see Evans 1988). Consequently,

it would appear that there is unexpectedly low evidence for regular sound change over the whole continent. To provide a representative example, the data in the first column of Table 1 illustrate the typical range of phonological differentiation of assumed cognates in Pama-Nyungan languages. Pama-Nyungan is the largest of the proposed language families in Australia, with a time depth of at least 4-6ka proposed by Bouckert, Bowern and Atkinson (2018). Contrast this to data in the second column, from Romance, a genetic grouping that we know is considerably younger since the ancestral language, Latin, is documented. Both cognate sets reconstruct to something very similar in phonological shape, yet the Romance set involves evidence of palatalisation in French, the development of nasalised vowels in Portuguese and a new centralised vowel appearing in Romanian. This stands in stark opposition to the predominant complete identity, or word initial loss in a few languages, that we find in the more deeply-related Pama-Nyungan data.

Table 1: Reflexes of proto-Pama-Nyungan **kampa* 'cook in earth oven' (data from Alpher 2004: appendix) and Latin *kampus* 'field' (data from Weiss 2015: 129)

Pama-Nyungan *_kampa_ 'cook in earth oven'		**Latin _kampus_ 'field'**	
Uradhi (urf)	aβa-	Spanish (spa)	kampo
Wik-Mungknh (wim)	ka: mp-	Portuguese (por)	kãpu
Djabugay (dyy)	kampa(:)	Catalan (cat)	kam
Jiwarli (dze)	kampa-	Occitan (oci)	kamp
Nyangumarta (nna)	kampa-	Old French (fro)	tʃamp
Warlpiri (wbp)	kampa-	Italian (ita)	kampo
Wirangu (wgu)	kampa-	Romanian (ron)	kɨmp
Kaytetye (gbb)	ampə-	Sardinian (srd)	kampu
Manjiljarra (–[1])	kampa		
Walmajarri (wmt)	kampa		
Martuthunira (vma)	kampa		
Yingkarta (yia)	kampa-ɲi		

We have emphasised that regular, divergent sound correspondences provide crucial evidence of basic genetic relationships that hold between languages and of the cognacy of individual lexical items (as opposed to borrowings). However, we have not as yet explicitly stated why they have such a privileged status. In historical linguistics, genetic relationship between languages is a *system level* notion. That is, when linguists claim that a group of languages is genetically related, they are implying that they have descended from the same original linguistic system; the family tree model then summarises the system level relationships that have resulted from the transmission and divergence of this original system over time. As Miceli (2015, 2019) argues, regular divergent sound correspondences are key evidence because they enable us to demonstrate that in a group of languages, the phonological system, the system of word forms (including associated morphology) and the semantics are linked and have been transmitted as a set. Because regular sound change affects the system as a whole rather than

[1] No ISO 639-3 code.

single items, it provides evidence of a linguistic system that has persisted and diversified over time, in a way that other types of change, applying less universally, cannot. Conversely however, if similar lexemes do not reveal regular divergent sound correspondences, then there is no firm evidence that they actually have been transmitted vertically as a set, and no principled way of ruling out borrowing.

Returning to the level of individual items, there are also implications for the detection of cognacy. Normally (i.e., outside of Australia) the predominance of regular divergent sound correspondences enables a comparativist to make reasonable assumptions also about those identical correspondences that do occur: if they appear in contexts where no divergent correspondences were found, then they are reasonably likely to reflect inheritance. Loans can be identified when identical correspondences appear in contexts where divergence was expected. This illustrates again the point we made above about the transmission of whole systems: if there is evidence that a large number of word forms have been transmitted as a set, then cognate status can be more safely extended to those that display identical correspondences. On the contrary, "[i]f comparison reveals a majority of identical/near-identical sound correspondences there is no set of words to 'fall back on'" (Miceli 2015: 713), and cognacy remains an insecure assumption. This is the situation we face in Australia. In the remainder of the paper, we begin to chip away at what this situation means and how we might account for it. We examine the Australian problem from two angles. In §4 we identify factors within Australian phonological systems which might be giving rise to a paucity of regular sound change observable in Australian languages. In §5 we discuss potential implications for the nature of intergenerational transmission.

4. Suggestive evidence from synchronic phonologies

A full understanding of this apparent lack of sound change in Australia will doubtless require significant further research. Nevertheless, it may be possible to tease out some initial clues from Australia's synchronic phonologies, since after all, sound change is a significant ultimate source of synchronic morphophonological processes (Bermúdez-Otero 2015), and such processes do exist in Australian languages. We introduce some relevant characteristics of Australian segment inventories and phonotactics, and then consider processes of lenition, assimilation and deletion.

The phonemic inventories of Australian languages exhibit highly constrained diversity (Voegelin et al. 1963; Moran et al. 2020; Round 2021a). Consonant systems differ primarily in terms of just five parameters of variation: the presence of one versus two apical places of articulation (articulated with the tongue tip); the presence of one versus two laminal places (articulated with the tongue blade); the presence or absence of a glottal stop; the presence of one versus two series of plosives; and the presence of one, two, or no laterals at laminal places of articulation (Round 2021a). Setting all five parameters to their maximal values yields the inventory in Table 2, approximated most closely by Nhanda (nha; Blevins 2001a; though Nhanda lacks a vibrant). Setting them to their minimal values yields Table 3, as in Wargamay

(wgy; Dixon 1981). Two-thirds of Australian consonant systems vary somewhere in between these two extremes, and many vary in only minor, additional respects (Round 2021a).

Table 2 Inventory most closely approximated by Nhanda (Blevins 2001a)

		Apical		Laminal			
	Labial	Alveolar	Retroflex	Dental	Pre-palatal	Dorsal	Glottal
Fortis plosive	p	t	ʈ	t̪	c	k	ʔ
Lenis plosive	b	d	ɖ	d̪	ɟ	g	
Nasal	m	n	ɳ	n̪	ɲ	ŋ	
Lateral		l	ɭ	l̪	ʎ		
Vibrant		r					
Glide	w		ɻ		j		

Table 3 Inventory of Wargamay (Dixon 1981a)

	Labial	Apical	Laminal	Dorsal
Plosive	p	t	c	k
Nasal	m	n	ɲ	ŋ
Lateral		l		
Vibrant		r		
Glide	w	ɻ	j	

Australian vowel inventories are overwhelmingly triangular, with either three or five vowel qualities. The main parameters of variation are the presence or absence of contrastive length; the presence or absence of mid vowels; and the presence or absence of additional, non-low central vowels such as /ə,ɨ/ (Round 2021a).

The phonotactic profiles of Australian languages are likewise similar across the continent (Dixon 1980; Hamilton 1996; Fletcher and Butcher 2014; Round 2021b). Syllable onsets typically must be filled by a single consonant, and words therefore are overwhelmingly consonant initial. In word-final position, many languages permit only vowels, while those that permit consonants frequently restrict them to coronal sonorants. Word internal consonant clusters are strongly constrained by a sonority sequencing requirement shown in (1) where '>' indicates linear order, as well as a cross-linguistically highly unusual place-of-articulation constraint shown in (2) (Hamilton 1996; Round 2021b).

(1) Variant A: Glide > Liquid > Nasals > Obstruents > Glide
Variant B: Glide > Liquid > Nasals, Obstruents > Glide

(2) Apicals > Laminals > Dorsals > Labials

Prosodically, Australian languages overwhelming have root-initial main stress. For languages lacking prefixes, which is most, this means that words are metrically head-initial (Fletcher and Butcher 2014). Minimal words in Australia languages are commonly bimoraic or disyllabic (Baker 2014), and large proportions of lexical roots are of this minimal length (Dixon 1980).

4.1 Lenition

In a survey of 118 Australian languages, Round (2021c) finds synchronic lenition alternations, defined as alternations between superlaryngeal stops and more sonorous oral segments or zero, in 46 of the varieties examined, or just under 40%. The most common alternations are shown in Figure 3. Morphologically, the alternations overwhelmingly occur in word-medial, morph-initial positions. The segmental context in which the lenis variant appears is typically either intervocalic or between continuants, with the stop appearing elsewhere. However, instances of corresponding, regular historical sound changes are much rarer. Two explanations for this suggest themselves.

FIGURE 3

Stops	p	t	ʈ	ʈ̪	c	k
Common lenis alternants	w	ɻ	ɻ	j	j	w,Ø

It may be that roots are poor hosts for Australian lenition changes. In a bare disyllabic root, the only position available for a potential target of lenition — namely, a word-internal, intervocalic or intercontinuant stop — is between the two vowels, yet in many Australian languages, this position is observed to be phonetically lengthened (Butcher and Harrington 2003; Fletcher and Butcher 2014). If lenition is conditioned by short duration (Cohen Priva and Gleason 2020; Ennever, Meakins, and Round 2017), then within a typical Australian disyllabic root, there will be no position where lenition would be expected. Longer roots should be capable of hosting lenition, but they are rare. In a reconstruction of proto-Gunwinyguan, Harvey (2003) identifies 632 lexical reflexes in Jawoyn (djn), a language that exhibits stop lenition, yet only 14 items — around 2% — contain stops later than the post-tonic position in segmental contexts where lenition would be expected. Of Alpher's (2004) 176 reconstructed proto-Pama-Nyungan roots, only 7 are trisyllables, and none contain a stop in the final syllable.

It may also be that lenition changes are often irregular. The lenis segments in Figure 3 are all approximants which already exist in almost every Australian consonant inventory. If these synchronic lenis alternants are the product of original sound changes, then those changes were structure-preserving, that is, rather than creating new phoneme categories, they merely shifted segments from one existing category to another. Because of their nature, structure-preserving changes are susceptible to item-by-item lexification and thus irregularity (Labov 1981; Kiparksy 1988). Turning to known cases, though Jawoyn underwent stop lenition (Harvey 2003), only 36 of its 64 reflexes of proto-Gunwinyguan stops in the right segmental context actually exhibit lenition; the others are stops.[2] Baker et al. (2019) show that lenitions in Wubuy (nuy; a.k.a. Nunggubuyu), another Gunwinyguan language, have also been sporadic. Shaw et al. (forthcoming) show synchronic, phonetic lenition in Iwaidja (ibd) to be variable across

[2] Harvey (2003: 207,230) cautions that his dataset may contain recent loans between Gunwinyguan languages. Nevertheless, we would not expect 50% of the items to be recently borrowed.

speakers and lexemes, and Ennever et al. (2017) argue for there being a window of more- or less-lenited production targets for stop phonemes in Gurindji (gue). Round (2021c) notes that in synchronic alternations, lenition is conditioned in a range of morphologically idiosyncratic ways.

In sum, although the lenition of stops is a common synchronic morphophonological process, quite possibly it is often the echo of sound changes that were originally irregular; and in many Australian languages, roots may largely lack potential targets of stop lenition. This may explain why one of Australia's most common morphophonological alternations is not matched by numerous, regular sound changes.

4.2 Assimilation and deletion

The most common synchronic assimilation processes in Australian languages occur in consonant clusters (Round 2021c). Assimilation in manner is rare, but in place of articulation is reasonably common, appearing in 38 of 118 languages.[3] Place assimilation mostly acts to repair underlying clusters, formed at morphological boundaries, which would violate the surface phonotactic requirements stated in (1,2) above. Such alternations, however, are unlikely to be the synchronic reflection of assimilating sound changes, for the reason that any such sound change presupposes an earlier state in which cluster phonotactics were different from the present, yet phonotactic constraints on Australian clusters are strikingly uniform across all Australian language families, and thus likely reflect very deep-time diachronic stability. Consequently, we simply do not expect to find many regular, assimilating sound changes in Australian languages.

Synchronic deletions in Australian languages likewise are predominantly motivated by constraints on cluster phonotactics (Round in prep), or by the ban on vowels in hiatus (McManus and Round 2013). Round (2021d) surveys Nasal Cluster Dissimilation (McConvell 1988), in which a nasal is lost from one nasal+stop cluster in the context of another; these synchronic alternations are quite varied in detail and often morphologically idiosyncratic, and do not appear related to diachronic changes that are regular. For these reasons, we do not expect to find much regular, word-internal deletion sound change in Australian languages. This does, however, leave the door open to deletions at word edges.

Word-initial deletion, or 'initial-dropping' of word initial consonants or CV sequences is not operative synchronically in any Australian language, but is widely attested as an irregular change, and in cases has been regular also (Blevins 2001b), most notably in proto-Arandic (Koch 1997; Koch 2001) and some languages of Cape York (Hale 1976b; Hale 1976c; Alpher 1976; Verstraete 2019). Like lenition discussed above, initial dropping would be also

[3] To avoid skewed results, Round's study excludes assimilation in the very widespread Pama-Nyungan ergative/locative allomorphs. These are reconstructable back to proto-Pama-Nyungan as /-Cu/ and /-Ca/, where /C/ is a stop that assimilates in place of articulation to the stem-final consonant to its left (Hale 1976a; Sands 1996).

susceptible to lexical diffusion, at least in some cases. If a language's lexicon already contains vowel-initial words, then the subsequent loss of any word-initial consonant from additional items would merely produce an acceptable, already existing phonotactic structure. Phonetically reduced, high-frequency items may be particularly susceptible, and Blevins (2001b) reports an elevated incidence of idiosyncratic initial dropping in precisely such items.

Synchronic word-final deletion is attested, though is rare in Australian languages (Round in prep). Lardil (lbz) productively deletes final vowels and some preceding consonants (Hale 1973; Round 2011). These have a complex diachrony, originating as word-final consonant deletion and utterance-final vowel deletion rules found throughout the Tangkic language family (Round 2010; Round 2017a). In Yidiny (yii), final deletions of vowels are morphologically idiosyncratic (Dixon 1977; Round 2017b), though with strong statistical trends apparent (Hayes 1999) suggesting the operation of lexical diffusion within certain narrow phonological environments; the deletion of preceding consonants is regular. In Djambarrpuyngu (djr; Wilkinson 1991), synchronic final vowel deletions are morphologically idiosyncratic. The same is true in Bardi (bcj; Bowern 2013: 105–7), where final vowel deletion is additionally conditioned syntactically and exhibits social and stylistic variation. This synchronic evidence suggests that, diachronically, the loss of final consonants may be driven primarily by word-final phonotactic requirements, activated by vowel loss that exposes erstwhile word-internal clusters to them. Final vowel loss does occur as a regular change, in the Wik, Southwest Pama and Nyungar subgroups of Pama-Nyungan and the Yirram branch of Mirndi (Alpher 2021). Synchronic evidence from the Tangkic family and Yidiny, though, suggests that final deletions may be restricted to long roots, to avoid disrupting word minima (Hayes 1982; Wilkinson 1988; Round 2017a). Given that the lexicons of many Australia languages are dominated by minimal, disyllabic or bimoraic roots, this may be another reason why regular change seems rare: often there are relatively few roots which would be exposed to final vowel loss, and subsequently, to final consonant loss. In sum, we do expect to find regular deletion sound changes in Australian languages, though word-final deletions may be sufficiently lexically restricted (to relatively rare, long roots), that they may become hard to detect at significant time depths, due to normal lexical loss and borrowing.

5. Implications for diachrony

In the previous section we provided a discussion of common synchronic morpho-phonological processes. Although this discussion offered some potential explanations for why evidence of regular sound change is rare, these explanations do not change the fact that it is difficult to prove, in any familiar way, that pairs of semantically and phonologically similar lexemes, in any two Australian languages, are cognate. Here we turn to consider how the history of languages that lack evidence of regular sound change can be approached.

One approach is to retain traditional assumptions about the nature of language transmission and diversification, but to develop different methodologies to recover the historical signal. For example, if diagnostic regular sound changes for demonstrating cognacy are lacking, then can

other parts of the language system step in to help? Bowern and Atkinson (2012) infer the phylogeny of Pama-Nyungan based on presumed cognates, and Bouckaert, Bowern and Atkinson (2018) based on presumed cognates and languages' geographic proximity. If the items in the underlying datasets of these studies are indeed, by and large, historically related lexemes, then the phylogenies inferred should be approximately correct. If that is so, then other aspects of Pama-Nyungan linguistic systems (which have evolved, via replication and modification, along the true Pama-Nyungan phylogeny) should exhibit a variability across the phylum that corresponds well to the nested historical relationships implied by these phylogenies inferred from presumed cognates. In technical phylogenetic parlance, such a correspondence is known as phylogenetic signal (Blomberg and Garland 2002). In recent work, Macklin-Cordes, Bowern and Round (2021) show that for the simplest of phonotactic traits[4] in Pama-Nyungan, phylogenetic signal relative to the 'cognate'-based phylogenies is remarkably high. This simply would not be expected if the presumed-cognate data of the earlier phylogenetic studies was wildly off the mark. These results are promising and suggest that as new methods come online in linguistic phylogenetics, we should see improvements in our capacity to evaluate whether various aspects of grammar paint a phylogenetic picture that is consonant with the picture inferred from Australia's presumed cognates. Although this may never help us to pinpoint whether any specific pair of items is truly related, it will assist us in ascertaining whether, as a whole class of data, Australia's presumed cognates encapsulate evidence of historical relationships that resembles the kind of evidence gotten from true cognates, which are identified elsewhere in the world via regular sound change.

A second approach to the Australian conundrum is to reconsider the status of traditional working assumptions. Miceli (2019) proposes that the paucity of evidence of regular sound change, along with other aspects of the Australian comparative pattern that have not been discussed here due to space constraints,[5] are not in line with the traditional working assumptions that underlie the comparative method. Although the nature of Australian phonological systems partly explains why there may be little evidence of regular sound change, evidence that sound change has often applied irregularly is also consistent with scenarios of significant L2 acquisition and language contact. The family tree model, and the expectation of tree like-phylogenies more generally, relies on an underlying assumption that in the process of normal transmission, there is a clearly identifiable L1 to be acquired. But normal transmission can be unfolding in multilingual settings where there may not be a clear L1 to be transmitted and acquired, and where no language has a privileged status (egalitarian multilingualism). This is likely to have been the long-term situation in Australia. Miceli (2019) proposes that the

[4] Specifically, the Markov transition frequencies of two-phoneme sequences, for instance, the frequency with which a two-phoneme sequence /ŋX/ is /ŋa/, /ŋi/, /ŋk/, etc.

[5] As already mentioned, the unusual nature of the Australian comparative pattern has long been noted. It is characterised by a mismatch in the degree of structural similarity (phonology and other grammatical structure, as well as the structure of lexical and grammatical categories) in comparison to the proportion of word forms that are shared. For example, O'Grady, Voegelin and Voegelin's (1966) coin the terms 'family-like language', to refer to a group of dialects that only share 45% of their basic vocabulary, and 'phylum-like language family', to refer to Pama-Nyungan which displays a low degree of phonological diversity alongside a low number of potential cognates.

monolingual ideal, associated with a balanced comparative pattern[6], is a useful reference point from which the complexity and diversity of linguistic histories can be understood, but that balance is likely to be more of an exception than the norm that is currently assumed. Understanding processes that give rise to imbalance then becomes fundamentally important in reconstructing the linguistic past, especially in the Australian context. Important questions remaining to be answered in this regard include why there has been so much diversification in the lexicons of Australian languages compared to what we observe in the phonological systems (Voegelin et al. 1963), and what kind of diachronic processes lie behind imbalances of this kind.

Conclusion

In this paper we have described the unusual nature of diachronic sound patterns in Australian languages. Although we typically find evidence of both of regular and irregular processes of sound change in the diachronic sound patterns of languages of the world, Australian languages are strikingly deficient in evidence of regular sound change. We then examined this Australian problem from two angles. We identified potential explanations for it, reasoning from the nature of synchronic Australian phonologies, and we emphasised how this unusual characteristic of Australian languages may demand new methods of evaluating evidence for diachronic relatedness, and new thinking about the nature of intergenerational transmission itself. We refer the reader also to Bowern (this volume) for additional angles from which the Australian problem can be examined. The Australian 'problem' could also be called a challenge. Meeting it is likely to put Australian languages centre stage in the revision of working assumptions in historical linguistics and in the development of novel methods of analysis.

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[6] With normal transmission all linguistic domains are acquired relatively faithfully, and therefore the expectation is that change and retentions will be evenly distributed across the linguistic system, giving rise to a balanced comparative pattern (see Miceli 2019).

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