Diachrony of Coda *ŋ in Suzhou, Wu Chinese: Regular Change and Differing Readings

This paper focuses on the diachrony of coda /ŋ/ in Suzhou, Wu Chinese under the context of three consecutive generations and Differing Literary and Colloquial Readings. The majority of change are phonetically-conditioned and purely regular: velar *ŋ changes to alveolar [n] after non-back vowels [ə] and [ɪ]; *ŋ deletes and transfers the nasality to preceding vowels after low [a] and [ɒ]; historical *CⱼVŋ syllables surface with a fronted and raised vowel in contemporary Suzhou. Meanwhile, the lexically-specific pronunciation split between Literary and Colloquial Readings is explainable by standard dialect borrowing effects from Mandarin Chinese. Combining language-internal and language-external forces to a fully regular analysis, the paper proposes an alternative to approach lexically-specific patterns of sound change. Rather than allowing a lexically-gradual sound change (i.e. Lexical Diffusion), I show that lexical borrowing is a more appropriate analysis to the Differing Readings pattern in Suzhou on both empirical and theoretical grounds.

Keywords: Neogrammarian sound change, Lexical Diffusion, Suzhou Chinese, lexical borrowing

1. Introduction

This paper aims to tease apart the interaction between ongoing sound change and lexically-determined alternating pronunciations in the Suzhou dialect of Chinese, a representative member of the Wu Chinese family. I argue against a Lexical Diffusional approach to sound change (Wang 1969; Chen & Wang 1975) in stating that all relevant changes can be captured as either purely regular sound change or lexical borrowing. I focus on the diachrony of the phoneme /ŋ/ in coda position, which has taken different paths of change depending on the preceding vowel. The coda nasal change is further complicated by pronunciation variation across generations and two register-dependent lexical groups. The majority of change observed in the data are strictly phonetically conditioned – coda /ŋ/ fronting happens when the preceding nucleus is non-front [ə] or [ɪ]; coda deletion and subsequent nucleus nasalization (Vŋ > (Ṽŋ) > Ṽ) takes place when the nucleus is low [a] or [ɒ]; there is also a vowel fronting effect caused by historical *Cⱼ onsets. On the other hand, loanwords from Mandarin Chinese into Suzhou block certain processes of the aforementioned change, which is reflected in the register-dependent alternation. One example is given in (1):

(1)   Lexical borrowings disrupt regular change in Suzhou

a. Regular change:	*aŋ > [ã:]	爭 [tsã:]		'to argue with'
b. Lexical borrowing:	əŋ > [ən]	爭論 [tsən.lən]		'dispute'

As shown, (1a) reflects a phonetically-motivated regular sound change applying to the entire *native* lexicon ("Colloquial Readings"; see §2), while (1b) stands for recent loans from Mandarin Chinese, a minority with regard to vocabulary size ("Literary Readings"; see §2). My analysis directly contrasts with a Lexical Diffusional approach (argued by Yang 2004 for Suzhou; see Wang 1969 for discussion), where seemingly irregular synchronic distributional patterns are treated as 'residues' of phonetically abrupt but lexically gradual change.

This paper offers additional supporting evidence to a few proposals regarding mechanisms of sound change in general and also Chinese historical linguistics. First, it recognizes lexical borrowing as a legitimate explanation to surface irregularity within the synchronic span (i.e. within an apparent time study; see Joseph 2009; 2015)[1]. The analysis I propose still adheres to the fundamental principle of regular sound change, while fully accounting for seemingly irregular data. Second, the paper also supports previous analyses of the Differing Reading phenomenon in Chinese as a register-specific lexical borrowing process (Lin 2011) instead of a diffusional sound change.

The paper is structured as follows: §2 gives some background information on two related topics: the theoretical debate between 'the Regularity Hypothesis' (Hockett 1965) and Lexical Diffusion (Wang 1969; Chen & Wang 1975) as the most fundamental mechanism of sound change; and the lexically-conditioned pronunciation alternation under discussion – 'Differing Literary and Colloquial Readings' (henceforth 'Differing Readings'). §3 presents the data drawn from recent descriptive accounts of Wu Chinese (Qian 1992; Ye 1993). A brief sketch of the relevant phonological system of Suzhou is summarized in §4. In §5 I offer my phonetically-conditioned analysis to the generational patterns and Differing Readings alternation based on established Middle-Chinese representations of different rhymes; a comparison of my analysis to the Lexical Diffusion approach will be given in § 6, followed by a short summary at the end.

2.   Background Information

2.1   Regularity and Irregularity of Sound Change
There have been numerous attempts to theorize language change since the proclamation of the

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[1] Interestingly, Wang (1969) considers such treatment of outliers of a specific regular change 'unsatisfyingly ancillary and particularistic'. This critique, in addition to its concerns for historical accuracy (i.e. if certain language contact conditions were geographically/historically plausible), also points out that borrowing as an explanation often arises due to a 'lack of alternative explanations' (Wang 1969: 10).

Neogrammarians (Osthoff & Brugmann 1878). They claimed that sound change is regular in the sense that all lexical items sharing identical phonetic environments would undergo identical phonetic changes over time (Hale 2003; Bermúdez-Otero 2007 for review). Under this view, any patterns of sound change that is not completely regular (i.e. ones where two or more distinct changes target the exact same phonetic environment) would pose a serious problem as they challenge the fundamental Neogrammarian principle. Attempts to resolve such irregularities in the data have thus been a major part of work for historical linguists following the Regularity Hypothesis.

When seemingly irregular patterns arise, three solutions are available according to a Neogrammarian: First, it is possible that the conditioning environment is incorrectly characterized, such that there are actually distinct changes targeting *separate* phonetic environments which appear to be similar at a first glance. Karl Verner's (1877) reanalysis of the famous exceptions in Grimm's Law is a fitting example. Alternatively, some irregular changes can be caused by *analogy* (also known as *paradigm leveling*), a conscious process carried out by the speakers to 'regularize' the sound relationship in a language, typically across different forms within a morphological paradigm (see Joseph 2012 for examples). The last possibility is that the synchronic lexicon becomes irregular as an artifact of contemporary/recent lexical borrowings from neighboring or standard linguistic varieties (Joseph 2015). Contemporary borrowing from one language variety A into variety B would easily be irregular, since forms from B do not have to correspond to any change targeting the same environments in A. Forms borrowed into the language for a long time could still be outliers of certain sound change patterns, simply because the loans entered the language at a later point and 'missed' some incipient changes[2].

In opposition to the Neogrammarian view is what is known as *Classical Lexical Diffusion* (Wang 1969, Chen & Wang 1975, among others; see also more recent exemplar approach by Bybee 2002, 2017). Wang and colleagues believe that the *primary* mechanism of sound change does not have to be regular ('phonetically gradual and lexically abrupt', in Wang's words). Instead, they propose that sound change is in principle *phonetically abrupt and lexically gradual*. That is, the same sound change is applied to lexical items on an item-by-item basis. Crucially, irregular patterns in sound change become a non-issue for Lexical Diffusional approaches to sound change: as a sound change gradually diffuses through words with relevant phonetic environment in the lexicon, it is of course possible for the change to complete if no other factors intervene. This gives us the numerous regular attestations of sound change. However, it is also likely that two *competing* changes targeting the same phonetic environment coexist in the grammar for a certain period, and they operate on different groups of lexical items. The

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[2] A very telling example is the three lexical layers in Modern Japanese, roughly corresponding to native *yamato* words, early borrowings from Chinese and later borrowings from European languages. See Itô and Mester (1995, 1999a, 2003) for a comprehensive discussion.

outcome would naturally be an arbitrary and 'irregular' separation of the lexicon, where some words have participated in change X, while others participated in change Y. Since Lexical Diffusion by definition is lexically gradual, it is unnecessary for one to rule out irregular (i.e. lexically gradual) sound change on principled grounds.

To support the proposal that sound change is lexically gradual, Wang and colleagues consider the Differing Reading phenomenon in Chinese dialects a prime example of Lexical Diffusion, with 'large sectors of morphemes which have two pronunciations'(Wang 1969: 15). Part of the goal of this paper is to revisit this debate on the regular nature of sound change in the context of Differing Readings in Suzhou. With regard to the data on the diachrony of coda /ŋ/ in Suzhou, I argue that all recent changes in Suzhou coda /ŋ/ are purely regular, while the lexically-gradual Differing Readings alternation is solely caused by borrowings from Mandarin Chinese. Instead of deeming an 'irregular' change an exception to the Neogrammarian tradition, I treat 'gaps' in a regular change as indicators to language-external factors[3] – in the current case, borrowing.

2.2   Differing Readings

Wu Chinese, like many other Chinese languages, has a lexically-determined alternating pronunciation called 'Differing Literary and Colloquial Readings'. When pronouncing a Chinese character bearing the same meaning in different lexical items, two different phonetic forms will sometimes arise: 'Literary Reading' and 'Colloquial Reading'. The decision of which to use is lexically fixed, leaving other sociolinguistic factors (e.g. gender, socioeconomic status, level of education) irrelevant in most cases – typically, lexical items requiring Literary Reading come from standard dialects of Chinese[4], while ones with Colloquial Reading are usually older lexical items in the local variety which tend to preserve and reflect the sound system of Middle Chinese (Qian 2003: 70, Wang 1981, Lin 2011).

In the contemporary dialect of Suzhou, lexical items with Literary Readings mainly consist of foreign loanwords and technical terminology. The majority of the lexicon follows Colloquial Reading, reflecting a more conservative phonology dating back to at least Middle Chinese (Wang 1955, Lin 2011). Below in Table 1 are a few examples of Differing Readings in Shanghai Chinese, one of the neighboring Wu dialects of Suzhou.

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[3] Andersen (1973) makes a difference between evolutive change – 'a change entirely explainable in term of the linguistic system that gave rise to it' and adaptive change – 'a change not explainable without reference to factors outside the linguistic system in question' (Andersen 1973: 778). Differing Readings can be considered a case of adaptive change in his terminology.

[4] Nanjing and Beijing Mandarin during the Ming and Qing dynasties, as well as Modern Mandarin Chinese. See Lin (2011) for a comprehensive survey on the current status of Differing Readings among Chinese languages.

Table 1. Differing Readings in Shanghai, Wu. Tones are omitted.

Character	Gloss	MC[a]	Mandarin	Literary		Colloquial	
生	to live	*ʂaŋ	[ʂən]	[sən]	生物 'biology'	[saŋ]	生活 'life'
人	person	*nʲin	[zən]	[zən]	人民 'people'	[nin]	小人 'child'

a. The current paper does not intend to resolve the debate on different reconstruction accounts of Middle Chinese (see § 3.2). For our current purpose, I follow the Middle Chinese reconstruction of Pulleyblank (1984, 1991).

The two Literary words 'biology' and 'people' in Table 1 are both recent loans from Mandarin (Shen 2012 for overview), while 'life' and 'child' are both native (i.e. Colloquial) expressions in Chinese. The character '生' in '生物' (lit. 'living things', biology) has a Literary pronunciation of [sən], almost identical to that of Mandarin, while its Colloquial pronunciation in '生活' (a compound of two words both meaning 'to live') is [saŋ], resembling the Middle Chinese form *ʂaŋ [5]. The alternating pronunciations of '人' give a more compelling case: in Literary '人民' (lit. 'person citizen', loaned as a legal term 'people') the character '人' is [zən], whereas in Colloquial '小人' (lit. 'small person', child) the pronunciation is [nin]. Both the onset and the rhyme are drastically different in the two readings [zən] and [nin] in Shanghai, but each is closely related to a distinct origin – contemporary Mandarin Chinese [zən] and Middle Chinese *nʲin. In addition, it seems rather unlikely for an arbitrary change *nʲin > [zən] to take place in Shanghai, even if we accept the lexically gradual change mechanism by Wang (1969) – the change from *nʲin to [zən] is not phonetically motivated on any account and thus should not even be considered as a case of *sound* change. Therefore, I believe it is more plausible to consider the Literary forms as borrowings from Mandarin Chinese, rather than outcomes of (irregular) sound change.

As demonstrated, Literary Readings in contemporary Wu Chinese are heavily influenced by the pronunciation of Mandarin, while Colloquial Readings tend to reflect their corresponding historical forms (e.g. Middle Chinese). This pronunciation alternation accounts for a great amount of synchronic variation in contemporary Suzhou Chinese, some of which will be the focus of this paper.

3.   Recent Change of Suzhou coda /ŋ/: Descriptive Data

3.1   Preliminaries
In this section, I will provide the descriptive data of coda /ŋ/ in Suzhou, synthesizing the

[5] The onset in Shanghai is alveolar [s] instead of retroflex [ʂ] mainly because there is no retroflex place of articulation in Shanghai's native phonology. The same is true for [z]/[ʐ].

comprehensive work of Qian (1992) and Chao (1928). Note that both authors chose to account for the recent sound change of Suzhou in the form of an apparent time survey (Baily et al. 1991), transcribing the speech of three consecutive generational groups – Old, Middle and Young[6]. Crossing three generations with two Differing Readings, we end up with maximally six distinctive pronunciations for a single character. Adding to the complexity of the data are a few other recent changes, which do not affect the current account of coda /ŋ/. I will discuss each of these irrelevant changes here and omit them in my summary of the data.

Firstly, in younger generations there is a vowel merger combining low back rounded /ɒ/ and low front /a/ into a variant /ʌ/ with a lot of inter-speaker variation[7]. This specific change accompanies other similar mergers and can be accounted for as a general trend to neutralize the [round] phonological contrast among vowels. Even though the front-back (or rather, unrounded-rounded) contrast plays an essential role at a certain point (see § 5.2.3), this subsequent merger does not add much to the discussion of coda /ŋ/. I will leave out this merger in my data and analysis.

Secondly, whether prenuclear glides in Chinese languages count as actual segments in the syllable rhyme or secondary articulations attached to the onset has always been a topic of debate. From a purely typological view, Chao (1934) is right in that there is no optimal solution in a phonemic analysis, since there would always be a trade-off between the phonemic inventory and phonological complexity (e.g. phonotactics, syllable structure). I choose to follow Duanmu's (2007) framework to analyze the prenuclear glides as secondary articulations, an integral part of the onset instead of the rhyme, mainly because of the compelling evidence from the phonetics of Mandarin[8]. Since the the syllable structure of Suzhou is comparable to that of Mandarin, I will thus treat prenuclear glides as secondary articulations.

The last piece of the preliminary discussion concerns the focus of my analysis: rhymes. It is a common practice for Chinese phonologists to analyze a syllable as consisting of initials and finals, which are roughly the same as onsets and rhymes (Wang 1955; see also Lin 2007 for a discussion of the difference between initials/finals and onsets/rhymes). Analysis of historical Chinese phonology, as well as recent literature on dialectology, make extensive reference to rhyme categories of *Guangyun*, a rhyme dictionary compiled in the Song dynasty (around 1000 CE). The descriptive data of Suzhou (Chao 1928 and Qian 1992) I use are also organized according to *Guangyun* rhyme groups, which

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[6] Old speakers all aged over seventy at the time of recording; Young informants mainly consisted of high school students in their teens; Middle speakers were mostly in their forties and fifties. Chao's (1928) fieldwork predates that of Qian (1992) for over half a century, but the general pattern of pronunciations seem to be similar in the two accounts.

[7] This happens to other variants of the two low vowels as well, including glottalized [aʔ], [ɒʔ] and nasalized [ã], [ɒ̃]. See, for example, Yang (2004) for a descriptive account.

[8] See Duanmu (2007: 12-13) for a discussion on the phonetics of Mandarin prenuclear glides and over-analysis of phonemes.

makes it possible to connect the contemporary data of Suzhou to reconstructions of Middle Chinese. Following the way the data is constructed, I will focus on the change of coda /ŋ/ grouped by different rhyme categories and mention the corresponding onsets only when it is relevant.

3.2   The Data

Below in Table 2 are all possible /ŋ/-coda rhymes in Middle Chinese and their corresponding reflexes in both Mandarin Chinese and Suzhou, adapted from the fieldwork of Qian (1992) and Chao (1928).

Table 2. /ŋ/-coda rhymes and corresponding pronunciations in Suzhou. Mandarin transcriptions are adapted from Duanmu (2007). Tones and onsets are omitted. Mandarin: corresponding rhyme in Modern Mandarin L: Literary; C: Colloquial; O: Old speakers; M: Middle-aged speakers; Y: Young speakers.

Rhyme	Example	Mandarin	L-O	C-O	L-M	C-M	L-Y	C-Y
登I	恆 - *constant*	[əŋ]	[ən]	[ən]	[ən]	[ən]	[ən]	[ən]
登II	朋 - *friend*	[əŋ]	[ən]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]
庚I	爭 - *dispute*	[əŋ]	[ən]	[ã:]	[ən]	[ã:]	[ən]	[ã:]
庚II	孟 - *a surname*	[əŋ]	[ən]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]
庚III	橫 - *horizontal*	[əŋ]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]
庚IV	命 - *life*	[əŋ]	[ɪn]	[ɪn]	[ɪn]	[ɪn]	[ɪn]	[ɪn]
庚V	兄 - *brother*	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]
陽I	嘗 - *taste*	[aŋ]	[õŋ]	[õŋ]	[õ:]	[õ:]	[õ:]	[õ:]
陽II	讓 - *let*	[aŋ]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]
江	江 - *river*	[aŋ]	[õŋ]	[õŋ]	[õ:]	[õ:]	[õ:]	[õ:]
東	絨 - *wool*	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]	[oŋ]

Each row stands for a distinct chain of sound change under its *Guangyun* rhyme, indicated by the first cell. Roman numeral markings for subgroups do not appear in *Guangyun* and are merely an analytical tool, making them easier to refer to – I show in the analysis that different behaviors of subgroups under a single *Guangyun* rhyme occur mainly because of influence from the onsets.

The variation between Literary and Colloquial Readings in Suzhou is in essence the opposition between language-external (Mandarin) influence and language-internal phonology. To fully capture the diachronic change in this synchronic apparent-time dataset, one also needs to look at the common predecessor variety of Suzhou Chinese and Mandarin Chinese. Below I draw Middle Chinese

phonological data from three reconstruction systems: the Wang system (Wang 1955), the Pulleyblank system (Pulleyblank 1984, 1991) and the Baxter & Sagart system (Baxter 1992 and Baxter & Sagart 2014).

Table 3. Proposed reconstructions for the *Guangyun* groups. Prenuclear glides are considered part of the onset and omitted.

Guangyun	*Wang*	*Pulleyblank*	*Baxter & Sagart*
登	*əŋ	*əŋ	*əŋ
庚	*ɐŋ	*aŋ	*aŋ
陽	*ɑŋ	*ɑŋ	*aŋ
江	*oŋ	*ɑŋ	*oŋ
東	*uŋ	*uŋ	*uŋ

Table 3 illustrates some differences among reconstructions for each rhyme category. For instance, Baxter & Sagart has reconstructed 庚 and 陽 rhymes as having the same nucleus (*aŋ), while both Wang and Pulleyblank propose a difference in vowel quality between these two groups (*ɐŋ vs. *ɑŋ or *aŋ vs. *ɑŋ). This difference is sometimes essential to account for the various reflexes of rhymes in modern varieties of Chinese. For the purpose of my current analysis, I will follow the reconstructions of Pulleyblank (1984, 1991). Nonetheless, I do not intend to commit to any reconstruction account in particular as comparing the empirical relevance across different systems is beyond the scope of this paper. My aim of synthesizing these data is to simply point out the intriguing diversity among reconstructions in Chinese historical phonology, which is open for future research and discussions.

I conclude this section by generalizing the main processes of change in the apparent time survey of Suzhou, giving the Pulleyblank reconstruction and the data from Table 2. Note that the reconstruction for 陽 and 江 rhyme uses a rounded back *ɒ nucleus, which is slightly different from Pulleyblank's *ɑ reconstruction (see 5.1.4 and 5.2.3).

(2). A summary of all changes in coda /ŋ/
   a. *əŋ > [ən]. Fronting of velar [ŋ]. Found in both subgroups of 登 rhyme to different degrees: across the board in 登I, only in Literary Old in 登II.
   b. *əŋ > [ã:]. Change of both the nucleus and the coda. Found in 登II, on every form other than Literary Old.
   c. *aŋ > [ã:]. Coda nasal deletion and vowel nasalization. Found in 庚I, II and III to different

degrees: all Colloquial Readings in 庚I; all Colloquial Readings plus Literary Mid and Young in 庚II; across the board in 庚III. Note that 庚II and 登II have the *exact* same surface forms.

d. *aŋ > [ən]. Fronting/raising of nucleus and subsequent fronting of coda. Found in 庚II on Literary Old. It seems like a mirror-image of the change in 登II.

e. *aŋ > [ɪn]. Fronting/raising of nucleus to [ɪ] and subsequent fronting of coda. Found only in 庚IV, applying across the board.

f. *aŋ > [oŋ]. Change of nucleus. Found only in 庚V, applying across the board.

g. *ɒŋ > [ɒ̃ŋ] > [ɒ̃:]. Coda nasal deletion and vowel nasalization. Found in 陽I and 江. It is the only change with two sequential steps over age in a synchronic account[9] – [ɒ̃ŋ] among Old speakers but [ɒ̃:] among Mid and Young speakers.

h. *ɒŋ > [ã:]. Nucleus fronting accompanying coda deletion and vowel nasalization. Found only in 陽II, applying across the board.

i. *uŋ > [oŋ]. Lowering of vowel nucleus. Found only in 東, applying across the board.

4.   A Phonological Sketch

A brief detour to the phonological system of Suzhou is needed for the analysis. I give the phonemic inventory of Suzhou vowels and nasal sonorants in (3) below:

(3).   Suzhou vowels and nasal sonorants

Vowels:	Front	Central	Back	**Nasals:**	m n ŋ
High	i ɪ y	ɨ ʉ	u		
Mid	ɛ ø	ə	o		
Low	æ	ã	ɒ̃ ɒ		

Noticeably, Suzhou has four contrastive low vowels: a low front /æ/, a fully nasalized low central /ã/ and two low back rounded /ɒ̃, ɒ/ contrasting in nasalization. With regard to phonological features, the four low vowels require at least *two* backness features to be distinctive if one subscribes to a privative featural system (Steriade 1987, Archangeli 1988, Mohanan 1991). This is demonstrated in (4):

(4).   Featural specifications of low vowels assuming a privative distinctive feature system

	[front]	[back]	[nasal]
/æ/	+		

[9] Compare this to (2c) and (2h) with only a nasalized monophthong in the synchronic grammar.

/ã/			+
/ɑ̃/		+	+
/ɒ/		+	

As shown, besides the common feature [low] (omitted), two backness features [front] and [back] plus the [nasal] feature are needed to fully distinguish the four low vowels. Interestingly, /ã/ is *underspecified* for both [front] and [back] according to this approach. This will become very crucial in my analysis of nasal place assimilation below.

There have been attempts in feature geometry theory to unite the places of articulation of vowels and consonants (the Place node in Sagey 1986, the C/V-Place node in Clements and Hume 1995, to name a few). Taking this into consideration, the contrast between a dorsal /ŋ/ and a coronal /n/ can be captured by a minimal [back] vs. Ø (*underspecified*) feature difference under the Dorsal node[10].

With these preliminaries in mind, I give featural specifications for all contrastive phonemes that are present in the contemporary Suzhou data in Table 2:

(5).   Featural specifications of all relevant phonemes. Empty cells entail underspecification of corresponding feature.

	[front]	[back]	[nasal]	[high]	[low]	[consonantal]	[vocalic]
/ɪ/	+			+			+
/æ/	+				+		+
/ã/			+		+		+
/ɑ̃/		+	+		+		+
/o/		+					+
/u/		+		+			+
/ə/							+
/n/			+			+	
/ŋ/		+	+			+	

The backness specification of a particular phoneme appears to be crucial in the phonological grammar of Suzhou, as the co-occurrence condition of a vowel nucleus and a nasal coda is fully *predictable* if

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[10] This phonemic analysis gives coronal /n/ no place specification: /n/ becomes a nasal consonant underspecified for any place feature. See motivation for such treatment of /n/ on both theoretical (Archangeli 1988, Dresher et al. 1994) and empirical (Paradis & Prunet 1991b, Rice 2007) grounds.

we compare the backness feature of the two neighboring segments. Summarizing the data in Table 2, this is shown in (6):

(6).   Co-occurrence of vowel-nasal sequences in Suzhou. Ø: underspecified for both [front] and [back]. Forms with asterisks are unattested. Asterisks stand for unattested/ungrammatical forms.

	Nucleus	Coda
[ən]	Ø	Ø
[ɪn]	[front]	Ø
[oŋ]	[back]	[back]
[õŋ]	[back]	[back]
*[əŋ]	Ø	[back]
*[ãŋ]	Ø	[back]
*[ɪŋ]	[front]	[back]

(6) presents an interesting regressive harmony pattern of [back]: when the coda nasal is a velar /ŋ/, the preceding vowel nucleus has to be [back]. Only when the coda nasal is a coronal /n/ (underspecified for place feature), the preceding vowel can be either front (as in [ɪn]) or central (as in [ən]).

This [back] harmony pattern gives us a straightforward account for several changes of coda /ŋ/ in Suzhou: regardless of generations or Differing Readings, the velar coda /ŋ/ only surfaces after a [back] vowel. When the nucleus is a non-back [ə] or [ɪ], a historical *ŋ is always fronted to (underspecified) alveolar [n]; when the nucleus is the low central [a], *ŋ is completely deleted[11].

The essential point here is that the synchronic grammar of Suzhou blocks all realizations where a specified [back] coda does not have a corresponding [back] nucleus. Meanwhile, the grammar is less strict when the coda is an alveolar [n] underspecified for place, as both mid and front vowels can be the nucleus. The above observation can be captured either by a pair of ordered *SPE* rewrite rules (Chomsky & Halle 1968) or one markedness constraint in the Optimality Theoretic framework (Prince & Smolensky 1993) that will have to be high-ranked in the Suzhou grammar:

(7a). $\begin{bmatrix} \text{nasal} \\ \text{consonantal} \\ \text{back} \end{bmatrix} \rightarrow \emptyset / \begin{bmatrix} \text{nasal} \\ \text{vocalic} \\ \text{low} \end{bmatrix} \_\_ \#$

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[11] Historical coda *n, on the other hand, shows one case of such back harmony pattern in Suzhou: *un > ən (Qian 1992). Other historical rhymes with *n coda all had non-back vowels as their nuclei, and thus mostly show no change in contemporary Suzhou Chinese.

(7b). $\begin{bmatrix} \text{nasal} \\ \text{consonantal} \\ \text{back} \end{bmatrix} \rightarrow \begin{bmatrix} \text{nasal} \\ \text{consonantal} \end{bmatrix}$ / [vocalic] __ #

(8).   AGREE-[BACK]: Assign one violation for each [back] coda that does not succeed a [back] nucleus.

It is important to note that (7) or (8) give a phonological account to *both* the historical *ŋ > n/Ø change, and the synchronic phonotactics of Mandarin borrowings in Suzhou. As I will show in the analysis, recent Mandarin loans with the rhyme [əŋ] adapts to the phonotactics of Suzhou and changes to [ən] in Literary Reading.

I have discussed all technical and analytical tools needed for the analysis of the diachrony of coda /ŋ/ in contemporary Suzhou. In the following section, I account for all the observed changes in (2) using established reconstructions of both major rhyme categories and several specific onsets (Pulleyblank 1984, 1991). I will also split the analysis into two parts, analyzing changes that are mostly regular at first, and then those due to borrowing effects. The analysis is followed by a short synthesis, combining the two parts together to form a more holistic picture.

5.   Analysis

5.1   Regular changes

I begin by accounting for the changes that are already complete: those showing a single surface realization regardless of generations or Differing Readings. The completed changes are part of (2a), (2c) and (2e), (2f), (2g), (2i).

5.1.1   [back] agreement in (2a)

Within the change stated in (2a), 登 I is the subgroup that have across-the-board realization of *əŋ as [ən]. There is very little debate in the literature about reconstructing 登 rhyme as *əŋ. The change is reiterated below:

(9).   *əŋ > [ən]. applying across the board in 登 I.

This change is rather straightforward: velar *ŋ is fronted to alveolar [n] through either rule (7b) or through the constraint interaction between AGREE-[BACK] and some relevant faithfulness constraint (e.g. MAX-[BACK]). Interestingly, there is no surface Differing Reading effect in this group: the

Mandarin reflex of historical *əŋ rhyme is a faithful [əŋ] (see Table 2). Even if there were Literary borrowings into Suzhou from Mandarin, they would follow the synchronic phonotactics of [back] harmony and change to [ən]. Consequently, one will not see any pronunciation difference in this particular rhyme category.

Articulatorily, this kind of change can be understood as a weakening effect, where less time to carry out 'fine-tuned neuromotor activities' in fast spontaneous speech can lead to overlapping articulatory gestures (Bybee 2015: 469). This is also known as *ease of articulation*. In a gestural framework of articulation (Browman & Goldstein 1989, 1992), this process can be described as a gestural overlap between the nucleus (with no tongue body gesture) and the coda (with a [back] tongue body gesture). Suzhou shows one possibility of resolving such gestural overlap: neutralizing the [back] feature, thus fronting the coda /ŋ/ to [n].

A natural question to ask at this point is that how pervasive this [back] harmony pattern has been in Suzhou. There are two possible explanations: first, the effects of this constraint might have appeared during the transition from Middle Chinese to Modern Chinese[12], where Suzhou and Mandarin developed distinct grammars on the co-occurrence of [back] segments. As a result, Mandarin remains faithful to the historical *ŋ coda ([əŋ]), while Suzhou restricts the positions *ŋ would occur both diachronically and synchronically ([ən]). Alternatively, as Baxter & Sagart (2014: 12) have pointed out, rhyme books such as *Guangyun* are themselves approximations of the Middle Chinese sound system, for they had to make compromises across different regional varieties. If the Colloquial (language-internal) form of this particular rhyme has been *ən in Suzhou during or even before Middle Chinese period, there is essentially no change in the Colloquial form[13]. The Literary realization of Mandarin loans (which are all [əŋ]) as [ən] can then be seen as an attempt to comply with Suzhou's native phonotactics – agreeing [back] in the rhyme.

5.1.2 Vowel fronting and [back] agreement in (2e)

Below is the change in (2e) reiterated. As indicated in 4.2, the historical form *aŋ has a nucleus underspecified for backness.

(10).   *aŋ > [ɪn]. Found only in 庚 IV, applying across the board.

Both segments in the rhyme are fronted. This is one case where a satisfactory explanation needs a

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[12] 11th-19th century, from the time of *Guangyun* to the time of early Literary loans (Shen 2012, Wang 1955).
[13] Since the phonetic difference between [əŋ] and [ən] is rather small and hard to capture without a proper phonetic alphabet, it is entirely possible for authors to miss or even intentionally ignore such detailed regional variation when compiling early rhyme books.

further elaboration on the onset. 庚 IV is traditionally referred to as '庚三等開口' ('庚 Division III Open') in Chinese historical linguistics literature, meaning it contains a [j] prenuclear glide, or a palatalization secondary articulation to the onset (Cʲ) in my representation. Therefore, a full reconstruction for this subgroup would be *Cʲaŋ.

The change from *a to [ɪ] seems more approachable now: historical *Cʲaŋ fronts and raises the nucleus over time to a high front position. Since the nucleus is not [back] at any stage, coda *ŋ is forced to be fronted, giving [ɪn] in the synchronic grammar. Interestingly, the corresponding realization of this rhyme in contemporary Mandarin Chinese is [Cʲəŋ] (Duanmu's phonetic transcription), with a fronted and raised nucleus, but an unchanged [ŋ] coda – there is still a slight impact of vowel fronting on the historical *Cʲaŋ words in Mandarin (*a > ə), but the coda stays mostly unchanged[14].

This chain of fronting in Suzhou can be seen as two well-motivated place assimilations, one fronting and raising the vowel and another fronting the coda. Production of a palatalized onset [Cʲ] fronts the nucleus over time *ə > ɪ, which can be easily captured by an articulatory gestural model. With respect to the nasal coda, the fronting process could take place regardless of vowel fronting, since *əŋ as a sequence does not obey the [back] harmony restriction in Suzhou and will change to [ən] anyways [15]. The status of 庚IV group was attested for at least over a century (Ding 2003), indicating that the change is already quite stable at the time of Qian's (1992) fieldwork.

5.1.3   Merger between rhymes, stability of /ŋ/ in (2f) and (2i)

(2f) and (2i) can be dealt with together as one merger. 庚 V is also known as '庚 Division III Closed' ('庚三等合口') in Chinese historical linguistics tradition. The group of 'Closed' rhymes contains a rounded [u] as part of the nucleus. Although the category is traditionally represented as *Ciuaŋ, I will conform to my framework and transcribe the reconstruction as *Cʲuaŋ. There is less debate on the historical form of 東 as *uŋ. Below are the changes associated with these two rhymes:

(11). a. *(u)aŋ > [oŋ]. Found only in 庚V, applying across the board.
    b. *uŋ > [oŋ]. Found only in 東, applying across the board.

The two separate groups ended up as [oŋ] in all Readings and all generations. Qian (1992) notes that

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[14] Baxter & Sagart (2014) has proposed a dialectical difference between *Cʲəŋ and *Cʲiŋ for this very subgroup in Old Chinese. This might as well be the difference already established in earlier stages of Chinese between Wu and other northern varieties, the latter of which later becomes the basis of Mandarin Chinese.

[15] Neighboring dialects of Suzhou have forms such as [ĩ:] (more radical nasal deletion/nasalization) and [ɪŋ] (palatalized nasal), indicating that: (a). the restriction on [ɪ]-[ŋ] co-occurrence and (b). palatalization of both nasals and vowels are observed elsewhere in Wu Chinese (Qian 1992).

庚 V rhyme has merged into 東 rhyme, which gives them [oŋ] in almost all varieties in Modern Wu[16]. The exact process that causes a change from *u to [o] is not a central concern of this paper. What is of most interest is the stability of [ŋ] diachronically– although the nucleus *u has changed into [o], the historical velar *ŋ is maintained faithfully, without any variation in the apparent time data. This is presumably because both the nucleus and the coda in [oŋ] are phonologically [back], and the whole rhyme satisfies the [back] harmony pattern. This is the only case in contemporary Suzhou that *ŋ surfaces in all six conditions, regardless if it is a lexical borrowing from Mandarin (Literary) or a native form (Colloquial).

For 庚 V (*Cʲuaŋ), the nucleus [a] is not fronted by the palatalized onset as in 5.1.2. I believe the intervening [u] has blocked influence of the onset on [a]. As a result, the merged vowel nucleus (be it [u] or [o]) is not fronted in any variety of Wu.

5.1.4 Coda neutralization and vowel nasalization in (2c) and (2h)

There are two rhyme categories belonging to this type: 庚 III in (2c) and 陽 II in (2h). 庚 III consists of words with onset /h, ɦ/ or ones without an onset. 陽 II is also known as '陽 Division III Open' ('陽三等開口'), indicating the onset is accompanied by palatalization. There is little evidence here to determine whether the historical form of 陽 II is *Cʲaŋ (following Baxter & Sagart) or *Cʲɒŋ (following Pulleyblank and Wang) – the discussion in § 5.2.3 gives a more compelling case. For the moment I (stipulatively) assume the latter is a more accurate representation. Below is the change reiterated.

(12). a. *aŋ > [ã:]. Found in 庚III, applying across the board.
        b. *Cʲɒŋ > [Cʲã:]. Found only in 陽II, applying across the board.

Note that (2c) contains two other groups (庚 I, II) showing a variation between synchronic forms [ã:] and [ən]. I discuss them in § 5.2.1. For 庚 III, the deletion of coda and subsequent emergence of vowel nasalization in *-aŋ > [ã] is a rather common process and is attested cross-linguistically[17].

The listener-induced *misperception and reconstruction* model of Ohala's (1981) offers a good explanation to this phenomenon: a distorted speech signal of *aŋ as [ã(ŋ)] is *misperceived* by an idealized Listener (often a child in language acquisition) as a nasalized monophthong /ã/, where the nasality has completely transferred to the nucleus[18]. Based on the unsuccessful (or rather, unfaithful)

[16] Changshu, one of the neighboring dialects still pronounces these rhymes as [uŋ], although a variation between [oŋ] and [uŋ] among the Young generation suggests an ongoing trend of *uŋ > [oŋ].
[17] See, for example, Ohala & Ohala (1992) for Hindi and Chen & Wang (1975) for various Chinese languages.
[18] The fact there is no synchronic variation between [ã:] and [ã(ŋ)] suggests that this transfer of nasality is already complete at the time of Qian's (1992) fieldwork.

reconstruction in their phonology, the Listener-turned-Speakers would produce fully nasalized [ã:] without variation.

Three aspects of this change are worth special notice. Firstly, the coda /ŋ/ does not appear at all in contemporary Suzhou, regardless of age and Differing Readings. Recall that the [back] harmony pattern in Suzhou prohibits a velar /ŋ/ preceded by any nucleus that is not [back]. Instead of assimilating to the alveolar [n], the coda deletes while its nasality transfers to the nucleus in this case. This observation is still in line with my claim in § 4.2, in that [aŋ] is *never* an acceptable rhyme in Suzhou. This is essential when compared to pattern (2g), where we still see evidence of [ɒ̃ŋ] in the pronunciation among the Old generation (See more in 5.2.3). Secondly, I did not explicitly cover the fact that the vowel length has changed in this process as well. Since full syllables in most Chinese languages have a bimoraic domain as their rhyme (Duanmu 2007: 41), neutralizing a (moraic) coda entails lengthening the preceding nucleus [19]. This process is also referred to as *compensatory lengthening* in the phonological literature (Hayes 1989). Lastly, I have so far shown two different strategies in Suzhou to achieve [back] harmony: fronting of [ŋ], or deletion of [ŋ] accompanied by nasalization of the nucleus. The choice of which to apply is clearly phonetically conditioned: deletion & nasalization only apply to low vowels /a, ɒ/, while nasal fronting applies to other non-low vowels. The condition with change (2h) is similar. Its nucleus was firstly fronted because of the palatalized onset (*Cʲɒ > [Cʲa]), making it indistinguishable from that of 庚 III. From then on, the course of change illustrated in above took place and ultimately changed the rhyme to [ã:]. Consequently, 陽 II words are pronounced as [Cʲã:] in modern Suzhou.

5.1.5   Interim summary

The preceding subsections have provided analyses for all patterns with no cross-generation or Differing Readings variation in Suzhou, where processes of regular change account for all synchronic forms. However, some Literary forms borrowed from Mandarin may differ from their Colloquial counterpart, while still following the [back] harmony phonotactics of Suzhou. There is an additional regular change *ɒŋ > [ɒ̃ŋ] > [ɒ̃:], where we see generational progression from the data. In the following section I deal with changes that are either lexically graded or are ongoing, therefore cannot be regarded as being fully completed.

5.2   'Irregular' and ongoing changes –Mandarin borrowing in Literary and generational

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[19] Proposing a fixed number of moras in each syllable also works in favor with the secondary articulation status of glides – some traditional 'diphthongs' such as [Cia] or [Cua] can all be represented as [Cʲa:] and [Cʷa:], reflecting the phonetically long monophthongal nuclei.

patterns

In this part I discuss several seemingly irregular changes, namely the remaining rhyme categories in (2a) and (2c), and (2b), (2d). For these groups, the variation in synchronic forms is due to a split between Literary and Colloquial Readings. There is also an ongoing sound change quite similar to what I have discussed in § 5.1.4, conditioned by different generations. I will first deal with the part of the data with consistent Literary/Colloquial split, and then look at their difference across age groups. Lastly, I will account for the purely generational change of *ɒŋ > [ɒ̃ŋ] > [ɒ̃ː] as a regular change in progress.

5.2.1   Consistent Differing Readings among Old speakers as a borrowing effect

From Table 2 we know that three rhyme groups show a consistent split between Literary and Colloquial Readings, at least among Old speakers. Below are the relevant data, with the addition of corresponding Middle Chinese reconstructions:

Table 4. Differing Readings observed in 庚 I, 庚 II and 登 II

Guangyun	Middle Chinese	Mandarin	Literary Old	Colloquial Old
庚I	*aŋ	[əŋ]	[ən]	[ã:]
庚II	*aŋ	[əŋ]	[ən]	[ã:]
登II	*əŋ	[əŋ]	[ən]	[ã:]

Table 4 summarizes the Differing Reading variation among old speakers, reiterated in (13) below. Essentially, all Literary forms realize as [ən] while their Colloquial counterparts are [ã:]. 庚 I stands for all historical *aŋ rhymes *without a labial or a glottal onset*. 庚 II and 登 II are two sub-categories with rather restricted environments: they contain 庚 (*aŋ) and 登 (*əŋ) rhyme syllables with a single labial onset (/b/, /p/, /pʰ/ and /m/ – I will use /B/ below as a cover term for all labial segments).

(13).   a. *aŋ > [ən]. In 庚 I, II Literary Old.
        b. *aŋ > [ã:]. In 庚 I, II Colloquial Old.
        c. *əŋ > [ən]. In 登 II Literary Old.
        d. *əŋ > [ã:]. In 登 II Colloquial Old.

The changes in (13) look like perfect examples of Classical Lexical Diffusion due to the way we schematize them: there appears to be a lexically-specific split in each of the Middle Chinese rhyme category – *aŋ to [ən] or [ã:], *əŋ to [ən] or [ã:]. However, as I have discussed in §2.2, the Literary

lexicon in Suzhou should be treated as recent borrowings from Mandarin, rather than the outcome of language-internal sound change. The stable Literary pronunciation of [ən] among these three groups follows naturally from the corresponding Mandarin forms [əŋ] – the synchronic [əŋ] > [ən][20] change is simply a nasal fronting process to accommodate the [back] harmony pattern, similar to that in §5.1.1. Colloquial Readings of 庚 (*aŋ) group, on the other hand, reflect a regular course of change demonstrated in §5.1.4: *aŋ > [ã:].

One process that remains unexplained is (13d), namely the *əŋ > [ã:] change in 登 II Colloquial Old. I argue that because of a previous merger between 庚 II and 登 II (Qian 1992), the rhyme of 登 II already became *aŋ before the subsequent nasal deletion/nasalization took place. This is further confirmed by a few other neighboring dialects of Wu[21]. The two steps of change are captured in (14).

(14). a. Merger between *əŋ and *aŋ after a labial onset. *Bəŋ > *Baŋ.
       b. Literary Reading emerges as loanwords from Mandarin /əŋ/. [əŋ] > [ən] in Literary
          Old; *aŋ > [ã:] in Colloquial.

5.2.2   Subsequent generational change, loss of Differing Readings

The previous subsection has dealt with the Differing Readings data among Old speakers in Qian (1992). If Suzhou were to maintain this Literary/Colloquial split, we should see essentially no change among Middle and Young speakers. This is indeed the case with 庚 I, which shows an opposition between Literary [ən] and Colloquial [ã:] across all age groups (see Table 2). However, the merged 庚 II/登 II group shows another interesting pattern in later generations, illustrated in Table 5 below.

Table 5. Loss of Differing Readings in the merged 庚 II/登 II group. L: Literary; C: Colloquial; O: Old speakers; M: Middle-aged speakers; Y: Young speakers.

Reconstruction	Mandarin	L-O	C-O	L-M	C-M	L-Y	C-Y
Merged *Baŋ	[əŋ]	[ən]	[ã:]	[ã:]	[ã:]	[ã:]	[ã:]

As shown, both readings in Middle-aged and Young speaker groups have been 'levelled' to [ã:], with

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[20] There is a slight difference in transcription I use to show the distinction between regular language-internal change and standard dialect loanword effect: I use the form with an asterisk *aŋ when talking about the Colloquial form, since the change leads back to the predecessor of contemporary Wu, Middle Chinese; on the other hand, Mandarin loan form is transcribed with square brackets [əŋ], indicating the form was borrowed phonetically quite recently (19th-20th century) and was language-external at the onset of change.

[21] For example, in Kunshan dialect, 登 and 庚 have merged completely, showing only [ən] in Literary and only [ã:] in Colloquial across all generations. Compare this with Suzhou where a distinction within 登 and 庚 rhymes is still necessary because of the variation in later generations (Qian 1992).

the pronunciation of Literary [ən] being lost. One possible reason for this change could be a paradigm levelling effect: 登 II/庚 II is a phonologically confined category (*Baŋ after the merger) with simply not many vocabularies eligible for the Differing Readings phenomenon[22]. Andersen (1969b) has proposed that ad-hoc adaptation rules in innovative changes, especially ones that are register-sensitive (he uses the term 'phonostylistic rules', see Andersen 1973: 773), are subject to gradual reduction over generations because of the limited lexeme size. Literary Reading in Wu Chinese is a rather clear example of phonostylistic rules – a phonological alternation applicable to recent borrowings. After the emergence of Differing Readings, the two pronunciation registers eventually converged again because of the tiny Literary vocabulary size, and low frequency of usage. In other words, younger generations start to lose the ability to keep a contrast between Literary and Colloquial in the merged rhyme, due to their limited input on the Literary/Colloquial pronunciation distinction. Consequently, we see this 'nativization' effect which makes all pronunciations more Colloquial-like.

5.2.3   Age-graded propagation and stability of /ŋ/ in 陽 I and 江

The last set of data does not seem to have the Differing Readings effect, but instead demonstrates a generational change pattern. 陽 I is a rhyme subgroup that contains 陽 rhymes without palatalized onsets (which is 陽 II; see §5.1.4). The synchronic realization gives us a piece of evidence for its historical form: a stable nasalized [ɒ̃] (or [ɒ̃ŋ]) makes *ɒŋ a more likely reconstruction, at least for the predecessor of Suzhou. Alternatively we could take *aŋ to be the appropriate reconstruction for 陽. This predicts that *Cʲaŋ would undergo nucleus raising and fronting until the rhyme becomes [Cɪn], as demonstrated in §5.1.2 – this contradicts with the data for 陽 II ([Cʲã:] across the board). The same can be said for 江. Below is the change for both 陽 I and 江:

(15).   *ɒŋ > [ɒ̃ŋ] > [ɒ̃:]. In 陽 I and 江 rhymes. [ɒ̃ŋ] in Old generation, [ɒ̃:] in Middle and
        Young generations. Differing Readings have no effect on the pronunciation.

This is another case of historical /ŋ/ maintained in the synchronic grammar, *along with* nasalization on the nucleus, which makes it particularly interesting. [ɒ̃ŋ] is essentially the 'intermediate' stage of what I have demonstrated in §5.1.4: nasality starts to appear on the nucleus, yet coda /ŋ/ still stays, as we would expect for a phonetically-driven sound change. Interestingly, a stage of [ãŋ] (with a nucleus underspecified for [back]) does not exist anywhere in the synchronic grammar, while [ɒ̃ŋ] seems like

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[22] The only pair I can think of that shows a robust contrast is 猛: [mən] ('勇猛', brave) vs. [mã:] ('猛門', rude). Even so, [mən] is extremely rare because the vocabularies associated with it are only used in written literary works and are almost never pronounced.

a stable target among Old speakers. I believe this is a meaningful distinction Qian (1992) has made in transcribing the synchronic data.

The explanation again lies in the requirement for [back] harmony in Suzhou: only [back] nuclei are allowed to precede the velar /ŋ/. If Ohala's (1981) model of *misperception and reconstruction* is at work here, [ãŋ] would definitely be present at some point along the change of *aŋ > [ã:]. However, since [ãŋ] violates the synchronic phonotactics of Suzhou, the form was never a phonologically stable target, and only served as an extremely brief transition (i.e. stayed as a phonetic target) during the variation between conservative *aŋ and innovative [ã:]. This is exactly why there is no [ãŋ] in the synchronic grammar, as the change took a short time to complete and there is already no trace of variation in modern Suzhou. On the other hand, [ɤ̃ŋ] stays in contemporary Suzhou for an observable period (among old speakers) since it is compatible with the [back] harmony phonotactics. This peculiar 'latency' effect among the Old speakers not only provides an extra piece of evidence for the *misperception and reconstruction* model (we can actually see the very first stage of misperception as a stable phonetic/phonological target), but also further confirms the strict phonotactic restriction on agreeing [back] features in Suzhou.

One further note on the status of [back] harmony: one might be skeptical towards using a synchronically observed restriction to explain diachronic change – after all, constraints leading to a diachronic change could be relaxed or reranked synchronically (see Kiparsky 2015), while rewrite rules may also change their respective orderings. On the other hand, motivating certain phonological processes to account for the synchronic observation does not necessarily grant their long-standing status in the diachrony. This is best demonstrated in loanword phonology. For example, in Japanese, there are roughly three lexical strata: native Japanese, Chinese loans and recent loans (from Dutch, Portuguese and English; Ito and Mester 1995, 1999a, 2003). Each stratum has slightly different phonological behaviors – voiced geminates are allowed in recent loans from European languages but not in Chinese loans or native words (van Oostendorp 2014). A logically possible solution would be to claim that certain markedness constraints (e.g. the constraint on voiced geminates) are relaxed in recent time to allow more faithful representations of recent loans, since reranking of these constraints does not affect already established vocabulary (Chinese loans and native words) in Japanese. This type of analysis makes a very interesting prediction – that 'foreignization' of the native lexicon, the exact opposite of loanword nativization, should be possible.

Coming back to the case of Suzhou Chinese, Literary loans from Mandarin around 19th and 20th century were certainly *capable* of relaxing the [back] harmony pattern: it might even be the case that during the onset of Literary loans, variation between [əŋ] (Mandarin loans) and [ən] (Suzhou native vocabulary) or [ãŋ] and [ã:] was indeed present. This would not affect the Colloquial domain of

Suzhou either – Colloquial words as the native vocabulary should remain faithful to their corresponding predecessor, given that no other change took place. However, positing that the [back] harmony phonotactics has been relaxed in the *synchronic* grammar predicts that *all* words in Suzhou are able to disobey the restriction – not only can Literary [əŋ] keep its form, there is also possibility for a [ən] > [əŋ] change in Colloquial words (i.e. bleeding of Literary pronunciation into Colloquial), given the correct circumstances. Although it has been argued that hyperforeignisms, forms adapting a foreign phonology systematically, are not completely uncommon across languages (see Janda et al. 1994 and Joseph 2009 for examples), this kind of deviation from native phonotactics is never observed in Suzhou. Therefore, two observations of the synchronic data – the total absence of forms violating [back] harmony, the inability of Literary bleeding into Colloquial – have lead me to the conclusion that the same restriction on agreeing [back] feature has not only shaped diachronic change of Suzhou, but also stays active in the synchronic grammar of the dialect.

5.2.4   Interim summary

I have analyzed all remaining change patterns in the data, where variation appears either across Literary and Colloquial Readings, or across generations. I have also argued for Mandarin loanword effect on Literary Readings for the changes that does not seem regular at first glance. Lastly, the change of *ɒŋ > [ɒ̃ŋ] > [ɒ̃:] shows a very valuable 'latency' effect along the course of regular coda deletion/nucleus nasalization, giving an account of the very first step of change. Below is a summary of my analysis. It is important to note that all three mechanisms are working in conspiracy towards a single synchronic phonotactics: regardless of age and Differing Readings, coda /ŋ/ after a non-back nucleus is never allowed.

Table 6. Summary of proposed change in Mandarin and Suzhou. The contemporary Mandarin phonetic data is taken from Duanmu (2007).

Reconstruction	Language	Present (as of Qian 1992)	Analysis
*əŋ	Mandarin	[əŋ]	§5.1.1 (登I)
	Suzhou	[ən]	
*Bəŋ/*Baŋₐ	Mandarin	[əŋ]	§5.2.1 (登II, 庚II)
	Suzhou	Literary [ən] > [ã:] Colloquial [ã:]	
*aŋ	Mandarin	[əŋ]	§5.2.2 (庚I)
	Suzhou	Literary [ən] Colloquial [ã:]	

Table 6. *(continued)*

*Haŋ[b]	Mandarin	[əŋ]	§5.1.4 (庚III)
	Suzhou	[ã:]	
*Cʲaŋ	Mandarin	[əŋ]	§5.1.2 (庚IV)
	Suzhou	[ɪn]	
*oŋ/*uŋ	Mandarin	[oŋ]	§5.1.3 (庚V, 東)
	Suzhou		
*ɒŋ	Mandarin	[ɑŋ]	§5.2.3 (陽I, 江)
	Suzhou	[ɒ̃ŋ] > [ɒ̃:]	
*Cʲɒŋ	Mandarin	[ɑŋ]	§5.1.4 (陽II)
	Suzhou	[ã:]	

a: *Bəŋ/*Baŋ stands for Middle Chinese *əŋ/*aŋ with a labial onset.

b: *Haŋ stands for Middle Chinese *aŋ with a glottal onset.

The next section will be dedicated to two remaining topics: the applicability/non-applicability of Mandarin influence, and a comparison of my current analysis to a lexical diffusional alternative.

6. Discussion

6.1 Absence of Differing Readings

After the discussion of Mandarin influence on the Literary domain in 5.2.1 and 5.2.2, a natural question follows: if loans from Mandarin can cause a Literary/Colloquial pronunciation alteration, why does the influence not take place everywhere, but only in such confined rhyme categories (庚*aŋ, 登*əŋ)? Explaining what this loan effect can do when it applies is essential to the analysis, but it is equally important to understand why it does not apply in other cases. Below are all the cases where Differing Reading alteration is not present.

In group 登 I, the change is *əŋ > [ən] across the board, while the Mandarin form is [əŋ] as well. There is no way one could know if any Mandarin influence has taken place in this category, since the surface form in Mandarin is identical to the historical input for Suzhou – *əŋ (see §5.1.1). The same can be said for other categories I have covered: 庚 V and 東 where the rhymes are unanimously [oŋ], and 庚 IV where the rhymes both come from *Cʲaŋ historically[23].

庚 III (*aŋ rhyme with glottal or zero onsets, *Haŋ) is a category where Mandarin influence could

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23 In this latter case, even if Suzhou gets [Cʲən] from Mandarin loans, both the nucleus and the coda will be fronted to [ɪn], since [ən] is not allowed as a rhyme.

apply but did not: the Mandarin form has [əŋ], whereas in Suzhou the rhyme is nasalized [ã:] across the board. I offer two possible explanations to the non-applicability of loanword effect: firstly, 庚 III has a rather strict phonetic/phonological environment, leading to a tiny pool of vocabulary; just like what I have proposed for 登 II and 庚 II, a very small, infrequent Literary vocabulary under this rhyme means speakers will have difficulty maintaining the contrast between Mandarin-influenced Literary and language-internal Colloquial items – there are simply too few words to be pronounced in the Literary domain. Over time the borrowed Literary pronunciation will be levelled to the more common, Colloquial form. One other approach requires looking at the phonetic details of Mandarin and Suzhou. In Mandarin Chinese, the 'h'-like phoneme is actually a velar /x/ instead of a glottal /h/, making a character such as '横' [xəŋ] phonetically. In contrast, Colloquial pronunciation for the same character is [ɦʷã:], with both the onset and the rhyme different from Mandarin. Such a stark phonetic difference between these two languages may have simply blocked the borrowing of loanwords into Literary, since the whole syllable of [xəŋ] is 'foreign' to the phonotactics of Suzhou – Suzhou does not have velar fricatives, and [əŋ] is ungrammatical.

Lastly I will deal with the difference of *ɒŋ > [ɒ̃ŋ] > [ɒ̃:] in Suzhou and simply [aŋ]/[ɑŋ] in Mandarin. Importantly, Mandarin Chinese does not have phonological contrasts among the low vowels: /a/ as a phoneme can surface as [æ] when palatalized (e.g. '先' [ɕʲæn]) or [ɑ] when followed by /ŋ/. There has been a debate in Mandarin Chinese phonology on whether to represent this *ang* rhyme as [aŋ] or [ɑŋ] (Duanmu 2007: 38), but the variation existing between the two is not phonologically meaningful either way. Making the assumption that /aŋ/ in Mandarin is phonetically [ɑŋ] due to place assimilation (backing of nucleus, rather than fronting of coda as in Suzhou), the lack of influence from Mandarin is again understandable, as [ɒ̃ŋ] and [ɑŋ] are almost indistinguishable, except for the clear nasalization in Suzhou. Such an input from Mandarin is not capable of creating a clear-cut Literary/Colloquial pronunciation alternation.

To sum up, I believe that the absence of Mandarin influence on Literary in most cases can be explained by the fact that the rhyme in modern Suzhou is extremely similar or even identical to the corresponding realization in Mandarin. Regarding the rhymes, the effect would not be detectable even if there are loans from Mandarin onto the Literary domain. Therefore, this standard dialect influence has a very limited range of application in the analysis.

6.2   A comparison to Lexical Diffusion

Now I come back to the question at the beginning of this paper: what does it mean for a sound change to be 'regular'? When it is considered 'irregular', is Lexical Diffusion a viable explanation? Being regular means there is a certain rule (or process) that applies to every lexical item conforming to a

specific phonetic environment over time, changing every instance of them to a unified form. The changes listed in §5.1 and §5.2.3 are indeed regular, with the change applying to all lexical items sharing the same phonetic environments. By contrast, §5.2.1 and §5.2.2 have demonstrated two cases where *some* lexical items – which turn out to be Literary vocabulary loaned from Mandarin – behave differently from the rest of them under similar conditioning environments.

This seems like a perfect example of Lexical Diffusion. According to Wang (1969), sound change is by large lexically gradual; various factors (to name a few, word frequency, syntactic environment and register; Bybee 2017) can render some lexical items *more prone* to a change, leaving others behind. If we attribute the cause of Differing Readings to Lexical Diffusion, the emerging Literary Reading is simply a lexically-gradual sound change: *aŋ/*əŋ > [ən].

I provide two main counter-arguments to such a diffusional analysis. Firstly, vocabularies that 'lag behind' in Lexical Diffusion should eventually complete the same change, as more innovative forms spread corresponding rules to them. This bleeding effect is absent in the data of Suzhou: by prediction, Literary readings of 登 II / 庚 II words as [ən] (as the innovative pronunciation) would slowly bleed to the Colloquial domain, making other lexical items under the same category [ən] as well. This is clearly not the case, as the pronunciation of Colloquial Reading is consistently [ã:]. In fact, what we see in reality is the Literary Reading gradually losing its ground, getting replaced by a more 'conservative' form – Colloquial [ã:]. Native speakers of Suzhou, regardless of age, all have a clear-cut, categorical distinction between the two Differing Readings. If we treat Differing Readings as borrowings from Mandarin, this lack of Literary bleeding is then expected: nativization of loaned forms are often observed, while the reverse 'foreignization' of native words are extremely rare, if not totally impossible (Joseph 2009, 2015).

The second piece of evidence comes from a summary of all phonological processes I have discussed, listed in (16) below.

(16). a. Coda /ŋ/ fronting: applicable when the preceding nucleus is non-back [ə] or [ɪ]

b. Vowel fronting: applicable when the onset is palatalized [Cⱼ]

c. Coda /ŋ/ deletion and vowel nasalization : applicable when the preceding nucleus is low [a] or [ɒ].

These three changes are all phonetically well-motivated and apply across-the-board (even with Literary Readings, *aŋ/*əŋ > [ə**n**]). If we then accept *a > [ə] as a phonetically abrupt and lexically gradual change to explain the Literary pronunciation, the analysis becomes extremely arbitrary and ad-hoc: *a > [ə] becomes the *only* distributional fact we invoke Lexical Diffusion for. While other

processes are all phonetically-motivated (phonetically-gradual, in Wang's words), we adopt a phonetically-abrupt sound change *only* when it is needed. If Lexical Diffusion is truly a primary mechanism as Wang (1969) has suggested, one would expect to find it as a pervasive cause with numerous attestations, but not a 'last resort' mechanism to account for lexical residues. Put more concretely, one would expect: (i). lexically-specific changes are distributed all across the lexicon; (ii). those changes are not restricted to a handful of loanwords, but apply to native vocabulary as well. This is clearly not what we observe in the data of Suzhou.

In short, I argue that a borrowing analysis of Literary Readings in Suzhou is more appropriate than the Lexical Diffusion alternative mainly for two reasons: the lack of bleeding effect of Literary pronunciation, arbitrariness of the Lexical Diffusion analysis.

7.   Concluding remarks

This paper analyzes the status of coda /ŋ/ and its change across three consecutive generations and two Differing Reading domains using the synchronic data of Suzhou, Wu Chinese. I have identified three major processes of sound change in play: the fronting of coda /ŋ/; vowel fronting due to an adjacent palatalized onset; the deletion of the coda segment and transfer of nasality to the vowel nucleus. In addition, I attribute the Literary Readings alternation to a borrowing effect from Mandarin. By looking at the combination of phonetically-conditioned regular sound change and seemingly irregular borrowing effect, I have demonstrated that Lexical Diffusion is not the only solution to a lexically-graded residual pattern, and that regularity can still be maintained even some lexically-guided variation exists in the synchronic grammar.

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