Existential and Universal Anchoring: A Case Study of Chinese Diminutive Affixation

University of Southern California
Guanjun Feng (Bella)

1. Introduction

Anchoring constraints were originally proposed for explaining the special faithfulness to edges, both in the domain of Input-Output correspondence (e.g. Benua 1998) and Base-Reduplicant correspondence (e.g. Hendricks 1998). In Optimality Theory framework (Prince & Smolensky 1993), this paper proposes two sets of anchoring constraints, Existential and Universal ANCHORING for edges and head, requiring a segment at a particular position (edge/head) of S$_1$ have correspondents at the corresponding position of SOME/EVERY syllable of S$_2$.

The proposal is based on a case study of the diminutive affixation in two Chinese dialects. The diminutive morpheme in different Chinese dialects has been extensively studied among Chinese phonologists with different approaches (Duanmu 1990, Chen 1992, Yip 1992, Lin 1993, Wu 1994, Da 1996, Lin 1997, Zhang 2000). The interesting thing about this morpheme is that the surface forms of it vary drastically among the family of Chinese dialects, though historically they are the same morpheme. (Xu, 1981) Following is the data:

(1) Anxiang

Stem	Diminutive	Gloss
1. p^{h}a	p^{h}a.p^{h}ər	claw
2. ke	ke.kər	square

(2) Jian'ou

Stem	Diminutive	gloss
1. pu	pu.lu	roll
2. niau	niau.liau	wind

(3) Pingding

Stem	Diminutive	Gloss
1. ieʔ.tiæ	ieʔ.tɭɐ	a little
2. tɤu	tɭɤu	pocket

(4) Beijing

Stem	Diminutive	Gloss
1. p^{h}ɒ	p^{h}ɒ^r	hill
2. su	su^r	number

In Anxiang dialect, a stem like /ke/ is copied partially to accommodate the retroflex suffix. In another dialect, Jian'ou, the diminutive morpheme appears as a lateral /l/ at the onset of the added second syllable for a monosyllabic input. In Pinding dialect, the diminutive affix is a lateral infix working as the second consonant of a complex onset. For example, for an input /tɤu/, the diminutive form is [tɭɤu]. In Beijing dialect, the interesting phenomenon is that the morpheme is realized as a feature of retroflexion on the vowels, e.g. /pa/ becomes

[pa^r] (the superscribed /r/ indicates the retroflexion as a feature instead of a full segment).
With the two sets of anchoring constraints I propose, I show that the diminutive affixation in Anxiang and Jian'ou that looks like reduplication is actually not reduplication. Instead, the affixation can be explained as driven by conflicts among constraints including the two sets of anchoring constraints proposed here. The "apparent reduplication" in Anxiang and Jian'ou is actually multiple correspondence (Stuijke 1998) between input and output. The "apparent reduplication" is shown to be phonologically driven by the existential EDGE-ANCHOR over INTEGRITY. The fact that in the other two dialects, Pingding and Beijing, diminutive affixation doesn't cause "the apparent reduplication" as in Anxiang and Jian'ou further supports this claim. (Feng, ms) Though different, the "apparent reduplication" and the "no reduplication" cases are explained with a unified account. In this account, there is no need to prespecify the diminutive affix as a reduplicative affix in Anxiang and Jian'ou dialects. I claim the different ranking of anchoring constraints with other constraints such as INTEGRITY and UNIFORMITY leads to the variation.

The paper is organized as follows. In §2, I briefly review the Optimality Theory and Correspondence Theory. §3 analyzes the Anxiang data and proposes ∃-EDGE-ANCHOR as the driving force for the second syllable of the output. ∀-EDGE-ANCHOR is proposed to account for why the extra syllable recruits materials from the input. §4 turns to Jian'ou dialect and proposes ∀-Head-Anchor for explaining the recruitment of segment in this dialect. §5 gives the conclusion and expects issue for future research.

2. Background in OT

The basic architecture of optimality theory (Prince & Smolensky 1993) is the following. GEN (short for "generator) is the function that generates a set of candidates for each input and sumbits them to EVAL (short for "evaluator"). From the candidates, the optimal output is picked up by EVAL which is a function that evaluates output candidates as to their harmonic values, and selects the optimal candidate. Lexical representation (or underlying forms) of morphemes form the input to GEN. The criteria for EVAL in evaluating the inputs is through ranking of constraints. Every grammar is a system of conflicting constraints. Constraints are cross-linguistically universal but differences in ranking cause language variation. Every constraint is violable but the violation must be minimal. For a particular ranking of constraints, an output is considered "optimal" when it incurs the least serious violations.

Tableaux are used in OT to show the ranking of constraints and compare different candidates. For two constraints C_1 and C_2, C_1 crucially outrank C_2 if we have the following configuration in tableau 1: (The hand in front of candidate (a) indicates it is the optimal output. An exclamation mark shows the candidate is ruled out at that point.)

Tableau 1

INPUT	C1	C2	C3
☞a. A		*	
b. B	*!		
c. C		*	*!

In constrast, C2 and C3 don't have a crucial ranking for the reason that candidate (c) would be ruled out no matter what the ranking between C2 and C3 would be. From tableau 1, we also know that with the available constraints, candidate (c) will never be chosen over candidate (a) since it has a superset of violations of those of candidate (a).

The conflict between markedness and faithfulness constraints is at the heart of OT. Correspondence Theory (McCarthy & Prince 1995) holds that candidate sets are provided with correspondence relations between elements in related strings.

(5) Correspondence

Given two related strings S1 and S2 , correspondence is a relation R between elements of S1 and elements of S2 . Segments α (an element of S1) and β (an element of S2) are referred to as correspondents of one another if $\alpha\Re\beta$. (McCarthy & Prince 1995: Appendix A).

The S1 and S2 of the definition in (1) may be related as an input-output pair, or as base and reduplicant, or as a pair of output words.

In this study, the framework of OT and Correspondence Theory is adopted. I will show that variation among dialects is decided by the different ranking of a set of potentially conflicting constraints.

3. Anchoring in the Anxiang Dialect

3.1 Motivation for Copying: ∃-EDGE-ANCHOR

Anxiang is a dialect spoken in the Hunan Province in central China. There have been several studies of it (Yip 1992, Da 1996, among others) because of the interesting phenomenon in the affixation of the diminutive morpheme in this language. The following data is taken from Da (1996).

	Stem	Diminutive	Gloss
3.	p^ha	p^ha.p^hər	claw
4.	ke	ke.kər	square
5.	to	to.tər	pile

6.	p^hwu	p^hwu.p^hwər	shop
7.	p^hau	p^hau.p^hər	bulb
8.	tou	tou.tər	peak
9.	loŋ	loŋ.lər	cage
10.	kan	kan.kər	stick
11.	tyi	tyi.tyər	flute
12.	ty[1]e	tye.tyər	plate

(Note: the apostrophe in the data indicates aspiration of the proceeding consonant)

Looking at the data, we observe that the stem is partially copied into an extra syllable with the /r/ affix being the coda. Given a stem like /ke/, its diminutive form could simply have been a direct suffixation of the retroflex as [ker] or it could well be [kər] if this dialect does not permit full vowel with a coda [r]. (This issue will be further discussed below.) Instead, we see [ke.kər], which adds an extra syllable. Why should [ke.kər] be preferred over [ker] or [kər]? The extra segments in [ke.kər] appear to violate DEP-IO, and it doesn't do any better than [ker] or [kər] on constraints like NOCODA and *VPLACE. For DEP-IO and NOCODA, the following definitions are commonly assumed:

(6) NOCODA: *C]σ ('Syllables are open') Prince & Smolensky 1993

(7) DEP-IO: Output segments must have input correspondents.
('No epenthesis') McCarthy & Prince 1995

*VPLACE belongs to a broad family of constraints that ban structure altogether: *STRUC (Zoll 1992, cited in Prince and Smolensky 1993). Additional discussion of this type of constraints can be found in McCarthy & Prince 1994, Beckman 1998, Walker 2000. *VPLACE requires vowels not have place features.

(8) *VPLACE: vowels should not have place features.

[ə] is commonly considered to have no place features. I therefore will assume each full vowel other than [ə] will incur a violation of *VPLACE. Putting the constraints and candidates together, we get Tableau 2 (note: the frowning face in front of a candidate refers means that candidate should win under the constraint ranking in the Tableau but is not selected as the optimal output.):

Tableau 2

INPUT: ke, DIM	*VPLACE	NOCODA	DEP-IO
☹a. kər		*	
☹b. ker	*	*	
☞c. ke.kər	*	*	**

[1] Following Wu (1994) among others, I take /y/ here not as a segment glide but a palatalization on the preceding consonant.

From the above, we see that the actual output [ke.kər] does not do better on the syllable structure constraint NOCODA or on *VPLACE, and is much worse than the other two candidates with respect to the IO-faithfulness constraint. Then the next step for us to go is to find out what is good about [ke.kər] that makes it the optimal candidate. Candidates like [ker] or [kər] are worse than the optimal candidate only in that the right edge of the input, [e] in this case, is not the right edge of the output. However, in the optimal output, [e] is at the right edge of the first syllable and [k] is at the left edge of both syllables. I assume the following correspondence:

(9) Input: / k e +r/

Output: [k e. k ə r]

For the left edge of the input, there are two correspondents in the output, one in the first syllable and the other in the derived syllable. For the right edge of the input, however, only the first syllable has the right edge corresponding to it. The bold arrow in the chart denotes the correspondence for the left edge of input. For the left edge of the input, there are two correspondents in the output. The idea of multiple correspondence could be found in Struijke (1998) where it is claimed that reduplication could be considered as a “Broad Input-Output” correspondence holding between the input and the entire output. For reduplicated words, the elements in the input have two chances to surface in the output, namely in the base and the reduplicant. I adopt this idea of multiple correspondence but don’t consider the second syllable in [ke.kər] as reduplicant. I will explain the reason in another section.

With the above observation, we need a constraint that requires correspondence between edges of input and output. Anchoring constraints are originally introduced as constraints specific for reduplication that require base-initial or final segments to have initial or final correspondents in the reduplicant. McCarthy and Prince (1995) give the following general definition of ANCHOR constraints:

(10) {RIGHT, LEFT}-ANCHOR (S_1, S_2)

Any element at the designated periphery of S_1 has a correspondent at the designated periphery of S_2.

Let Edge(X, {L, R})=the element standing at the Edge=L, R of X.

RIGHT-ANCHOR. If x=Edge(S_1, R) and y=Edge(S_2, R) then $x \Re y$.

LEFT-ANCHOR. Likewise, *mutatis mutandis*.

This constraint requires that the left/right edge of S_1 have a correspondent and the correspondent must be at the left/right edge of the S_2. This definition of Anchor would not be able to capture the difference between [ke.kər] and [ker] or [kər] since for the right edge of the input [e], none of them has its correspondent at the right edge. Instead, the right edge of the output is occupied by the diminutive affix.

Benua (1998) proposes that ANCHOR constraints have the general form ANCHOR (Cat_1, Cat_2, P) where Cat_1, Cat_2 range over morphological categories (root, affix, word, etc.) and prosodic categories (syllable, foot, PrWd, etc.), and position P may be Initial, Final or Head which are Left, Right and Head Anchor. For purposes of consistancy, throughout the paper I will use Left, Right and Head to refer to the three positions. Benua (1998) uses the following ANCHOR constraint for Tiberian Hebrew for cases of guttural epenthesis:

(11) ANCHOR(Root, σ, Final)
If α is an element of S_1, β is an element of S_2, α and β are correspondents, and if α is final in the root, then β is final in a syllable.

The idea of the Benua's version of Anchoring is, if α and β are correspondents, β is final of a syllable. By her definition, candidate [ker] can be ruled out for the reason that the [e] in [ker] is the correspondent of the input final /e/, but [e] in [ker] is not final in a syllable. However, as schwa is frequently analyzed as a default vowel, I would assume the schwa in [kər] works as an epenthesized vowel to give a nuclear to the second syllable in the output. Therefore, the schwa in [kər] is not the correspondent of /e/ which means [kər] vacuously satisfies the Anchoring constraint given by Benua. This version of Anchoring itself still could not rule out candidate [kər] unless schwa is to be assumed as the correspondent of the input final /e/. In that case, both [ke.kər] and [kər] would have one violation of IDENT-Feature or MAX-Feature and [ke.kər] is favored over [kər] under this version of Anchor. Presumably it could also work. However, in this paper I am going to follow the usual assumption that schwa is a default epenthised vowel. Therefore, to rule out candidate like [kər], the following Anchoring constraint is proposed with minor revisions on Benua's version:

(12) ∃-EDGE-ANCHOR
If α is an edge of S_1, there must exist a β of S_2 that α and β are correspondents, and β is edge in SOME syllable.

I call this version of Anchoring Existential Anchoring. The reason for calling it existential will become clearer later. Following Nelson (1998), I calculate the violation of Edge-Anchoring categorically; A candidate will incur one violation for each edge to which it fails to anchor. With this definition of ∃-EDGE-ANCHOR, [ke.kər] could be distinguished from [ker] or [kər], shown in the following tableau:

Tableau 3

INPUT: ke, DIM	∃-EDGE-ANCHOR	DEP-IO	*VPLACE	NOCODA
a. kər	*!	*		*
b. ker	*!		*	*
☞c. ke.kər		*	*	*

Both candidates (a) and (b) have only one syllable with /r/ as the right edge (not the input right edge); so both of them have one violation of ∃-EDGE-ANCHOR. [ke.kər] has the first syllable anchored with both edges of the input, satisfying the requirement of ∃-EDGE-ANCHOR.

Another candidate to be considered is the one that does not realize the diminutive morpheme and will be ruled out by a constraint REALISE-μ higher ranked than ∃-EDGE-ANCHOR. Constraints that require the realization of a morpheme were first proposed by Samek-Lodovici(1993) and have been developed in Akinlabi (1996), Gnanadesikan (1997), and Walker (1998, 2000).

(13) REALISE-μ: A morpheme must have some phonological exponent in the output.

Not only must the morpheme in this dialect be realized, but also it is to be realized as a suffix. That means the diminutive morpheme has to be aligned with the right edge of prosodic word, which is required by and ALIGN-DIM-R (McCarthy & Prince, 1993):

(14) ALIGN-DIM-R: ALIGN(DIM, Right, PrWd, Right): Align the right edge of the diminutive morpheme to the right edge of a prosodic word.

Tableau 4 illustrates the motivation for having the extra syllable (As *VPLACE and NOCODA are low ranked shown in tableau 3, I won't include them in this summary tableau):

Tableau 4

INPUT: ke, DIM	∃-EDGE-ANCHOR	ALIGN-DIM-R	REALISE-μ	DEP-IO
a. kər	*!			*
b. ker	*!			
c. kre		*!		
d. ke			*!	
☞e. ke.kər				*

This tableau shows that ∃-EDGE-ANCHOR and and ALIGN-DIM-R are fighting for the right edge of the output. Candidates (a) and (b) both lose because the right edge is given to the diminutive morpheme, thus violating ∃-EDGE-ANCHOR. Candidate (c) gives the right edge of the word to the right edge of the input to satisfy ∃-EDGE-ANCHOR, at the cost of ALIGN-DIM-R. The loss of candidate (d) shows that the diminutive morpheme must be parsed. The loss of the above four candidates shows if there is only one syllable in the output, the two competing constraints (∃-EDGE-ANCHOR and ALIGN-DIM-R) can never be both satisfied without violating REALISE-μ. Since ∃-EDGE-ANCHOR will be satisfied by getting a right edge of a syllable, not necessarily the right edge of the word. The compromise is reached by having an extra syllable so that the right edge of one syllable can be given to the final of the root (obeying ∃-EDGE-ANCHOR) and the right edge of the word is available for the diminutive morpheme(obeying ALIGN-DIM-R). This is realized at the cost of a lower ranked constraint DEP-IO. The reason why the optimal candidate has only one violation of DEP-IO is that DEP-IO requires “output segments must have input correspondents”. As we have assumed multiple correspondence shown in (9), each of the [k] in the output has its input correspondent; [ə] is the only epenthesized segment, thus [ke.kər] only incurs one violation of DEP-IO.

With the existential Anchoring, I have explained why there is an extra syllable in the output. However, there is still the question as to why the copy is recruiting elements from the input. Why does the extra syllable have the left edge of the input instead of a default onset like [t]? To answer this, ∀-EDGE-ANCHOR is proposed in the following section.

3.2 ∀-EDGE-ANCHOR

As shown in (9), multiple correspondence between the input and the output is assumed. The left edge of the input [k] shows up twice in the output while the right edge shows up only once. I claim that the reason for [k] to appear twice in the output is due to a strong requirement of EDGE Anchoring. The right edge of the input occurs only once in the first syllable of the output. The right edge of the whole output is occupied by the diminutive affix /r/, showing the realization of the morpheme as a suffix and the alignment of it with the right edge of the word is preferred over a complete anchoring of both edges of the stem.

Based on the ∃-EDGE-ANCHOR, I propose a strong version of Anchoring constraint. It is the universal anchoring: ∀-EDGE-ANCHOR

(15) ∀-EDGE-ANCHOR

If α is an edge of S_1, there must exist a β of S_2, α and β are correspondents, and β is at corresponding edge in EVERY syllable of S_2.

Similar to ∃-EDGE-ANCHOR, the violation of ∀-EDGE-ANCHOR is computed categorically; For each edge of the input, there is one violation if it is not in the correponding edge of one syllable of the output. To obey this constraint, both edges of the input must appear at edges of each syllable of the output. For an input /ke/, [ke], [ke.ke], [ke.ke.ke] … would be candidates that fully obeys the universal edge anchor. The difference between [ke] and [ke.ke] is that INTEGRITY violated in the latter. INTEGRITY is a constraint that forbids multiple correspondence.

(16) INTEGRITY: ("No Breaking") McCarthy & Prince (1995)
No element of S1 has multiple correspondents in S2.
For $x \in S1$, and $w, z \in S2$, if $x \Re w$, and $x \Re z$, then $w=z$.

Putting the constraints together, we have the following tableau:
Tableau 5

INPUT: k_1e, DIM	REALISE-μ	ALIGN-DIM-R	∀-EDGE-ANCHOR	INTEG	DEP-IO
a. ke.ke	*!				
b. ke.kre		*!			
c. ke.er			**!	*	
d. ke.ker			*	**!	
e. k_1e.t_2ər			**!		**
?f. k_1e.t_1ər			*	*	*
☞g. ke.kər			*	*	*

Candidate (a) [ke.ke] and (b) [ke.kre] lose on REALISE-μ and and ALIGN-DIM-R resepctively, showing both constraints are higher-ranked than ∀-EDGE-ANCHOR, DEP-IO and INTEGRITY. Candidate (c) [ke.er] has two violations of ∀-EDGE-ANCHOR since [k] doesn't have a corresponding edge in the second syllable, and although [e] has a correspondent in the second syllable, the correspondent is not at the corresponding edge. It might also be possible that this candidate loses because of hiatus or some other syllable structure constraints. For this analysis, I will just focus on the issue of edge position. Comparing candidate (c) with the optimal output, we get the ranking: ∀-EDGE-ANCHOR >> DEP-IO. In candidate (d) [ke.ker], the input edges have correspondents in both syllables of the output (though the second [e] is not at the right edge). Therefore, it has one more violation of INTEGRITY than the optimal output but one less of DEP-IO, showing INTEGRITY >> DEP-IO. In order to show the correspondence between input and output, I use subscripts in candidates (e) and (f). Candidate (e) [k_1e.t_2ər]loses on ∀-EDGE-ANCHOR since neither "t_2" is not the correspondent of the left edge of the input. It shows ∀-EDGE-ANCHOR is higher-ranking than INTEGRITY. It also shows why an inserted default consonant can't win. A question mark is put in front of candidate (f) [k_1e.t_1ər] to show that this tableau can't rule out it yet, but IDENT-IO is violated. No matter how IDENT-IO is ranked, candidate (f) would be ruled out since it has a superset violations of the optimal output.

Therefore, we have the following constraint ranking to explain why the extra syllable in the optimal output recruits material from the input:
REALISE-μ , ALIGN-DIM-R >>∀-EDGE-ANCHOR >> INTEGRITY >> DEP-IO
Note one thing, for purpose of clarity, I have divided the explanation of Anxiang diminutive affixation into two sections, one for the motivation of having an extra syllable and the other for the recruiting of material from input. That doesn't mean there is ordering between the processes. The selection of candidates happens simultaneously, which is a main claim of OT. Combining the result ranking of Tableau 4 and Tableau 5, we have REALISE-μ, ALIGN-DIM-R >>∀-EDGE-ANCHOR >> INTEGRITY >> DEP-IO
and ∃-EDGE-ANCHOR >> DEP-IO. The following tableau tells us more about the ranking (I have excluded REALISE-μ and and ALIGN-DIM-R since neither of them would be violated here) :
Tableau 6

INPUT: ke, DIM	∃-EDGE-ANCHOR	∀-EDGE-ANCHOR	INTEG	DEP-IO
a. ker	*!	*		
b. kər	*!	*		
☞c. ke.kər		*	*	*

The above tableau gives the ranking of ∃-EDGE-ANCHOR over INTEG. A summary ranking for Anxiang dialect would be like the following:

(17)

ALIGN-DIM-R REALISE-μ ∃-EDGE-ANCHOR

∀-EDGE-ANCHOR

INTEG

DEP-IO

In summary, it has been shown that the higher ranking of the existential Edge-ANCHOR over INTEGRITY and DEP-IO forces the output to have an extra syllable. In the recruitment of material, the higher ranking of the universal Edge-Anchor over INTEGRITY and DEP-IO potentially triggers both edges of the extra syllable to be the edges of the input. However, the ranking of and ALIGN-DIM-R over universal Edge-Anchor causes the right edge of the output to be the diminutive affix.

3.3 *Heavy Account

Da (1996) has another account of the Anxiang diminutive affixation. He claims that because of *HEAVY, /r/ can't be attached to full vowels, diphthongs or VC sequences. Since it is shorter in duration than a full vowel, /ə/ only has one mora, /ə/+r is not a violation of *HEAVY.

(18) *Heavy: *σ

μ μ μ In Mandarin dialects, super heavy syllable is avoided.

But Da has to assume that both closed and open syllables are uniformly heavy bearing two moras, no matter whether the rime of a syllable contains a single vowel or a diphthong. He assumes the syllabic structure of Mandarin is as in (19):

(19) A. σ B. σ

μ μ μ μ

V C V

Da assumes that a single vowel in an open syllable in Chinese is to be interpreted as being associated with two moras while /ə/ has only one mora. But he doesn't explain why full vowel +/r/ can't have the structure in A which wouldn't have been a violation of *HEAVY. My analysis has an advantage over the *Heavy account of Da in that it presents the conflict between and ALIGN-DIM-R with ANCHOR as a conflict for two segments to get the right edge of the word. The conflict is resolved by the success of and ALIGN-DIM-R >>∀-EDGE-ANCHOR. With this ranking, both edges of the extra syllable are fixed. In order to obey the general requirement of syllable structure, a default vowel /ə/ is epenthesized. We don't need to assume the specific syllable structure as Da does and also cross-linguistically, /ə/ is a default vowel.

Another problem with the *Heavy account is that its assumption would have to say that in cases of /p^ha/→p^ha.p^hər, /p^hau/ →p^hau.p^hər, and /kan/→kan.kər, any rime has to be changed to an [ə] in the extra syllable. No matter whether the rime is a full vowel, a diphthong or a VC sequence, it will always be in correspondence with the [ə] in the output since the [ə] comes as a replacement for the base rime to rescue the heavy syllable. This means the [ə] in the output can be the correspondent of a single segment –a full vowel, or of two segments –a diphthong or VC sequence. I consider assuming one segment to be in correspondence with different numbers of segment for the same affixation in one language is arbitrary. My analysis thus has the advantage of not assuming the unnecessary correspondence between [ə] and the rime. [ə] is the default vowel for epenthesis as frequently seen cross-linguistically. Besides, *Heavy account couldn't explain why the onset of the extra syllable is not a default consonant.

In summary, the suffixation of diminutive morpheme in the dialect of Anxiang shows the important effects of ANCHOR constraints. Because of the higher ranking of the existential Edge-Anchor and and ALIGN-DIM-R over DEP-IO and INTEGRITY, an extra syllable has to be added. In the process of reduplication, the and ALIGN-DIM-R constraint is satisfied at the cost of partially violating the universal Edge-Anchor. These two sets of constraints explain why and how the extra syllable appears in the suffixation of diminutive morpheme in the Anxiang dialect.

4. Similiar Phenomenon in Jian'ou

4.1 Motivation for Copy

The diminutive morpheme in Jian'ou, a southern dialect of China spoken in Fujian Province, is realized as a lateral infix. For a monosyllabic stem, the infix appears as the onset of the second syllable that has the same rime of the stem.

Stem	l-infixed words	gloss
1. pu	pu.lu	roll
2. niau	niau.liau	wind
3. tiŋ	tiŋ.liŋ	twist
4. ts^hu	$ts^hu.lu$	flip one's eye
5. paiŋ	paiŋ.laiŋ	turn around
6. tse	tse.le	wrinkle
7. kau	kau.lau	mix, blend
8. k^hy	$k^hy.ly$	curly
9. k^hi	$k^hi.li$	lean aside

In this dialect, we again see an extra syllable in the diminutive form. Same as in the case of Anxiang dialect, I assume multiple correspondence between the Input and Output, configured as the following:

(20) Input: / p u +l/

Output: [p u. l u]

Same as in Anxiang, I claim the motivation of having the extra syllable in the output is ∃-EDGE-ANCHOR [2]. The following tableau shows different ranking of constraints we use for Anxiang:

Tableau 7

INPUT: pu, DIM	∃-EDGE-ANCHOR	REALISE-μ	DEP-IO	ALIGN-DIM-R	INTEG
a. pul	*!				
b. pəl	*(!)		*(!)		
c. pu		*!			
☹ d. plu				*	
☞e. pu.lu				*	*

Candidate (d) ties with the optimal output on ∃-EDGE-ANCHOR, REALISE-μ, and ALIGN-DIM-R and DEP-IO, and does better than the optimal output with respect to INTEGRITY. In order to rule out this candidate, we need *COMPLEX(ONSET) to at least outrank INTEGRITY.

(21) *COMPLEX(ONS): *[$_\sigma$CC ('Onsets are simple') (Prince & Smolensky 1993)

Tableau 8

INPUT: pu, DIM	∃-EDGE-ANCHOR	REALISE-μ	ALIGN-DIM-R	DEP-IO	*COMPLEX(ONS)	INTEG
a. plu			*		*!	
☞b. pu.lu			*			*

From the fact that [pu.lu] becomes the optimal output at the violation of INTEGRITY, it is very tempting to say that what is really working here is NOCODA instead of ∃-EDGE-ANCHOR. However, when we consider stems like /paiŋ/, it becomes unclear how NOCODA could motivate the full copy of the rime which includes a coda as shown in the following tableau.

Tableau 9

INPUT: paiŋ, DIM	NOCODA	INTEGRITY
☞a. paiŋ.laiŋ	**	***
☹b. paiŋ. lai	*	**
☹c. paiŋ.la	*	*

[2] The reason for using ∃-Edge-Anchor instead of ∃-Head-Anchor is explained in the appendix.

To rule out candidates (b) and (c), we still need to refer to the faithfulness to the right edge of the first syllable. This shows NOCODA is not sufficient or relevant here.

4.2 ∀-HEAD-ANCHOR

The above analysis works fine for Jian'ou in explaining the motivation of having the extra syllable. Now, we turn to the issue as to how the extra syllable recruits its materials. Suppose we use ∀-EDGE-ANCHOR as we did in Anxiang. It would be difficult to explain an output [niau.liau] for /niau/. We use the same configuration as (20) for the input /niau/, we will have the following correspondence:

(22) Input: / n iau +l/

Output: [n iau. l iau]

We can see, the rime of both syllables of the output comes from the vocalic part of the input. For another input /paiŋ/, the rime (which I assume to be the head of syllable) of both syllables of the output [paiŋ.laiŋ] comes from both the vocalic part and the right edge of the input. ∀-EDGE-ANCHOR does not require the full copy of the rime, but only the edges.

Benua (1998), in her generalization of anchoring constraint, includes "head" as one of the positions that can be anchored besides the right and left edges. She used IO-Anchor-Final for Tiberian Hebrew for cases of guttural epenthesis, which is about Input-Output correspondence. However, she turns to Output-Output correspondence when she proposes the stress identity enforced by Anchor to the edges and heads of feet. The reason for this shift is presumably because of the general inhibition against assuming prosodic structure in the input. (Of course, OO-correspondence is what she mainly talks about in her dissertation). This inhibition had initiated quite interesting studies on stress patterns that show faithfulness to underlying prosody. Alderete (1994) proposes HEAD-DEP which requires "Every segment contained in a prosodic head in S2 has a correspondent in S1". This constraint smartly avoids assuming prosodic structure in the input. But later, in Alderete (1995), he interprets HEAD-MAX of MaCarthy (1995) as: If a segment in the input is a prosodic head, and this segment stands in correspondence with a segment in the output, then the related segment in the output is also a prosodic head. In the explanation of Cupeno, he has to assume prosodic structure in the underlying form.

Beckman (1998) formulated MAX-POSITION as the following:

(23) MAX-*Position*

Every element of S_1 has a correspondent in some position P in S_2.

With this formulation, MAX-HEAD will require that all segments have a HEAD syllabification in S_2, regardless of their prosodic affiliation (or lack thereof) in S_1.

Based on Beckman's MAX-POSITION, I propose ∀-HEAD-ANCHOR as the following:

(24) ∀-HEAD-ANCHOR: Every element in S_1 has a correspondent in EVERY syllable head of S_2 (cf: Nelson 1998 uses ANCHOR-σ́ instead of MAX-σ́.)

By syllable head, I refer to rime (including both the nucleau and the coda). This is supported by Nelson (1998) where she gives proof from French hypocoristics truncation for considering the head of a foot as the moras in the stressed syllable rather than the whole syllable. The violation of ∀-HEAD-ANCHOR is calculated by segment; for each segment, there will be violation if it is not in the rime of every syllable of the output. This way of calculation is consistent with Beckman(1998). The following tableau shows the interaction of this constraint with others:

Tableau 10 (assuming REALISE-μ is higher-ranked)

INPUT: paiŋ, DIM	DEP-IO	∀-HEAD-ANCHOR	INTEG	ALIGN-DIM-R
a. paiŋ.lə	*!	**(!)***		*
b. paiŋ.pəl	*!	***(!)*		
c. paiŋ.liŋ		***!	**	**
d. paiŋ.lai		***!	**	**
☞e. paiŋ.laiŋ		**	***	***

It doesn't show much for the constraint ranking, except DEP-IO, ∀-HEAD-ANCHOR>> INTEGRITY, ALIGN-DIM-R [3]. The following tableau shows the ranking between INTEGRITY and and ALIGN-DIM-R and the high ranking of ∃-EDGE-ANCHOR. (Although, one may say candidate [pu.pul] is ruled out by NOCODA. As I mentioned in the end of last section, NOCODA would not be able to do the job. I will just stay with the present constraints.)

[3] The ranking here is kind of tricky. From tableau 10, comparing candidates (c) and (d) with the optimal output, it looks like as long as ∀-HEAD-ANCHOR outranks either of INTEG or ALIGN-DIM-R, (c) and (d) would be ruled out. I haven't figured out how to represent this kind of ranking yet.

Tableau 11

INPUT: pu, DIM	∃-EDGE-ANCHOR	DEP-IO	∀-HEAD-ANCHOR	INTEG	ALIGN-DIM-R
a. pu.pul			**	**!	
b.pul	*!		*		
☞c. pu.lu			**	*	*

So the constraint ranking for Jian'ou is summarized in the following:

∃-EDGE-ANCHOR ∀-HEAD-ANCHOR DEP-IO

INTEGRITY

ALIGN-DIM-R

To summarize the two dialects, in both Anxiang and Jian'ou, the affixation of diminutive morpheme involves adding an extra syllable. The material of the extra syllable is recruited from the input. For Anxiang, the left edge of the input is Anchored twice to the output while the right edge of the output is occupied by the diminutive affix.

This asymmetry between left edge and right edge is due to the fact that the universal Edge-Anchoring constraint lower ranked than ALIGN-DIM-R, thus giving away the right edge of the word to the diminutive affix. In Jian'ou, both the existential Edge-Anchoring and the universal Head-Anchoring are higher ranked than ALIGN-DIM-R, causing the head of both syllables of the output to be the same as the head of the root.

To get the diminutive morpheme realized and at the same time keep the anchor correspondence between the stem and the diminutive form, adding an extra syllable is not the only solution. The Pingding and Beijing dialects have two other ways.

4.3 Why not RED?

After looking at the above of Anxiang and Jian'ou, one may wonder why multiple correspondence has to be assumed and not to consider the diminutive morpheme as a affix prespecified with a RED or with a template structure. The main reasons for not assume BR-correspondence are the following:

First, historically speaking, the diminutive morpheme across the four dialects we are investigating is the same morpheme. (Xu, 1981). If we assume the diminutive morpheme in Anxiang and Jian'ou is prespecified with RED or a template structure, we have to do so for the Pingding and Beijing dialects. However, we would not be able to explain why in Pingding and Beijing, the diminutive surface form doesn't show any characteristics of reduplication.

Second, if we regard the copy of the extra syllable as reduplication, it would be difficult to explain why the reduplicant is more marked than the base. In the Anxiang case, for the diminutive form [ke.kər], we would assume [kər] is the reduplicant and [ke] is the base if it is reduplication involved in the affixation. Generally, Chinese languages don't permit coda except nasals. /r/ as coda is marked. Cross-linguistic data suggests reduplicant is usually unmarked comparing with the base which is the so-called TETU, the emergence of the unmarked. Our [ke.kər] is just the opposite, having a marked coda in the reduplicant. This suggests there is something problematic if we assume reduplication.

The advantage of assuming multiple correspondence is that we can explain the difference in markedness between [ke] and [kər] in [ke.kər]. The reason that [ke] is more faithful to the input than [kər] is due to the asymmetry between the Existential and Universal Anchoring constraint. [ke] is subject to both constraints while [kər] is only subject to the Universal Anchoring constraint.

Last, independent research on other languages has shown not only that prespecifying reduplicative affix or templatic structure is not necessary, but also that such analytic devices will fail to capture some key generalizations, shown in Alderete et al. 1999 and Walker 2000.

5. Conclusion

This paper has proposed two sets of Anchoring constraints, existential and universal anchoring to the edge and head which requires a segment at a particular position of S1 have correspondents at the corresponding position of SOME/EVERY syllable of S2. These two sets of constraints are necessary in explaining the reason why among the Chinese dialects, for the same diminutive morpheme, some dialects have an extra syllable surfaced from a monosyllabic input while in others dialects this does not happen. I have shown that for a language that has ∃-EDGE-ANCHOR higher-ranked than INTEGRITY, the extra syllable appears; otherwise, the output stays monosyllabic either by having a complex onset (as in Pingding) or by having the head of the output coalescensed with the diminutive morpheme (as in Beijing dialect) (Feng, 2001).

With these two sets of Anchoring constraints, I have argued that the "apparent reduplication" in Anxiang and Jian'ou is not reduplication. I have shown that in the diminutive affixation of these two dialects, the existence of an extra syllable is driven by Input-Output multiple correspondence. Underlyingly, the diminutive morpheme is the same in Chinese dialects. It is not prespecified with a RED or a template structure in Anxiang and Jian'ou dialect; and it is not necessary to assume one. The fact that in both Anxiang and Jian'ou, the extra syllable is less faithful to the input than the first syllable is due to the asymmetry between the existential and universal constraints. The extra syllable is subject only to the ∀-Anchoring constraint while the first syllable is subject to both ∃ and ∀-Anchoring.

The above claim reminds us of the claim of Struijke (1998). She argues that the fact that reduplicants often contain less marked material than roots follows from the idea that reduplicants are related to the input by general Input-Output correspondence only, while roots are subject to Root faithfulness in addition to broad Input-Output correspondence. The difference between her claim and mine is that she was calling root and reduplicant while I argue against there is reduplication in the Anxiang and Jian'ou diminutive affixation. This difference raises a further issue as to what diagnostic methods could be adopted for judging whether an apparent copy is reduplication or multiple correspondence between Input and Output. I will leave it for further research.

Another issue awaits further investigation is whether there are needs to have two sets of Anchoring constraints for Left Edge. After deciding on this, a factorial typology for different kinds of multiple correspondence related to affixation could be tested.

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Guanjun Bella Feng
Dept. of Linguistics
University of Southern California
Los Angeles, CA900089
gfeng@usc.edu
http://www-scf.usc.edu/~gfeng