Weak Derived Environment Effect
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Constraint conjunction (Lubowicz 2002) and comparative markedness theory (McCarthy 2003) represent two major proposals for analyzing derived environment effects in OT. It is often difficult to distinguish these two approaches on the empirical ground. The goal of this paper is to defend the former approach, drawing empirical evidence from stop alternations in Ndjébbana spoken in Australia.

Ndjébbana exhibits quite productive stop alternations in the root-initial position (McKay 1984, 2000). As shown in (1a), a root-initial stop is geminated with devoicing when it is followed by a stressed vowel. When a root-initial stop precedes a stressless vowel, it turns into a glide, as illustrated in (1b). But stress is not the only relevant factor. Morphologically, a prefix must be attached for these alternations to occur. In SPE terms, they are formulated as in (2). The stop alternations are derived environment processes. This is confirmed by two facts. First, infinitive forms, which are not prefixed, do not undergo stop alternations ([bíttabo] 'follow'). Second, as exemplified in (3), the stop alternations are not found root-internally.

As further justification for my interpretation of Ndjébbana data in (1), note that the stop alternations are not dominance effects. Mckay (2000) mentions that they take place with verbal, adjectival, and nominal roots. The occurrence of stop alternations is not restricted to particular prefixes, either. This observation strongly suggests that the stop alternations are quite general processes in Ndjébbana morphophonology.

In the widely accepted definition of derived environment effects, the structural description must be met through affixation or application of a previous phonological rule (Kiparsky 1973). For instance, consider palatalization in Korean (Suh 1995; Hume 1990; Suh & Pak 2003). Examples are provided in (4). /t/ turns into [c] before [i] across morphemes, as illustrated in (4a). By contrast, palatalization is blocked within a morpheme, as shown in (4b). Essentially, addition of the suffix *-i* feeds the environment for palatalization.

Of significant interest is the fact that the stop alternations in (1) do not fall into the standard definition of derived environment effects. They make crucial reference to prefixation. However, stress assignment is not contingent on prefixes, so prefixes make no contribution to produce the key phonological context of stop alternations. I call this *weak derived environment effect*.

At the analytical level, weak derived environment effects lend strong support for constraint conjunction (Lubowicz 2002) rather than comparative markedness (McCarthy 2003). Descriptively, assume (5) as the responsible markedness constraints. As analyzed in (6), the examples in (3) reveal that Faith outranks the markedness constraints. The key factor differentiating (1) from (3) is left-edge alignment of a root. Given the fact that Align-L(Rt,PrWd) is violated by prefixed forms, I propose conjunction of Align-L(Rt,PrWd) and the markedness constraints in (5). As demonstrated in (7) and (8), this conjoined constraint dominates Faith. (7a) and (8a) are successfully eliminated by the conjoined constraint.

On the other hand, in a comparative markedness account, the crucial ranking should look like (9). The analysis is demonstrated in (10)-(12). This alternative successfully explains (3), but it fails in (1). This is because the marked segmental sequences in (5) do not straddle two distinct morphemes. Most remarkably, violation of *[bV̀] is always old, meaning that M(new) plays no selective role. (10c), (11c), and (12b) will be ruled out by Faith anyway, even without M(new). As seen from the winning status of (11a) and (12a), no stop alternation is expected, contrary to fact. This consideration clearly indicates that weak derived environment effects are intractable to comparative markedness theory.

Besides explicability of weak derived environment effects, constraint conjunction has a conceptual advantage over the comparative markedness analysis. Gemination and glide formation are best viewed as fortition and lenition, respectively, as discussed by McKay (2000). Stressed syllables are phonologically salient, and gemination of the onset enhances it. On the other hand, glide formation in unstresed syllables results in increase in sonority, so it is lenition (Lavoie 2000). Functionally speaking, gemination and glide formation are motivated by maximization of perceptual contrast (Flemming 1995). In my exposition built on constraint conjunction, the markedness constraints in (5) are defined solely in phonological terms by divorcing phonological markedness and morphological derivedness. This separation is certainly desirable, given that fortition and lenition are amply motivated in other languages independently of morphological derivedness. But this separation is impossible in comparative markedness as markedness constraints are inherently connected with derivedness (see (9)). Embedding morphological derivedness in markedness constraints leads to significant loss of generality in proper understanding of fortition and lenition per se.

In sum, I conclude that constraint conjunction is superior to comparative markedness for two reasons. First, constraint conjunction efficiently explains weak derived environment effects. By contrast, they defy satisfactory elucidation with comparative markedness constraints. Second, constraint conjunction clearly segregates phonological markedness and morphological derivedness, so significant generalizations behind phonological changes can be captured purely from phonological perspectives.

(1)

a. *Roots*	*Prefixed forms*	*Gloss*	b. *Roots*	*Prefixed forms*	*Gloss*
bíttabo	ŋa-ya-ppíttabo	I'll follow him	bíttabo	ŋá-wottabo	I'm following him
ɟuwé	ka-ccúwa	he is sick	ɟuwé	ka-yawé-la	he was sick

(2)

□	b	□	□pp□		
□		□□	□	□	/ Prefix+_____Ví
□	ɟ	□	□cc□		

□	b	□	□	w	□
□		□□	□	□	/ Prefix+_____V
□	ɟ	□	□	y	□

(3)

Surface forms	*Gloss*
kalabángara	white ibis
buɟúluŋ	bottle
malawéja	build
ɲayára	shoulder

(4)

a. *Underlying forms*	*Surface forms*	*Gloss*	b. *Underlying forms*	*Surface forms*	*Gloss*
mat-i	maci	eldest	mati	mæti	joint
kot-i	koci	honestly	tətita	tetita	to be slow

(5) *[bV́/wV́/bV/ppV] *[ɟV́/yV́/ɟV/ccV]

(6)

	/kalabángara/	Faith	*[bV́/wV́]
a. ☞	kalabángara		*
b.	kalappángara	*!	
c.	kalawángara	*!	*

(7)

	/ŋa-ya-bíttabo/	Align-L & *[bV́/wV́]	Faith	*[bV́/wV́]
a.	ŋa-ya-bíttabo	*!		*
b. ☞	ŋa-ya-ppíttabo		*	
c.	ŋa-ya-wíttabo	*!	*	*

(8)

	/ŋa-bíttabo/	Align-L & *[bV/ppV]	Faith	*[bV/ppV]
a.	ŋá-bottabo	*!		*
b.	ŋá-ppottabo	*!	*	*
c. ☞	ŋá-wottabo		*	

(9) *[bV́/wV́/bV/ppV](new) » Faith » *[bV́/wV́/bV/ppV](old)

(10)

	/kalabángara/	*[bV́/wV́](new)	Faith	*[bV́/wV́](old)
a. ☞	kalabángara			*
b.	kalappángara		*!	
c.	kalawángara	*!	*	

(11)

	/ŋa-ya-bíttabo/	*[bV́/wV́](new)	Faith	*[bV́/wV́](old)
a. ☞	ŋa-ya-bíttabo			*
b. ☹	ŋa-ya-ppíttabo		*!	
c.	ŋa-ya-wíttabo	*!	*	

(12)

	/ŋa-bíttabo/	*[bV/ppV](new)	Faith	*[bV/ppV](old)
a. ☞	ŋá-bottabo			*
b.	ŋá-ppottabo	*!	*	
c. ☹	ŋá-wottabo		*!	