A Targeted Spreading Imperative for Nasal Place Assimilation*

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1. Introduction

In sequences consisting of a nasal stop followed by a complex consonant such as [g͡b], two types of nasal Place assimilation (NPA) are commonly observed (e.g., Sagey 1990, Ryder 1987, Cahill 1995, Padgett 1995). The first type, found in Gonja (Painter 1970) and many other languages (e.g., Ohala and Lorentz 1977, Cahill 1995), is *partial assimilation*: the nasal takes on only one of the Place features of the complex consonant. Before labial-dorsal consonants such as [g͡b], the typical result of partial assimilation is spreading of the dorsal feature (e.g., Ohala and Lorentz 1977, Ohala and Ohala 1993); schematically, /Ng͡b/ → [ŋg͡b]. The second type of NPA, observed in Kpelle and many other West African languages, is *total assimilation*: the nasal takes on both Place features of the following complex consonant; schematically, /Ng͡b/ → [ŋ͡mg͡b].

In some languages, such as Gã (Berry 1951) and Kɔnni (Cahill 1995), partial NPA applies in certain morphosyntactic contexts and total NPA in others. For example, Cahill (1995) reports that in Kɔnni partial assimilation applies within words but total assimilation is found across word boundaries. The existence of such languages supports the hypothesis that the choice between partial and total NPA is phonologically determined, and hence potentially sensitive to morphosyntactic structure in the way that many phonological processes are, rather than being solely a matter of language-specific phonetic implementation.

The phonological distinction between partial and total NPA presents a challenge for theories of assimilation. For example, Sagey (1990, 70ff.) motivates the Place node of feature geometry partly on the grounds that it correctly predicts total NPA as found in languages such as Kpelle. If both Place features of a sound like [g͡b] are united under the Place node, and NPA is analyzed as spreading of that node, then necessarily both features are assimilated. However, as first observed Padgett (1995), these assumptions about the representation and spreading of Place features preclude an analysis of partial NPA as found in Gonja (or, word-internally, in Kɔnni). (Other conceptions of the relationship between

*For responses to queries and feedback on this work, I am very grateful to Ian Coffman, Jaye Padgett, Joe Pater, Paul Smolensky, and the participants of NELS 41.

feature-geometric nodes and feature spreading, such as that of Halle (1995), are consistent with partial NPA and the proposal made in this paper.)

As also observed by Padgett (1995), exactly the opposite problem — the incorrect prediction that total NPA is impossible — exists for theories in which Place assimilation is motivated by a constraint that requires every consonant to have some Place specification (HAVEPLACE; Padgett 1995, Parker 2001, Lombardi 1995/2001). The recent analysis of Place assimilation and cluster simplification by McCarthy (2008a), while successful in accounting for an impressive range of data, has this property and thus fails to predict total NPA. In section 2, I briefly review the proposal of McCarthy (2008a) and discuss the undesirable consequences of adding a *spreading imperative* — a constraint that prefers spreading of all Place features between adjacent consonants — to the system proposed in that article. Section 3 develops a revised theory of targeted constraints (Wilson 2000, 2001, Bakovic and Wilson 2000, Hansson 2001) and shows that a targeted version of the spreading imperative correctly predicts that partial and total NPA are both typologically possible, and avoids the incorrect predictions of its non-targeted counterparts. Section 4 addresses some of the criticisms of targeted constraints that have been presented in the literature, and suggests that the descriptive and explanatory potential of such constraints may be realized only within derivational constraint-based architectures such as Harmonic Serialism (e.g., McCarthy 2007a,b, 2008a,b).

2. The Problem

Working within Harmonic Serialism (HS), and incorporating earlier ideas about the mechanics of feature spreading (e.g., Mascaro 1987, Cho 1998), McCarthy (2008a) analyses a case of NPA such as /anpa/ → [ampa] into two steps. First, the Place specification of the nasal is lost in order to better satisfy a licensing constraint on Place features such as the Coda Condition (Ito 1989, Goldsmith 1990): /anpa/ → [aNpa]. Second, the Place feature of the following consonant spreads to the nasal in order to eliminate a violation of HAVEPLACE. McCarthy makes a compelling case for this two-step analysis by showing that it accounts for robust typological generalizations about cluster modification and integrates the analysis of assimilation with that of deletion and debuccalization.

However, if the Place features of a complex consonant can spread independently, the HAVEPLACE theory of assimilation predicts that partial NPA /Ng͡b/ → [ŋg͡b] *harmonically bounds* total NPA /Ng͡b/ → [ŋ͡mg͡b] (see Padgett 1995, (27)). Spreading just one of the Place features suffices to fulfill the HAVEPLACE requirement of the nasal. Spreading more than one Place feature incurs an additional violation of the well-motivated Markedness constraint against complex segments (*COMP(LEX)SEG(MENT); Padgett 1995) and additional violations of Faithfulness constraints such as IDENT[Place] (McCarthy and Prince 1995) and NOLINK[Place] (McCarthy 2008a, 278).[1]

Of course, if the Place features of a complex consonant cannot spread independently, the problem of accounting for *partial* NPA arises in the same way that it does for

[1]This problem is independent of how the *gradualness* condition of HS is formulated (e.g., McCarthy 2007a): [ŋg͡b] harmonically bounds [ŋ͡mg͡b] even if both are in the candidate set for /Ng͡b/.

the feature-geometric approach of Sagey (1990). Thus none of the theories of assimilation discussed up to this point correctly predicts both partial and total NPA.

The apparently straightforward solution to this problem is to allow the Place features of a complex consonant to spread independently, regardless of whether they are located under a single Place node, and to posit some constraint that conflicts with *CompSeg by preferring total NPA over partial NPA. Padgett (1995) refers to this type of constraint as a *spreading imperative*. The spreading imperative proposed by Padgett seems generally problematic.[2] However, various alternative constraints that prefer spreading can be found in the OT literature (e.g., Agree[F], Bakovic (2000); Align[F], as in Cole and Kisseberth 1995; Share[F], McCarthy 2011) and it would appear that simply adding one of them to the constraint set of McCarthy (2008a) would eliminate the problem of incorrectly excluding total NPA.

Such a solution turns out to be not as simple or desirable as it first appears, essentially for reasons anticipated by McCarthy (2008a, pp. 283, 294). One of the main strengths of McCarthy's analysis is that it accounts for the generalization that syllable onsets (perhaps more precisely, released consonants) resist major Place assimilation (Webb 1982, Ohala 1990, Padgett 1995, Steriade 2001a,b) and deletion (Wilson 2001). A crucial component of the account is that mappings in which a Place feature is delinked from the onset member of a cluster, as in /anpa/ → [anHa] (where 'H' is a debuccalized oral segment), are harmonically bounded (see McCarthy 2008a:272, 282). Harmonic bounding relations depend on the constraint set, and McCarthy argues against constraints such as the Cluster Condition (Yip 1990) on the grounds that they would upset this particular result. Adding a spreading imperative such as Agree[Place] to McCarthy's constraint system also breaks the harmonic bound on the loss of Place features from onsets, at least in nasal/complex-consonant sequences. As illustrated in the following tableau, unattested mappings such as /ŋɡ͡ba/ → [ŋɡa] are predicted when NoLink[Place] and the constraint Agree[Place] (assumed here to apply only to adjacent consonants) together outrank Max[Place].

(1)

/ŋɡ͡ba/	HavePl	Agree[Place]	NoLink[Place]	Max[Place]	*CompSeg
a. ŋɡ͡ba		-1 !			-1
b. ŋ͡mɡ͡ba			-1 !		-2
c. ŋɡa				-1	-1

It seems that no alternative formulation of the spreading imperative circumvents this prediction without giving rise to other undesirable effects. To give one more example, McCarthy (2011) proposes a constraint type Share[F], which is "violated once for every pair of segments that are not linked to the same [F] autosegment." Hypothetical

[2]The constraint proposed by Padgett (1995, (28)), Spread[Place], assigns one violation for every segment and every Place feature (in some domain, such as the word) that are not associated. Within parallel OT, Spread[F] predicts languages in which [F] appears on the surface only if it can be associated to every segment in the domain. Within HS the prediction is that there will be languages in which [F] appears on the surface only if it can be associated to all segments in the domain *in a single step*. Neither prediction seems to be characteristic of spreading or feature realization. For a range of additional pathological predictions of constraints that penalize lack of association within an entire domain, see Wilson (2004), McCarthy (2011).

SHARE[Place] could not force deletion of a [labial] feature as in the tableau above, and therefore appears to be an improvement over AGREE[Place]. However, rankings of the form {SHARE[Place] ≫ *COMPSEG ≫ MAX[Place]} predict languages in which underlying complex consonants surface faithfully *only* when they can spread both of their Place features to another segment (e.g., /g͡b/ → /ba/ but /ŋ-g͡ba/ → [ŋ͡mg͡ba]). Systems like this, in which an underlying feature of a licensed segment surfaces only when it can be shared, are a general prediction of SHARE[F] but appear not to exist.[3]

3. A Targeted Spreading Imperative

Incorrect predictions of the type illustrated in the tableau above are instances of the Too Many Solutions problem (e.g., Lombardi 1995/2001, Steriade 2001a,b). Targeted constraints were offered in Wilson (2000, 2001) as a general approach to such problems, but have been criticized as insufficient for this purpose by McCarthy (2002a, 2008a,b). Because the original formulation of targeted constraints presupposed a highly parallel approach to phonology, the potential of such constraints to address Too Many Solutions problems must be reevaluated within HS. In this section, I show that a revised formulation of targeted constraints can, in concert with the gradual derivations posited by HS, provide an account of both partial and total NPA without predicting unattested 'solutions' to the spreading imperative.

3.1 Evaluation by Targeted Constraints

The central idea of the theory of targeted constraints is that a Markedness constraint $*\phi$ is not satisfied by all possible ways of eliminating instances of ϕ. Instead, the constraint specifies a change, here called ρ (for 'repair'), that instances of ϕ must undergo in order to eliminate their violations. Targeted constraints thus combine properties of both classic OT constraints and rules: like OT constraints, they assign violations and participate in strict-domination relations with other constraints; like rules, they specify a change that relates inputs to outputs. Combining these properties in a coherent, effective way is the main formal problem in developing the theory.

It is useful to begin by considering how a non-targeted Markedness constraint $*\phi$ evaluates a one-step mapping in HS. First some notation. Let $\mathbf{x}$ stand for the input of the mapping, $\mathbf{y}$ stand for the output, and $\mathbf{x} : \mathbf{y}$ represent the correspondence between elements of $\mathbf{x}$ and elements of $\mathbf{y}$. In HS, unlike parallel OT, the correspondence $\mathbf{x} : \mathbf{y}$ will always be relatively simple because the output is constrained to be minimally different from the input (see McCarthy 2007a,b, 2008a,b on the definition of gradualness in HS).

The harmony of the mapping $\mathbf{x} \rightarrow \mathbf{y}$ according to the non-targeted constraint $*\phi$ is determined by ignoring $\mathbf{x}$ and accumulating over the instances of ϕ in $\mathbf{y}$. The notions of identifying instances of violations and accumulating over them have been given exact

[3] SHARE[Place] must be violated once for each possible Place feature that is not shared, as implicitly assumed in the text, otherwise the constraint cannot serve as an impetus for total NPA. Alternatively, there may be one constraint per Place feature: SHARE[labial], SHARE[coronal], etc.

finite-state (e.g., Eisner 1997) and model-theoretic (e.g., Potts and Pullum 2002) definitions. For present purposes, we can simply write $[\phi(\mathbf{b})]^{\mathbf{y}} = 1$ if $\mathbf{b}$ is a subpart of $\mathbf{y}$ that is an instance of ϕ, and $[\phi(\mathbf{b})]^{\mathbf{y}} = 0$ otherwise. The definition of 'subpart' will depend on the structure of $\mathbf{y}$: if $\mathbf{y}$ is a string, then its natural subparts are subsequences (not necessarily contiguous); if $\mathbf{y}$ is a graph, then its natural subparts are subsets of nodes and edges (not necessarily connected). In any case, the harmony of the mapping $\mathbf{x} \rightarrow \mathbf{y}$ according to $*\phi$ is equal to the negative of the sum of $[\phi(\mathbf{b})]^{\mathbf{y}}$ over all subparts of $\mathbf{y}$; that is, $H(\mathbf{x} \rightarrow \mathbf{y}) = -\sum_{\mathbf{b}}[\phi(\mathbf{b})]^{\mathbf{y}}$ where the sum is over subparts $\mathbf{b}$ of $\mathbf{y}$. (The negative sign means that increasing the number of violations lowers the harmony.)

A targeted version of $*\phi$ also tallies one negative unit of harmony for every instance of ϕ in the output. However, the constraint also evaluates the subparts of the input and the input-output correspondence relation. It *rewards* input instances of ϕ that have undergone the change specified by ρ; and it *penalizes* input subparts that are instances of ϕ and have not undergone the change specified by ρ. More precisely, let $\mathbf{a}$ be any subpart of the input and $\hat{\mathbf{a}}$ be the subpart of the output that corresponds to $\mathbf{a}$. Then the reward or penality that the constraint assesses for $\mathbf{a}$ is given by the expression $[\phi(\mathbf{a})]^{\mathbf{x}}(2\rho[\mathbf{a} : \hat{\mathbf{a}}]^{\mathbf{x:y}} - 1)$. If $\mathbf{a}$ does not violate the constraint — if it is not an input instance of the marked configuration ϕ — this expression evaluates to 0 regardless of the value of the parenthesized part. If $\mathbf{a}$ does violate the constraint, then the first term $[\phi(\mathbf{a})]^{\mathbf{x}}$ is equal to 1 and a reward or penalty is assessed depending on the value of $(2\rho[\mathbf{a} : \hat{\mathbf{a}}]^{\mathbf{x:y}} - 1)$. The expression $\rho[\mathbf{a} : \hat{\mathbf{a}}]^{\mathbf{x:y}}$ evaluates to 1 if $\mathbf{a}$ and $\hat{\mathbf{a}}$ differ in the way that ρ specifies; in this case, the result is a positive harmony reward: $1 \cdot (2 \cdot 1 - 1) = +1$. But $\rho[\mathbf{a} : \hat{\mathbf{a}}]^{\mathbf{x:y}} = 0$ if $\mathbf{a}$ and $\hat{\mathbf{a}}$ do not differ as specified by ρ, resulting in a negative harmony penalty: $1 \cdot (2 \cdot 0 - 1) = -1$.

There are two remaining technical issues in the formalization of targeted constraints: ensuring that output violations always incur a negative unit harmony; and avoiding double penalties for input instances of ϕ that correspond to output instances of ϕ. These issues can be handled by having one sum that runs over subparts of the input and defining the summation operator appropriately. The final equation for the harmony of $\mathbf{x} \rightarrow \mathbf{y}$ according to the targeted constraint $\langle *\phi, \rho \rangle$ is given below, where $\oplus$ is defined so that $-1 \oplus \alpha = \alpha \oplus -1 = -1$ ($\alpha \in \{+1, 0, -1\}$) and is otherwise identical to ordinary '+':

(2) $$H_{\langle *\phi,\rho\rangle}(\mathbf{x} \rightarrow \mathbf{y}) = \textstyle\sum_{\mathbf{a}} \Big(-[\phi(\hat{\mathbf{a}})]^{\mathbf{y}} \oplus [\phi(\mathbf{a})]^{\mathbf{x}}(2\rho[\mathbf{a} : \hat{\mathbf{a}}]^{\mathbf{x:y}} - 1) \Big)$$

To summarize: for every input subpart $\mathbf{a}$, the constraint determines whether the corresponding output subpart $\hat{\mathbf{a}}$ is an instance of ϕ and assigns a penality of -1 if so; if not, it determines if $\mathbf{a}$ is an instance of ϕ, and if so it assigns a harmony reward of $+1$ or a penalty of -1 as described above. If neither $\mathbf{a}$ nor $\hat{\mathbf{a}}$ is an instance of ϕ, these two subparts contribute nothing (0) to the harmony of the mapping. Any computational implementation of non-targeted constraints can be used to formalize the evaluation of input and output subparts. Targeted constraints additionally require an implementation of the function ρ that inspects corresponding subparts; previous work on the formalization of rule-based phonology (e.g., Kaplan and Kay 1994) will be useful for this purpose.

Before returning to assimilation, which involves subparts consisting of (at least) two segments, it is useful to illustrate the theory with a targeted constraint that evaluates smaller configurations. Research by Lombardi (1995/2001), Steriade (2001b) has established that laryngeal Markedness constraints can cause obstruents in non-licensing positions to undergo loss of their laryngeal features but not other logically-possible repairs (such as becoming a sonorant, deleting, or triggering vowel epenthesis). Letting X stand for a position in which laryngeal features are not licensed on obstruents, the relevant targeted constraint on privative [voice] specifications is $\langle \phi =$ *X/[-son,voice], $\rho =$ [voice] $\rightarrow \emptyset\rangle$. The ϕ component identifies input or output obstruents in position X that have a [voice] feature. The ρ component identifies cases in which an input segment that is specified [voice] corresponds to an output segment that does not have a [voice] specification. As illustrated in the following tableau (where X is assumed to encompass word-final position), the constraint rewards loss of [voice] specifications but not any of the other repairs just mentioned.

(3)

/pad/	*X/[-son,voice]$_{[\text{voice}] \rightarrow \emptyset}$	IDENT[voice]	IDENT[son]	MAX-C	DEP-V
a. pad	-1 !				
b. pat	+1	-1			
c. pan	-1 !		-1		
d. pa	-1 !			-1	
e. padə	-1 !				-1

In the mapping /pad/ → [pat], there is one subpart of the input, namely the word-final /d/, that is an instance of $\phi =$ *X/[-son,voice]. This subpart corresponds to an output subpart [t] that differs from it in the way specified by $\rho =$ [voice] $\rightarrow \emptyset$ (and which is not itself an instance of *X/[-son,voice]). All other input subparts and their output correspondents contribute 0 to the harmony, so the total is $0 \oplus 1 \cdot (2 \cdot 1 - 1) = +1$. The evaluation of the mapping /pad/ → [pan] works out the same except that /b/ and [n] do not differ in the way the constraint specifies — the [voice] specification of /b/ has not been removed from [n] — therefore the total harmony is $0 \oplus 1 \cdot (2 \cdot 0 - 1) = -1$. Similarly, the outputs [pa] and [padə] do not repair the input violation as designated, therefore they also have a harmony of -1. The consequence is that the optimal repair is devoicing in spite of the fact that other alternatives in the candidate set violate lower-ranked Faithfulness constraints.[4]

3.2 Accounting for Partial and Total NPA

The tableau below indicates how the present theory successfully predicts both partial and total NPA. The targeted spreading imperative, represented in the tableau by t-AGREE[Place] has a ϕ component that is identical to non-targeted AGREE[Place]. Specifically, ϕ identifies subparts of an input or output consisting of two adjacent consonants x_i and x_j and a Place feature f_k that is associated to x_i but not to x_j. Note that this component of the constraint is symmetric (i.e., x_i could be the left or right member of the consonant sequence). The ρ component of the constraint specifies the change in which f_k becomes associated to x_j. It

[4]The gradualness condition on HS derivations prevents a candidate such as [paʔ], which differs from the input on both [voice] and Place, from entering the candidate set. This is important, because the targeted constraint would assign +1 to [paʔ] and some lower-ranked constraint might prefer it over [pat]. For further discussion of the relationship between targeted constraints and gradualness, see section 4.

is assumed here that prior derivation has produced an input in which one but not both of the Place features of the complex consonant have spread to the preceding nasal.

(4)

/ŋg͡ba/	t-AGREE[Place]	NOLINK[Place]	MAX[Place]	*COMPSEG
a. ŋg͡ba	−1			−1
b. ŋ͡mg͡ba	+1	−1		−2
c. ŋga	−1		−1	

The ranking shown in the tableau yields total NPA, as in Kpelle, because t-AGREE[Place] assigns higher harmony to spreading of the [labial] feature (candidate (b)) than to the fully faithful candidate (candidate (a)). Reranking NOLINK[Place] (alternatively, IDENT[Place]) above t-AGREE[Place] predicts partial NPA, as in Gonja: elimination of the t-AGREE[Place] violation is blocked by Faithfulness. What is predicted to be impossible is loss of a Place feature in order to achieve better 'spreading' (candidate (c)): neither the Markedness constraint t-AGREE[Place] nor the Faithfulness constraints prefer this outcome, therefore the problematic prediction of non-targeted AGREEE[Place] is avoided.[5]

Notice that the same ranking that compels /ŋg͡ba/ → [ŋ͡mg͡ba] will also prevent spreading from being undone, as in /ŋ͡mg͡ba/ → [ŋg͡ba], because the targeted constraint t-AGREE[Place] assigns violations for output instances of ϕ regardless of how they arise. This blocking behavior of the constraint differentiates it from a classic NPA rule, which could compel spreading at one step in the derivation but would not have the formal power to prevent delinking in the immediately following step. More generally, targeted constraints can play a crucial role in both resolving marked configurations and preventing them from being created. To this extent at least they contribute to an explanatory account of phonological conspiracies (in the sense of Kisseberth 1970). In the final section, I expand upon this point in the context of a broader reevaluation of the viability of targeted constraints.

Several remaining issues in the analysis of NPA are largely orthogonal to the purpose of this paper, but worth mentioning briefly. As noted in the introduction, partial NPA to labial-dorsal consonants typically spreads the dorsal Place feature. The constraint t-AGREE[Place] does not predict this as stated, but it could do so if it were made sensitive to the perceptual similarity of Placeless and dorsal (vs. labial) nasals (see Ohala and Lorentz 1977, Ohala and Ohala 1993, Padgett 1995, McCarthy 2008a, p. 278, note 3; see also note 7 below). The empirical question is whether there are languages in which labial-dorsal consonants spread labial Place, in which case t-AGREE[Place] may have to be replaced with freely rerankable t-AGREE[labial], t-AGREE[dorsal], etc. Related issues arise with the respect to the asymmetric spreading systems analyzed by Jun (1995).

To account for languages such as Gã, in which total NPA applies only morpheme-internally, it will be necessary to rank t-AGREE[Place] below a constraint that is violated by autosegmental spreading across a morpheme boundary or by complex segments in affixes (e.g., Padgett 1995). The constraint that prevents total NPA within words but not across words in languages like Kɔnni remains unclear.

[5] The constraint *COMPSEG could compel deletion of one of the Place features of the consonants, but it would have to be ranked above MAX[Place] to have this effect. The important point is that loss of Place features from onset (released) consonants *in nonhomorganic clusters only* is predicted to be impossible.

4. Targeted Constraints and Harmonic Serialism

Targeted constraints were originally proposed within a fully parallel version of OT. Arguments against targeted constraints such as those given by McCarthy (2002b, 2008a,b) may therefore diagnose problems with the constraints themselves or with the parallel architecture. There are essentially three types of argument, which I consider in turn.

First, McCarthy (2002b) demonstrates hat the targeted-constraint theory of Wilson (2000, 2001) does not account for the typological generalization about deletion and Place assimilation mentioned in section 2: there are some rankings under which Place assimilation or deletion are predicted to affect the onset (or released) member of an intervocalic consonant cluster. This problem can be eliminated by moving from parallel OT to a serial architecture such as HS. McCarthy (2008b) demonstrates that the typological generalization can be successfully captured within HS. While targeted constraints may not be crucial to this analysis (though see note 7 below), but they do not negatively affect it. In particular, replacing McCarthy's CODACOND with a targeted version that specifically prefers deletion of Place features from coda (unreleased) consonants leaves the account intact. The previous section provides evidence that at least one targeted constraint, t-AGREE[Place], is necessary to account for total NPA within HS. Therefore, the issue is how much targeted constraints are able to contribute to the explanation of assimilation and deletion patterns within HS, not whether they are needed at all; this is a topic for future research.[6]

The original formulation of targeted constraints stated that one candidate **x** must be *identical to* or *exactly the same* as another candidate **y**, except for the change specified by the constraint, in order for **x** to be preferred over **y**. The second type of argument that has been given against targeted constraints is that 'identical to' and 'exactly the same' are too rigid. For example, (McCarthy 2008b, p.39) argues that true metrically-conditioned vowel syncope as in Aguarana can involve a change of syllabic affiliation in addition to vowel deletion (e.g., /(ˈpa.ta)ka/ $\rightarrow$ [(ˈpat)ka]), and therefore that a targeted constraint requiring candidates to be 'identical' except for the syncopated vowel would not be effective in the analysis of such cases. This argument is valid, but again the change from parallel OT to HS offers a straightforward resolution.

The identity clause was designed to restrict the preference relations of targeted constraints under the assumption that members of a candidate set could differ from each other and the input in every conceivable way. Within HS, the gradualness requirement already controls the extent of input-output disparity, so the identity clause is no longer conceptually necessary or even desirable. The revised formulation of targeted constraints in section 3 implies that a preferred output **y** must differ from the input **x** in the way specified by ρ, but it does not stipulate that **y** must differ from **x** *only* in this way. Gradualness will prevent **y** from diverging from **x** in many other respects (i.e., **y** would be excluded from the candidate set if there were further differences between it and the input). But resyllabification is one type of principled exception: the technical definition of gradualness (see McCarthy 2007a,b, 2008a,b) allows output syllabification to diverge freely from input syllabification,

[6] See Hansson (2001) and McCarthy (2002b, p. 288) for the advantages of analyzing long-distance consonant harmony and dissimilation, respectively, with targeted constraints.

because no Faithfulness constraints are violated by changes in the syllabic parse. Once the identity clause is supplanted by the independently necessary and more nuanced notion of gradualness, a targeted syncope constraint can correctly reward [(ˈpat)ka] relative to input /(ˈpa.ta)ka/. Another topic for future research is whether targeted constraints contribute substantially to the HS analysis of syncope, rather than just being compatible with it.

Finally, targeted constraints can be criticized on the grounds that they fail to predict multiple repairs for the same marked configuration (either within or across languages). This argument is difficult to address in a short paper, primarily because targeted constraints are motivated by typological limits on repairs. Rather than attempting to show that targeted constraint theory strikes a perfect balance between allowing multiple repairs and restricting the predicted typology, I will consider a few specific cases discussed by McCarthy (2008a), all of which involve spreading to Placeless segments in onset (released) position.

In Arbore (Hayward 1984, p. 66-67, McCarthy 2008a, p. 286), /h/ in onset (released) position assimilates in Place to a preceding coda (unreleased) consonant, as in /mín-h-áw/ → [mínnáw/ 'my house'. The targeted constraint t-AGREE[Place], used earlier to account for anticipatory NPA, also prefers this case of perseveratory Place assimilation. The input segments /n/ and /h/ are adjacent and there is a [coronal] Place feature associated to one but not the other; this is an instance of the configuration ϕ that t-AGREE[Place] disprefers. Associating the [coronal] feature to the output correspondent of /h/ is an instance of the change ρ designated by the constraint, and therefore results in a harmony reward (+1). Because the constraint specifies that the repair is spreading, but does not dictate the direction, it correctly predicts that languages like Arbore are possible.

A similar logic applies to languages, such as Lardil (Hale 1973, McCarthy 2008a, p. 286), in which Place assimilation affects epenthetic onset consonants, under the assumption that epenthesis inserts a Placeless segment. It also extends to cases in which progressive Place assimilation affects an affix onset, under the assumption that such affix consonants are underlyingly Placeless (as McCarthy 2008a, p.295 suggests for the Dutch diminutive suffix) or that affix-specific Markedness constraints compel debuccalization of the affix consonant which then feeds assimilation (as in the analysis of Musey affix alternations given by McCarthy 2008a, pp. 296-298). Clearly, the same targeted constraint can be implicated in the analysis of different resolutions for a given marked configuration.[7]

[7] The discussion in the text raises the question of why progressive Place assimilation can only affect Placeless onsets. The theory of Place assimilation developed here and that of McCarthy (2008a) both appear to predict unattested mappings such as /aŋba/ → [aŋg͡ba] (perhaps followed by [aŋg͡ba] → [aŋga], which avoids a surface complex consonant). In the present theory, /aŋba/ → [aŋg͡ba] would improve on t-AGREE[Place], whereas in McCarthy's theory it would remove a violation of CODACOND. The nonexistence of such mappings suggests that considerations of perceptual similarity, which were a key part of the original theory of targeted constraints, should be incorporated into the present proposal. The perceptual cues for major Place features are generally stronger in released position (Jun 1995, Steriade 2001a), so [aŋg͡ba] is plausibly more perceptually distinct from [aŋba] than is [aŋ͡mba] or [aNba]. If a targeted constraint prefers the most perceptually minimal resolution of a given marked configuration, rather than specifying a particular change such as Place spreading, mappings such as /aŋba/ → [aŋg͡ba] could be blocked. Note that in order for progressive Place spreading to remain possible when the following onset is Placeless, as in Arbore, it would have to be the case that formant transitions or other cues signal the Place of a coda consonant more strongly when it is followed by a Placeless onset; this possibility should be evaluated experimentally.

4.1 Conclusion

Accounting for both partial and total NPA is a long-standing problem for phonological theory that engages with broader issues of typological restrictiveness, parallel vs. serial derivation, and the nature of phonological constraints. In this paper, I have proposed a Place spreading imperative that accounts for both attested patterns through interaction with other well-known constraints. The constraint is set within an explicit and novel formulation of targeted constraints that draws upon and complements the established strengths of HS. Previous arguments against targeted constraints have been reexamined in light of the architectural and other changes adopted here. And many directions for future research on targeted constraints in HS, including the analysis of conspiracies and possible further improvements in restrictiveness, have been identified.

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