

## Lexical insertion occurs in the phonological component\*

Matthew Wolf  
Yale University

The B words were not constructed on any etymological plan. The words of which they were made up could be any parts of speech, and could be placed in any order and mutilated in any way which made them easy to pronounce while indicating their derivation[...] Because of the greater difficulty in securing euphony, irregular formations were commoner in the B vocabulary than in the A vocabulary. For example, the adjectival forms of *Minitrue*, *Minipax*, and *Miniluv* were, respectively, *Minitruthful*, *Minipeaceful*, and *Minilovely*, simply because *-trueful*, *-paxful* and *-lovely* were slightly awkward to pronounce. In principle, however, all B words could inflect, and all inflected in exactly the same way.

-From “*The Principles of Newspeak*” (Orwell 1949)

### 1. Introduction

The same abstract morphological object in a given language—whether the theory being assumed identifies this as the classical morpheme, a set of morphosyntactic features, or something else—may be pronounced in different ways when it appears in different contexts. The term ‘allomorphy’ in the broadest sense refers to any instance where this occurs. Some cases of allomorphy involve purely morphosyntactic suppletion, a parade example being the English irregular verb which is pronounced [gow] in the present tense and [went] in the past tense. While the grammar must choose between these phonologically-distinct pronunciations, the choice is not made on the basis of any phonological information. If one knows which inflectional features this verb bears in some utterance, one will be able to predict which pronunciation to use; nothing at all about the verb’s position in prosodic structure, or about the phonological composition of other parts of the utterance, needs to be known.

At the other extreme, there are other cases of allomorphy which arise solely from phonological alternations. In such cases, the morphology consistently selects a

---

\* The present version of this chapter is adapted and updated from chapter 2 of my dissertation (Wolf 2008). My advisor, John McCarthy, and my committee members Joe Pater, Lisa Selkirk, and Mark Feinstein are to be thanked for their assistance and feedback on that work. I have also received valuable comments and suggestions on ideas presented here from Diana Apoussidou, Michael Becker, Kathryn Flack-Potts, Karen Jesney, Shigeto Kawahara, John Kingston, Joan Mascaró, Kathryn Pruitt, Anne-Michelle Tessier, and members of audiences at HUMDRUM 2006 (especially Luigi Burzio, Paul de Lacy, Alan Prince, and Bruce Tesar), Reed College (especially Matt Pearson), the 15<sup>th</sup> Manchester Phonology Meeting (especially Patrik Bye, Bruce Morén-Duolljá, Mary Paster, Ricardo Bermúdez-Otero, Jochen Trommer, and Christian Uffman), the Workshop on the Division of Labor Between Phonology and Morphology in Amsterdam (especially Geert Booij, Diane Lesley-Neuman, Andrew Nevins, Marc van Oostendorp, and Dieter Wunderlich, in addition to several individuals named already), Yale University (especially Stephen R. Anderson, Gaja Jarosz, Darya Kavitskaya, and Erich Round), and the University of Pennsylvania (especially David Embick and Rolf Noyer). The views and interpretations presented here are my own (which none of the aforementioned people should be assumed to agree with), as is the responsibility for all errors of fact or reasoning.

single *underlying* pronunciation for some morphological object, and this underlying pronunciation undergoes different phonological changes in different phonological contexts where it may be found. For example, in my variety of English, the Rhythm Rule (Lieberman & Prince 1977) results in the word ‘thirteen’ having at least two different surface allomorphs: [θɜː.tʰɪjn] in citation form and non-pretonically, but [θɜː.tʰɪjn] when it precedes another primary-stressed syllable, as in the phrase *thirteen men*.

This paper is concerned with systems of allomorphy which fall in the territory between these two extremes. Since at least the work of Carstairs(-McCarthy) (1987, 1988, 1990, 1998), it has been widely familiar that there are systems of allomorphy where the allomorphs are distributed according to a phonological generalization, but where it would not be plausible to derive the different surface allomorphs in the phonology from a single underlying form. What these cases demand is that there be a selection between multiple different listed pronunciations (like the first type of allomorphy above) but that this selection make reference to information about the phonological context in which the chosen pronunciation will appear (like the second type). A fairly well-known example is that of the 3<sup>rd</sup> person masculine singular possessive/direct object enclitic in Moroccan Arabic (Harrell 1962; Heath 1987: 34, 238; Mascaró 1996b), which is /-u/ after a consonant-final base, but /-h/ after a vowel-final one:

- (1) a. [ktab-u]      ‘his book’  
    b. [xtʰa-h]     ‘his error’

Following Paster (2005, 2006, this volume), I will refer to this phenomenon as ‘phonologically conditioned suppletive allomorphy’, or PCSA for short.

A longstanding and unresolved question in phonological and morphological theory is that of how these different kinds of allomorphy are distributed in the grammar. A relatively traditional response—implicitly accepted in some form, I suspect, by most generative linguists—would go like this. There is a module of grammar, which we may call the morphological component, in which non-phonologically-conditioned suppletion like that involving *go* ~ *went* is handled. This component takes abstract morphological structure and consults the list of arbitrary sound-meaning pairs stored in the language’s lexicon to decide which collection of sounds is appropriate for expressing which bit of morphological structure. When this is finished, the output of the morphology—a collection of phonological underlying representations—becomes the input a second module of the grammar, which we may call the phonological component. The phonology takes this string of underlying forms and maps it onto the phonological surface form, which is then passed along to the articulators to be phonetically realized. The second type of allomorphy, like that involving [θɜː.tʰɪjn] and [θɜː.tʰɪjn], arises in the phonological component.

So far all this is relatively straightforward, perhaps even banal. The trickier (and thus more interesting) matter, under the standard assumptions just laid out, is that of

where in the grammar PCSA arises. It is this question which the present chapter is concerned with. In the existing literature, three general responses to this question can be identified.

The first answer is that PCSA arises in the phonological component. This view has become widespread since the appearance of Optimality Theory (Prince & Smolensky 2004 [1993]). In parallel Optimality-Theoretic models of phonology, the selection of the surface pronunciation of some form results from considering various candidate pronunciations and determining which best satisfies a set of ranked and violable constraints. It is easy to see the intuitive appeal of treating PCSA in such a framework, since PCSA seems by definition to involve using phonological criteria to choose between competing alternative pronunciations. It is thus not surprising that in the first few years of OT, a number of different researchers (Burzio 1994; Mester 1994; Hargus 1995; Tranel 1995, 1996, 1998; Drachman, Kager, & Malikouti-Drachman 1996; Kager 1996a; Mascaró 1996a,b; Anttila 1997a,b; Dolbey 1997; Hargus & Tuttle 1997; Perlmutter 1998; Plag 1999; Steriade 1999b; Anttila & Revithiadou 2000; Rubach & Booij 2001) proposed OT analyses of PCSA effects in a variety of languages. Many works since these (far too numerous to list) have pursued this same line of analysis.

The second response is that some cases of PCSA happen in the phonology component and others in the morphology component. Lapointe & Sells (1996), Dolbey (1997), and Lapointe (1999) note that there are at least some attested PCSA systems in which typologically-plausible and strictly *phonological* OT constraints are not available which will produce the correct distribution of allomorphs. If PCSA is to be kept in the phonology component, these cases seem to require that the phonological constraints must be augmented with additional constraints which impose preferences which are, from a phonological standpoint, arbitrary (Kager 1996a; Mascaró 2007; Bonet, Lloret & Mascaró 2007; Trommer 2008). An alternative suggestion, put forth by the authors cited at the beginning of this paragraph, is that the cases of PCSA which are not clearly phonologically optimizing are not really part of the phonology at all, but are instead like English *go/went*: they involve arbitrary subcategorization for features of the environment in which each allomorph appears, and it simply happens that some of the features subcategorized for are phonological.

The third response goes further. If some cases of PCSA need to be chalked up to arbitrary preferences imposed by nonphonological constraints, then this seems to vitiate the argument for PCSA ever representing optimization according to phonological criteria. If arbitrary morphological subcategorization frames are needed in order to cope with some cases of PCSA (as well as with nonphonological suppletion like *go~went*), then it is most economical (or so the argument goes) to assign all suppletion to the morphology component. Versions of this position are staked out, notably, by Paster (2005, 2006, this volume), Bye (2007), and Embick (2010).

This paper suggests that a very different response is in order. Perhaps, if there are systems of suppletive allomorphy which show the mixed influence of phonological criteria and morpholexical, nonphonological ones, this is because the two kinds of

criteria are enforced by constraints which belong to a single component of the grammar, meaning that it is unsurprising that they should interact. That is, perhaps there is no crisp dividing line between allomorphy belonging to the morphological module and allomorphy belonging to the phonological module, because these are not in fact separate modules. Instead, I would like to suggest, there is a single module of grammar in which all lexical insertion occurs, along with all phonological operations.<sup>1</sup>

The argument is developed as follows. In section 2 I present the structure of the standard approach to PCSA in OT, taking as a central illustration Mascaró's (1996b) analysis of the Moroccan Arabic example mentioned above. Having seen how this mode of analysis works, we will then consider a well-known case in which arbitrary preferences seem to be required, namely that of the Ergative suffix in the Pama-Nyungan language Dyrbal. Section 3 lays out an analysis of the Dyrbal facts cast within a theoretical framework which assumes that phonology and lexical insertion occupy a single module of grammar. One advantage of this approach over one which relegates all PCSA to the morphology is that it makes possible a more satisfactory treatment of conspiracies (Kisseberth 1970) between PCSA and phonological alternations or phonotactic restrictions of the same language (Kiparsky 1972; Tranel 1995; González 2005; Itô & Mester 2006; Alber to appear). This argument is developed in section 4. Section 5 discusses some additional types of interactions between phonological and morphological constraints which are expected if the two constraints belong to the same component and are freely re-rankable with respect to one another. Section 6 gives a concluding summary and examines some potential lines of future work in the research program argued for in this chapter.

## 2. PCSA as phonological optimization: The standard treatment, and its limits

The idea that PCSA occurs in the phonological component has been implemented in a variety of different ways, but to the extent that a 'standard' implementation of this idea exists, it is probably the one presented by Mascaró (1996a,b). The analysis of the Moroccan Arabic 3<sup>rd</sup> person masculine singular possessive/direct object enclitic in Mascaró (1996b) assumes that this morpheme has two underlying forms, /-u/ and /-h/<sup>2</sup>, and that the following convention (originally stated in explicit form in Mascaró 1996a) is applicable in such cases:

- (2) For a lexical item L such that  $\Phi = a, b$ :  
 $\text{Eval}(\text{Gen}(a, b)) = \text{Eval}(\text{Gen}(a) \cup \text{Gen}(b))$

That is: when a morph L's phonological representation  $\Phi$  consists of two underlying forms *a* and *b*, the candidate set evaluated when L is in the input is defined as the union

---

<sup>1</sup> Diana Apoussidou has pointed out to me that—aside from matters of 'allomorphy' as such—one could argue for this same conclusion by pointing to the act of composing verse, which appears by definition to involve lexical selection making reference to the phonological properties of the words chosen.

<sup>2</sup> The idea of a morpheme as having more than one UR—or, somewhat differently put, of the UR as a set of allomorphic alternants—has its roots in work by Hudson (1974) and Hooper (1976).

of two candidate sets: Gen(a), the candidate set produced with just *a* in the input, and Gen(b), the candidate set produced with just *b* in the input<sup>3</sup>. When some morphs in the input have multiple underlying forms, candidates thus differ not only in what surface form they contain, but also in which underlying form they select for those morphemes which have multiple disjunctive URs.

When the Moroccan Arabic 3<sup>rd</sup> person masculine singular enclitic is added to a vowel-final base, a candidate using the /-h/ allomorph will win, provided that having an onsetless syllable, as using /-u/ would give rise to, is less serious a problem than having a coda in the word-final syllable, as using /-h/ would give rise to. Mascaró's (1996b) analysis expresses this idea via the OT constraint ranking ONSET » NoCODA:

(3)

/xt <sup>ʰ</sup> a – {h, u}/		ONSET	NoCODA
Inputs:	Outputs:		
/xt <sup>ʰ</sup> a-h/	a. [xt <sup>ʰ</sup> ah]		1
/xt <sup>ʰ</sup> a-u/	b. [xt <sup>ʰ</sup> a.u]	W1	L

For consonant-final bases, the same ranking will result in the selection of a candidate that uses /-u/:

(4)

/ktab – {h, u}/		ONSET	NoCODA
Inputs:	Outputs:		
/ktab-u/	a. [kta.bu]		
/ktab-h/	b. [ktabh]		W1

Let us now consider the general requirements that must hold for an instance of PCSA to be analyzable under these assumptions. Suppose that a morpheme is realized, depending on its context, by one of two listed allomorphs *X* and *Y*, which appear respectively in the phonological contexts *A\_B* and *C\_D*. If the choice between *X* and *Y* is made by an OT grammar in the manner illustrated for Moroccan Arabic, then two things must be the case:

- (5) a. Some (markedness) constraint  $M_1$  that exerts the preference  $AXB \succ AYB$  must dominate all constraints that exert the preference  $AYB \succ AXB$ .
- b. Some other (markedness) constraint  $M_2$  that exerts the preference  $CYD \succ CXD$  must dominate all constraints that exert the preference  $CXD \succ CYD$ .

These requirements result directly from the basic logic of constraint ranking in OT. For a pair of competing options like *AXB* and *AYB*, the highest-ranked constraint which prefers one over the other must prefer *AXB*, since otherwise unattested \**AYB* would be

<sup>3</sup> An essentially identical formulation is also put forth by Perlmutter (1998: 319).

chosen instead.<sup>4</sup> In some allomorphy systems, like /-h/ ~ /-u/ in Moroccan Arabic, it is easy to find the required M<sub>1</sub> and M<sub>2</sub> among markedness constraints which are well motivated by phonological typology. In Mascaró's (1996b) analysis of Moroccan Arabic depicted in (1)-(2), for instance, we can call on standard, widely-used, not-especially-controversial constraints like ONSET and NoCODA.

For other allomorphy systems, it is not apparent that the required M<sub>1</sub> and M<sub>2</sub> can be found. The system that arises most frequently in discussions of this issue (McCarthy & Prince 1990, 1993a: ch. 7; Bonet 2004; McCarthy & Wolf 2005; Paster 2005, 2006, this volume; Bye 2007; Trommer 2008) involves the marking of Ergative case on vowel-final stems in the Pama-Nyungan language Dyirbal (Dixon 1972)<sup>5</sup>:

- (6) *Dyirbal ergative*
- |             |               |
|-------------|---------------|
| jaɾa-ŋku    | 'man-ERG'     |
| jamani-ku   | 'rainbow-ERG' |
| palakara-ku | 'they-ERG'    |

As the data illustrate, disyllabic vowel-final stems are suffixed with /ŋku/ in the Ergative, while longer stems are suffixed with /ku/.<sup>6</sup> (Stems ending in a nasal or [j] mark the Ergative with [Tu], where [T] is a stop homo-organic with the stem-final consonant; with stems ending in a liquid, the final liquid is deleted, and the Ergative is marked with [-ɾu].) It is reasonably clear that there will be constraints that prefer /ku/ over /ŋku/, regardless of context, since the nasals, velars, and consonant clusters are all marked. However, given that /ku/ and /ŋku/ resemble each other so much, it is not so obvious that we would be able to find a typologically-plausible universal constraint which could prefer /ŋku/ over /ku/ just in case the stem was disyllabic.

If we can't, then it seems that in addition to substantively phonological preferences among allomorphs like those imposed by constraints like ONSET and NoCODA, at least some cases of PCSA require a role for *arbitrary* preferences among allomorphs, in the Dyirbal case in favor of /-ŋku/. Some authors have retained the same sort of OT framework illustrated for Moroccan Arabic while adding constraints that impose arbitrary, lexically-specified preferences (Kager 1996a; Kenstowicz 2005; Mascaró 2007; Bonet, Lloret & Mascaró 2007). Others have drawn a different lesson, concluding that if PCSA cannot be adequately treated without recourse to arbitrary preferences, there is nothing conceptually gained by treating PCSA as involving phonological optimization at all (Paster 2005, 2006, this volume; Bye 2007; Embick

---

<sup>4</sup> See Prince (2002, 2003) for formal discussion in relation to this. The formulation that the highest-ranked constraint which distinguishes between a winning and a losing candidate must prefer the winner is originally due to Jane Grimshaw.

<sup>5</sup> Dyirbal has a single (voiceless unaspirated) stop series; to represent these I use IPA [p t k ...] rather than [b d g...] as used by Dixon (1972) and others. Similarly, I use [j] rather than [y] to represent the glide used in Dyirbal.

<sup>6</sup> In their study of Dyirbal song, Dixon & Koch (1996: 44) report finding one instance of the /-ŋku/ allomorph being used with a trisyllabic base. They suggest that this may be an archaism, reflecting an earlier stage (retained in other Australian languages) where the /-ŋku/ form was used with all vowel-final stems.

2010). That is, the preference-relations among allomorphs which have been understood as being exercised by substantively phonological constraints could be replaced by arbitrary statements expressing the same preferences. In this way, non-phonological selection criteria would do all the work, and there would be no need to have both phonological and morpholexical constraints on allomorph selection.

As mentioned, this chapter will argue for a quite different conclusion: that allomorph selection is governed by both phonological and morphological constraints, and that these constraints occupy one and the same OT grammar and are freely re-rankable with respect to one another. The next section presents the assumptions of the framework being argued for here.

### **3. Optimal Interleaving theory and its treatment of arbitrary preference in allomorph selection**

The framework for which I will argue here is one which I call Optimal Interleaving, or OI for short, the proposal for which is originally put forth in Wolf (2008). This framework, in brief assumes (a) a realizational view of morphology, and (b) that morphological realization occurs together with phonology in a single OT-CC (McCarthy 2007) or Harmonic-Serialist (Prince & Smolensky 2004 [1993]: §5.2.3.3) grammar. This section lays out these assumptions in more detail.

#### *3.1 Realizational morphology*

Stump (2001) presents a taxonomy of morphological theories which distinguishes between *incremental* theories and *realizational* ones. In an incremental theory, morphemes are regarded as meaningful collections of phonological material, which are assembled together to make words. That is, the construction of the abstract semantico-syntactic structure of words and the construction of the words' (underlying) phonological form proceed hand-in-hand. On the other hand, *realizational* theories<sup>7</sup> assume that a purely abstract morphological structure is built first, and then at a later step, this structure is 'realized' or 'spelled out' by associating units of the abstract structure with collections of phonological material. Rules or constraints of one sort or another, depending on the realizational theory being assumed, are responsible for dictating which abstract morphological features can be (arbitrarily) paired with which collections of phonological structure.

On a realizational view, the derivation of the English word *cats* will proceed something like this: first an abstract structure which we may represent as |CAT+PLURAL| is built. The process of spell-out then associates the abstract unit |CAT| with the underlying phonological string /kæt/ and |PLURAL| with the underlying string /z/. The collection of underlying forms /kætz/ then undergoes voicing assimilation and other phonological rules to yield the surface form [kæts]. Within this general picture, there is substantial room for disagreement, for instance with regard to the extent to which

---

<sup>7</sup> The terms 'separationist' (Beard 1995) and 'late insertion' used as descriptors of morphological theories mean essentially the same thing as 'realizational', in the sense of that term being used here.

words do or don't contain internal syntax-like structure organizing their abstract features; Distributed Morphology (Halle & Marantz 1993) and A-Morphous Morphology (Anderson 1992) are prominent realizational theories which take markedly different positions on this issue. In this paper, I will attempt to remain agnostic about such issues to the extent possible, focusing instead on arguments for a realizational perspective in general, and in particular on reasons to suspect that morphological realization takes place in the same grammatical module as the phonology. I will use the term "morpheme" to refer to structures at the abstract level of morphological structure and the term "morph" to refer to the bundles of phonological material which are used to spell out morphemes (i.e., what is known in Distributed Morphology as a "vocabulary item"). My use of the term "morpheme" in this way should not be taken as indicating disagreement with frameworks like A-Morphous Morphology which reject the classical morpheme; rather, it should be taken as referring to any structural positions or layers within the abstract representation of a word which are smaller than the whole word but (potentially) larger than an individual morphosyntactic feature.

While this paper is mainly concerned with pencil-and-paper theoretical arguments, it is worth noting that several lines of experimental evidence suggest that a realizational view of morphology is correct. Results involving speech errors (Pfau 2000; see also Albright 2007 for discussion), anomia (Henaff Gonon *et al.* 1989; Hittmair-Delazer *et al.* 1994; Badecker *et al.* 1995; Semenza *et al.* 1997), tip-of-the-tongue states (Levelt 1993; Caramazza & Miozzo 1997; Vigliocco *et al.* 1997), and lateralized readiness potentials using a go/no-go paradigm (van Turrenout *et al.* 1997, 1998; Rodriguez-Fornells *et al.* 2002; Jescheniak *et al.* 2003; Guo & Peng 2007; cf. Abdel Rahman & Sommer 2003; Friedmann & Biran 2003) have all been cited as evidence in favor of the psychological reality of a level of representation—and perhaps even an actual temporal stage in on-line processing—in which the semantic and morpho-syntactic features of a word are present, but in which the word's phonological properties have not yet been introduced. In psycholinguistic models which incorporate a distinction between 'lemmas' and 'lexemes' (e.g. Levelt 1989, 1993; Levelt *et al.* 1999), these notions roughly correspond to those of 'morphemes' and 'morphs', as the latter two terms are used in this chapter.

On the theoretical side, we can identify at least two arguments in favor of a realizational view. First, it is generally assumed that it is only the abstract morphological structures, and not their spell-outs, which are built in or interact with syntax; spell-out, in derivational terms, occurs after syntax is done. This predicts that the syntax will be insensitive to the phonological composition of words, which seems to be right<sup>8</sup>; this prediction is dubbed 'Feature Disjointness' in Distributed Morphology (Marantz 1995), and similar empirical conclusions are argued for (though from a standpoint quite different from DM's) under the rubric of the Principle of Phonology-

---

<sup>8</sup> A similar argument can be made regarding purely morphological diacritic features, such as markers of declension-class membership, if we assume that such features inhere not in root morphemes, but instead in the morphs that realize them; see Acquaviva (2008: 13) for discussion of this point.

Free Syntax (Zwicky 1969; Zwicky & Pullum 1986a,b, 1988; Miller, Pullum & Zwicky 1992, 1997)<sup>9</sup>.

The other argument in favor of a realizational view is that it permits us to analyze at least some morphological syncretisms without having to resort to accidental homophony. A straightforward illustration involves adjective inflection in Dutch (Sauerland 1995). Neuter singular strong adjectives have no overt inflectional ending; strong adjectives of other numbers-gender combinations carry an ending /-ə/:

(7) *Number/gender endings in Dutch strong adjectives*

	[+neuter]	[-neuter]
[+plural]	-ə	-ə
[-plural]	∅	-ə

On an incremental view of morphology, this would require us to posit three accidentally-homophonous /-ə/ suffixes, with the meanings “neuter plural”, “non-neuter plural”, and “non-neuter singular”. This is because in an incremental theory, morphological features inhere in and are introduced by the formatives which represent them, and so the observed formatives must carry all of the features which are possessed by the word which they appear in. Realizational theories are different, because while all the required dimensions of morphosyntactic feature contrast exist at the level of abstract morphological structure, it is possible that some of these contrasts may be neutralized in the mapping from morphemes to morphs—that is, a single morph of the language may be used to express multiple distinct morphemes.

Following Sauerland (1995)’s Distributed Morphology analysis, in a rule-based realizational framework we might set up the following two rules for Dutch:

- (8) a. Spell out the inflectional ending as /∅/ if it contains the features [-plural, +neuter].
- b. Spell out the inflectional ending as /-ə/.

Since rule (8a) is applicable in a proper subset of the places where rule (8b) is, the rules will effectively apply in the order shown if they are disjunctively ordered in accordance with the Elsewhere Condition (Kiparsky 1973). In other words, the null form of the inflectional ending is the default, but when the feature-combination required for the use of this form is absent, the elsewhere form /-ə/ is used instead.

In Distributed Morphology, such default/elsewhere relationships between morphs (or “vocabulary items” in DM parlance) is generally taken to be expressed via the Subset Principle (Halle 1997):

---

<sup>9</sup> However, see Teeple (2006, 2008a,b) for arguments involving French determiners and prepositions that syntax must be integrated with phonology and morphological spell-out in a single, fully parallel grammar.

(9) *Subset Principle*

The phonological exponent of a Vocabulary item is inserted into a morpheme in the terminal string if the item matches all or a subset of the grammatical features specified in the terminal morpheme. Insertion does not take place if the vocabulary item contains features not present in the morpheme. Where several Vocabulary items meet the conditions for insertion, the item matching the greatest number of features specified in the terminal morpheme must be chosen.

On this view, morphs (vocabulary items) can be thought of as ordered pairs consisting of a bundle of morphological features and a bundle of phonological material. When determining which morph to pair up with a particular morpheme, the grammar compares the features of the morpheme with the features of each morph in the language's lexicon. The morph which is chosen is the one which matches the greatest number of the features present in the abstract morpheme, provided that the morph does not contain any features which the morpheme lacks. Expressed in these terms, we can set up the following two morphs for Dutch (Sauerland 1995):

- (10) a. <[-plural, +neuter], Ø>  
b. <Ø, /ə/>

Couched in these theoretical terms, the default status of the phonologically-null morph is a consequence of the fact that its bundle of morphological features contains a proper superset of the morphological features of the /ə/ morph. In a short while, we will see that a similar mode of analysis can be called on in order to implement the required arbitrary preference among the competing allomorphs of the Dyrbal Ergative. The main architectural innovation this will require, naturally, is that constraints on the goodness of feature-matching in morphological spell-out must be able to interact with phonological constraints. Before addressing either the Dyrbal Ergative or these broader theoretical questions, though, we need to consider how a Subset-Principle-like mechanism of morph selection could be set up using OT constraints.

### 3.2 Constraints on morpheme-morph correspondence

Let us suppose, in keeping with the general hypothesis advanced in this paper, that the input to the phonology consists of an abstract morphological structure.<sup>10</sup> Let us assume that the abstract representation consists of a set of nodes called *morphemes*, and that individual morphosyntactic features are autosegmental dependents of these nodes. (In principle the features might not be direct dependents of morphemes, but instead arranged in a more elaborate multi-layered feature geometry, as in Harley & Ritter [1998]). To the extent possible, I will try to remain agnostic regarding what kind of superordinate structure the morphemes themselves may be organized into (e.g. whether the morphemes are terminal nodes of a syntactic tree, or slots in a

---

<sup>10</sup> Zuraw (2000) makes the same assumption; she refers to the abstract semantic/morphosyntactic structure that forms the input to the phonology as the *intent*. That the input to the phonology may contain some not-yet-spelled-out morphosyntactic features is also proposed by Yip (1998).

morphological template, or something else.) Following Trommer (2001), I will refer to a morpheme together with its dependent morphological features as a *feature structure*, or FS.

As before, let us suppose that a language’s lexicon contains a list of *morphs*, and that morphs are ordered pairs consisting of an FS and an underlying phonological material. Under these assumptions, a candidate in the phonology will consist of:

- A set of morphs;
- A surface phonological representation;
- An input-output Correspondence relation (McCarthy & Prince 1995, 1999) between the surface phonological representation and the underlying phonological representations contained in the morphs;
- A Correspondence relation between the FSes of the morphs and the FSes of the morphemes in the input. (Call this the MM correspondence relation.)

For the English word *cats*, the winning candidate will then look something like this (coindexation indicates that two elements stand in Correspondence with one another; to emphasize the existence of distinct Correspondence relations, Greek letters indicate MM correspondence, and Arabic numerals indicate IO correspondence):

(11)

<i>input</i>	<i>morphs</i>	<i>surface form</i>
CAT <sub>α</sub> -PLURAL <sub>β</sub>	<CAT <sub>α</sub> , /k <sub>1</sub> æ <sub>2</sub> t <sub>3</sub> />, <PLURAL <sub>β</sub> , /-z <sub>6</sub> />	[k <sub>1</sub> æ <sub>2</sub> t <sub>3</sub> s <sub>4</sub> ]

Similar assumptions about the nature of candidates can be found in Zuraw (2000) and Walker & Feng (2004), as well as in much recent work in the Bidirectional Phonology and Phonetics program making use of ‘lexical’ or ‘M-Phon’ constraints, including Boersma (2001, 2006), Escudero (2005), Apoussidou (2007), Jesney (2009), Jesney, Pater & Staubs (2010), and Hamann, Apoussidou & Boersma (to appear).<sup>11</sup>

As in standard OT, phonological markedness constraints will evaluate the surface phonological representation, and phonological IO-faithfulness constraints will evaluate the Correspondence relation between the underlying and surface phonological structures. One thing which will be new is that there will be faithfulness constraints on the morpheme-morph dimension of Correspondence which assess the ‘goodness of fit’ between the input FSes and the FSes of the morphs employed in a given candidate.

Let us now return DM’s Subset Principle. Given the assumptions and terminology just laid out, we can rephrase the Subset Principle as follows:

<sup>11</sup> A related proposal also appears in Eisenstat (2009). See also the works cited in footnotes 12 and 13 for Correspondence-theoretic approaches to morphological selection (though which do not necessarily take the view that spell-out and phonology are in the same module of the grammar).

- (12) a. If  $F$  is a feature-structure of a morpheme and  $F'$  is a feature structure of a morph that it corresponds to,  $F'$  must not contain any features which are not present in  $F$ .
- b. If  $F$  is a feature-structure of a morpheme and  $F'$  is a feature-structure of a morph that it corresponds to,  $F'$  must contain as many of  $F$ 's features as possible.
- c. In case of conflict between them, satisfying requirement (a) takes priority over satisfying requirement (b). However, requirement (b) must still be satisfied to the fullest extent possible, without violating requirement (a).

Once it's rephrased in this way, it becomes clearer that the Subset Principle contains a kind of implicit OT-type constraint ranking: constraint (12a) dominates (12b). That ranking means that (12a) will be obeyed in case of conflict, but even then (12b) is satisfied to the fullest extent that it can be. The minimal violation of disobeyed constraints forms the core argument for OT's assumption that constraints are ranked, rather than being parameterized as on or off (Prince & Smolensky 2004 [1993]; see also McCarthy & Prince's [1994] discussion of The Emergence of the Unmarked, which is a subcase of this minimal-violation effect). Therefore, it seems fruitful to reformulate (12a-b) as OT constraints.

Requirement (12a) can be stated as a constraint of the DEP family, which on the IO dimension of correspondence serve to militate against epenthesis<sup>12</sup>: the introduction of items in the output representation which lack correspondents in the input representation. Specifically, let us assume that for every morphosyntactic feature  $F$ , there is a constraint of the following form<sup>13</sup>:

- (13) DEP-M( $F$ )  
 Let  $\pi'$  be an instance of the feature  $F$  at the morph level. Assign one violation-mark if there does not exist some  $\pi$  at the morpheme level, such that  $\pi$  and  $\pi'$  stand in MM-correspondence.

In addition to the DEP-M constraints for features, there will also presumably be DEP-M(FS) constraints, requiring that every feature structure at the morph level have a corresponding FS at the morpheme level.

Similarly, requirement (12b) can be stated as a constraint of the MAX family, which in IO correspondence militate against deletion: the presence of items in the

<sup>12</sup> See also Gouskova (2007) for discussion of other roles played by DEP constraints on various dimensions of correspondence.

<sup>13</sup> A non-exhaustive list of similar constraints in OT treatments of morphology includes Curnow's (1999) IDENT constraints, Ackema & Neeleman's (2004, 2005) FAITHFULNESS, and Wunderlich's (2001) IDENT constraints, Xu (2007) DEP constraints, and Aronoff & Xu's (to appear b) IDENT constraints.

input which lack correspondents in the output. On the MM dimension of Correspondence there will exist constraints of the following form for every feature F (as well as for FSes)<sup>14</sup>:

- (14) MAX-M(F)  
 Let  $\pi$  be an instance of the feature F at the morpheme level. Assign one violation-mark if there does not exist some  $\pi'$  at the morph level, such that  $\pi$  and  $\pi'$  stand in MM-correspondence.

To show these constraints put to analytic use, let's return for one last time to the Dutch example. Recall that the two morphs we posited were:

- (15) a. <[-plural, +neuter],  $\emptyset$ >  
 b. < $\emptyset$ , /ə/>

When the morpheme containing an adjective's inflectional features has any person/number feature combination besides [-plural, +neuter], it will be the < $\emptyset$ , /ə/> allomorph which is used. This creates a conflict between DEP-M and MAX-M constraints for feature-combinations like [+plural, +neuter] and [-plural, -neuter]. For the latter of these, the question is, is it more important to give a correspondent to the morpheme's [-plural] feature or to avoid using a morph containing a token of [+neuter] which isn't present at the morpheme level? The attested result follows if DEP-M(+neuter) outranks MAX-M(-plural):

(16)

$\begin{array}{c} \text{FS}_\alpha \\ / \backslash \\ [-\text{plural}]_\beta \quad [-\text{neuter}]_\gamma \end{array}$	DEP-M(+neuter)	MAX-M(-plural)
$\begin{array}{c} \text{FS}_\alpha \\ / \backslash \\ [-\text{plural}]_\beta \quad [-\text{neuter}]_\gamma \end{array}$		1
$\begin{array}{c} \text{FS}_\alpha \\ / \backslash \\ [-\text{plural}]_\beta \quad [+neuter]_\delta \end{array}$ <i>(no phonological material)</i>	W1	L

By an exactly analogous argument, DEP-M(-plural) must outrank MAX-M(+neuter) in order to get the /ə/ morph to win with adjectives which are [+plural, +neuter].<sup>15</sup>

<sup>14</sup> A non-exhaustive list of similar constraints includes Noyer's (1993) PARSE-PROPERTY, Bonet's (1994) ELSEWHERE, Kiparsky's (1997) MAX-CAT and (2005) EXPRESSIVENESS, Donohue's (1998) PARSE constraints, Curnow's (1999) MAX and IDENT constraints, Selkirk's (2001) REALIZE constraints, Trommer's (2001) PARSE constraints, Wunderlich's (2000, 2001, 2003) MAX constraints, Ackema & Neeleman's (2004, 2005) PARSE, Teeple's (2006, 2008a,b) FAITH-SM and EXPRESSIVENESS, Strigin's (2007) MAX-STRUCT, Xu (2007) MAX constraints, and Aronoff & Xu's (to appear b) IDENT constraints.

### 3.3 Harmonic Serialism

The original OI proposal in Wolf (2008) is cast within an OT architecture called OT with Candidate Chains (McCarthy 2007). In OT-CC, each candidate is (approximately) a chain of successively more harmonic forms, each differing from the last via only by one of some hypothesized set of minimal changes. OT-CC is an elaboration on Harmonic Serialism (Prince & Smolensky 2004 [1993]: §5.2.3.3) designed to cope with counterfeeding and counterbleeding opacity. However, OI's premise that morphological spell-out occurs in the phonology can also be implemented in plain Harmonic Serialism (see for instance Kimper [2009] and McCarthy [to appear/2011]), which for many phenomena supplies as much derivational machinery as we need. For greater ease of exposition, I will therefore assume an HS version of OI in the present paper.

Harmonic Serialism involves repeated and gradual looping through the same OT grammar, which can be given the following informal pseudo-algorithmic description:

1. Set *CurrentInput* to be the original input to the grammar.
2. Construct a candidate set consisting of (a) a fully-faithful candidate identical to *CurrentInput*, and (b) all candidates which can be formed from *CurrentInput* by performing one of a specified set of basic operations.
3. Find the optimum of this candidate set.
4. If the optimum is the fully-faithful candidate, exit; the derivation has converged, and the optimum becomes the output of the grammar.
5. If the optimum is not the fully-faithful candidate, then a new loop begins. Set *CurrentInput* to be the optimum just found, and return to step 2.

HS thus differs from standard OT not only in the repeated looping through GEN and EVAL until convergence, but also in imposing a limit on how much the candidates which compete on each optimization can differ from the input. The HS architecture does not entail in and of itself any particular assumptions about what are the “basic operations” by which candidates can differ from the input. As such, a major (perhaps *the* major) topic of research in HS is to explore the implications of various hypotheses about what those operations are.<sup>15</sup> OI advances the hypothesis that the insertion of any one morph from the language's lexicon, and the placing of this morph in correspondence with the abstract morphological structure, is a single basic operation.

---

<sup>15</sup> As an alternative (or perhaps in addition) to using faithfulness constraints to regulate morpheme/morph correspondents, it would be possible to propose constraints which directly stated “morphosyntactic feature *F* should be realized by underlying form *U*”. The ‘lexical’ constraints of Bidirectional Phonology and Phonetics (see references below (11)) and the realization constraints of Realization OT (Xu 2007, Aronoff & Xu to appear a,b) work this way. Constraints of the same form appear in several works in the OT literature on PCSA systems requiring arbitrary preference, for instance Kager (1996a).

<sup>16</sup> An extensive bibliography of recent works in or about HS and OT-CC is available from [http://works.bepress.com/john\\_j\\_mccarthy/102/](http://works.bepress.com/john_j_mccarthy/102/).

### 3.4 Analysis of the Dyirbal Ergative

In Dyirbal, the competing ergative morphs /-ŋku/ and /-ku/ stand in a special-general relationship: /ŋku/ appears in one specific context (after a disyllabic stem), and /ku/ appears elsewhere. In this case, the context of the special morph is phonologically defined.

As we have already seen, special-general relations of the same sort also exist in systems of suppletive allomorphy in which there is no evidence of phonological conditioning. The inflection of Dutch strong adjectives discussed earlier in this chapter is just such an example: null inflection is used with neuter singular adjectives (the special case) and /-ə/ is used otherwise (the general case).

In order for the general case to emerge, the preference for the special case has to be overruled in certain contexts. In OT terms, this means that in the contexts where the general case appears, the relevant MAX-M(F) constraints are dominated by a constraint which, in just those contexts, prefers the use of the general case over the use of the special case. As we saw in (15), in the case of Dutch, the relevant constraints are DEP-M(+neuter) and DEP-M(-plural).

For Dyirbal, the analytic strategy will be the same. The arbitrary preference for /ŋku/ over /ku/ can be derived from the assumption that /ŋku/ spells out more features than /ku/ does. The main difference between Dutch and Dyirbal will be in the nature of the constraint that dominates MAX-M(F) and which triggers use of the general case. For Dutch, these were morpheme/morph faithfulness constraints, but for Dyirbal, the constraint will have to involve phonology, since a phonological generalization is at work.

In order to justify the particular assumptions that I'll make about the morphosyntax of /ŋku/ and /ku/, we need to consider one further fact about the Dyirbal case system. This is that Locative case shows a pattern of allomorphy which is identical to that of that of the Ergative, except that the Locative has [a] where the Ergative has [u]. So, among V-final stems, disyllabic stems take [ŋka] in the Locative, whereas longer stems take [ka] (Dixon 1972):

- (17)       jaŋa-ŋka       'man-LOC'  
          jamani-ka     'rainbow-LOC'

That there should be this kind of partial syncretism between the Ergative and Locative is unsurprising in light of proposals about case features. Specifically, Halle & Vaux (1998) have proposed that Ergative and Locative share a feature [-free], which designates 'nominals with a consistent role in argument structure.' The other two cases which have this feature under Halle & Vaux's proposal are Instrumental (whose

phonological realization is identical to that of Ergative in Dyirbal) and Accusative, which Dyirbal doesn't have.<sup>17,18</sup>

We can therefore make the following generalization about Dyirbal:

- (18) a. The feature [-free] is marked by /ŋ/ on disyllabic roots, but receives no overt phonological realization with longer roots.
- b. In the [-free] cases, the other case features besides [-free] may be spelled out by other morphs, i.e. /ku/ in the Ergative and Instrumental or /ka/ in the Locative.

The idea that the apparent /-ŋku/ allomorph is in fact two suffixes /-ŋ/ and /-ku/ is independently proposed by Trommer (2008) in the service of a proposal about the phonological basis for the /-ŋ/ appearing only with disyllabic bases. His proposal is cast within Stratal OT (e.g. Kiparsky 2000, among many others), and assumes that /-ŋ/ is a stem-level extension while /-ku/, the Ergative marker proper, is a word-level affix. He proposes that, at the stem level, the competing allomorphs of the stem extension are /-ŋ/ and  $\emptyset$ . The default allomorph is /-ŋ/, enforced in Trommer's (2008) analysis by an arbitrary-preference constraint  $\text{EXT}=\eta$ . The null allomorph is used instead with greater-than-disyllabic bases because  $\text{EXT}=\eta$  is outranked by a markedness constraint which is lexically indexed to the /-ŋ/ allomorph:

- (19)  $\text{PWD}=\text{BINFT}$   
Assign one violation mark for every prosodic word which is larger than a single binary foot in size.

Trommer (2008) assumes a slightly modified version of the convention proposed by Pater (2007, 2009) for interpreting lexically-indexed markedness constraints:

- (20)  $*X_L$ : Assign one violation mark to any instance of X which that contains a phonological exponent of an allomorph specified as L.

Under this convention, the indexed markedness constraint  $\text{PWD}=\text{BINFT}_\eta$  will assign a violation-mark to any PWD which contains the /-ŋ/ allomorph of the stem extension *and* is larger than a single bisyllabic foot in size. It therefore provides a disincentive for the use of the /-ŋ/ allomorph on a base that is three or more syllables long:

---

<sup>17</sup> Superficially, Dyirbal has a nominative-ergative system in nouns but a nominative-accusative system in pronouns. However, Dixon (1972: §5.2) argues that the pronouns too underlyingly pattern as nominative-ergative. In any case, if accusative case does exist in Dyirbal, it and its morphosyntactic exponence is limited to a closed class of forms (the pronouns) and can probably be safely ignored when advancing a proposal about the phonological exponence of the case feature [-free].

<sup>18</sup> For an account of the gradual collapsing together of the various allomorphs of the Ergative and Locative by younger Dyirbal speakers as the language dies out, see Schmidt (1985: ch. 4). She finds that "reduction in the range of locative allomorphs operates on the same principles as ergative allomorph reduction" (p. 52).

(21) *Stem level: /-ŋ/ blocked with trisyllabic stem*

/jamani-{-ŋ, Ø}/	PWD=BINF <sub>T<sub>ŋ</sub></sub>	EXT=ŋ
☞ [(‘ja.ma) <sub>Ft</sub> .ni] <sub>PWd</sub>		1
[(‘ja.ma) <sub>Ft</sub> .niŋ] <sub>PWd</sub>	W1	L

For a bisyllabic root like /jaɾa/, the default /-ŋ/ allomorph will be selected at the stem level, since no violation of PWD=BINF<sub>T<sub>ŋ</sub></sub> will result:

(22) *Stem level: /-ŋ/ chosen with disyllabic stem*

/jaɾa-{-ŋ, Ø}/	PWD=BINF <sub>T<sub>ŋ</sub></sub>	EXT=ŋ
☞ [(‘ja.ɾaŋ) <sub>Ft</sub> ] <sub>PWd</sub>		
[(‘ja.ɾa) <sub>Ft</sub> ] <sub>PWd</sub>		W1

The stem [(‘ja.ɾaŋ)<sub>Ft</sub>]<sub>PWd</sub> will subsequently receive the Ergative suffix /-ku/ in the Word-level morphology, creating a new violation of PWD=BINF<sub>T<sub>ŋ</sub></sub>. This, however, will be tolerated, provided that the anti-deletion constraint MAX is too highly ranked to permit trimming the word down to disyllabic size, or deleting the /-ŋ/ to render PWD=BINF<sub>T<sub>ŋ</sub></sub> inapplicable:

(23) *Word level: /-ku/ added*

[(‘ja.ɾaŋ) <sub>Ft</sub> ] <sub>PWd</sub> -ku	MAX	PWD=BINF <sub>T<sub>ŋ</sub></sub>	EXT=ŋ
☞ [(‘ja.ɾaŋ) <sub>Ft</sub> ku] <sub>PWd</sub>		1	
[(‘ja.ɾaŋ) <sub>Ft</sub> ] <sub>PWd</sub>	W1	L	
[(‘ja.ɾa) <sub>Ft</sub> ku] <sub>PWd</sub>	W2	L	

On this analysis, there is a straightforward markedness basis for the preference for /-ŋ/ over null, but the basis of choice is not obviously apparent from the surface because the /-ŋ/ vs. null choice at the stem level is rendered opaque by subsequent affixation at the word level. In what follows, I will show that this analysis can be translated into the premises of OI theory via (a) attributing the arbitrary preference for /-ŋ/ to MAX-M(-free) and (b) implementing the opaque character of the system in HS rather than in Stratal OT.

Before showing the analysis, one bit of preview on the phonological constraints to be employed. As in most previous analyses of the Dyirbal Ergative (and indeed as with most phonological analyses of syllable-counting PCSA), the constraint lying behind the non-use of /-ŋ/ with longer than disyllabic stems will be one involving foot structure. Dyirbal has left-to-right trochaic stress (Dixon 1972: §7.2.2; McCarthy & Prince 1990): the initial syllable and all non-final odd-numbered syllables get stress. Dixon (1972: 275) reports that there are no phonetic differences between stressed syllables that would permit us to identify one particular stressed syllable in the word as the bearer of primary stress. However, he says so after mentioning that one could conceivably posit that the initial syllable bore primary stress. (Dixon himself rejects this as “a mere analytic ploy”, due to the just-mentioned lack of phonetic distinctions between degrees of stress.) The basis for this possibility is that there are a number of

morphemes in Dyirbal (not just the Ergative) which show one allomorph with two-syllable bases and a different allomorph with longer bases. Transitive verbalizations of nouns (Dixon 1972: 86) are formed by adding /-mal/ to a two-syllable stem, and /-(m)bal/ to a longer stem. Second, reflexive forms of [j]-final verbs are formed by adding /-máriy/ to disyllabic stems, and /-(m)báriy/ to longer stems. These alternations can be seen as conditioned by the affix's proximity to the initial stress. There are other allomorphic processes which refer to proximity to *any* stress (e.g. the reflexives of [l]-final roots: Dixon 1972, p. 89), but there are no allomorphic alternations which are conditioned by proximity to any particular non-initial stress (to the exclusion of other stresses). This might be seen as evidence that all word-initial stresses in Dyirbal have a property which no medial stresses have. If that's right, the obvious candidate for this property is that initial stresses are primary stresses, while medial stresses are all secondary.

Assuming that primary stress in Dyirbal is indeed word-initial, we may attribute the blocking of /-ŋ/-affixation on greater-than-disyllabic stems to the following constraint:

- (24) COINCIDE( $\eta$ , head ft) <sub>$\eta$</sub>   
 Assign one violation-mark for every instance of the segment /-ŋ/ which is not in the head foot. [Due to indexed nature of constraint, only evaluate instances of /-ŋ/ which belong to the morph that spells out the feature [-free].]

This constraint is a member of the COINCIDE family of positional markedness constraints introduced by Zoll (1998). These constraints impose requirements to the effect that marked structures are allowed only when affiliated with certain prominent positions. In the present case, this constraint will discourage introducing an [-ŋ] if that segment would not fall in the head foot, which by hypothesis is coextensive in Dyirbal with the first two syllables of a word. This requirement, it can be noted, is quite similar to the restriction in Guugu Yimidhirr (Haviland 1979; Kager 1996b) that long vowels are permitted only in the first two syllables of a word; it is this pattern which is one of the empirical bases upon which Zoll (1998) argues for the existence of licensing constraints like (23).

Now, to see how the analysis of Dyirbal works, let us begin by considering the derivation of [jaŋaŋku], 'man-ERGATIVE'. I will assume that the input to the phonology for this word contains two abstract morphemes: a root morpheme MAN, and a Case morpheme having as its dependents the features [-free, -oblique, +structural, +superior] (i.e., the full composition of Ergative case in the theory of case features in Halle & Vaux [1998]). I will assume that the insertion of any one morph from the language's lexicon can occur as a single step in the Harmonic-Serialist derivation. Additionally, I will assume that the construction of prosodic structure—syllables and feet, for present purposes—can occur simultaneously with any operation that occurs on a single step. This will simplify the current presentation, and is not intended to take a definitive stance on the extent to which prosodification operations are or are not steps in their

own right in HS derivations; see the conclusion for some discussion of this still very much open issue with regard to PCSA.

Supposing that MAX-M(root) is undominated in Dyrbal, the first thing to occur will be the insertion of the root morph /jaɾa/. (For visual simplicity in the tableaux illustrating the analysis of Dyrbal, I will depict direct co-indexation between phonological surface forms and the FSEs of the input; it should be understood that the link between these two representations is mediated by MM-correspondence between the morpheme and morph levels, and by IO-correspondence between the phonological portion of those morphs, and the phonological surface form).:

(25)

MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	MAX-M (root)	MAX-IO (seg)	COINCIDE (η, head ft) <sub>η</sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
⊗  MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }  [(jaɾa) <sub>FT</sub> ] <sub>PWD</sub>				1	1	1	1
MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }  η <sub>2</sub>	W1			L	1	1	1
MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }  ku <sub>3,4,5</sub>	W1			1	L	L	L
MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	W1			1	1	1	1

On the second pass, our choices are either to insert /-η/, whose feature structure contains the feature [-free], or to insert /-ku/, whose feature structure contains [-oblique, +structural, +superior]. Assuming that MAX-M(-free) is higher ranked than the MAX-M constraints for the other three features, the candidate which inserts /-η/ will beat the one that inserts /-ku/:

(26)

$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	MAX-M (root)	MAX-IO (seg)	COINCIDE ( $\eta$ , head ft) <sub><math>\eta</math></sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
$[(\text{ja}\overline{\text{ra}}_1)_{\text{Ft}}]_{\text{PWd}}$							
$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }					1	1	1
$[(\text{ja}\overline{\text{ra}}_1\eta_2)_{\text{Ft}}]_{\text{PWd}}$							
$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }				W1	L	L	L
$[(\text{ja}\overline{\text{ra}}_1)_{\text{Ft}} \text{ku}_{3,4,5}]_{\text{PWd}}$							
$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }				W1	1	1	1
$[(\text{ja}\overline{\text{ra}}_1)_{\text{Ft}}]_{\text{PWd}}$							

As can be seen, I'm assuming here that upon being inserted, the suffix /- $\eta$ / is immediately incorporated into a foot. Because the root is disyllabic, the foot which /- $\eta$ / becomes part of is the leftmost foot of the word, and so the indexed constraint ALL-FT-LEFT <sub>$\eta$</sub>  is not violated.

On the next and, for our purposes, final pass, /-ku/ is inserted:

(27)

$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	MAX-M (root)	MAX-IO (seg)	COINCIDE ( $\eta$ , head ft) <sub><math>\eta</math></sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
$[(\text{ja}\overline{\text{ra}}_1\eta_2)_{\text{Ft}}]_{\text{PWd}}$							
$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }							
$[(\text{ja}\overline{\text{ra}}_1\eta_2)_{\text{Ft}} \text{ku}_{3,4,5}]_{\text{PWd}}$							
$\overline{\text{MAN}}_1$ - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }					W1	W1	W1
$[(\text{ja}\overline{\text{ra}}_1\eta_2)_{\text{Ft}}]_{\text{PWd}}$							

Now let us consider what happens with longer bases, with which the /ŋ/ morph will not appear. On the assumptions that Dyirbal foot structure is left-to-right trochaic, and that the [ŋ] of an intervocalic [ŋk] cluster is parsed as a coda (the justification for which will be discussed shortly), we may propose that the spell-out of [-free] by the /ŋ/ morph is blocked because MAX-M(-free) is outranked by the indexed positional licensing constraint which requires instances of the segment /-ŋ/ to coincide with the head foot:

(28)

$\left[ \begin{array}{l} \text{THEY}_1- \\ \{-fr_2, -obl_3, \\ +str_4, +sup_5\} \end{array} \right]$ $[(\text{'pa.la})_{\text{Ft}} (\text{'ka.ra}_1)_{\text{Ft}}]_{\text{PWd}}$	MAX-M (root)	MAX-IO (seg)	COINCIDE (ŋ, head ft) <sub>ŋ</sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
$\left[ \begin{array}{l} \text{THEY}_1- \\ \{-fr_2, -obl_3, \\ +str_4, +sup_5\} \end{array} \right]$ $[(\text{'pa.la})_{\text{Ft}} (\text{'ka.ra}_1)_{\text{Ft}} \text{ku}_{3,4,5}]_{\text{PWd}}$				1			
$\left[ \begin{array}{l} \text{THEY}_1- \\ \{-fr_2, -obl_3, \\ +str_4, +sup_5\} \end{array} \right]$ $[(\text{'pala})_{\text{Ft}} (\text{'kara}_1\text{ŋ}_2)_{\text{Ft}}]_{\text{PWd}}$			W1	L	W1	W1	W1
$\left[ \begin{array}{l} \text{THEY}_1- \\ \{-fr_2, -obl_3, \\ +str_4, +sup_5\} \end{array} \right]$ $[(\text{'pa.la})_{\text{Ft}} (\text{'ka.ra}_1)_{\text{Ft}}]_{\text{PWd}}$				1	W1	W1	W1

At this point we can see why assumptions about the syllabification of [VŋkV] sequences as [Vŋ.kV] is essential to the success of the analysis of the disyllabic stems. We assumed that /-ŋ/ is inserted before /-ku/, which requires that MAX-M(-free) outrank the MAX-M constraints for the other three features making up Ergative case. If COINCIDE(ŋ, head ft)<sub>ŋ</sub> dominates MAX-M(-free), the former constraint will by transitivity also dominate the MAX-M constraints for the three features spelled out by /-ku/. If adding /-ku/ would cause /-ŋ/ to resyllabify as an onset, then it follows that adding /-ku/ will create a new violation of COINCIDE(ŋ, head ft)<sub>ŋ</sub>. Given the constraint rankings just adduced, insertion of /-ku/ would then be blocked, which obviously is not what we want:

(29)

MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	MAX-M (root)	MAX-IO (seg)	COINCIDE (η, head ft) <sub>η</sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
[(jaɾa <sub>1</sub> η <sub>2</sub> ) <sub>FT</sub> ] <sub>PWd</sub>							
☞ MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }			W1		L	L	L
[(ja.ɾa <sub>1</sub> ) <sub>FT</sub> η <sub>2</sub> ku <sub>3,4,5</sub> ] <sub>PWd</sub>							
● MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }					1	1	1
[(jaɾa <sub>1</sub> η <sub>2</sub> ) <sub>FT</sub> ] <sub>PWd</sub>							

The same assumption about syllabification will be necessary if we alternatively assumed that /-ku/ were inserted before /-η/ (making /-η/ a kind of infix). This is because /-η/ would end up in onset position to begin with, again resulting in a new violation of COINCIDE(η, head ft)<sub>η</sub>:

(30)

MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }	MAX-M (root)	MAX-IO (seg)	COINCIDE (η, head ft) <sub>η</sub>	MAX-M (-free)	MAX-M (-obl)	MAX-M (+struc)	MAX-M (+sup)
[(jaɾa <sub>1</sub> η <sub>2</sub> ) <sub>FT</sub> ku <sub>3,4,5</sub> ] <sub>PWd</sub>							
☞ MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }			W1	L			
[(ja.ɾa <sub>1</sub> ) <sub>FT</sub> η <sub>2</sub> ku <sub>3,4,5</sub> ] <sub>PWd</sub>							
● MAN <sub>1</sub> - {-fr <sub>2</sub> , -obl <sub>3</sub> , +str <sub>4</sub> , +sup <sub>5</sub> }				1			
[(jaɾa <sub>1</sub> η <sub>2</sub> ) <sub>FT</sub> ku <sub>3,4,5</sub> ] <sub>PWd</sub>							

Is this assumption about syllabification justified? Dixon (1972: 274) states that “[i]t is not easy to formulate a criterion for dividing up Dyirbal words into syllables”, but there are a couple of pieces of evidence hinting that [Vη.kV] is the right syllabification for intervocalic nasal-stop clusters. First, these clusters occur only word-medially in Dyirbal, never as word-initial onsets or word-final codas (Dixon 1972: 272-

273). Second, there is at least one other case in the language where the choice of [VɲkV] versus [VkV] is sensitive to the degree of prosodic prominence of the material preceding the intervocalic consonants. This involves the Dative marker, which is generally [-ku], but which appears as [-ɲku] when it immediately follows a stressed syllable (Dixon 1972: 284).<sup>19</sup> In any case, there does not appear to be any evidence which would argue in favor of [V.ɲkV] being the correct syllabification.

### 3.5 Comparison with other theories of arbitrary preference in PCSA

The Dyirbal Ergative is challenging for the assumption that PCSA should be analyzed in the phonology because it is hard to see what phonological constraint(s) will exert the baseline preference for /-ɲku/ over /-ku/. Therefore, it seems necessary to add to the OT grammar of the phonology some constraint which will exert a nonphonological preference in favor of /-ɲku/. In the OI analysis presented in the previous section, this preference is indeed nonphonological, but it is not strictly speaking arbitrary. The idea that the presence of the /-ɲ/ is favored by virtue of its being the morph which expresses the case feature [-free] is supported by the partial syncretism between the Ergative and Locative. This approach to nonphonological preferences in PCSA thus has the virtue of ascribing such preferences to the morphological feature-composition of morphs. When constructing an analysis, we of course do not have complete freedom in assuming that a certain morph has a certain feature-composition: the hypotheses that we can make in that regard are empirically constrained by the general properties of the language's morphology. Put somewhat differently, the OI approach does not introduce 'arbitrary preference among allomorphs' as a theoretical primitive; nonphonological preferences must always be embedded within the overall analysis of the language's morphology. This is an advantage, both conceptually, and (probably) in restrictiveness, relative to theories which add to the phonology constraints which simply say 'allomorph X is arbitrarily preferred to Y'. In addition to this, the OI approach avoids a number of other empirical and theoretical difficulties with existing proposals for implementing arbitrary preference in PCSA, which we will now examine.

The first OT-based proposal for implementing an arbitrary preference among allomorphs is found in the analysis of the Dyirbal ergative in McCarthy & Prince (1993a: ch. 7). They argue for a serial analysis in which the privileged allomorph /-ɲku/ is 'tried' first. That is, in the first pass of constraint evaluation, the input contains only

---

<sup>19</sup> Dixon discusses this (197: 283-286) as one reflex of a process of nasal insertion, whereby "the sooner a medial consonant cluster, C<sub>2</sub>, comes after a stressed vowel the more tendency there is for it to include a nasal... [this process] involves the insertion of -n- at certain grammatical boundaries" (283). The fact that proximity to *preceding* stress is what makes conditions favorable for the insertion of the nasal seems to be consistent with the assumption being made here that nasals are syllabified as codas. Now, if there is such a general process, the reader may naturally wonder whether the [-ɲku] ~ [-ku] alternation is actually the result of a phonological rule, not a matter of listed allomorphy at all. The best response to this objection seems to be that insertion of nasals at morpheme boundaries occurs at different degrees of proximity to stress for different suffixes: following the head foot for the Ergative and Locative, but immediately following stress for the Dative.

the allomorph /-ŋku/ rather than the pair of underlying forms {/-ŋku/, /-ku/}. They further assume that the allomorph /-ŋku/ is indexed to a constraint AFFIX-TO-FOOT:

- (31) AFFIX-TO-FOOT  
 The base to which /-ŋku/ is suffixed is a single foot.  
 [nb. definition mildly rephrased from original—M.W.]

If this constraint, along with ALIGN([ŋku],R, PWd, R), which will militate against infixing /-ŋku/, are ranked above the anti-null-parse constraint MPARSE (Prince & Smolensky 2004 [1993]; McCarthy & Wolf 2005; Wolf & McCarthy 2009), the null parse will win on the first pass of constraint evaluation if the stem involved is greater than disyllabic:

- (32) /jamani-ŋku/ leads to null parse

/jamani-ŋku/	AFFIX-TO-FOOT	ALIGN([ŋku],R, PWd,R)	MPARSE
a. $\emptyset$ null parse			1
b. [(‘ja.ma) <sub>HeadFt</sub> (ni.ŋku) <sub>Ft</sub> ] <sub>Wd</sub>	W1		L
c. [(‘ja.ma) <sub>HeadFt</sub> (ŋku.ni) <sub>Ft</sub> ] <sub>Wd</sub>		W1	L

The fully-faithful candidate (31a) violates AFFIX-TO-FOOT because the suffix /-ŋku/ is not adjacent to the head foot. AFFIX-TO-FOOT is satisfied in (31c), which infixes /-ŋku/ so as to place it immediately to the right of the head foot, but this involves displacing /ŋku/ from the right edge of the PWd, and hence violating ALIGN([ŋku],R, PWd, R). Both of these constraints are ranked above MPARSE, and so the null parse (which, by hypothesis, violates no constraint but MPARSE) is the winner.

Because the pass of constraint evaluation with /-ŋku/ in the input fails to produce any output, the grammar then tries again with the elsewhere allomorph /-ku/ in the input instead<sup>20</sup>. Because /-ku/ is not indexed to AFFIX-TO-FOOT, that constraint can no longer be violated, and the fully-faithful candidate now defeats the null parse:

- (33) Use of /ku/ beats null parse

/jamani-ku/	AFFIX-TO-FOOT	ALIGN([ŋku],R, PWd)	MPARSE
a. $\emptyset$ [(‘ja.ma) <sub>Ft</sub> (ni.ku) <sub>Ft</sub> ] <sub>Wd</sub>			
b. null parse			W1

While this approach does work, it suffers from the conceptual drawback of having to impose an external mechanism of ‘order of trying’ to get the desired result. Since competition is the essence of OT, we would prefer on grounds of parsimony for

<sup>20</sup> Discussions of parallels between allomorph selection and morphological gaps can also be found in Kiparsky (1994: §3.1), McCarthy & Wolf (2005: §6.1), and Bye (2007).

competition like that between /-ŋku/ and /-ku/ in Dyirbal to be resolved *within* an OT grammar.<sup>21</sup>

The MPARSE approach also suffers from a second, more serious drawback: it is unable to account for systems of allomorphy in which some realization (whether faithful or unfaithful) of both allomorphs would be more harmonic than the null parse. Consider, as an example, the indefinite article in English, which is *a* ([eɪ]~[ə]) before a following consonant-initial word and *an* ([æn]) before a following vowel-initial word. If there were an arbitrary preference between these two allomorphs, then one of them would have to yield the null parse as winner when it was ‘tried’ in the environment where it does not appear. If *a* were the special case, the null parse would have to be the optimal output for an input like *a apple*, and likewise if *an* were the special case, the null parse would have to be the optimal output for an input like *an duck*. The problem here is that there is no reason to think that either of these inputs would map to the null parse. This is because *an* can perfectly well be used with words containing a coda (*an end*) and *a* can equally well be used with words containing an underlying internal hiatus (*a sambaing* [i.e., an instance of someone dancing the samba]), which might be repaired by one of various processes (e.g. *r*-insertion), depending on the dialect. This means that, in English, neither NOCODA nor ONSET can dominate MPARSE (or MPARSE<sub>indefinite</sub>, if we posit morphologically-specific versions of the constraint, as in Wolf & McCarthy 2010).

Given this, the MPARSE approach would require that systems of listed allomorphy which involve arbitrary preference have a fundamentally different architecture from at least some systems that do not. In the former case, there would be only one allomorph in the input at a time, with allomorphs being tried in the requisite order, whereas in the latter case, both allomorphs would have to be present in the input simultaneously, as in the analysis given for Moroccan Arabic in (3)-(4).

This situation stands in contrast to that of the lexical-insertion-in-the-phonology view adopted in OI theory. In OI, systems that involve arbitrary preference and those that do not can be analyzed using exactly the same architecture. For a case like that of the Moroccan Arabic 3<sup>rd</sup> person masculine singular clitic, where there is no arbitrary preference, we simply need to assume that the two morphs /h/ and /u/ have identical FSES. This means that all constraints of the MAX-M(F) and DEP-M(F) families will be indifferent as to whether to use /h/ or /u/, and the choice will be left entirely up to the phonological constraints.

The second existing proposal about arbitrary preference is advanced by Bonet, Lloret, and Mascaró (2007) and Mascaró (2007), and also is used in Bonet (2004), Kikuchi (2006), Bradley (2007), and Bennett (2009, 2010)<sup>22</sup>. It involves the following constraint:

---

<sup>21</sup> The MPARSE approach to arbitrary preference does have the possible advantage of being able to accommodate competition between synthetic and periphrastic expressions with the same meaning, where the two competing forms might not plausibly belong to the same candidate set, at least not at the level of the phonology. The question of whether competition between synthesis and periphrasis exists is a controversial one; Embick & Marantz (2008) is a recent entry denying that there is such competition, which cites a number of works taking the opposite view.

- (34) **PRIORITY.** Respect lexical priority (ordering) of allomorphs.  
 Given an input containing allomorphs  $m_1, m_2, \dots, m_n$ , and a candidate  $m_i'$ , where  $m_i'$  is in correspondence with  $m_i$ , **PRIORITY** assigns as many violation marks as the depth of ordering between  $m_i$  and the highest dominating morph(s).  
 (Definition from Mascaró 2007)

**PRIORITY**-based analyses are architecturally identical in form to multiple-underlying-form analyses like the one presented earlier for Moroccan Arabic: there is only one pass of constraint evaluation, and all of the competing allomorphs are in the input at once. The following tableaux, adapted from Bonet (2004), illustrate how the **PRIORITY** approach handles the Dyirbal facts:

(35) *Dyirbal 'man.ERG' with PRIORITY*

/jaɾa -{ŋku, ku}/	AFFIX-TO-FOOT	PRIORITY
a. $\text{[('ja.ɾa)_{HeadFt} \eta ku]_{Wd}}$		
b. $\text{[('ja.ɾa)_{HeadFt} ku_{Ft}]_{Wd}}$		$W_1$

With a disyllabic stem, as in (35), [-ŋku] and [-ku] can both be suffixed to the head foot. Candidate (35a) thus satisfies **AFFIX-TO-FOOT**, because [-ŋku] is so suffixed, and (35b) satisfies the same constraint, vacuously because /-ku/ is not indexed to **AFFIX-TO-FOOT**. Since **AFFIX-TO-FOOT** is indifferent as to the choice of allomorphs, the choice is made by the lower-ranked constraint **PRIORITY**. The winning candidate chooses the first-listed underlying form /-ŋku/ and thus gets no marks from **PRIORITY**. By contrast, candidate (35b) chooses the second-listed underlying form /-ku/. It therefore gets one mark from **PRIORITY**, and thus loses.

Now consider what happens with a greater-than-disyllabic stem:

(36) *Dyirbal 'rainbow.ERG' with PRIORITY*

/jamani -{ŋku, ku}/	AFFIX-TO-FOOT	PRIORITY
a. $\text{[('ja.ma)_{HdFt} (ni.ku)_{Ft}]_{Wd}}$		1
b. $\text{[('ja.ma)_{HdFt} (ni.ŋku)_{Ft}]_{Wd}}$	$W_1$	L

Because, when the stem is more than two syllables long, the head foot is no longer at the right edge of the Prosodic Word, neither allomorph of the ergative suffix can be suffixed to the head foot. As a result, the candidate that chooses the first-listed underlying form /-ŋku/ incurs a violation from **AFFIX-TO-FOOT**. The candidate that chooses /-ku/ gets no such violation (again vacuously because /-ku/ is not indexed to **AFFIX-TO-FOOT**), and so the /-ku/-selecting candidate now emerges as the winner, because **AFFIX-TO-FOOT** is higher-ranked than **PRIORITY**.

<sup>22</sup> Similar constraints demanding the use of privileged allomorphs are invoked by Kager (1996a), van Oostendorp (1998), Kenstowicz (2005), and Trommer (2008).

The PRIORITY approach is thus able to get the desired results because the constraint PRIORITY can exert whatever pairwise preferences are needed: we simply list the desired preference-order among allomorphs in the lexicon, and PRIORITY does the rest. This approach is not without its problems, though. The main one is that, unless we stipulate a universal upper bound on the number of underlying forms that a single lexeme can have, PRIORITY will have to evaluate candidates gradiently, since it assigns  $(n-1)$  violation-marks to candidates that pick the  $n$ th highest-priority allomorph. For example, Bonet, Lloret, & Mascaró (2007) propose that the masculine gender suffix in Catalan has three underlying forms, which are ordered in the preference hierarchy  $\{\emptyset > u > ə\}$ <sup>23</sup>. To give the desired effects, PRIORITY needs to assign one violation-mark to candidates that pick /-u/ and two violation-marks to candidates that pick /-ə/. Given that, outside of suppletive allomorphy, gradient evaluation is never necessary and is frequently empirically undesirable (McCarthy 2003), we have good reason to look for an alternative to PRIORITY which requires only categorical evaluation. MAX-M(F) constraints are just such an alternative: they assess categorically, assigning a single violation mark for each instance of the feature F at the morpheme level which is not spelled out at the morph level.

Mascaró (2007: fn. 13) suggests that PRIORITY could be regarded as categorical, if it is thought of as assigning a violation-mark for every pairwise preference among allomorphs that is not respected by a given candidate. For example, a candidate in Catalan which used [ə] as the masculine marker would get two marks because it disregards two preference statements: ‘ $\emptyset > ə$ ’ and ‘ $u > ə$ ’. However, since  $\emptyset$  and [-u] are not present in the output of a [ə]-selecting candidate, it is unclear how PRIORITY could judge that both preference statements had been disrespected, absent giving it the power to compare [ə]-selecting candidates with  $\emptyset$ -selecting and [u]-selecting alternatives within the candidate set, or something equivalent to this. Cross-candidate comparison by the constraints themselves is a major departure from standard OT assumptions about how constraints work,<sup>24</sup> and so eschewing a constraint like PRIORITY, which may require such a device, is probably well-motivated.

The third and final existing proposal about arbitrary preference uses categorical constraints. Picanço (2002) proposes that, when a lexeme has multiple allomorphs, each allomorph is indexed to a PARSE-MORPH constraint (Akinlabi 1996). The constraint PARSE-MORPH(X) is violated by a given candidate if that candidate fails to pick allomorph X, so the ranking of the various PARSE-MORPH constraints will determine the

---

<sup>23</sup> There are other analyses which posit the existence of more than two allomorphs of a single affix: Mascaró (2007) argues that the infinitive marker in Baix Empordà Catalan has six and that the Classical Arabic definite article has fourteen, while Wolf (2007) proposes that morphemes that trigger the ‘mixed mutation’ in Breton have four.

<sup>24</sup> Cross-candidate comparison is employed in the Sympathy theory of phonological opacity (McCarthy 1999, 2003a); see McCarthy (2007: §2.3.4.3) for discussion of some problems with this theory. Two further (and distinct) forms of cross-candidate comparison are proposed in Wilson’s (1999, 2001) and Blumenfeld’s (2006) approaches to the ‘too-many-repairs’ problem; see McCarthy (2008a) for an HS-based approach to the same problem which does not involve cross-candidate comparison.

order of (arbitrary) preference among the allomorphs.<sup>25</sup> For instance, in Dyrbal, for input /jaɾa-{/ŋku/, /ku/}/, the candidate [jaɾa-ŋku] violates PARSE-MORPH(ku), while \*[jaɾa-ku] violates PARSE-MORPH(ŋku). If PARSE-MORPH(ŋku) is higher-ranked, then [jaɾa-ŋku] will be preferred over \*[jaɾa-ku]. There is a problem, though: there is no clear reason why both of these candidates should not be bested by \*[jaɾa-ŋku-ku], which satisfies *both* PARSE-MORPH constraints by virtue of preserving both allomorphs in the output. The architecture of the PARSE-MORPH approach requires candidates to stand in correspondence with *all* of the underlying forms of a given morpheme in order for the PARSE-MORPH constraint relevant to each of the unused allomorphs to be violated. Perversely, however, this allows candidates like \*[jaɾa-ŋku-ku] to arise, which the PARSE-MORPH constraints (as well as MAX) will allow to win.

Of course, we could stave off this problem by stipulating, perhaps via a formulation like the one in (2), that with regard to a given set of listed allomorphs, each candidate can stand in correspondence with one and only one member of the set. OI, on the other hand, can derive the economisation of allomorphs without having them pile up in the output. The reasoning is that the insertion of any phonologically contentful morph will bring with it additional markedness violations. This provides a disincentive for the insertion of morphs beyond what is necessary to satisfy higher-ranked constraints, for example of the MAX-M family. For a fuller development of this argument, see Wolf (2008: §2.5), as well as Trommer (2001: §3.4.3), who is working within a different OT-based theory of realizational morphology. Similar arguments about the emergent nature of economy effects in OT are put forth by Grimshaw (2003) on syntax and by Gouskova (2003) on phonology.

### 3.6 Comparison with subcategorization-only approaches

PCSA systems like the Dyrbal Ergative respect generalizations that can be stated in phonological terms, but which cannot be rationalized solely in terms of typologically well-supported phonological markedness constraints. In OI, as well as in the PRIORITY and PARSE-MORPH theories, the response to this problem is to fit these PCSA systems into the phonology. This is done by incorporating into the phonology constraints which enforce nonphonological preferences.

Another response is possible, though. This is to argue that the lack of markedness conditioning in PCSA systems like the Dyrbal ergative is evidence that those systems are not part of the phonology. Instead, one can assume that the allomorphs /-ŋku/ and /-ku/ compete before the phonology gets underway, in the morphology, and that /-ŋku/ subcategorizes for a disyllabic stem:

---

<sup>25</sup> PARSE-MORPH constraints as used by Picanço (2002) seem to be equivalent to the ‘lexical’ constraints used in Escudero (2005), Apoussidou (2007), Boersma (2006) and related works (see references below (11)), and to the realization constraints of Realization OT (Xu 2007, Aronoff & Xu to appear a,b). These authors propose that each UR available in the language for some meaning is hypothesized to be associated with a constraint demanding that that UR be used to express that meaning.

- (37) Subcategorization frames for Dyirbal ergative<sup>26</sup>  
Use /-ŋku/ if the stem is disyllabic  
Use /-ku/ otherwise

Lapointe & Sells (1996), Dolbey (1997), and Lapointe (1999) have argued that some PCSA systems—the ones that resist a purely markedness-based analysis, like the Dyirbal ergative—should be handled through some sort of extra-phonological subcategorization mechanism. Paster (2005, 2006, this volume), Bye (2007), and Embick (2010) go further, arguing that, if PCSA systems like the Dyirbal ergative need to be treated as extra-phonological, it is more parsimonious to assume that *all* PCSA is extra-phonological. That is, there is no reason for some PCSA to be handled with subcategorization in the morphology and some with markedness constraints in the phonology if subcategorization will suffice for both.

At the same time, a strong parsimony argument can be given in favor of the position that at least some cases of PCSA are part of the phonological component (Mester 1994; Tranel 1996; González 2005; Itô & Mester 2006; Alber to appear). These cases are those which involve conspiracies (Kisseberth 1970). In these cases, the suppletive allomorphs are distributed in such a way as to avoid some phonological configuration X, and the phonology of the language (segmental alternations, static phonotactic restrictions, syllabification, stress placement, etc.) independently prohibits, avoids, or eliminates other instances of the same configuration X. If PCSA is not part of the phonology, then the ban on X would have to be enforced at two separate places in the grammar: in the morphological component and the phonological one. This would exactly parallel the Duplication Problem (Clayton 1976; Kenstowicz & Kisseberth 1977; Prince & Smolensky 2004 [1993]) faced by theories of phonology which make use of morpheme structure constraints: restrictions defining the phonological form of inputs to the phonology often duplicate restrictions which are active in the phonology itself (see also Cook 1971; Kiparsky 1972: 216; and Ross 1973 for early suggestions that syntactic or morphological rules, or morpheme structure constraints, could participate in a conspiracy alongside phonological rules).

Conspiracies involving PCSA are found even in many of the simplest examples. For instance, in the analysis of Moroccan Arabic /-u~/ /-h/ suppletion which we adopted from Mascaró (1996b), the use of /-h/ rather than /-u/ after a vowel-final stem was attributed to the constraint ONSET. This constraint makes itself felt in numerous other places in the language. Heath's (1987) study of colloquial Moroccan Arabic phonology reports all of the following strategies for avoiding onsetless syllables. First, stems cannot begin with a short vowel; this is rectified through epenthesis of glottal stop (p. 19). Second, vowel-initial loan verbs from French and Spanish undergo either initial glottal-stop epenthesis or deletion of the initial vowel. Third, borrowed vowel-

---

<sup>26</sup> Notice that these subcategorization frames must refer to a derived property of the stem, namely its syllable count. This is not a problem for a subcategorization model if it's coupled with a Lexical Phonology-type model of phonology/morphology interleaving. First, the level *n* phonology for Dyirbal would syllabify the stem; then, the ergative suffix would be added in the level (*n* + 1) morphology, subject to the subcategorization frames in (41).

initial nouns can also undergo glottal-stop epenthesis, though “there are indications that speakers find the glottal-initial form awkward” (19), and as an alternative they will use the noun with the definite prefix /l-/, even in morphosyntactically non-definite contexts (pp. 19, 38):

- (38)        /ʃi l-anʰanʰasʰ/                    ‘some pineapples’  
                   some DEFINITE-pineapples

For some nouns this has progressed to full re-analysis of definite /l-/ as part of the stem, as indicated by the presence of a double lateral in the definite form: /l-lasʰ/ ‘the ace [playing card]’.<sup>27</sup> Finally, there are also alternations involving devocalization of suffixal high vowels following a vowel-final stem (pp. 199, 237) and deletion of suffixal short vowels following a vowel-final stem, and indeed short vowels never appear on the surface adjacent to another vowel (p. 252).

A similar argument, first made in the OT literature by Tranel (1996) and again involving ONSET, can be made for French. At least three strategies for avoiding onsetless syllables can be found in that language. First there is *liaison*, the phenomenon whereby certain morphs have a latent final consonant which surfaces just in case the following word (of sufficient prosodic proximity) begins with a vowel:

- (39)        *les amis*            [le.za.mi]            ‘the friends’  
                   *les tamis*            [le.ta.mi]            ‘the sieves’

Second is elision: certain other morphs, such as the singular definite article, end in a vowel which is deleted before a following vowel:

- (40)        *le tami*                [lœ.ta.mi]            ‘the sieve’  
                   *l’ami*                    [la.mi]                ‘the friend’

Third, a number of determiners and adjectives show suppletive allomorphy which is governed in part by grammatical gender and in part by the C-initial vs. V-initial status of the following word. These words have a V-final allomorph, which appears in the masculine when the following word is C-initial (40a); they also have a C-final allomorph which is used in the feminine (40b) and in the masculine when the following word is V-initial:

- (41)        a.        *ce pays*                [sœ.pe.i]            ‘this country.MASC’  
                   b.        *cette vie*                [set.vi]            ‘this life.FEM’  
                   c.        *cet ami*                [sɛ.ta.mi]            ‘this friend.MASC’

Additionally, certain possessive pronouns show an opposite gender mismatch: the feminine form is vowel-final (41a), while the masculine form ends underlyingly in a

<sup>27</sup> The definite article in French is *l’* [l] before a vowel-initial noun, and is *el* with masculine nouns in Spanish (as well as with certain [a]-initial feminine nouns—see below); this undoubtedly plays a role in the tendency of vowel-initial nouns borrowed from these languages to be re-analyzed with initial [l].

nasal which surfaces before a vowel (41b), and coalesces with the preceding vowel of the pronoun when a consonant follows (41c):

- (42)
- |    |                 |            |                          |
|----|-----------------|------------|--------------------------|
| a. | <i>ma vie</i>   | [ma.vi]    | 'my life' (feminine)     |
| b. | <i>mon ami</i>  | [mo.na.mi] | 'my friend.MASC'         |
| c. | <i>mon pays</i> | [mõ.pe.i]  | 'my country' (masculine) |

The gender mismatch here occurs before vowel-initial feminine nouns, which take the masculine allomorph, whose final nasal then syllabifies as the onset of the noun's initial syllable:

- (43)
- |                 |           |             |
|-----------------|-----------|-------------|
| <i>mon arme</i> | [mo.naʁm] | 'my weapon' |
| (*[ma.aʁm])     |           |             |

As Tranel (1996) argues, if allomorph selection is hashed out in the phonology, then these suppletion facts can be linked with *liaison* and elision as all being reflexes of the single constraint ONSET. (The gender mismatch apparently involved in the French suppletion facts itself supplies another argument for integrating phonology and morphology into a single module of grammar; see below for discussion.)<sup>28</sup>

Similar observations can be made regarding syllable-counting allomorphy. In Sámi, for example, the passive marker and four person/number endings have two listed allomorphs, one with an even number of syllables and the other with an odd number of syllables (Dolbey 1997). The distributional generalization is that the even-parity allomorphs are used with even-parity bases and the odd-parity allomorphs with odd-parity bases:

- (44) *Syllable-counting allomorphy in Sámi*
- |                | <i>even ~ odd</i> | <i>Even-σ root:</i> | <i>Odd-σ root:</i>  |
|----------------|-------------------|---------------------|---------------------|
| 1du:           | ∅ ~ -tne          | /jearra-/ 'ask'     | /veahkehea-/ 'help' |
|                |                   | [je:r.re]           | [veah.ke.he:t.ne]   |
| 2du:           | -beahtti ~ -hppi  | [jear.ra.-beah.ti]  | [veah.ke.he:hp.pi]  |
| 2pl:           | -behtet ~ -hpet   | [jear.ra.-beh.tet]  | [veah.ke.he:-h.pet] |
| 3pl. preterit: | ∅ ~ -dje          | [je:r.re]           | [veah.ke.he:-d.je]  |
| passive:       | -juvvo ~ -vvo     | [je:r.ro.-juv.vo]   | [veah.ke.hu-v.vo]   |

The effect of this is that words formed with one of these suffix end up with an even number of syllables overall. This is desirable from the standpoint of allowing words to be exhaustively parsed into disyllabic feet, as Dolbey's (1997) analysis proposes:

<sup>28</sup> Many of the generalizations which are used to argue for the existence of ONSET-driven (and potentially gender-mismatching) suppletion in French hold true in the prescriptively normative variety of the language, but may be much less clearly true in colloquial or dialectal speech. See Janda (1998) for a number of historical and sociolinguistic arguments that these patterns are not really phonologically driven, and do not really involve gender mismatch.

(45)

/jearra-{behtet,hpet}	PARSE-SYLLABLE
a. $\mathbb{E}$ [(jear.ra) <sub>Ft</sub> (beh.tet) <sub>Ft</sub> ] <sub>PWd</sub>	
b. [(jear.rah) <sub>Ft</sub> pet] <sub>PWd</sub>	W1

(46)

/veahkehea-{behtet, hpet}	PARSE-SYLLABLE
a. $\mathbb{E}$ [(veah.ke) <sub>Ft</sub> (heah.pet) <sub>Ft</sub> ] <sub>PWd</sub>	
b. [(veah.ke) <sub>Ft</sub> (hea.beh) <sub>Ft</sub> tet] <sub>PWd</sub>	W1

The constraint PARSE-SYLLABLE, which demands that all syllables be parsed into feet, is not responsible solely for determining the choice of allomorphs, but also is at work in ensuring that the syllables of Sámi words are parsed into feet at all.

PCSA can conspire with segmental as well as with prosodic phonology. For example, let us consider the following facts from the Gur language Kõnni (Cahill 2007; also Struijke & de Lacy 2000). This language has five noun classes, which are distinguished from one another by the number and definiteness suffixes that they take. (Following Cahill's (2007) notation, I use capital letters for segments whose underlying [ATR] value is undeterminable because they undergo allophonic alternations in that feature.):

(47) *Number and definiteness markers of Kõnni noun classes*

	Class 1	Class 2	Class 3	Class 4	Class 5
Singular	-ɲ	-ɲ	-ɲ	-ɲ	∅
Singular definite	-rÍ	-kÚ	-kÁ	-bÚ	-wÁ
Plural	-A	-tÍ	-sÍ	-tÍ	(irregular)
Plural definite	-A-hÁ	-tÍ-tÍ	-sÍ-sÍ	-tÍ-tÍ	(irregular)
% of nouns	26	12	31	7	13

The remaining 11% of nouns are 'mixed': they take singular and plural markers from different classes.

Kõnni exhibits several patterns involving avoidance of flaps in consecutive syllables. The sequences [rɾ] and [rVɾ] are never found on the surface in the language, either within a single morph or through the concatenation of two morphs. These sequences are avoided in part through allomorph selection. Cahill (2007: 125, fn. 15) reports that there are "many" [r]-final stems in noun classes 2 and 3, and "a few" in class 4, but none in class 1. (There are no [r]-final stems in class 5 because this class

contains almost exclusively vowel-final stems.) This asymmetry can be attributed to the fact that class 1 is the only one whose members take an [r]-initial suffix, namely the singular definite /-rǐ/. Similarly, there are several [r]-final mixed-class nouns which take a class 1 plural suffix, but these nouns “without exception” (Cahill 2007: 125) take a non-class-1 singular definite suffix.

The class 1 singular definite marker /-rǐ/ is thus systematically banned from being used with [r]-final nouns. Given the standard OT assumption of Richness of the Base (Prince & Smolensky 2004 [1993]), we are not free to assume a constraint on the *input* to morphological spell-out which says that the diacritic feature [class 1] cannot be marked on /r/-final nouns. Instead, it must be the case that even if there is a /r/-final stem which was lexically-specified with this feature, the feature will not be faithfully spelled out by /-rǐ/ in the singular definite.

Additionally, because [r(V)r] sequences are never found in the language in any context we can infer that the language’s phonotactics contain an active constraint against such sequences. The effects of this constraint can be seen in the two [r]-initial suffixes of the language which undergo a dissimilatory alternation when attached to a base whose rightmost consonant is [r]. One is the agentive, which is normally [-rÚ], but which changes to [-tÚ] if the rightmost consonant in the base is [r] (as well as if the rightmost root consonant is [l], if the last segment of the base is [n], and optionally if the last consonant in the root is [ŋ] (p. 145):

- (48) [r]~[t] alternation in agentive suffix
- |    |                 |  |
|----|-----------------|--|
| a. | [bóntò:-ɲì:-rǒ] | ‘hoodless cobra’ (lit. ‘toad-swallower’) |
| b. | [dǐ-dà:-rǒ]     | ‘buyer’                                  |
|    | <i>but:</i>     |  |
| c. | [bò-bòrì-tó]    | ‘sower’                                  |
| d. | [gbì-gbàrì-tó]  | ‘watcher’                                |

Similarly, the masculine suffix on nouns is normally [-ra:ŋ], but appears instead as [-da:ŋ] with noun roots whose rightmost consonant is [r] or [n] (p. 147):

- (49) [r]~[d] alternation in masculine suffix
- |    |                         |                    |
|----|-------------------------|--------------------|
| a. | [kpá- <sup>1</sup> rǎŋ] | ‘male guinea fowl’ |
|    | <i>but:</i>             |                    |
| b. | [gàɲìàrà-dàáŋ]          | ‘male weaver bird’ |

If PCSA is handled wholly through subcategorization frames, then the avoidance of /-rǐ/ in favor of other singular definite markers would have to be attributed to a subcategorization frame dictating some other singular definite suffix be used with /r/-final roots. But on this analysis there would be no connection between the distribution of /-rǐ/ and the phonotactic constraint which ruled out [r(V)r] sequences across the board in the language, and which triggered the dissimilations undergone by the agentive and masculine suffixes. The subcategorization frame associated with /-rǐ/

would be part of the morphology, while the phonotactic constraint (and associated dissimilation processes) would be part of the phonology.

Conspiracies involving allomorph selection also limits on affix use which do not obviously involve competition between alternative allomorphs. For example, English doesn't permit geminates morph-internally, but geminates can arise in compounding and level 2 junctures (Benus, Smorodinsky & Gafos 2004, Kaye 2005, Martin 2007): e.g. *sand dune*, *solely*, *cleanness*.<sup>29</sup> Martin (2007) shows that—despite the allowability of geminates at such junctures—words containing such geminates are statistically underrepresented in corpora of English, at least for compounding and for the suffixes *-less* and *-ly*. (He also identifies similar patterns in Navajo and Turkish, wherein structures that are banned morph internally are found, but nonetheless tend to be avoided, at morph junctures.)

This means that English speakers have a tendency to avoid the use of *-less* and *-ly* with [l]-final bases. This could be expressed as a condition on affix distribution in the morphology, but then no connection would be drawn between the tendency to avoid these affixes in contexts where they would create geminates, and the general absence of geminates in English. On the other hand, we could account for the underrepresentation of forms like *smell-less* by assuming that a constraint \*GEMINATE cases them to lose to competing candidates which use different morphs to express the same meaning (e.g. *smell-free*) or to a null output candidate (Martin 2005); making the ranking of this constraint variable would ensure that candidate forms like *smell-less* do not lose all of the time. An analysis like this would account for the conspiracy by linking the general ban on geminates and the gradient avoidance of *-less* and *-ly* where they would create geminates to the action of the same constraint.

It is possible to give at least one additional argument for putting PCSA in the phonology which is related to, but crucially differs from, conspiracy arguments of the kind just reviewed. This is that prosodically-conditioned allomorph selection can show sensitivity to language-particular properties of syllabification or foot-parsing. A version of this argument is given by Bennett (2009, 2010) with regard to plural allomorphy in Irish. Noun plurals in Irish can be formed in a variety of different ways, with the form of the plural taken by a given noun generally not predictable. However, there is a phonological subpattern involving the plural endings *-(e)anna* /-ənə/ and *-(e)acha* /-axə/. (These two forms seem to be morphologically 'linked' to one another for several reasons, for instance that these are the only plural endings which can appear in "double plurals" with the further suffix *-(a)í* /-i:/.) This pattern is that /-əxə/ generally appears only after bases which do not have final stress; when stress is base-final, /-ənə/ usually appears instead. Main stress in Irish is word-initial, so for the most part root-final stress will be found with monosyllabic roots, and non-root-final stress with polysyllabic roots.

---

<sup>29</sup> This is an example of marked structures being allowed only in morphologically-derived environment ('Derived Environment Blocking' or DEB). For discussion of additional such cases, a number of which provide arguments in favor of OI, see Wolf (2008: ch. 4; 2010).

Bennett (2009, 2010) argues that /-əxə/ is disesteemed in post-tonic position due to the interaction of two facts about the prosodic structure of Irish: (a) feet are syllabic trochees, and (b) intervocalic /x/ is syllabified as a coda rather than as an onset. Fact (b) means that the /-axə/ allomorph will be syllabified [-əx.ə] (beginning with a closed and thus heavy syllable) whereas /-ənə/ will be syllabified [-ən.ə] (beginning with an open and thus light syllable). Using /-ax.ə/ after a stressed syllable would result in the initial heavy syllable of the suffix occupying the weak position of a trochee:

- (50)        /klog-axə/                \*(['klo.gəx)ə]  
               /klog-ənə/            [('klo.gə)nə]  
               clock-PLURAL

We now arrive at the argument for PCSA being in the phonology. This analysis, as mentioned, crucially appeals to the fact that /x/ syllabifies as a coda in Irish. The [-əx.ə] allomorph will always begin with a heavy syllable, which will be marked in the weak position of a foot. Now, if PCSA is not in the phonology, the distribution of the allomorphs will have to be handled with subcategorization frames which state directly that /-axə/ is used with bases that don't have final stress (polysyllabic bases), and /-ənə/ with bases that do have final stress (monosyllabic bases). These subcategorization statements would produce the same allomorph distribution attested in actual Irish, *even if the language did not syllabify /x/ as a coda*. Now, in the strictest sense this is not a conspiracy, since (as Bennett [2009, 2010] emphasizes), Irish otherwise tolerates ('σH) trochees.<sup>30</sup> However, the dispreference for /-əxə/ in post-tonic position crucially makes use of a language-particular fact about the syllabification of /x/, a connection which is missed on an analysis which does not put PCSA in the phonology.

To be sure, the core of the empirical case for subcategorization-only accounts of PCSA comes from cases where the distribution of allomorphs cannot fully be rationalized in terms of typologically natural phonological constraints. The drawback of a subcategorization-only approach is that it generalizes all PCSA to this worst case, sacrificing the possibility of making connections between PCSA systems and other aspects of a language's phonology in the many cases (like the ones just reviewed) where these connections *can* be made. In this context, it is possible to draw an analogy with Halle's (1959) famous argument against structuralist phonemics based on the facts from Russian voicing assimilation. Briefly, the objection was that what was clearly a single generalization about the distribution of voiced versus voiceless obstruents had to be assigned both to the morphophonemic rules (in cases where it neutralized phonemic contrasts like /k/~g/) and to the allophonic rules (in cases like [tɕ]~[dʒ] where the two obstruents are not contrastive). Occam's Razor therefore recommends a generative analysis (where voicing assimilation can be stated as a single rule) over a taxonomic-

---

<sup>30</sup> That said, certain Irish dialects exhibit other phonological processes which protect the prominence of [(C)ax] syllables. Bennett (2009, 2010) cites two examples. First, in Munster Irish, which is atypical in that it has quantity-sensitive stress, syllables with a short vowel and a coda do not count as heavy (and so don't attract stress), whereas [(C)ax] syllables do attract stress. Second, in Ulster Irish, unstressed vowels reduce to schwa, with the sole exception of unstressed [(C)ax] syllables.

phonemic analysis (where it has to be stated as two rules). Precisely the same logic can be invoked in the cases discussed in this section: when it is possible to analyze a PCSA system and other aspects of a language's phonology using the same theoretical resources (e.g., the same OT phonological constraints), we should, all else being equal, prefer an analysis which does so over analysis which uses multiple different devices to analyze the same set of facts.<sup>31</sup> A related point, raised by Aronoff & Xu (to appear) in relation to arguments that affix order cannot be phonologically conditioned, is that it is hard to see what could possibly falsify the position that PCSA is not part of phonology. No matter how richly a PCSA system reflected generalizations which played a role elsewhere in a language's phonology, it would always be possible to redundantly state these generalizations in the form of subcategorization frames in a separate, morphological component. This suggests that—to the extent that phonology/PCSA conspiracies are observed in at least some languages—the position that PCSA and 'real' phonology are part of the same component of the grammar needs to be treated as the null hypothesis.

#### 4. Other predicted forms of phonological interference with morphology

Our analysis of the Dyirbal ergative posits that satisfaction of a phonological constraint  $\text{COINCIDE}(\eta, \text{head ft})_{\eta}$  results in violation of a lower-ranked morphological constraint of the MAX-M family. If phonological constraints freely are re-rankable constraints on morpheme/morph correspondence, then we expect that there should also be effects where satisfaction of a phonological constraint forces violation of a conflicting DEP-M constraint. In the case of DEP-M(feature) constraints, this would mean that the phonology forced insertion of a morph which bore grammatical features that were not present in the morpheme to which it corresponded. In the case of DEP-M(FS) constraints, this would mean that the phonology was forcing insertion of an entire morph which didn't correspond to any morpheme—a kind of 'dummy affix' which was there for solely phonological reasons, but which did not express any of the grammatical features of the word it appeared in.

Several cases of both kinds have indeed been suggested. In the case of phonologically-induced feature mismatches, we have already alluded to such an effect in Moroccan Arabic, where vowel-initial borrowed nouns show up with the definite prefix /l-/ even in non-definite contexts (Heath 1987: 19, 38); this may be analyzed as DEP-M([definite]) being outranked by either general ONSET and/or a constraint requiring prosodic words to begin with a consonant (Flack 2007, 2009).

---

<sup>31</sup> Of course, it is entirely possible that language learners do not always internalize the facts of their L1 in the most parsimonious manner that they can; Hale's (1973) discussion of the Māori passive is a celebrated example of a case where the analysis which seems most simple from the linguist's standpoint is quite arguably not what native speakers have internalized. The existence of such cases does not, I think, invalidate the use of Occam's Razor in arguments in theoretical linguistics. If evidence surfaces that in some case that native speakers' internalized grammars do not correspond to the simplest possible analysis, then we are simply in a situation where all else is no longer equal with respect to the empirical data. Occam's Razor is about which analysis we should prefer out of the infinite number of possible analyses which *are* compatible with the given empirical data.

One of the best-known phenomena which has been analyzed as morphological feature mismatch induced by a phonological requirement is that of the French gender mismatches mentioned earlier. A number of different analyses of these facts have been given. Some have proposed that this in fact involves the use of feminine morphs in morphosyntactically masculine contexts (Tranel 1995; Perlmutter 1998; Steriade 1999b), which in OI terms would mean violation of DEP-M(feminine) as well as MAX-M(masculine).

(51)

[THIS <sub>1</sub> FRIEND <sub>2</sub> ]     [masc] <sub>3</sub> [masc] <sub>4</sub>		ONSET	DEP-M (fem)	MAX-M (masc)
<i>morphs:</i>	<i>surface phonology:</i>			
☞ <THIS <sub>1</sub> , /set/> <FRIEND <sub>2</sub> , /ami/>     [fem] <sub>5</sub> [masc] <sub>4</sub>	[sɛ.ta.mi]		1	1
<THIS <sub>1</sub> , /sœ/> <FRIEND <sub>2</sub> , /ami/>     [masc] <sub>3</sub> [masc] <sub>4</sub>	[sœ.a.mi]	W1	L	L

Other analyses have argued that the apparent feminine allomorphs in these examples are not really morphologically specified as feminine; however, even under these analyses, the phonology can be seen to be forcing morphological defectiveness of one sort or another. For example, Lapointe & Sells (1996) and Tranel (1998) propose that in a pair like *ce/cet(te)*, [sœ] is indeed [masculine], but [set], which can appear in both masculine and feminine contexts, is unspecified for gender. In OI terms, this means that forms like *cet ami* do not violate DEP-M(feminine), but they would still involve violation of MAX-M(masculine). An analysis conceptually similar to this one is found in Lamarche (1995), who proposes that lexical items like *ce/cet(te)* have two listed allomorphs, neither of which is specified for gender, and which are ordered, [sœ] being the default form and [set] the elsewhere form; use of the default form is proposed to be blocked before a vowel and in morphosyntactically feminine contexts. On a view of this kind, forms like *cet ami* would involve phonologically-motivated violation of arbitrary preferences among allomorphs, just like the one in Dyirbal which was discussed earlier.<sup>32</sup>

Another well-known example of an apparent gender mismatch driven by phonological pressures is that of Spanish ‘feminine *el*’ (Plank 1984; Posner 1985; Zwicky 1985b; Harris 1987, 1989, 1991; Hayes 1990; Halle, Harris & Vergnaud 1991; Janda & Varela-García 1991; Álvarez de Miranda 1993; Janda 1998; Kikuchi 2001; Cutillas 2003;

<sup>32</sup> To the extent that this or any similar example involves competition between morphs with non-identical sets of morphosyntactic features, it serves as an additional argument for a realizational model of morphology (Teeple 2006). An incremental theory would require that competition occur among the alternative phonological forms which were listed in the representation of a given morpheme, and as such the competing allomorphs would by definition have to be affiliated with the same morphosyntactic features.



- (53) a. Marie a été mon/\*ma, puis son épouse.  
'Marie has been my, then his wife.'
- b. J'ai des doutes sur mon/\*?ma, disons, employabilité.  
'I have doubts about my, let us say, employability'
- c. In the car on the way back to London, we had an-to me-even more peculiar exchange about my niece and her boyfriend. (Julian Barnes, "The Past Conditional", in the Dec. 25 2006/Jan. 1 2007 issue of *The New Yorker*; cited by Zuraw 2006a)
- d. a—in my opinion, anyway—totally unexpected result (Rotenberg 1978: 55)

These observations are not as damning as they may first seem for the claim that the allomorphic alternations involved are phonologically-conditioned. First, even if we were to say that, for example, feminine *el* is no longer phonologically conditioned in the synchronic grammar of present-day Spanish (as argued by Posner 1985 and Bonet, Lloret & Mascaró this volume), the fact that it only happens with [á]-initial feminine nouns strongly hints that at least at one time in the history of the language it was phonologically conditioned. Second, the phonological status of each of these patterns of allomorphy would be vouched for if it is the case that nonce words consistently come to participate in the pattern according to their phonological shape. At least in the case of English *a/an*, for which I have native intuitions, it seems quite clear that newly-coined nouns will reliably take *a* if consonant initial and *an* if vowel-initial. Thirdly, it is entirely imaginable that cases of non-local allomorph selection like the ones in (52-53) represent a kind of cyclic or transderivational faithfulness effect: for *el nuevo arma*, it is not inconceivable that either there is a derivational stage in the phrase's spellout where the adjective either has not yet been spelled out, or has not yet been linearized into a position between the article and the noun. As an alternative to positing a derivational step where the adjective is absent, one might also contemplate assuming that there is an output-output correspondence relation (Burzio 1994; Benua 1997) between *el nuevo arma* and the adjective-less phrase *el arma*; selection of *el* would be phonologically motivated in the latter, and the use of the same allomorph of the article would be compelled by high-ranked OO faithfulness in the former. (On the use of OO-faithfulness for phrase-level phenomena, see Steriade 1999a,b; McCarthy 2000, 2007: §2.3; and Truckenbrodt 2002).

An analysis along these lines is not entirely implausible, because in word-internal phonology as well there are a number of cases known in which the domain in which a cyclic phonological process applies is linearly discontinuous on the surface, as a result of being broken up by the insertion of an infix. In my dissertation (Wolf 2008: §5.6) I review several reported examples of this, including Portuguese vowel assimilation (Ranier 1995, Benua 1997), Cibemba spirantization (Hyman 1994, 2002; Hyman & Orgun 2005; Benua 1997), Sundanese nasal harmony (Robins 1957; Anderson 1972; Stevens 1977; Hart 1981; van der Hulst & Smith 1984; Cohn 1990; Benua 1997),

Sanskrit *ruki* (Kiparsky 1982: 80-82), Abaza voicing assimilation (Allen 1956, Kenstowicz & Kisseberth 1977: §2.3) and Pashto vowel coalescence (Kenstowicz & Kisseberth 1977: §2.2). Moreover, apart from phonologically-conditioned allomorphy applying non-locally at the phrasal level, phonological feature-agreement processes may apply non-locally in like manner. Sy (2006) argues that in Wolof, ATR agreement holds between the lexical head of an XP and functional items in the same XP, even though they may not be phonologically adjacent. (See also Bing [1987] and Kaye [1981] on possible instances of phonological agreement between pronouns and nouns.) To the extent that phonological relations are not always transparently local on the surface, it should come as no surprise that the structural relations at work in phonologically-conditioned allomorph selection sometimes are as well.

Another possibility, raised by Schlenker's (to appear) discussion of the French possessive-pronoun data, is that there is some sort of discontinuous constituency at work: perhaps at some stage in the derivation, the article in *el nuevo arma* immediately precedes *both* the adjective and the noun. At some later stage, one of these precedence relations will have to be eliminated in order to fit the phrase into a single linear order, and hence make it utterable.

A final case of phonologically-driven gender mismatch occurs with the plural suffix in Modern Hebrew. This language has two plural suffixes: [-im], which for the most part is used with masculine nouns, and [-ot], which for the most part is used with feminines. There are exceptions with both suffixes, though: there are masculine nouns which take [-ot] and feminines which take [-im]. A phonological tendency underlies the use of [-ot] with masculines: Bolozky & Becker (2006) found that of 230 native masculine nouns which take [-ot], 146 have [o] as the rightmost stem vowel. The tendency of such masculine nouns to be more likely to take [-ot] has been found to manifest in experimental tasks with nonce forms (Berent, Pinker & Shimron 1999, 2002; Becker 2009).

An OT analysis of this pattern is given by Becker (2009: ch. 3). His proposal begins with the fact that with most native nouns in Hebrew, as well as all deverbal nouns, suffixes attract stress off of the stem (Bat-El 1993; Becker 2003). This means that using [-im] when the stem's rightmost vowel is [o] results in the configuration [...C<sub>0</sub>oC<sub>0</sub>ím], as opposed to [...C<sub>0</sub>oC<sub>0</sub>ót] which would result from using [-ot]. Becker proposes that the first structure is dispreferred relative to the second by a constraint which requires that the mid-vowel features of [o] must be licensed by being linked to a stressed nucleus. In [...C<sub>0</sub>oC<sub>0</sub>ím] the [o] is unstressed, but in [...C<sub>0</sub>oC<sub>0</sub>ót], assuming that the two [o]s share place features, these features will be linked to the second, stressed [o], licensing them and avoiding violation of the constraint. Assuming that this constraint is variably ranked above MAX-M(masculine) and DEP-M(feminine), we get the observed pattern of a tendency towards the use of gender-mismatched [-ot] with masculine nouns having [o] as their rightmost vowel. For further details and discussion of this phenomenon, see Becker (2009: ch. 3) and Wolf (2008: §2.4.2).

Several further possible cases of phonologically-driven mismatch in inflectional features are reported, including in English (Dixon 1977; cf. Nathan 1981 and Sparks 1984), Ondarroa Basque (Côté 1999, 2000), Armenian (Vaux 2003: 114-116), and Irish (O'Brien 2007).

Now let us turn to violation of DEP-M(FS): cases in which phonological constraints force insertion of an entire 'dummy' affix. Perhaps the best-known case of this comes from the Western Desert language Pitjantjatjara. Hale (1973) argues that Pitjantjatjara has the following word-final augmentation rule:

$$(54) \quad \emptyset \rightarrow pa / C\_ \#$$

The process is clearly conditioned by the presence of what would otherwise be a word-final consonant. When the stem is followed by a V-final suffix, the augmentative /pa/ doesn't show up:

(55)	<i>uninflected</i>	<i>ergative</i>	<i>dative</i>	
	man'kurpa	man'kur-tu	man'kur-ku	'three'
	punpunpa	punpun-tu	punpun-ku	'fly'

The /pa/ also appears after certain verbal suffixes: /-n, -n'in, -ŋin, -nin/ ~ /-npa, -n'inpa, -ŋinpa, -ninpa/.

This augmentation process is theoretically challenging because the marked status of [labial] place means that epenthesis of [labial] consonants should be impossible. The tableau below illustrates the analysis that I propose for Pitjantjatjara, and the markedness problem that would arise for the assumption that the augmentative [-pa] were epenthetic:

(56)

THREE <sub>1</sub>	DEP-IO	*C] <sub>PWd</sub>	DEP-M(FS)	*[labial]
a. $\text{mankur}_1\text{-pa}_2$			1	2
b. $\text{mankur}_1$		W1	L	1
c. $\text{mankur}_1\text{-ta}$	W2		L	1
d. $\text{mankur}_1\text{-pa}$	W2		L	2

The markedness constraint responsible for /pa/-insertion is what we can call \*C]PWd, which bans Prosodic Words from ending in a consonant (see Flack [2007, 2009] for extensive typological justification of this constraint). For the input |THREE<sub>1</sub>|, i.e. the root meaning 'three' alone, with no inflection, the winning candidate is [mankurpa]. This candidate has inserted the root morpheme /mankur/, as well as the semantically-empty affix /pa/. The presence of /pa/ means that the winning candidate satisfies \*C]<sub>PWd</sub>, but it also means that the candidate incurs an extra violation of \*[labial], by virtue of containing the segment /p/.

One competitor of the observed winner is (56b), which inserts only the root

morpheme /mankur/. This candidate does better than the winner on \*[labial], due to the absence of [-pa], but it loses by virtue of violating the higher-ranked constraint \*C]<sub>PWD</sub>. Of greater interest are the competitors (56c-d), with epenthesis. Both of these candidates violate the anti-epenthesis constraint DEP-IO, by virtue of epenthesizing the sequences [ta] or [pa]. By contrast, the winner does not violate DEP-IO, because all of its surface segments— including the [pa]—stand in correspondence with the segments in the underlying form of some morph.

Crucially for my argument, (56d), which is surface-homophonous with the winner, is harmonically bounded by (56c), which epenthesizes [ta] rather than [pa]. The two perform identically on DEP-IO and \*C]<sub>PWD</sub>, but (56b) is more harmonic than (56c) because the coronal [t] is less marked than the labial [p]. This means that if morph insertion were not available as a ‘repair’ in the phonological component of the grammar—that is, if the depicted winner in tableau (56) were not a possible candidate—there would be no way for \*C]<sub>PWD</sub> -violation to be avoided by insertion of [pa], since [pa]-epenthesis should always be harmonically bounded by [ta]-epenthesis (except in specific contexts that might favor the presence of a labial, e.g. adjacent to another labial).

The prediction of markedness theory that marked segment types like labials can never be epenthetic is largely supported by typological surveys (e.g. de Lacy 2002). The analysis that I offer thus somewhat complicates the status of epenthetic quality as evidence about markedness, since any segment, no matter how marked, could in principle belong to the UR of a morph inserted for phonological reasons. This does not seem tremendously worrisome, though, as there are various diagnostics that will often be available to distinguish epenthetic segments from affix segments. For example, de Lacy (2002) notes that apparent epenthetic round vowels in Seri, Hungarian and Icelandic are restricted to particular morphological contexts, and suggests that these segments are therefore likely to be morphemes rather than true epenthetic segments. Hale (1973) identifies similar conditions on the distribution of augmentative /-pa/ in Pitjantjatjara—it does not appear with vocatives or after the 2nd person singular clitic /-n/—and argues therefrom that /-pa/ is a morpheme. Similar arguments for the morph(eme)-hood of apparent epenthetic segments have been put forth by Cardinaletti & Repetti (2007) regarding vowel epenthesis in standard and dialectal varieties of Italian (see also Tranel & Del Gobbo 2001: 198) and by Kager (1999: 130) in relation to vowel epenthesis in Mohawk (Michelson 1988, 1989; Piggott 1995). Looking beyond surface evidence, there are also likely to be experimental means for disentangling the epenthetic vs. affixal status of segments. For example, lexical and epenthetic segments may be acoustically different, i.e. epenthesis is at least sometimes incompletely neutralizing (Gouskova & Hall 2009); we might also ask whether speakers display ‘perceptual epenthesis’ of the inserted material (Dupoux *et al.* 1999).

Additional possible cases of phonologically-motivated insertion of dummy affixes have been reported in Nunggubuyu (Heath 1984), Alabama (Montler & Hardy 1991), Axininca Campa (Black 1993), Slavey (Howard 1990: 802), Navajo (Young & Morgan 1987: 112), and Spanish and French (Allen 1976).

Now let's consider the MAX-M family. We've already dealt with cases like the Dyirbal ergative which arguably involve MAX-M(feature) violation. What about violation of MAX-M(FS)? This would involve entire morphemes failing to be spelled out by any morph at all.

A familiar and typologically common way in which consecutive identical or near-identical morphs are avoided is via haplology—i.e., omitting one of them (Stemberger 1981; Menn & MacWhinney 1984; de Lacy 2000). A simple example from English is discussed by Jaeger (to appear) and Walter & Jaeger (2005). In English, use of the overt complementizer *that* is normally optional:

- (57) a. She said you came.  
 b. She said that you came.

In the studies just cited, it was found that omission of complementizer *that* was significantly more likely when the complementizer would have appeared adjacent to demonstrative *that*, as in *She said (that) that inspector came yesterday*. Cases like this can be analyzed by assuming that a phonological OCP constraint (perhaps variably) dominates the MAX-M constraints that favor spelling out one of the two relevant morphemes (see Golston 1995, Yip 1998 for proposals in this direction)<sup>34</sup>:

(58)

COMP <sub>1</sub> DEMONST <sub>2</sub>	OCP	MAX-M(complementizer)
∅̄ ðæt <sub>2</sub>		1
ðæt <sub>1</sub> ðæt <sub>2</sub>	W1	L

Evidence has also been reported of *that*-omission being sensitive to rhythmic factors. Jaeger (to appear: §5) and Lee & Gibbons (2007) found that the complementizer was less likely to be omitted before stressed than before unstressed syllables. Since the complementizer itself is generally unstressed, this makes sense in terms of pressure to avoid stress clashes and lapses.

There is at least one plausible argument against treating haplology as outright omission of a morph. The problem comes from cases of partial haplology, which seem to involve partial fusion of two underlying strings, as in e.g. French /deksi1s2 + i3s4t/ → [deksi1,2s3,4t] *déixiste* 'person who studies deixis'. In this example, the affix is clearly not omitted outright, because it still has a surface exponent in the form of the final

<sup>34</sup> The OCP effect on adjacent instances of *that* also seems to control allomorph choice in restrictive relative clauses. Normally there is optional variation between *that* and *which* to introduce a relative clause: *The book {which/that} I ordered arrived today*, though use of *which* is generally frowned upon by prescriptivists. Pullum (2010) points out that *which* becomes the only acceptable option when another *that* precedes: *That which/\*that doesn't kill you might give you stomach trouble*. (The version of the example sentence with *which* is a caption from a cartoon in the July 5, 2010 issue of *The New Yorker*.) My intuitions are that *that* is not entirely ill-formed in this context, though it is clearly degraded relative to *which*. (The option of using *which* to avoid the OCP violation is also mentioned in passing by Walter & Jaeger [2005]).

segment [t]. However, there is reason to be skeptical of the coalescence analysis of partial haplology. This is that it requires us to assume that coalescence occurs between pairs of segments that are underlyingly non-adjacent—for example the [i]s and [s]es in the French example. As there is, to my knowledge, no evidence for non-local coalescence outside of haplology, it would be desirable to pursue an analysis of these cases which don't require any new theoretical devices. One simple strategy would be to assume that such cases simply involve selection of different morphs. In French, for instance, the default morph for 'person who studies X' would be /ist/, with another morph /t/ being used with stems ending in /...is/.

Phonologically-conditioned morph omission is not limited to cases of haplology. One non-haplological example occurs in Northeastern Central Catalan (Bonet, Lloret & Mascaró, this volume), where the plural suffix /-s/ is omitted in interconsonantal and pre-nominal position. Another example occurs in Hausa (Inkelas 1988, Selkirk 2002). Hausa has a focus particle /fa/ which, when it does appear, surfaces to the right of a focused constituent. However, its appearance is subject to various restrictions relating to the size or presence of nearby material. For instance, when it's a verb that's focused, /fa/ will appear if the verb has no complement (making /fa/ VP-final) or if the verb's complement includes more than one PWd. However, /fa/ will not appear if the verb has a single-word complement:

- (59) a. Verb *fa*  
 b. Verb *fa* Adjective Noun  
 c. \*Verb *fa* Noun

Inkelas (1988) and Selkirk (2002) propose to account for these facts in terms of the prosodic phrasing of the different VP types in (59):

- (60) a. (Verb *fa*)<sub>PPh</sub>  
 b. (Verb *fa*)<sub>PPh</sub> (Adjective Noun)PPh  
 c. \*(Verb *fa* Noun)

Normally the full VP will be parsed as a single phonological phrase, but when it contains three prosodic words, as in (60b), the complement will be parsed as a separate PPh under the pressure of a BINARYMAXIMUM constraint (Selkirk 2000), which forbids a PPh node to dominate more than two PWd nodes. The generalization on the appearance of /fa/ now becomes straightforward: it's omitted when it would not appear at the right edge of a phonological phrase.

This requirement could be enforced in one of two ways. Inkelas (1988) proposes that /fa/ has a subcategorization frame requiring it to appear at the right edge of the PPh. In Generalized Alignment terms, we could translate this proposal into a constraint ALIGN(/fa/, R, PPh, R). Selkirk (2002) proposes that /fa/ is banned from surfacing in phrase-medial position by a markedness constraint she calls MEDIALEXHAUSTIVITY. Because /fa/ is a function word, it doesn't form a prosodic word of its own, and instead its syllable attaches directly to the PPh node. This skipping of levels in the prosodic

hierarchy is marked, and violates constraints of a family that Selkirk (1995) calls EXHAUSTIVITY. The proposal in Selkirk (2002) is that there are separate exhaustivity-enforcing constraints for phrase-medial and phrase-peripheral positions, and that the MEDIAL EXHAUSTIVITY constraint dominates a morphological constraint requiring the surface realization of /fa/. This accounts for the ability of /fa/ to surface phrase-finally but not phrase medially:

(61)

verb FOCUS noun	MEDIAL EXHAUSTIVITY	MAX-M(focus)	PERIPHERAL EXHAUSTIVITY
☞ [[verb] <sub>PWd</sub> [noun] <sub>PWd</sub> ] <sub>PPH</sub>		1	
☞ [[verb] <sub>PWd</sub> [fa] <sub>σ</sub> [noun] <sub>PWd</sub> ] <sub>PPH</sub>	W1	L	

(62)

verb FOCUS adjective noun	MEDIAL EXHAUSTIVITY	MAX-M (focus)	PERIPHERAL EXHAUSTIVITY
☞ [[verb] <sub>PWd</sub> [fa] <sub>σ</sub> ] <sub>PPH</sub> [[adj] <sub>PWd</sub> [noun] <sub>PWd</sub> ] <sub>PPH</sub>			1
☞ [[verb] <sub>PWd</sub> [fa] <sub>σ</sub> ] <sub>PPH</sub> [[adj] <sub>PWd</sub> [noun] <sub>PWd</sub> ] <sub>PPH</sub>		W1	L

Another well-known case of prosody-driven morph omission occurs in the pausal phonology of Classical Arabic, of which McCarthy (to appear, 2011) gives an analysis in OI terms. Further examples are reported in K'ichee (Henderson to appear), where the root transitive /-o/ and intransitive /-ik/ appear only when they would be final in an Intonational Phrase; in San Miguel Acatán Kanjobal (Zavala 1992: 64), where transitivity-marking thematic vowels only appear phrase-finally; and in Tohono O'odham (Fitzgerald 1994) where the presence or absence of the *g*-determiner is determined by a requirement that utterances begin with a trochaic foot.

All in all, it seems reasonable to conclude that both DEP-M and MAX-M constraints can be violated for phonological reasons. This suggests that we are on the right track in assuming that phonological constraints and constraints on spell-out reside in a single module of the grammar, and can be freely re-ranked with respect to one another.

Naturally, if there exist nonphonological constraints on spell-out besides those of the DEP-M and MAX-M families, we expect that these too should sometimes be violated for the sake of better-satisfying higher-ranked phonological constraints. For example, there might be markedness constraints on the morphosyntactic feature-content of morphs, which forbade certain features or feature-combinations from occurring at the morph level. Analyses featuring such constraints can be found in Noyer (1993, esp. §1.1) and Bonet (1994). One use to which this might be put is in causing the neutralization of a morphological distinction in certain contexts. For instance, Noyer's (1993: 5) analysis of the absence of first person dual forms in Arabic invokes a constraint \*[+1 -sg -pl], which prohibits the co-occurrence of dual number ([-singular, -plural], on his assumptions about number features) with first person. While this feature-combination might exist in the input to spell-out, ranking \*[+1 -sg

-pl] above the appropriate faithfulness constraints will prevent all of the features from being spelled out by morphs, thus preventing there from being an overt dual/plural contrast in the first person.

Can such constraints be violated for the sake of satisfying phonological constraints? At least one case<sup>35</sup> is known to me in which a morph which is normally omitted in a particular morphosyntactically-defined context will appear in that context if its presence is needed in order to satisfy a phonological requirement. The example, reported by Cook (1971), comes from Tsuut'ina, an Athabaskan language of southern Alberta which is also referred to in the literature under the name Sarcee. Tsuut'ina, like most Athabaskan languages, has a rich system of inflectional prefixes. Among these, the following four are omitted in certain morphosyntactic contexts:

- (63) a. /mi/ 3<sup>rd</sup> person singular direct object  
 b. /ni/ 2<sup>nd</sup> person singular subject  
 c. /ni/ terminative  
 d. /si/ perfective

Cook (1971) observes that these prefixes do appear, even in the morphosyntactic settings where they would normally be omitted, if omitting them would yield a word which had no syllable nuclei in the prefix string.<sup>36</sup> The terminative marker /ni/, for example, is normally omitted with 3<sup>rd</sup> person subjects:

- (64) a. nà-nī-s-nó home-terminative-1sg.subj.-√travel  
       'I am going to camp (got there)'  
 b. nà-∅-nó home-3sg.def.subj-√travel  
       'He is going to camp (got there)'
- (65) a. tì-nī-s-ná theme-terminative-1sg.subj-√move.camp  
       'I will move camp'  
 b. tì-∅-ná theme-3sg.def.subj-√move.camp  
       'He will move camp'

However, /ni/ is not omitted, even with 3<sup>rd</sup> person subjects, when there is no other morph in the prefix string to supply a vowel nucleus:

---

<sup>35</sup> In addition to the Tsuut'ina facts discussed here, a second possible case, occurring in Swahili, is reported by Brandon (1975).

<sup>36</sup> Cook (1984: §11.40) states that this condition on the omission of (61b-d) actually make reference not to the full prefix string but to the 'conjunct' (as opposed to 'disjunct') prefix string. The presence of a syllabic disjunct prefix, he says, does not block /ni/-omission. In the Athapaskan literature, the term 'conjunct domain' refers to prefix positions 4 through 9; it includes subject and object markers, mode, tense, and aspect markers, classifiers, and certain adverbial prefixes (see, *inter alia*, Hoijer 1971; McDonough 1990; Halpern 1990; Hargus & Tuttle 1997 for details).

- (66) a. nī-s-nà terminative-1sg.subj-√travel  
           'I have finished travelling'  
       b. ní-∅-na terminative-3sg.def.subj-√travel  
           'He has finished traveling'

This phonological restriction on whether or not to insert an affix is all the more striking if we look at Tsuut'ina words which have no phonologically-overt prefixes. In these words, satisfaction of the requirement that at least one vowel precede the stem is accomplished by [i]-epenthesis:

- (67)       /∅-zí/ → ì.zí  
           3sg.def.subj-√be.numb 'it will be numb'

As Cook (1971) notes, the epenthesis rule and the blocking of morph-omission in items like (64b) represent a clear case of a grammatical conspiracy: the language employs two different strategies in pursuit of satisfying the same surface wellformedness condition. The Tsuut'ina conspiracy can thus be added to the examples from discussed in the previous section.

In this case, the constraint served by the conspiracy demands that at least one vowel precede the stem. Sometimes, as in (65), the language epenthesizes an [i]. However, if the word in question contains an abstract morpheme [TERMINATIVE], the terminative morph /ni/ (which otherwise might be omitted) is inserted instead.

The Tsuut'ina facts can be analyzed as follows within the assumptions of OI theory. First, the usual omission of the terminative morph results from MAX-M(terminative) being dominated by a morphological markedness constraint something like the following:

- (68)       \*<sub>TERM-3</sub>  
           Assign a violation-mark if morphs whose FSes contain the features [terminative] and [3<sub>rd</sub> person] are present in the same morphosyntactic word.

As stated here, \*<sub>TERM-3</sub> is entirely *ad hoc*; presumably the avoidance of this particular feature co-occurrence at the morph level is due to some constraint(s) of a more general nature.

The following ranking yields omission of terminative /ni/ with 3<sub>rd</sub> person subjects:

(69)

theme <sub>1</sub> -term <sub>2</sub> -3p <sub>3</sub> -move.camp <sub>4</sub>	MAX-M (3p)	*TERM-3	MAX-M (terminative)
a. $\text{t}\bar{\text{i}}_1 \emptyset_3 \text{n}\acute{\text{a}}_4$			1
b. $\text{t}\bar{\text{i}}_1 \text{n}\bar{\text{i}}_2 \emptyset_3 \text{n}\acute{\text{a}}_4$		W1	L
c. $\text{t}\bar{\text{i}}_1 \text{n}\bar{\text{i}}_2 \text{n}\acute{\text{a}}_4$	W1		L

The constraint MAX-M(3p), which demands insertion of the 3<sub>rd</sub>-person subject morph, is undominated, eliminating candidates which do not have the feature ‘3<sub>rd</sub> person’ at the morph level. This leaves as contenders (67b), which inserts the terminative morph /ni/, and (67a), which omits it. Ranking \*TERM-3 above MAX-M(term) ensures that (67a) wins.

Next we need to account for the [i]-epenthesis process in (65). For this, we need to assume that some phonological markedness constraint which requires a vowel to precede the stem—call it NONINITIAL—dominates the anti-epenthesis constraint DEP:

(70)

3.sg.def.subj <sub>1</sub> -be.numb <sub>2</sub>	NONINITIAL	DEP
a. $\text{t}\bar{\text{i}}_1 \emptyset_1 \text{i} \text{z}\acute{\text{i}}_2$		1
b. $\emptyset_1 \text{z}\acute{\text{i}}_2$	W1	L

NONINITIAL should be understood as a cover constraint more general constraints which produce a pressure to have at least one pre-stem syllable. One possible way of explaining this pressure would be to assume that the prefix domain in Tsuut’ina is a morphosyntactic constituent. We could then further assume that the right edge of the prefix domain must coincide with the right edge of a foot or some other prosodic constituent (McCarthy & Prince 1993b; Truckenbrodt 1995), which in turn would entail that the prefix domain must contain at least one syllable. This would be quite close to the analysis proposed by McDonough (1990, 1996) for similar effects in Navajo.

Next we have to consider words like (64b), in which /ni/-omission is blocked for the sake of satisfying NONINITIAL. Here, NONINITIAL must dominate \*3-TERM (because /ni/ is used in a third-person context) and DEP must dominate \*3-TERM as well (because /ni/ is used rather than the epenthetic [i]):

(71)

terminative <sub>1</sub> -3.sg.def.subj <sub>2</sub> -travel <sub>3</sub>	NONINITIAL	DEP	*3-TERM
a. $\text{n}\acute{\text{i}}_1 \emptyset_2 \text{n}\text{a}_3$			1
b. $\emptyset_2 \text{n}\text{a}_3$	W1		L
c. $\text{i} \emptyset_2 \text{n}\text{a}_3$		W1	L

The Tsuut’ina facts are clearly linked to a class of related effects in the verbal systems of other Athapaskan languages which are traditionally referred to as ‘augmentation’. These effects involve an apparent phonological minimality requirement on the size of the prefix domain and/or the overall verb. It is a disputed question, however, whether



deal with the wide range of attested cases in which satisfaction of morphological constraints on spell-out is sacrificed in order to ensure satisfaction of phonological constraints.

The same theoretical conclusion is pointed to by facts, beyond the scope of this paper, which bear on the *interleaving* part of Optimal Interleaving. The implementation of phonology and spell-out in a single OT-CC grammar has, I have argued, desirable consequences for the treatment of several types of serial interactions between phonology and morphology. These include cyclic effects (Wolf 2008: ch. 5), non-derived environment blocking (Wolf 2008: ch. 4), underapplication in derived environments (Wolf 2008: ch. 5; 2010a), and ‘local ordering’ interactions (Anderson 1969, 1972, 1974) between phonological and morphological processes (Wolf 2009). To the extent that OT-CC gives us the results we want regarding phonology/morphology derivational interactions, this is a strong hint that phonology and morphology belong in one and the same OT-CC grammar, consistent with the conclusion argued for in the present chapter, namely that lexical insertion occurs in the phonological component of the grammar.

Before concluding this chapter, it is worth briefly discussing where the OI research program can go from here. As alluded to earlier, an important theoretical issue to be addressed involves the relationship between morph insertion and prosodification as steps in gradual Harmonic-Serialist derivations. In many cases of PCSA, the choice between allomorphs is often made on the basis of which would result in a less-marked syllabic or metrical structure. For example, in the Sámi data in (44), the pairing of even-parity allomorphs with even-parity bases and odd-parity allomorphs with odd-parity bases is most readily explained in terms of a pressure to parse all syllables into feet, and hence for the syllable count of the overall word to be even, assuming that feet are going to be bisyllabic (Dolbey 1997). This analysis, however, will be hard to implement in Harmonic Serialism if it were assumed that morph insertion, syllabification, and foot-parsing all occur in separate steps, since otherwise the choice of one allomorph versus another cannot be rationalized except with reference to conditions that will not obtain until several steps later. To the extent that allomorphs are chosen on the basis of which will make possible a less-marked syllabic, metrical, or prosodic parse, this suggests that the building of prosodic structure must occur for free, simultaneous with morph insertion, in a single step of a Harmonic-Serialist derivation. This conclusion is in tension, however, with a growing body of work arguing that there are benefits to assuming that syllabification (Elfner 2008), foot construction (McCarthy 2008b; Pruitt 2008; McCarthy & Pruitt to appear; though cf. Hyde 2009), and prosodic-phrase construction (Kimper to appear), all occur as their own steps in HS or OT-CC derivations. It will be very interesting to see how and whether these arguments can be reconciled with the arguments for doing spell-out in the same type of derivational architecture; no matter what the fate of the various theories being considered, investigation of these issues will undoubtedly reveal new generalizations about the nature of phonological and morphological operations, and the degree and manner of their integration with one another.

The aforementioned issues involving prosodification are an instance of a more general question: is allomorph choice always made at the point in the derivation the morpheme in question is spelled out, or may the decision look ahead to later steps of the derivation to see what using this or that allomorph will set us up to experience later on in the derivation? Implementing spell-out in HS, where only a single derivational path can be pursued, imposes a quite strict exclusion of lookahead, which in many cases is desirable (see e.g. McCarthy [to appear] on pausal phenomena in Classical Arabic). In OT-CC, on the other hand, because a multiplicity of derivational paths are constructed, and which then compete as candidates, the door is opened for very specific forms lookahead to emerge (see e.g. Wolf 2008: ch. 2), which may also be desirable. As with the specific case of morph insertion and prosodification, an interesting topic for further investigation will be to what extent, if ever, derivational lookahead effects in PCSA exist in natural languages, and how the attested cases may be fit into the general assumptions of OI theory.

## References

- Abdel Rahman, Rasha, and Werner Sommer (2003). Does phonological encoding in speech production always follow the retrieval of semantic knowledge?: Electrophysiological evidence for parallel processing. *Cognitive Brain Research* **16**, pp. 372-382.
- Ackema, Peter, and Ad Neeleman (2004). *Beyond Morphology: Interface Conditions on Word Formation*. Oxford: Oxford University Press.
- Ackema, Peter, and Ad Neeleman (2005). Word-formation in Optimality Theory. In Pavol Šteckauer and Rochelle Lieber (eds.), *Handbook of Word-Formation*. Dordrecht: Springer, pp. 285-313.
- Acquaviva, Paolo (2008). Roots and lexicality in Distributed Morphology. Ms., University College Dublin and Universität Konstanz. [lingbuzz/000654]
- Alber, Birgit (to appear). Past participles in Mòcheno: Allomorphy, alignment, and the distribution of onsets. In Michael Putnam (ed.), *German-Language Speech Islands: Generative and Structural Approaches*. Amsterdam: John Benjamins. [ROA-1094]
- Albright, Adam (2007). Cheap but not free: Commentary on Pfau 'cheap repairs'. In Carson T. Schütze and Victor S. Ferreira (eds.), *MIT Working Papers in Linguistics 53: The State of the Art in Speech Error Research: Proceedings of the LSA Institute Workshop*. Cambridge, MA: MITWPL, pp. 35-51.
- Allen, Andrew (1976). Interfixes preserve syllables and word roots. In Henry Thompson, Kenneth Whistler, Vicki Edge, Jeri J. Jaeger, Ronya Javkin, Miriam Petruck, Christopher Smeall, and Robert D. Van Valin, Jr. (eds.), *Proceedings of the Second Annual Meeting of the Berkeley Linguistics Society*. Berkeley: BLS, pp. 31-35.
- Allen, W.S. (1956). Structure and system in the Abaza verbal complex. *Transactions of the Philological Society* 1956, pp. 53-72.
- Álvarez de Miranda, Pedro (1993). El alomorfo de *la* y sus consecuencias. *Lengua española actual* **15**, pp. 5-43.
- Anderson, Stephen R. (1969). *West Scandinavian Vowel Systems and the Ordering of Phonological Rules*. Ph.D. dissertation, MIT, Cambridge, MA.
- Anderson, Stephen R. (1972). On nasalization in Sundanese. *Linguistic Inquiry* **3**, pp. 253-

- Anderson, Stephen R. (1974). *The Organization of Phonology*. San Diego: Academic Press.
- Anderson, Stephen R. (1992). *A-Morphous Morphology*. Cambridge: Cambridge University Press.
- Andrews, J.R. (1975). *Introduction to Classical Nahuatl*. Austin: University of Texas Press.
- Anttila, Arto (1997a). Deriving variation from grammar. In Frans Hinskens, Roeland van Hout, and W. Leo Wetzels (eds.), *Variation, Change, and Phonological Theory*. Amsterdam: John Benjamins, pp. 35-68. [ROA-63]
- Anttila, Arto (1997b). *Variation in Finnish Phonology and Morphology*. Ph.D. dissertation, Leland Stanford Junior University.
- Anttila, Arto, and Anthi Revithiadou (2000). Variation in allomorph selection. In Masako Hirotsu, Andries Coetzee, Nancy Hall, and Ji-yung Kim (eds.), *Proceedings of NELS 30*, pp. 29-42.
- Apoussidou, Diana (2007). *The Learnability of Metrical Phonology*. Doctoral dissertation, Universiteit van Amsterdam. [Available online at [http://www.fon.hum.uva.nl/diana/papers/The\\_Learnability\\_of\\_Metrical\\_Phonology.pdf](http://www.fon.hum.uva.nl/diana/papers/The_Learnability_of_Metrical_Phonology.pdf)]
- Aronoff, Mark, and Zheng Xu (to appear a). A realization Optimality-Theoretic approach to affix order. *Morphology*. [ROA-1053]
- Aronoff, Mark, and Zheng Xu (to appear b). A Realization Optimality-Theoretic approach to full and partial identity of forms. In Maria Goldbach, Marc-Olivier Hinzelin, Martin Maiden, and John Charles Smith (eds.), *Morphological Autonomy: Perspectives from Romance Inflectional Morphology*. Oxford: Oxford University Press. [ROA-1066]
- Badecker, William, Michele Miozzo, and Raffaella Zanuttini (1995). The two-stage model of lexical retrieval: Evidence from a case of anomia with selective preservation of grammatical gender. *Cognition* 57, pp. 193-216.
- Bat-El, Outi (1993). Parasitic metrification in the Modern Hebrew stress system. *The Linguistic Review* 10, pp. 189-210.
- Beard, Robert (1995). *Lexeme-Morpheme Base Morphology*. Albany: State University of New York Press.
- Becker, Michael (2003). Hebrew stress: Can't you hear those trochees? In Elsi Kaiser and Sudha Arunachalam (eds.), *University of Pennsylvania Working Papers in Linguistics* 9.1: *Proceedings of the 26<sup>th</sup> Annual Penn Linguistics Colloquium*. Philadelphia: Penn Linguistics Club, pp. 45-57.
- Becker, Michael (2009). *Phonological Trends in the Lexicon: The Role of Constraints*. Ph.D. dissertation, University of Massachusetts Amherst. [ROA-1008]
- Bennett, Ryan (2009). Irish plural allomorphy and output optimization. Ms., University of California, Santa Cruz. [Available online from <http://sites.google.com/site/lingrtb/Research>]
- Bennett, Ryan (2010). Irish plural allomorphy: Output optimization vs. subcategorization. Talk presented at 28<sup>th</sup> West Coast Conference on Formal Linguistics, Los Angeles. [Handout available online from <http://sites.google.com/site/lingrtb/Research>]
- Benua, Laura (1997). *Transderivational Identity: Phonological Relations Between Words*. Ph.D. dissertation, University of Massachusetts, Amherst. [ROA-259]

- Beňuš, Štefan, Iris Smorodinsky, and Adamantios Gafos (2004). Gestural coordination and the distribution of English 'geminate'. In Sudha Arunachalam & Tatjana Scheffler (eds.), *Penn Working Papers in Linguistics 10.1: Proceedings of the 27<sup>th</sup> Annual Penn Linguistics Colloquium*. Philadelphia: PLC, pp. 33-46.
- Berent, Iris, Steven Pinker, and Joseph Shimron (1999). Default nominal inflection in Hebrew: Evidence for mental variables. *Cognition* **72**, pp. 1-44.
- Berent, Iris, Steven Pinker, and Joseph Shimron (2002). The nature of regularity and irregularity: Evidence from Hebrew nominal inflection. *Journal of Psycholinguistic Research* **31**, pp. 459-502.
- Bing, Janet Mueller (1987). Phonologically conditioned agreement: Evidence from Krahn. In David Odden (ed.), *Current Approaches to African Linguistics*, vol. 4. Dordrecht: Foris, pp. 53-60.
- Black, H. Andrew (1993). *Constraint-Ranked Derivation: A Serial Approach to Optimization*. Ph.D. dissertation, University of California, Santa Cruz.
- Blumenfeld, Lev (2006). *Constraints on Phonological Interactions*. Ph.D. dissertation, Leland Stanford Junior University.
- Boersma, Paul (2001). Phonology-semantics interaction in OT, and its acquisition. In Robert Kirchner, Joe Pater, and Wolf Wilkey (eds.), *Papers in Experimental and Theoretical Linguistics 6: Workshop on the Lexicon in Phonetics and Phonology*. Edmonton: Department of Linguistics, University of Alberta, pp. 24-35. [ROA-369]
- Boersma, Paul (2006). A programme for bidirectional phonology and phonetics and their acquisition and evolution. Ms., Universiteit van Amsterdam. [ROA-868]
- Bolozky, Shmuel, and Michael Becker (2006). Living lexicon of Hebrew nouns. Ms., University of Massachusetts Amherst. [Available online at <http://becker.phonologist.org/LLHN/>]
- Bonet, Eulàlia (1994). The person-case constraint: A morphological approach. In Heidi Harley and Colin Phillips (eds.), *MIT Working Papers in Linguistics 22: The Morphology-Syntax Connection*. Cambridge, MA: MITWPL, pp. 33-52.
- Bonet, Eulàlia (2004). Morph insertion and allomorphy in Optimality Theory. *International Journal of English Studies* **4.2**, pp. 73-104. [ROA-734]
- Bradley, Travis (2007). Morphological derived-environment effects in gestural coordination: A case study of Norwegian clusters. *Lingua* **117**, pp. 950-985. [ROA-834]
- Brandon, Frank Roberts (1975). A constraint on deletion in Swahili. In Robert K. Herbert (ed.), *Proceedings of the Sixth Conference on African Linguistics [=Ohio State University Working Papers in Linguistics 20]*. Columbus: Department of Linguistics, The Ohio State University, pp. 241-259.
- Burzio, Luigi (1994). *Principles of English Stress*. Cambridge: Cambridge University Press.
- Cable, Seth (2006). *Syncope in the Verbal Prefixes of Tlingit: Meter and Surface Phonotactics*. München: Lincom Europa.
- Cahill, Michael (2007). *Aspects of the Phonology and Morphology of Kɔnni*. Dallas: Summer Institute of Linguistics.
- Caramazza, Alfonso, and Michele Miozzo (1997). The relation between syntactic and phonological knowledge in lexical access: Evidence from the 'tip-of-the-tongue' phenomenon. *Cognition* **64**, pp. 309-343.

- Cardinaletti, Anna, and Lori Repetti (2007). Vocali epentetiche nella morfologia dell'italiano e dei dialetti italiani. In Roberta Maschi, Nicoletta Penello, and Piera Rizzolatti (eds.), *Miscellanea di studi linguistici offerti a Laura Vanelli da amici e allievi padovani*. Udine: Forum, pp. 115-126.
- Carstairs, Andrew (1987). *Allomorphy in Inflexion*. London: Croon Helm.
- Carstairs, Andrew (1988). Some implications of phonologically-conditioned suppletion. In Geert Booij and Jaap van Marle (eds.), *Yearbook of Morphology 1988*. Dordrecht: Foris, pp. 67-94.
- Carstairs, Andrew (1990). Phonologically conditioned suppletion. In Wolfgang U. Dressler, Hans C. Luschütsky, Oskar E. Pfeiffer, and John R. Rennison (eds.), *Contemporary Morphology*. Berlin: Mouton de Gruyter, pp. 17-23.
- Carstairs-McCarthy, Andrew (1998). Phonological constraints on morphological rules. In Andrew Spencer and Arnold Zwicky (eds.), *The Handbook of Morphology*. Oxford: Blackwell, pp. 144-148.
- Clayton, Mary L. (1976). The redundancy of underlying morpheme structure conditions. *Language* 52, pp. 295-313.
- Cohn, Abigail (1990). *Phonetic and Phonological Rules of Nasalization*. Ph.D. dissertation, University of California, Los Angeles.
- Cook, Eung-Do (1971). Phonological constraint and syntactic rule. *Linguistic Inquiry* 2, pp. 465-478.
- Cook, Eung-Do (1976). *A Sarcee Grammar*. Vancouver: University of British Columbia Press.
- Côté, Marie-Hélène (1999). Edge effects in the prosodic hierarchy: Evidence from stops and affricates in Basque. In Pius Tamanji, Masako Hirotsu, and Nancy Hall (eds.), *Proceedings of NELS 29*. Amherst: GLSA, pp. 51-65.
- Côté, Marie-Hélène (2000). *Consonant Cluster Phonotactics: A Perceptual Approach*. Ph.D. dissertation, MIT, Cambridge, MA.
- Curnow, Timothy Jowan (1999). Maung verbal agreement revisited: A response to Donohue (1998). *Australian Journal of Linguistics* 19, pp. 141-159.
- Cutillas, Juan Antonio (2003). *Teoría lingüística de la optimidad. Fonología, morfología, y aprendizaje*. Murcia: Servicio de Publicaciones de la Universidad de Murcia.
- de Lacy, Paul (2000). Haplology and correspondence. In Paul de Lacy and Anita Nowak (eds.), *University of Massachusetts Occasional Papers in Linguistics 24: Papers from the 25<sup>th</sup> Anniversary*. Amherst: GLSA, pp. 51-88. [ROA-298]
- de Lacy, Paul (2002). *The Formal Expression of Markedness*. Ph.D. dissertation, University of Massachusetts Amherst. [ROA-542]
- Dixon, R.M.W. (1972). *The Dyirbal Language of North Queensland*. Cambridge: Cambridge University Press.
- Dixon, R.M.W. (1977). Semantic neutralization for phonological reasons. *Linguistic Inquiry* 8, pp. 599-602.
- Dixon, R.M.W., and Grace Koch (1996). *Dyirbal Song Poetry: The Oral Literature of an Australian Rainforest People*. St. Lucia, QLD: University of Queensland Press.
- Dolbey, Andrew (1997). Output optimization and cyclic allomorph selection. In Brian Agbayani and Sze-wing Tang (eds.), *Proceedings of the 15<sup>th</sup> West Coast Conference on Formal Linguistics*. Stanford: CSLI, pp. 97-112.
- Donohue, Mark (1998). A note on verbal agreement in Maung. *Australian Journal of*

- Linguistics* **19**, pp. 73-89.
- Drachman, Gaberell, René Kager, and Angeliki Malikouti-Drachman (1996). Greek allomorphy: An Optimality Theory account. *OTS Working Papers* **10**, pp. 1-12.
- Dupoux, E., K. Kakehi, Y. Hirose, C. Pallier, and J. Mehler (1999). Epenthetic vowels in Japanese: A perceptual illusion. *Journal of Experimental Psychology: Human Perception and Performance* **25**, pp. 1568-1578.
- Eddington, David, and José Ignacio Hualde (2008). *El abundante agua fría: Hermaphroditic Spanish nouns*. *Studies in Hispanic and Lusophone Linguistics* **1.1**, 5-31.
- Eisenstat, Sarah (2009). *Learning Underlying forms with MaxEnt*. MA Thesis, Brown University.
- Elfner, Emily (2009). Syllabification and stress-epenthesis interactions in Harmonic Serialism. Ms., University of Massachusetts Amherst. [ROA-1047]
- Embick, David (2010). *Localism versus Globalism in Morphology and Phonology*. Cambridge, MA: MIT Press.
- Embick, David, and Alec Marantz (2008). Architecture and blocking. *Linguistic Inquiry* **39**, pp. 1-53.
- Escudero, Paola (2005). *The Attainment of Optimal Perception in Second-Language Acquisition*. Doctoral dissertation, Universiteit Utrecht.
- Fitzgerald, Colleen (1994). Prosody drives the syntax: O'odham rhythm. In Susanne Gahl, Andrew Dolbey, and Christopher Johnson (eds.), *Proceedings of the Twentieth Annual Meeting of the Berkeley Linguistics Society*. Berkeley: BLS, pp. 173-183. [ROA-27]
- Flack, Kathryn (2007). *The Sources of Phonological Markedness*. Ph.D. dissertation, University of Massachusetts Amherst. [Available online at [http://www.stanford.edu/~kfpotts/papers/flack\\_dissertation.pdf](http://www.stanford.edu/~kfpotts/papers/flack_dissertation.pdf)]
- Flack, Kathryn (2009). Constraints on onsets and codas of words and phrases. *Phonology* **26**, pp. 269-302.
- Friedmann, Naama, and Michal Biran (2003). When is gender accessed? A study of paraphrasias in Hebrew anomia. *Cortex* **39**, pp. 441-463.
- Golston, Chris (1995). Syntax outranks phonology. *Phonology* **12**, pp. 343-368.
- González, Carolina (2005). Phonologically conditioned allomorphy in Panoan: Towards an analysis. In Jeffrey Heinz, Andrew Martin, and Katya Pertsova (eds.), *UCLA Working Papers in Linguistics 11: Papers in Phonology* 6. Los Angeles: UCLAWPL, pp. 39-56. [Available online at [http://www.linguistics.ucla.edu/faciliti/wpl/issues/wpl11/papers/Gonzalez\\_P\\_hono6.pdf](http://www.linguistics.ucla.edu/faciliti/wpl/issues/wpl11/papers/Gonzalez_P_hono6.pdf)]
- Gouskova, Maria (2003). *Deriving Economy: Syncope in Optimality Theory*. Ph.D. dissertation, University of Massachusetts Amherst. [ROA-610]
- Gouskova, Maria (2007). DEP: Beyond epenthesis. *Linguistic Inquiry* **38**, pp. 759-770. [ROA-948]
- Grimshaw, Jane (2003). Economy of structure in OT. In Angela C. Carpenter, Paul de Lacy, and Andries W. Coetzee (eds.), *University of Massachusetts Occasional Papers in Linguistics 26: Papers in Optimality Theory II*. Amherst: GLSA, pp. 81-120. [ROA-434].
- Guo, Taomei, and Danling Peng (2007). Speaking words in the second language: From semantics to phonology in 170ms. *Neuroscience Research* **57**, pp. 387-392.

- Hale, Kenneth (1973). Deep-surface canonical disparities in relation to analysis and change: An Australian example. In Thomas Sebeok (ed.), *Current Trends in Linguistics*, vol. 11. The Hague: Mouton, pp. 401-458.
- Halle, Morris (1959). *The Sound Pattern of Russian: A Linguistic and Acoustical Investigation: With an Excursus on the Contextual Variants of the Russian Vowels*, by Lawrence G. Jones. The Hague: Mouton.
- Halle, Morris (1997). Distributed Morphology: Impoverishment and fission. In Benjamin Bruening, Yoonjung Kang, and Martha McGinnis (eds.), *MIT Working Papers in Linguistics 30: PF: Papers at the Interface*. Cambridge, MA: MITWPL, pp. 425-449.
- Halle, Morris, and Alec Marantz (1993). Distributed Morphology and the pieces of inflection. In Kenneth Hale and Samuel Jay Keyser (eds.), *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, pp. 111-176.
- Halle, Morris, and Bert Vaux (1998). Theoretical aspects of Indo-European nominal morphology: The nominal inflections of Latin and Armenian. In Jay Jasanoff, H. Craig Melchert, and Lisi Olivier (eds.), *Mír Curad: Studies in Honor of Calvert Watkins*. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck, pp. 223-240.
- Halpern, Aaron (1995). *On The Placement and Morphology of Clitics*. Stanford: CSLI.
- Hamann, Silke, Diana Apoussidou, and Paul Boersma (to appear). Modeling the formation of phonotactic restrictions across the mental lexicon. *Proceedings from the Annual Meeting of the Chicago Linguistic Society 45*. [ROA-1046]
- Hargus, Sharon (1995). The first person plural subject prefix in Babine/Witsuit'en. Ms., University of Washington, Seattle. [ROA-108]
- Hargus, Sharon, and Siri G. Tuttle (1997). Augmentation as affixation in Athabaskan languages. *Phonology 14*, pp. 177-220.
- Harley, Heidi, and Elizabeth Ritter (1998). Person and number in pronouns: A feature-geometric analysis. *Language 78*, pp. 482-526.
- Harrell, Richard S. (1962). *A Grammar of Moroccan Arabic: With an Appendix of Texts in Urban Moroccan Arabic by Louis Brunot*. Washington: Georgetown University Press.
- Harris, James (1987). Disagreement rules, referral rules, and the Spanish feminine article *el*. *Journal of Linguistics 23*, pp. 177-183.
- Harris, James (1991). The exponence of gender in Spanish. *Linguistic Inquiry 22*, pp. 27-62.
- Hart, George (1981). *Nasality and the Organization of Autosegmental Phonology*. Bloomington: IULC.
- Haviland, John B. (1979). Guugu Yimidhirr. In R.M.W. Dixon and Barry Blake (eds.), *Handbook of Australian Languages*, vol. 1. Canberra: Australian National University Press, pp. 27-180.
- Heath, Jeffrey (1981). *Basic Materials in Mara: Grammar, Texts, and Dictionary*. [=Pacific Linguistics C-60]. Canberra: Research School of Pacific Studies, The Australian National University.
- Heath, Jeffrey (1984). *Functional Grammar of Nunggubuyu*. Canberra: Australian Institute of Aboriginal Studies.
- Heath, Jeffrey (1987). *Ablaut and Ambiguity: Phonology of a Moroccan Arabic Dialect*. Albany: State University of New York Press.

- Henaff Gonon, M.A., R. Bruckert, and F. Michel (1989). Lexicalization in an anomic patient. *Neuropsychologia* 27, pp. 391-407.
- Henderson, Robert (to appear). Morphological alternations at the Intonational Phrase edge (in K'ichee). *Natural Language and Linguistic Theory*.
- Hittmair-Delazer, Barbara Andree, Carlo Semenza, Ria De Bleser, and Thomas Benke (1994). Naming by German compounds. *Journal of Neurolinguistics* 8, pp. 27-41.
- Hoijer, Harry (1971). Athapaskan morphology. In J. Sawyer (ed.), *Studies in American Indian Languages*. Berkeley: University of California Press, pp. 113-147.
- Hooper, Joan (1976). *An Introduction to Natural Generative Phonology*. New York: Academic Press.
- Hudson, Grover (1974). The representation of non-productive alternation. In John M. Anderson and Charles C. Jones (eds.), *Historical Linguistics II: Theory and Description in Phonology*. Amsterdam: North-Holland, 203-229.
- van der Hulst, Harry, and Norval Smith (1984). Prosodic domains and opaque segments in autosegmental theory. In Harry van der Hulst and Norval Smith (eds.), *The Structure of Phonological Representations, vol. 2*. Dordrecht: Foris, pp. 311-336.
- Hyde, Brett (2009). A closer look at iterative foot optimization and the case against parallelism. Ms., Washington University in St. Louis. [ROA-1062]
- Hyman, Larry (1994). Cyclic phonology and morphology in Cibemba. In Jennifer Cole and Charles Kisseberth (eds.), *Perspectives in Phonology*. Stanford: CSLI Publications, pp. 81-112.
- Hyman, Larry (2002). Cyclicity and base non-identity. In David Restle and Dietmar Zaefferer (eds.), *Sounds and Systems: Studies in Structure and Change: A Festschrift for Theo Venneman*. Berlin: Mouton de Gruyter, pp. 223-239.
- Hyman, Larry, and Cemil Orhan Orgun (2005). Endocyclicity and paradigm non-uniformity. In Cemil Orhan Orgun and Peter Sells (eds.), *Morphology and the Web of Grammar: Essays in Memory of Steven G. Lapointe*. Stanford: CSLI Publications, pp. 7-23.
- Inkelas, Sharon (1988). Prosodic effects on syntax: Hausa *fa*. In Hagit Borer (ed.), *Proceedings of the Seventh West Coast Conference on Formal Linguistics*. Stanford: Stanford Linguistics Association, pp. 375-388.
- Itô, Junko, and Armin Mester (2006). *Indulgentia parentum filiōrum perniciēs*: Lexical allomorphy in Latin and Japanese. In Eric Baković, Junko Itô, and John J. McCarthy (eds.), *Wondering at the Natural Fecundity of Things: Essays in Honor of Alan Prince*. Santa Cruz: Linguistics Research Center, University of California, Santa Cruz, pp. 185-194. [ROA-884.7]
- Jaeger, T. Florian (to appear). Phonological optimization and syntactic variation: The case of optional *that*. *Proceedings of the 32<sup>nd</sup> Annual Meeting of the Berkeley Linguistics Society*. [Draft available online at [http://www.bcs.rochester.edu/people/fjaeger/papers/E\\_Jaeger\\_2006\\_bls.pdf](http://www.bcs.rochester.edu/people/fjaeger/papers/E_Jaeger_2006_bls.pdf)]
- Janda, Richard D. (1998). Comments on the paper by Perlmutter. In Steven G. Lapointe, Diane K. Brentari, and Patrick M. Farrell (eds.), *Morphology and its Relation to Phonology and Syntax*. Stanford: CSLI, pp. 339-359.
- Janda, Richard D., and Fabiola Varela-García (1991). On lateral hermaphroditism and other variation in Spanish “feminine” *el*. In Lise M. Dobrin, Lynn Nichols, and Rosa M. Rodríguez (eds.), *Papers from the 27<sup>th</sup> Regional Meeting of the Chicago*

- Linguistic Society: Part One: The General Session*. Chicago: CLS, pp. 276-290.
- Jescheniak, Jörg D., Anje Hahne, and Herbert Schriefers (2003). Information flow in the mental lexicon during speech planning: Evidence from event-related brain potentials. *Cognitive Brain Research* **15**, pp. 261-276.
- Jescheniak, Jörg D., and Herbert Schriefers (1999). Strictly discrete serial stages and contextual appropriateness. *The Behavioral and Brain Sciences* **22**, pp. 47-48.
- Jesney, Karen (2009). Uniformity effects as a consequence of learning with lexical constraints. Poster presented at KNAW Colloquium on Language Acquisition and Optimality Theory, Amsterdam. [Handout available online at <http://people.umass.edu/kjesney/Jesney2009KNAW.pdf>]
- Jesney, Karen, Joe Pater, and Robert Staubs (2010). Restrictive learning with distributions over underlying representations. Talk presented at Workshop on Computational Modeling of Sound Pattern Acquisition, Edmonton. [Handout available online at <http://people.umass.edu/kjesney/JesneyPaterStaubs2010.pdf>]
- Kager, René (1996a). On affix allomorphy and syllable counting. In Ursula Kleinhenz (ed.), *Interfaces in Phonology*. Berlin: Akademie Verlag, pp. 155-171. [ROA-88]
- Kager, René (1996b). Stem disyllabicity in Guugu Yimidhirr. In Marina Nespov and Norval Smith (eds.), *Dam Phonology: HIL Phonology Papers II*. Den Haag: Holland Institute of Generative Linguistics. [ROA-70]
- Kager, René (1999). *Optimality Theory*. Cambridge: Cambridge University Press.
- Kaye, Alan S. (2005). Gemination in English. *English Today* **21**, pp. 43-55.
- Kaye, Jonathan D. (1981). La selection des formes pronominales en Vata. *Revue québécoise de linguistique* **11**, pp. 117-135.
- Kenstowicz, Michael (2005). Paradigmatic uniformity and contrast. In Laura J. Downing, T.A. Hall, and Renate Raffelsiefen (eds.), *Paradigms in Phonological Theory*. Oxford: Oxford University Press, pp. 145-169.
- Kenstowicz, Michael, and Charles W. Kisseberth (1977). *Topics in Phonological Theory*. New York: Academic Press.
- Kikuchi, Seiichiro (2001). Spanish definite article allomorphy: A correspondence approach. *Phonological Studies* **4**, pp. 49-56.
- Kimper, Wendell (2009). Constraints on what's not there: The role of serial derivations in subtractive truncation. Paper presented at HUMDRUM 2009, Amherst. [Handout available online at [http://people.umass.edu/wkimper/humdrum\\_09.pdf](http://people.umass.edu/wkimper/humdrum_09.pdf)]
- Kimper, Wendell (to appear). Locality and globality in phonological variation. *Natural Language and Linguistic Theory*. [Available online at [http://people.umass.edu/wkimper/local\\_optionality\\_prepub.pdf](http://people.umass.edu/wkimper/local_optionality_prepub.pdf)]
- Kiparsky, Paul (1972). Explanation in phonology. In Stanley Peters (ed.), *Goals of Linguistic Theory*. Englewood Cliffs, NJ: Prentice-Hall, pp. 189-227.
- Kiparsky, Paul (1973). "Elsewhere" in phonology. In Stephen R. Anderson and Paul Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston, pp. 93-106.
- Kiparsky, Paul (1982). Lexical morphology and phonology. In I.S. Yang (ed.), *Linguistics in the Morning Calm*. Seoul: Hanshin, pp. 3-91.

- Kiparsky, Paul (1994). Allomorphy or morphophonology? In Rajendra Singh and Richard Desroches (eds.), *Trubetzkoy's Orphan: Proceedings of the Montréal Roundtable "Morphology: Contemporary Responses"* (Montréal, September 30 – October 2, 1994). Amsterdam: John Benjamins, pp. 13-31.
- Kisseberth, Charles (1970). On the functional unity of phonological rules. *Linguistic Inquiry* **1**, pp. 291-306.
- Lamarche, Jacques (1996). Gender agreement and suppletion in French. In Karen Zagana (ed.), *Grammatical Theory and Romance Languages*. Amsterdam: John Benjamins, pp. 145-157.
- Lapointe, Steven G. (1999). Stem selection and OT. In Geert Booij and Jaap van Marle (eds.), *Yearbook of Morphology 1999*. Dordrecht: Kluwer, pp. 263-297.
- Lapointe, Steven G., and Peter Sells (1996). Separating syntax and phonology in Optimality Theory: The case of suppletive segment/∅ allomorphy. Ms., University of California, Davis, and Leland Stanford Junior University.
- Lee, Ming-Wei, and Julie Gibbons (2007). Rhythmic alternation and the optional complementizer in English: New evidence of phonological influence on grammatical encoding. *Cognition* **105**, pp. 446-456.
- Levelt, Willem J.M. (1989). *Speaking: From Intention to Articulation*. Cambridge, MA: MIT Press.
- Levelt, Willem J.M. (1993). Lexical selection, or how to bridge the major rift in language processing. In Frank Beckmann and Gerhard Heyer (eds.), *Theorie und Praxis des Lexikons*, pp. 164-172.
- Levelt, Willem J.M., Ardi Roelofs, and Antje S. Meyer (1999). A theory of lexical access in speech production. *The Behavioral and Brain Sciences* **22**, pp. 1-38.
- Liberman, Mark, and Alan Prince (1977). On stress and linguistic rhythm. *Linguistic Inquiry* **8**, pp. 249-336.
- Marantz, Alec (1995). "Cat" as a phrasal idiom: Consequences of late insertion in Distributed Morphology. Ms., MIT, Cambridge, MA.
- Martin, Andrew (2005). *The Effects of Distance on Lexical Bias: Sibilant Harmony in Navajo*. MA Thesis, University of California, Los Angeles.
- Martin, Andrew (2007). *The Evolving Lexicon*. Ph.D. dissertation, University of California, Los Angeles.
- Mascaró, Joan (1996a). External allomorphy and contractions in Romance. *Probus* **8**, pp. 181-205.
- Mascaró, Joan (1996b). External allomorphy as emergence of the unmarked. In Jacques Durand and Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. Salford: European Studies Research Institute, University of Salford, pp. 473-483.
- Mascaró, Joan (2007). External allomorphy and lexical representation. *Linguistic Inquiry* **38**, pp. 715-735.
- McCarthy, John J. (2000). The prosody of phase in Rotuman. *Natural Language and Linguistic Theory* **18**, pp. 147-197.
- McCarthy, John J. (2003). OT constraints are categorical. *Phonology* **20**, pp. 75-138.
- McCarthy, John J. (2007). *Hidden Generalizations: Phonological Opacity in Optimality Theory*. London: Equinox.
- McCarthy, John J. (2008a). The gradual path to cluster simplification. *Phonology* **25**, pp. 271-319.

- McCarthy, John J. (2008b). The serial interaction of stress and syncope. *Natural Language and Linguistic Theory* **26**, pp. 499-546.
- McCarthy, John J. (to appear, 2011). Pausal phonology and morpheme realization. In Toni Borowsky, Shigeto Kawahara, Takahito Shinya, and Mariko Sugahara (eds.), *Prosody Matters: Essays in Honor of Lisa Selkirk*. London: Equinox. [ROA-1048]
- McCarthy, John J., and Alan Prince (1993a). *Prosodic Morphology I: Constraint Interaction and Satisfaction*. Ms., University of Massachusetts Amherst and Rutgers University, New Brunswick, NJ. [ROA-482]
- McCarthy, John J., and Alan Prince (1993b). Generalized Alignment. In Geert Booij and Jaap van Marle (eds.), *Yearbook of Morphology 1993*. Dordrecht: Kluwer, pp. 79-153. [ROA-7]
- McCarthy, John J., and Alan Prince (1994). The Emergence of the Unmarked: Optimality in Prosodic Morphology. In Mercè González (ed.), *Proceedings of the North East Linguistic Society 24*. Amherst: GLSA, pp. 333-379. [ROA-13]
- McCarthy, John J., and Alan Prince (1995). Faithfulness and reduplicative identity. In Jill N. Beckman, Laura Walsh Dickey, and Suzanne Urbanczyk (eds.), *University of Massachusetts Occasional Papers in Linguistics 18: Papers in Optimality Theory*. Amherst: GLSA, pp. 249-384. [ROA-60]
- McCarthy, John J., and Alan Prince (1999). Faithfulness and identity in prosodic morphology. In René Kager, Harry van der Hulst, and Wim Zonneveld (eds.), *The Prosody-Morphology Interface*. Cambridge: Cambridge University Press, pp. 218-309. [ROA-216]
- McCarthy, John J., and Kathryn Pruitt (to appear). Sources of phonological structure. In Ralf Vogel and Hans Broekhuis (eds.), *Linguistic Derivations and Filtering: Minimalism and Optimality Theory*. London: Equinox.
- McCarthy, John J., and Matthew Wolf (2005). Less than zero: Correspondence and the null output. Ms., University of Massachusetts Amherst. [ROA-722; revised version published as Wolf & McCarthy (2010).]
- McDonough, Joyce (1990). *Topics in the Phonology and Morphology of Navajo Verbs*. Ph.D. dissertation, University of Massachusetts, Amherst.
- McDonough, Joyce (1996). Epenthesis in Navajo. In Eloise Jelinek, Sally Midgette, Keren Rice, and Leslie Saxon (eds.), *Athabaskan Language Studies: Essays in Honor of Robert W. Young*. Albuquerque: University of New Mexico Press, pp. 235-257.
- Mester, Armin (1994). The quantitative trochee in Latin. *Natural Language and Linguistic Theory* **12**, pp. 1-61.
- Michelson, Karin (1988). *A Comparative Study of Lake-Iroquoian Accent*. Dordrecht: Reidel.
- Michelson, Karin (1989). Invisibility: Vowels without a timing slot in Mohawk. In Donna B. Gerdts and Karin Michelson (eds.), *Theoretical Perspectives on Native American Languages*. Albany: State University of New York Press, pp. 38-69.
- Miller, Philip, Geoffrey K. Pullum, and Arnold M. Zwicky (1992). Le principe d'inaccessibilité de la phonologie par la syntaxe: trois contre-exemples apparents en français. *Linguisticæ Investigationes* **16**, pp. 317-343.
- Miller, Philip, Geoffrey K. Pullum, and Arnold M. Zwicky (1997). The Principle of Phonology-Free Syntax: Four apparent counter-examples in French. *Journal of Linguistics* **33**, pp. 67-90.
- Montler, Timothy R., and Heather K. Hardy (1991). The phonology of negation in

- Alabama. *International Journal of American Linguistics* 57, pp. 1-23.
- Nathan, Geoffrey S. (1981). What's these facts about? *Linguistic Inquiry* 12, pp. 151-153.
- Nevins, Andrew (to appear). Phonologically-conditioned allomorph selection. In Marc van Oostendorp, Colin Ewen, Elizabeth Hume, and Keren Rice (eds.), *The Blackwell Companion to Phonology*. Oxford: Blackwell.
- Noyer, Rolf (1993). Optimal Words: Towards a declarative theory of word-formation. Talk presented at Rutgers Optimality Workshop-1, New Brunswick, NJ. [Available online at [ftp://babel.ling.upenn.edu/facpapers/rolf\\_noyer/optimal\\_words.ps](ftp://babel.ling.upenn.edu/facpapers/rolf_noyer/optimal_words.ps)]
- O'Brien, Jeremy (2007). Lexical Conservatism in Irish prepositions. Ms., University of California, Santa Cruz. [Available online at [http://people.ucsc.edu/~jpobrien/papers/obrien\\_irish\\_prep.pdf](http://people.ucsc.edu/~jpobrien/papers/obrien_irish_prep.pdf)]
- van Oostendorp, Marc (1998). Non-derivational opacity in allomorph selection. Talk presented at GLOW Workshop on Opacity in Phonology, Tilburg. [Handout available online at <http://www.vanoostendorp.nl/pdf/opacity.pdf>]
- Orwell, George [Eric Arthur Blair] (1949). *Nineteen Eighty-Four: A Novel*. London: Secker & Warburg.
- Paster, Mary (2005). Subcategorization vs. output optimization in syllable-counting allomorphy. In John Alderete, Chung-hye Han, and Alexei Kochetov (eds.), *Proceedings of the 24<sup>th</sup> West Coast Conference on Formal Linguistics*. Somerville, MA: Cascadilla Proceedings Project, pp. 326-333. [Lingref # 1238]
- Paster, Mary (2006). *Phonological Conditions on Affixation*. Ph.D. dissertation, University of California, Berkeley.
- Pater, Joe (2007). The locus of exceptionality: Morpheme-specific phonology as constraint indexation. In Leah Bateman, Michael O'Keefe, Ehren Reilly, and Adam Werle (eds.), *University of Massachusetts Occasional Papers in Linguistics* 32: *Papers in Optimality Theory III*. Amherst: GLSA, pp. 1-36.
- Pater, Joe (2009). Morpheme-specific phonology: Constraint indexation and inconsistency resolution. In Steve Parker (ed.), *Phonological Argumentation: Essays on Evidence and Motivation*. London: Equinox, pp. 123-154.
- Perlmutter, David M. (1998). Interfaces: Explanation of allomorphy and the architecture of grammars. In Steven G. Lapointe, Diane K. Brentari, and Patrick M. Farrell (eds.), *Morphology and its Relation to Phonology and Syntax*. Stanford: CSLI, pp. 307-338.
- Pfau, Roland (2000). *Features and Categories in Language Production*. Doctoral dissertation, Johan-Wolfgang-Goethe Universität, Frankfurt am Main.
- Picanço, Gessiane (2002) Tonal polarity as phonologically conditioned allomorphy in Mundurukú. In Julie Larson & Mary Paster (eds.), *Proceedings of the 28<sup>th</sup> Annual Meeting of the Berkeley Linguistics Society*. pp. 237-48. Berkeley, CA: Berkeley Linguistics Society, pp. 237-248.
- Piggott, Glyne L. (1995). Epenthesis and syllable weight. *Natural Language and Linguistic Theory* 13, pp. 283-326.
- Plag, Ingo (1999). *Morphological Productivity: Structural Constraints on English Derivation*. Berlin: Mouton de Gruyter.
- Plank, Frans (1984). Romance disagreements: Phonology interfering with syntax. *Journal of Linguistics* 20, pp. 329-350.

- Posner, Rebecca (1985). Non-agreement on Romance disagreements. *Journal of Linguistics* 21, pp. 437-451.
- Prince, Alan (2002). Entailed ranking arguments. Ms., Rutgers University, New Brunswick, NJ. [ROA-500]
- Prince, Alan (2003). Arguing optimality. In Angela C. Carpenter, Paul de Lacy, and Andries W. Coetzee (eds.), *University of Massachusetts Occasional Papers in Linguistics 26: Papers in Optimality Theory II*. Amherst: GLSA, pp. 269-304.
- Prince, Alan, and Paul Smolensky (2004 [1993]). *Optimality Theory: Constraint Interaction in Generative Grammar*. Oxford: Blackwell.
- Pruitt, Kathryn (2008). Iterative foot optimization and locality in stress systems. Ms., University of Massachusetts Amherst. [ROA-999]
- Pullum, Geoffrey (2010). That which doesn't apply to English. Post on Language Log, July 3. [Available online at <http://languagelog.ldc.upenn.edu/nll/?p=2425>]
- Pullum, Geoffrey K., and Arnold M. Zwicky (1988). The syntax-phonology interface. In Frederick J. Newmeyer (ed.), *Linguistics: The Cambridge Survey; Volume I, Linguistic Theory: Foundations*. Cambridge: Cambridge University Press, pp. 255-280.
- Ranier, Franz (1995). Inflection inside derivation: Evidence from Spanish and Portuguese. In Geert Booij and Jaap van Marle (eds.), *Yearbook of Morphology 1995*. Dordrecht: Kluwer, pp. 83-91.
- Rice, Keren (1990). Prosodic constituency in Hare (Athapaskan): Evidence for the foot. *Lingua* 82, pp. 201-254.
- Robins, R.H. (1957). Vowel nasality in Sundanese. *Studies in Linguistic Analysis: Special Volume of the Philological Society*, pp. 87-103.
- Rodriguez-Fornells, Antoni, Bernadette M. Schmitt, Marta Kutas, and Thomas F. Münte (2002). Electrophysiological estimates of the time course of semantic and phonological encoding during listening and naming. *Neuropsychologia* 40, pp. 778-787.
- Ross, John Robert (1973). Leftward, ho! In Stephen R. Anderson and Paul Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Holt, Rinehart & Winston, pp. 166-173.
- Rotenberg, Joel (1978). *The Syntax of Phonology*. Ph.D. dissertation, MIT, Cambridge, MA.
- Rubach, Jerzy, and Geert Booij (2001). Allomorphy in Optimality Theory: Polish iotation. *Language* 77, pp. 26-60.
- Sauerland, Uli (1996). The late insertion of Germanic inflection. Ms., MIT, Cambridge, MA. [Available online at <http://www2.sfs.nphil.uni-tuebingen.de/~uli/morph.pdf>]
- Schlenker, Philippe (to appear). A phonological condition that targets discontinuous syntactic units: *ma/mon* suppletion in French. *Snippets*. [Available online at <https://files.nyu.edu/pds4/public/Mon.pdf>]
- Schmidt, Annette (1985). *Young People's Dyirbal: An Example of Language Death from Australia*. Cambridge: Cambridge University Press.
- Selkirk, Elisabeth (1995). The prosodic structure of function words. In James L. Morgan and Katherine Demuth (eds.), *Signal to Syntax: Bootstrapping from Speech to Grammar in Early Acquisition*. Mahwah, NJ: Lawrence Erlbaum, pp. 187-213.
- Selkirk, Elisabeth (2000). The interaction of constraints on prosodic phrasing. In Merle Horne (ed.), *Prosody: Theory and Experiment: Studies Presented to Gosta Bruce*. Dordrecht: Kluwer, pp. 219-255.

- Selkirk, Elisabeth (2002). On the phonologically driven non-realization of function words. In Charles Chang, Michael J. Houser, Yuni Kim, David Mortensen, Mischa Park-Doob, and Maziar Toosarvandani (eds.), *Proceedings of the Twenty-Seventh Annual Meeting of the North East Linguistic Society*. Berkeley: BLS, pp. 257-270.
- Semenza, C., C. Luzzatti, and S. Carabelli (1997) Naming disorders for compounds in aphasia: A study in Italian. *Journal of Neurolinguistics* **10**, pp. 33-43.
- Sparks, Randall B. (1984). Here's a few more facts. *Linguistic Inquiry* **15**, pp. 179-183.
- Stemberger, Joseph Paul (1980). Morphological haplology. *Language* **57**, pp. 791-817.
- Steriade, Donca (1999a). Alternatives to syllable-based accounts of consonantal phonotactics. In Osamu Fujimura, Brian Joseph, and B. Palek (eds.), *Proceedings of the 1998 Linguistics and Phonetics Conference*. Prague: Karolinum Press, pp. 205-242.
- Steriade, Donca (1999b). Lexical conservatism in French adjectival liaison. In J.-Marc Authier, Barbara Bullock, and Lisa Reed (eds.), *Formal Perspectives on Romance Linguistics*. Amsterdam: John Benjamins, pp. 243-270.
- Stevens, Alan M. (1977). On local ordering in Sundanese. *Linguistic Inquiry* **8**, pp. 155-162.
- Struijke, Caro, and Paul de Lacy (2000). Overkill in dissimilation. Talk presented at NELS 31, Washington, DC.
- Stump, Gregory T. (2001). *Inflectional Morphology: A Theory of Paradigm Structure*. Cambridge: Cambridge University Press.
- Sy, Mariame (2006). Ultra long-distance ATR agreement in Wolof. In Rebecca T. Cover and Yuni Kim (eds.), *Proceedings of the 31<sup>st</sup> Annual Meeting of the Berkeley Linguistics Society: Special Session on Languages of West Africa*. Berkeley: BLS, pp. 95-106.
- Teeple, David (2006). Lexical selection and strong parallel OT. Ms., University of California, Santa Cruz.
- Teeple, David (2008a). Prosody can outrank syntax. In Charles B. Chang and Hannah J. Hanyie (eds.), *Proceedings of the 26<sup>th</sup> West Coast Conference on Formal Linguistics*. Somerville, MA: Cascadilla Proceedings Project, pp. 454-462. [lingref #1702]
- Teeple, David (2008b). Lexical selection and strong parallelism. Ms., University of California, Santa Cruz. [ROA-992]
- Tranel, Bernard (1995). Exceptionality in Optimality Theory and final consonants in French. In Karen Zagona (ed.), *Grammatical Theory and Romance Languages*. Amsterdam: John Benjamins, pp. 275-291. [ROA-61]
- Tranel, Bernard (1996). French liaison and elision revisited: A unified account within Optimality Theory. In Claudia Parodi, Carlos Quicoli, Mario Saltarelli, and Maria Luisa Zubizarreta (eds.), *Aspects of Romance Linguistics*. Washington: Georgetown University Press, pp. 433-455. [ROA-15]
- Tranel, Bernard (1998). Suppletion and OT: On the issue of the syntax/phonology interaction. In Emily Curtis, James Lyle, and Gabriel Webster (eds.), *The Proceedings of the Sixteenth West Coast Conference on Formal Linguistics*. Stanford: Stanford Linguistics Association/CSLI Publications, pp. 415-429.
- Tranel, Bernard, and Francesca Del Gobbo (2001). Local Conjunction in Italian and French phonology. In Caroline R. Wiltshire and Joaquim Camps (eds.), *Romance Phonology and Variation: Selected Papers from the 30<sup>th</sup> Linguistic Symposium on Romance Languages, Gainesville, Florida, February 2000*. Philadelphia: John Benjamins, pp. 191-218.
- Trommer, Jochen (2001). *Distributed Optimality*. Ph.D. dissertation, Universität Potsdam.

- Trommer, Jochen (2008). Syllable-counting allomorphy by indexed constraints. Talk presented at Old Word Conference on Phonology 5, Toulouse.
- Truckenbrodt, Hubert (1995). *Phonological Phrases: Their Relation to Syntax, Focus, and Prominence*. Ph.D. dissertation, MIT, Cambridge, MA.
- Truckenbrodt, Hubert (2002). Variation in p-phrasing in Bengali. *Linguistic Variation Yearbook* 2, pp. 259-303.
- Tuttle, Siri G. (1998). *Metrical and Tonal Structures in Tanana Athabaskan*. Ph.D. dissertation, University of Washington, Seattle.
- Van Turrennot, M., P. Hagoort, and C.M. Brown (1997). Electrophysiological evidence on the time course of semantic and phonological processes in speech production. *Journal of Experimental Psychology: Memory, Learning, and Cognition* 23, pp. 787-806.
- Van Turrennot, M., P. Hagoort, and C.M. Brown (1998). Brain activity during speaking: From syntax to phonology in 40 msec. *Science* 280, pp. 572-574.
- Vaux, Bert (2003). Syllabification in Armenian, Universal Grammar, and the lexicon. *Linguistic Inquiry* 34, pp. 91-125.
- Walker, Rachel, and Bella Feng (2004). A ternary model of phonology-morphology correspondence. In Benjamin Schmeiser, Veneeta Chand, Ann Kelleher, and Angelo J. Rodríguez (eds.), *Proceedings of the Twenty-Third West Coast Conference on Formal Linguistics*. Somerville, MA: Cascadilla Press, pp. 773-786.
- Walter, Mary Ann, and T. Florian Jaeger (2005). Constraints on optional *that*: A strong word form OCP effect. *Proceedings from the Annual Meeting of the Chicago Linguistic Society* 41.1, pp. 505-519.
- Wilson, Colin (2000). *Targeted Constraints: An Approach to Contextual Neutralization in Optimality Theory*. Ph.D. dissertation, University of California, Los Angeles.
- Wilson, Colin (2001). Consonant cluster neutralization and targeted constraints. *Phonology* 18, pp. 147-197.
- Wolf, Matthew (2007). For an autosegmental theory of mutation. In Leah Bateman, Michael O'Keefe, Ehren Reilly, and Adam Werle (eds.), *University of Massachusetts Occasional Papers in Linguistics 32: Papers in Optimality Theory III*. Amherst: GLSA, pp. 315-404. [ROA-754]
- Wolf, Matthew (2008). *Optimal Interleaving: Serial Phonology-Morphology Interaction in a Constraint-Based Model*. Ph.D. dissertation, University of Massachusetts Amherst. [ROA-996]
- Wolf, Matthew (2009). Local ordering in phonology/morphology interleaving: Evidence for OT-CC. Talk presented at 83<sup>rd</sup> Linguistic Society of America Annual Meeting, San Francisco. [Handout available online at <http://wolf.phonologist.org/LSA%202009%20handout.pdf>]
- Wolf, Matthew (2010). Implications of affix-protecting junctural underapplication. In Jon Scott Stevens (ed.), *Penn Working Papers in Linguistics 16.1: Proceedings of the 33<sup>rd</sup> Annual Penn Linguistics Colloquium*. Philadelphia: Penn Linguistics Club, pp. 235-234. [Available online from <http://repository.upenn.edu/pwpl/vol16/iss1/26/>]
- Wunderlich, Dieter (2000). A correspondence-theoretic analysis of Dalabon transitive paradigms. In Geert Booij and Jaap van Marle (eds.), *Yearbook of Morphology 2000*. Dordrecht: Kluwer, pp. 233-252.
- Wunderlich, Dieter (2001). How gaps and substitutions can become optimal: The

- pronominal affix paradigms of Yimas. *Transactions of the Philological Society* **99**, pp. 315-366.
- Wunderlich, Dieter (2003). On generating and constraining morphological objects: A reply to Harbour. *Transactions of the Philological Society* **101**, pp. 137-147.
- Xu, Zheng (2007). *Inflectional Morphology in Optimality Theory*. Ph.D. dissertation, Stony Brook University. [ROA-949]
- Yip, Moira (1998). Identity avoidance in phonology and morphology. In Steven G. Lapointe, Diane K. Brentari, and Patrick M. Farrell (eds.), *Morphology and its Relation to Phonology and Syntax*. Stanford: CSLI Publications, 216-246.
- Zavala, Roberto (1992). *El Kanjobal de San Miguel Acatán*. México: Universidad Nacional Autónoma de México.
- Zoll, Cheryl (1998). Positional asymmetries and licensing. Ms., MIT, Cambridge, MA. [ROA-282]
- Zuraw, Kie (2000). *Patterned Exceptions in Phonology*. Ph.D. dissertation, University of California, Los Angeles. [ROA-788]
- Zuraw, Kie (2006a). Prescient 'an'. Post on Phonoblog, December 25. [Available online via <http://camba.ucsd.edu/phonoblog>]
- Zuraw, Kie (2006b). More on a vs. an. Post on Phonoblog, December 29. [Available online via <http://camba.ucsd.edu/phonoblog>]
- Zwicky, Arnold M. (1969). Phonological constraints in syntactic descriptions. *Papers in Linguistics* **1**, pp. 411-463.
- Zwicky, Arnold M. (1985a). How to describe inflection. In Mary Niepokuj, Mary VanClay, Vassiliki Nikiforidou, Deborah Feder, Claudia Brugman, Monica Macaulay, Natasha Beery, and Michele Emanatian (eds.), *Proceedings of the Eleventh Annual Meeting of the Berkeley Linguistics Society*. Berkeley: BLS, pp. 372-386.
- Zwicky, Arnold M. (1985b). Rules of allomorphy and phonology-syntax interactions. *Journal of Linguistics* **21**, pp. 431-436.
- Zwicky, Arnold M., and Geoffrey K. Pullum (1986a). The Principle of Phonology-Free Syntax: Introductory remarks. *Ohio State University Working Papers in Linguistics* **32**, 63-91.
- Zwicky, Arnold M., and Geoffrey K. Pullum (1986b). Two spurious counterexamples to the Principle of Phonology-Free Syntax. *Ohio State University Working Papers in Linguistics* **32**, 92-99.