

Lexical Category and Phonological Contrast*

Jennifer L. Smith
University of Massachusetts, Amherst

Abstract

In a number of languages, nouns show phonologically privileged behavior compared to verbs. This difference is analyzed here as an instance of positional faithfulness: the category *noun* is a strong position, so the grammar includes noun-specific faithfulness constraints which, when high-ranking, allow nouns to be exempt from neutralization processes that target other words. Even a case of neutralization that targets nouns specifically is shown to be a type of neutralization process that characteristically affects strong positions, reinforcing the claim that the category *noun* has a special status in phonology.

1. Introduction

In a number of languages, words belonging to different lexical categories behave differently with respect to phonological contrast and neutralization. This paper considers a range of cases in which phonological behavior depends on lexical category. From these examples, a generalization emerges: nouns show privileged phonological behavior compared to words of other categories. That is, nouns may license more phonological contrasts than other words or resist phonological processes that apply to other words.

The special behavior of nouns is analyzed here as an extension of positional faithfulness (Selkirk 1994; Beckman 1995, 1998; Casali 1996): the category *noun* is a strong position, so the grammar contains special noun-specific faithfulness constraints, which, in a particular ranking, allow nouns to resist neutralization processes that affect words of other categories.

Finally, a process of neutralization in Chuukese [Trukese] (Goodenough & Sugita 1980; Muller 1999) provides additional support for the proposal that the category *noun* has the status of a strong position in the grammar. This neutralization process affects nouns only, which at first seems unexpected, if nouns are to be analyzed as a strong position. However, the process in question is shown to be one of a class of neutralization processes that characteristically affect strong positions.

This paper is structured as follows. Section 2 introduces several examples of languages in which phonological behavior is determined by lexical category, demonstrating that in each case, it is nouns that have greater phonological freedom. Section 3 outlines the role of phonological contrast in an Optimality Theoretic grammar, proposing that positional faithfulness theory as implemented by Selkirk (1994) and Beckman (1995, 1998) is the most appropriate analysis for the patterns seen in Section 2. Section 4 presents an analysis of hiatus resolution in Sinhala, as one example of how noun-faithfulness constraints can be used to account for noun/verb differences. Finally, Section 5 considers further implications of the proposal, discussing noun-specific neutralization in Chuukese and the role of adjectives in a theory of noun faithfulness.

2. Category-dependent phonological behavior: an overview

This section describes phonological patterns in Fukuoka Japanese, Spanish, and Sinhala that are sensitive to the lexical category to which words or morphemes belong. In each case, nouns are seen to have greater phonological privilege; they can either license more contrasts or resist more phonological processes than words of other categories can.

2.1 Fukuoka Japanese

In the Fukuoka-area dialects of Japanese, there are differences between nouns on the one hand and verbs and adjectives on the other in the phonology of pitch accent (Hayata 1985, Smith 1999). For nouns, as shown in (1), both accentedness (the presence or absence of an accent) and accent location are lexically contrastive.

(1) *Nouns have contrastive accent*

- | | | | |
|-----|--------------|--------|---|
| (a) | atama | 'head' | Unaccented |
| (b) | inóti | 'life' | Accented; penultimate (peninitial) accent |
| (c) | ókami | 'wolf' | Accented; initial accent |

However, accent-related behavior in verbs and adjectives is much more restricted. Not only is the presence of an accent obligatory, but even its location is predictable: accent falls on the head of the syllable containing the penultimate mora.¹

(2) *Verbs and adjectives have obligatory penultimate accent*

- | | | | | | |
|-----|---------------|---------------|-----|-------------------|----------------|
| (a) | tabéta | 'ate' | (c) | akáka~akái | 'red' |
| (b) | tabén | 'doesn't eat' | (d) | akakaróo | 'probably red' |

Therefore, in Fukuoka Japanese, phonological contrasts involving accent are permitted in nouns, but not in verbs or adjectives.

2.2 Spanish

In Spanish, the phonology of stress shows differences based on lexical category. The location of stress for nouns and adjectives is lexically contrastive (although restricted to one of the last three syllables of the word); examples (from Harris 1969 and Castillo & Bond 1948) are given in (3).

(3) *Nouns, adjectives have contrastive stress*

- | | | | | | | |
|-----|-------------|----------------|----------|---|----------------|--------------|
| (a) | Nouns: | página | 'page' | ≠ | amíga | 'friend, f.' |
| (b) | Adjectives: | célebre | 'famous' | ≠ | salúbre | 'healthy' |

However, the location of the stress in a verb is completely predictable, given its conjugational class and form (see, e.g., Harris 1969, Hooper 1976 for analyses of verb stress placement). A few examples are shown in (4).

(4) *Verbs have predictable stress*

- | | | | |
|-----|---------|--------------------------------|----------------------------------|
| | | <i>3sg. present indicative</i> | <i>3sg. preterite indicative</i> |
| (a) | 'speak' | hábla | habló |
| (b) | 'eat' | cóme | comió |
| | | ➔ Penultimate stress | ➔ Final stress |

So while lexical contrasts in stress placement are relatively limited in Spanish nouns and adjectives, they are completely absent in verbs. Again, nouns have a comparatively privileged status with respect to phonological contrast.

2.3 Sinhala

In Sinhala, underlying vowel hiatus at root-suffix boundaries is always repaired. However, the preferred repair strategy depends on the lexical category of the root involved (Fenstern 1979; Keer 1996; Letterman 1997; data shown here are from Letterman 1997). As exemplified in (5), nouns always resolve hiatus by glide insertion; no input material is deleted.

- (5) *Nouns repair hiatus by glide insertion*
- | | | | |
|-----|--------------|---------------------|-------------------|
| (a) | /ræ+a/ | ræjə | 'night, sg.def.' |
| (b) | /toppi+a/ | toppijə | 'hat, sg.def.' |
| (c) | /aʈu+a/ | aʈu <u>w</u> ə | 'attic, sg.def.' |
| (d) | /maaligaa+a/ | maaligaa <u>w</u> ə | 'palace, sg.def.' |

In contrast, as shown in (6), verbs preferentially resolve hiatus by deletion of an input vowel (although if both morphemes are monosyllabic, glide epenthesis does occur as a last-resort strategy; see (6c)).

- (6) *Verbs prefer to resolve hiatus through deletion*
- (a) Polysyllabic verbs: Root-final vowel deletes
- | | | |
|----------------------|---------|----------------------------------|
| /ba <u>l</u> a+ili/ | bæɻili | 'look, pl. nominal' ² |
| /ko <u>r</u> a+ili/ | kɛɻili | 'do, pl. nominal' |
| /te <u>e</u> r+ilaa/ | teɻilaa | 'understand, past part.' |
- (b) Monosyllabic verbs: Suffix vowel deletes
- | | | |
|--------------------|--------|-----------------------------------|
| /da+ <u>i</u> laa/ | daɻlaa | 'burn, past part.' |
| /we+ <u>i</u> laa/ | weɻlaa | 'become, past part.' ³ |
- (c) Monosyllabic verb and suffix: Glide insertion in this case only
- | | | |
|------------|------------------|------------------------------|
| /e+e+.../ | e <u>w</u> e... | 'come, passive' ⁴ |
| /ka+e+.../ | kæ <u>w</u> e... | 'eat, passive' |
| /ya+e+.../ | yæ <u>w</u> e... | 'go, passive' |

These patterns suggest that there is more pressure to preserve input material belonging to nouns than to verbs in Sinhala -- that is, nouns are able to resist the phonological process of vowel deletion to which verbs are generally subject.

2.4 Summary

The examples surveyed in this section are languages in which words of different lexical categories have different phonological behavior. The generalization that emerges from these examples is that nouns have greater phonological privilege than verbs. (Concerning adjectives, see the discussion in Section 5 below.) This generalization is further supported by a number of additional examples: In Arabic, verbs must fit morphological templates, but nouns need not be templatic (McCarthy & Prince 1990). In various Bantu languages, nouns have a greater number of contrastive tonal melodies than verbs have (e.g., Shona; Myers 1997). In Tuyuca, verb stem accent is sometimes subordinated to the accent of "dominant" suffixes, but this never occurs with noun stem accent (Barnes 1996; Smith 1998). Section 3 now turns to the question of how these kinds of noun/verb asymmetries can be modeled in the grammar.

Within OT, two major approaches have emerged in the analysis of this positional neutralization pattern, positional faithfulness (Selkirk 1994; Beckman 1995, 1998; McCarthy and Prince 1995; Casali 1996) and positional markedness (Steriade 1997; Zoll 1997, 1998). The basic idea shared by these theories is that a constraint can be designated to apply only to material inside a particular strong or weak position, so, effectively, the relationships between **M** and **F** can be different inside and outside a particular position.

This discussion adopts the positional faithfulness account of positional neutralization as implemented by Selkirk (1994) and Beckman (1995, 1998). This theory recognizes general **M** constraints, general **F** constraints, and **F** constraints for strong positions (**F-str**), which are, according to Beckman (1998; see also Casali 1996), those positions which are either phonetically or psycholinguistically prominent.⁶ All of the three constraint types can be freely reranked with respect to one another, resulting in the following factorial typology.

(10) *Factorial typology in positional faithfulness theory*

- | | | |
|---|---------------------------------------|--|
| <p>(a) M >> PF >> F
 <u>M</u> >> F >> F-str</p> | <p>(M highest ranked)</p> | <p>No contrast in any position</p> |
| <p>(b) F >> <u>M</u> >> F-str
 F >> F-str >> <u>M</u>
 F-str >> <u>F</u> >> <u>M</u></p> | <p>(F dominating M)</p> | <p>Contrast in all positions</p> |
| <p>(c) F-str >> M >> F</p> | <p></p> | <p>Positional neutralization:
contrast in strong position only</p> |

With this inventory of constraint types, languages can have a contrast in no positions, in all positions, or in strong positions only. The third possibility is precisely what is needed to account for positional neutralization effects, and it works as follows. In the ranking in (10c), the relationship **M** >> **F** holds for the language in general (because **F-str** only applies to material in the designated strong position), so the contrast is generally neutralized. However, precisely in the strong position, **F(-str)** >> **M**, so the contrast is maintained there.

In summary, positional neutralization is a phenomenon in which certain 'strong' positions, which have intrinsic phonetic or psycholinguistic prominence, license contrasts that other positions do not. It is accounted for by the theory of positional faithfulness, in which the prominent positions have special **F-str** constraints. With the ranking in (10c), an **F-str** constraint causes its associated strong position to maintain a contrast even though that contrast is neutralized elsewhere in the language.

3.2 *The noun as a strong position*

In all of the languages discussed in Section 2 with noun/verb differences, nouns have a greater degree of phonological freedom than verbs, whether in number of contrasts permitted or in resistance to phonological processes. That is, nouns are behaving like the familiar 'strong positions' in positional neutralization cases. This indicates that noun/verb differences should themselves be seen as a type of positional neutralization: nouns, being strong, resist neutralization processes that apply to verbs, being weak. Consequently, as for other strong positions, the grammar must contain a family of *noun faithfulness* constraints (**F-Noun**). If a language contains a constraint ranking of the form **F-Noun** >> **M** >> **F**, nouns will show greater phonological privilege than verbs along the

relevant dimension of faithfulness.

There is some evidence outside phonology in support of the claim that the category *noun* is a strong position. Beckman (1998) observes that the phonologically strong positions with special sets of **F-str** constraints are those positions that are psycholinguistically or phonetically prominent. In fact, there are findings from psycholinguistic studies suggesting that nouns are prominent. Nouns seem to be processed differently from verbs in a way that suggests differences in semantic or lexical organization (Huttenlocher & Lui 1979). Young children acquire nouns faster and in greater numbers than verbs (Goldin-Meadow et al. 1976), and the preference for nouns in acquisition is observed in a range of typologically distinct languages (Gentner 1982).

In addition, there are morphological differences between nouns and verbs. Verbs are more likely to require inflectional morphemes than nouns, so it might be said that nouns are closer to canonical free forms while verbs are closer to canonical bound forms. There are extreme examples of this kind of difference: languages in which verbs do not even pattern as morphological roots. In Warlpiri, verbs do not behave like roots with respect to [round] harmony (Beckman 1996); they are also few in number and appear to be a closed class (Nash 1980). Similarly, Bakker (1997) argues that Michif, an unusual contact language that has taken its nouns from French and its verbs from Cree, fits into a more typical pattern for contact languages if Cree verb roots are viewed as bound forms. From this perspective, Michif becomes merely another contact language that has taken free forms (here, nouns) from one source language and bound forms (verbs) from another. Indeed, the highly synthetic character of the verb in Cree supports this claim. In any case, the difference in morphological independence between nouns and verbs, seen most strikingly in languages like Warlpiri and Michif/Cree, may be another factor that contributes to the intrinsic prominence of the category *noun*.

This section has introduced the notion of positional faithfulness, which is needed to account for asymmetries of contrast among different positions in the same language, and has shown that noun/verb differences can be analyzed as a subcase of positional faithfulness with the category *noun* as a strong position. The following section gives an analysis of noun/verb differences in Sinhala hiatus resolution, as an example of how an analysis making use of noun-faithfulness constraints can be implemented.

4. Implementing noun faithfulness: Hiatus resolution in Sinhala

This section presents an analysis of hiatus resolution in Sinhala, in order to demonstrate how a positional faithfulness account of category-dependent phonological contrast can be formally implemented. The analysis given here owes much to those presented by Keer (1996) and Letterman (1997). Their analyses differ formally from this one, however, in assuming separate **F** constraints for verbs as well as for nouns.

The relevant data from Sinhala are repeated in (11) and (12) below: verbs repair hiatus by deleting one of the adjacent vowels (in the general case), but nouns repair hiatus by inserting a glide in order not to delete any input material.

(11) *Verbs prefer to resolve hiatus through deletion*

- | | | | |
|-----|-----------------------|-----------|--------------------------|
| (a) | /bal <u>a</u> +ili/ | bæɭili | 'look, pl. nominal' |
| (b) | /kor <u>a</u> +ili/ | kerɭili | 'do, pl. nominal' |
| (c) | /teer <u>e</u> +ilaa/ | teerɭilaa | 'understand, past part.' |

is **M** >> **F**, allowing neutralization.

5. Some further considerations

The proposal that has been developed in the preceding sections is that the category *noun* is a strong position, with associated noun-specific faithfulness constraints. This proposal has been designed to account for the cases of noun/verb differences discussed thus far, in which nouns were seen to have special phonological status compared to verbs. This section discusses a few implications and extensions of the core proposal. First, a language is considered in which nouns actually have fewer possible phonological contrasts than verbs: Chuukese. However, the way in which nouns are restricted in this language is shown to be a kind of neutralization that targets precisely the strong positions that are usually able to avoid positional neutralization processes, providing further support for the fundamental claim that the category *noun* patterns with other known examples of strong positions. Next, the lexical category *adjective* is considered, and the question of how adjectives fit into the pattern of noun/verb differences is addressed. Adjectives appear to fall together either with nouns or with verbs, depending on the inflectional behavior of adjectives in each language.

5.1 Augmentation of nouns in Chuukese

In Chuukese [Trukese] (Goodenough & Sugita 1980; Muller 1999), nouns and verbs differ with respect to word-size effects. Nouns have a bimoraic minimal size requirement, whose effects are seen in (17). The examples in (17a) show the normal surface pattern for nouns: uninflected nouns undergo truncation of the final mora of the underlying form. The special case of bimoraic nouns is shown in (17b). For these nouns, the expected outcome of truncation would be a monomoraic syllable (since the final consonants are not moraic). However, these forms further undergo vowel lengthening, which ensures that they remain minimally bimoraic.

(17) *Surface forms of nouns are minimally bimoraic*

			After deletion of root-final mora:
(a)	/mororofi/	'medicinal plant'	mororof
	/sawaa/	'taro'	sawa
(b)	/fasa/	'nest'	faas (*fas)
	/fæene/	'building'	fææn (*fæn)
	/maa/	'behavior'	maa (*ma)

Verbs are not subject to any such size restriction, as shown in (18). In fact, there are surface contrasts between monosyllabic verbs with long and short vowels.

(18) *Surface forms of verbs can be monomoraic*

(a)	fan	(*faan)	'to run aground'	≠	(b)	faan	'to break open'
	mær	(*mæær)	'to be shifted'	≠		mæær	'to grow (of plants)'
	at	(*aat)	'to arrive'				
	sʊ	(*sʊʊ)	'to depart'				

The preceding examples show that in Chuukese, nouns must meet a bimoraic minimality

requirement, while verbs have no lower bounds on their size. This appears to contradict the proposal made above; if the category *noun* is a strong position, why does it appear here as the target of a neutralization process?

In fact, Zoll (1998) has observed that certain kinds of **M** constraints, driving what she names 'augmentation of the input', do actually target strong positions. Smith (in preparation) argues that augmentation constraints, defined as **M** constraints exclusively affecting strong positions, are limited to constraints that act to make the strong positions *more prominent*. A few examples of augmentation effects are given in (19).

(19) *Examples of augmentation*

- (a) Lengthening of *stressed syllable* (Chierchia 1981)
- (b) Pressure to have stress fall on *root/stem* (Alderete 1999; Smith 1998)
- (c) Minimal Word effects: lengthening of *root* if too small (McCarthy & Prince 1986)

The minimal-word effects observed for nouns in Chuukese also fit this pattern: The nouns are subject to an augmentation process that makes them minimally bimoraic, enhancing their prominence (perhaps by giving them a more prototypically 'root'-like prosodic shape). Since augmentation effects specifically target strong positions, then Chuukese noun-specific augmentation actually provides further support for the claim that the category *noun* is a strong position.

5.2 *The behavior of adjectives*

The discussion in this paper so far has compared only nouns and verbs. When adjectives are considered as well, does a noun-faithfulness account of differences based on lexical category survive? While a fuller consideration of adjectives remains a topic for further research, the following pattern is striking. In Japanese, adjectives pattern phonologically with verbs, not with nouns. And Japanese is a language in which adjectives inflect for *verbal* categories, such as aspect and mood, as in (20).

- (20) *Japanese adjectives have verb-like morphology* (Data from Fukuoka dialect)
- (a) akáka 'is red (imperfective)'
 - (b) akakátta 'was red (perfective)'
 - (c) akakaróo 'probably red (conjectural)'

On the other hand, adjectives in Spanish pattern phonologically with nouns, not with verbs. Furthermore, Spanish adjectives inflect for *nominal* agreement features like gender and number, as shown in (21).

- (21) *Spanish adjectives have noun-like morphology*
- (a) roja 'red, fem.sg.'
 - (b) rojos 'red, masc.pl.'

Arabic is another case like Spanish: adjectives inflect for nominal agreement categories, and they pattern phonologically with nouns, not with verbs (J. McCarthy, p.c.). Many of the other languages considered in Section 2 seem not to have a separate category of *adjective* that is as morphologically distinct as it is in Japanese, Spanish, or Arabic. In Sinhala, adjectives appear to be zero-derived from nouns (Gair 1970:39). In Tuyuca (Barnes 1996), words that might be translated into English as

adjectives are morphologically a kind of verb. In Chuukese (Goodenough & Sugita 1980:xliv-xlvi; 1990), free 'adjectivals' appear simply to be intransitive verbs or nouns used as modifiers.

Thus, at this stage of research, it appears that if adjectives form a distinct morphological category in a language, they will pattern either with nouns or with verbs, depending on the types of morphological categories for which they inflect.

6. Conclusions

The category *noun* is a phonologically strong position, with a family of noun-specific faithfulness constraints. Like other strong positions, nouns are able to resist general positional neutralization processes that target weak positions, giving them the ability to license more phonological contrasts and resist more phonological processes than verbs. Also like other strong positions, nouns are subject to augmentation processes that act to enhance their perceptual prominence. The extra-phonological source of prominence that allows nouns to function as a phonologically strong position may be either special status in acquisition, more root-like status in morphology, or a combination of such factors.

Notes

* I am grateful to the participants at the University of Alberta Workshop on the Lexicon in Phonetics and Phonology (June 1999) for comments and discussion, especially Joe Pater, Rachel Walker, Robert Kirchner, and Colin Wilson; thanks also to John McCarthy and Lisa Selkirk. Of course, any errors or omissions are solely my responsibility. Please address comments to <jlsmith@linguist.umass.edu>. This research was partially supported by NSF grant SBR-9420424 and by an NSF Graduate Research Fellowship.

[Update, Jan 2002: Please now address comments to <jlsmith@unc.edu>.]

1. Other dialects of Japanese, including Tokyo and Osaka, also have predictable aspects to their verbal accent phonology (see, e.g., McCawley 1968, Poser 1984).
2. Some verbal suffixes in Sinhala cause umlaut in root vowels.
3. According to Letterman (1997:105), the past participial suffix /-ilaa/ causes vowel lengthening when it attaches to a monosyllabic root, but the verb /we/ 'become' is a lexical exception to this process.
4. In nouns, the inserted glide harmonizes with the preceding vowel (presumably through feature spreading; see Letterman 1997: 71-78), while in verbs, the inserted glide is always [w].
5. As discussed in Prince & Smolensky (1993), the simple fact that NOCODA outranks MAX (or PARSE, in their implementation of faithfulness) does not guarantee that an input /tap/ will be realized as [ta], with deletion. The output candidate [tapi], with epenthesis, satisfies NOCODA equally well, so the choice between [ta] and [tapi] is determined by the relative ranking of the **F** constraints penalizing epenthesis and deletion. The important point here is that with NOCODA highest ranked, [tap] is not a possible output of the language, so there can be no contrast between syllables with and without codas -- regardless of how the input /tap/ is actually altered to conform to NOCODA.
6. The other approaches to positional neutralization differ as follows. Positional faithfulness as implemented by McCarthy & Prince (1995) and Casali (1996) assumes both **F-str** and **F-wk** constraints. In order to prevent *weak* positions from licensing a contrast that strong positions do not, there must be a universally fixed ranking **F-str** >> **F-wk**. [Correction, Jan 2002: Casali uses **F-str** and general **F** constraints in a universally fixed ranking, like Beckman.] However, Keer (1999)

shows that some languages require that (a) there be a general **F** and (b) it dominate **F-str**; this indicates that the Selkirk/Beckman version, which uses general **F**, is a better theory of positional faithfulness.

The positional markedness approach as seen in Steriade (1997) uses constraints of the following types: general **F**, **M-wk**, and general **M** (or **M-str**). In this theory, positional neutralization effects are the result of the ranking **M-wk** >> **F** >> **M**; here, **M** dominates **F** only in the weak position, and **F** >> **M** elsewhere. I choose to use positional faithfulness rather than positional markedness because in (the Selkirk/Beckman implementation of) positional faithfulness, the only special positions that constraints can refer to are strong positions, which are by definition phonetically or psycholinguistically prominent. By contrast, positional markedness requires that constraints refer specifically to *non*-prominent positions. It seems more intuitive that the grammar should be able to identify and refer to prominent positions, which are already known to be important in processes such as perception and lexical access.

7. The insertion of a glide to avoid hiatus is also a faithfulness violation (violating DEP). However, this is probably *not* a violation of the noun-faithfulness constraint DEP_N, because the inserted glide appears outside the noun root itself (as well as outside the suffix).

References

- Alderete, J. (1995). Faithfulness to prosodic heads. Ms., University of Massachusetts, Amherst.
- Alderete, J. (1999). *Morphologically Governed Stress in Optimality Theory*. PhD dissertation, University of Massachusetts, Amherst.
- Bakker, P. (1997). *A Language of Our Own*. Oxford Studies in Anthropological Linguistics, no. 10. New York/Oxford: Oxford University Press.
- Barnes, J. (1996). Autosegments with three-way lexical contrasts in Tuyuca. *IJAL* 62,1:31-58.
- Beckman, J. (1995). Shona height harmony: Markedness and positional identity. In J. Beckman, L. Walsh-Dickey, and S. Urbanczyk, eds., *UMOP 18*. Amherst: GLSA, 53-75.
- Beckman, J. (1996). Labial Opacity as Labial Attraction. LSA Annual Meeting.
- Beckman, J. (1998). *Positional Faithfulness*. PhD dissertation, University of Massachusetts, Amherst.
- Casali, R. 1996. *Resolving Hiatus*. PhD dissertation, UCLA.
- Castillo, C. and O. Bond (1948). *The University of Chicago Spanish Dictionary*. Chicago: University of Chicago Press.
- Chierchia, G. (1981). An autosegmental theory of *raddoppiamento*. *NELS 11*. Amherst: GLSA.
- Feinstein, M. (1979). Prenasalization and syllable structure. *Linguistic Inquiry* 2:245-278.
- Gair, J. (1970). *Colloquial Sinhalese Clause Structures*. Janua Linguarum, Series Practica, no. 83. The Hague/Paris: Mouton.
- Gentner, D. (1982). Why nouns are learned before verbs: Linguistic Relativity versus Natural Partitioning. In S. Kuczaj, II, ed., *Language Development*. Hillsdale, NJ: Erlbaum.
- Goldin-Meadow, S., M. Seligman, and R. Gelman (1976). Language in the two-year old. *Cognition* 4:189-202.
- Goodenough, W. and H. Sugita, eds. (1980). *Trukese-English Dictionary*. Philadelphia: American Philosophical Society.
- Goodenough, W. and H. Sugita, eds. (1990). *Trukese-English Dictionary: Supplementary Volume*. Philadelphia: American Philosophical Society.
- Harris, J. (1969). *Spanish Phonology*. Cambridge, MA: MIT Press.

- Hayata, T. (1985). *Hakata-hougen no akusento · keitairon*. Fukuoka: Kyushu University Press.
- Hooper, J. [Bybee] (1976). *An Introduction to Natural Generative Phonology*. New York: Academic Press.
- Huttenlocher, J. and F. Lui (1979). The semantic organization of some simple nouns and verbs. *Journal of Verbal Learning and Verbal Behavior* 18:141-162.
- Itô, J. (1986). *Syllable Theory in Prosodic Phonology*. PhD dissertation, University of Massachusetts, Amherst.
- Keer, E. (1996). Floating moras and epenthesis in Sinhala. Ms., Rutgers University.
- Keer, E. (1999). *Geminates, the OCP, and Faithfulness*. PhD dissertation, Rutgers University.
- Letterman, R. (1997). *The Effects of Word-Internal Prosody in Sinhala: A Constraint-Based Analysis*. PhD dissertation, Cornell University.
- McCarthy, J. and A. Prince (1986). Prosodic morphology. Ms., University of Massachusetts, Amherst, and Brandeis University.
- McCarthy, J. and A. Prince (1990). Prosodic morphology and templatic morphology. In M. Eid and J. McCarthy, eds., *Perspectives in Arabic Linguistics II*. Amsterdam: Benjamins.
- McCarthy, J. and A. Prince (1995). Faithfulness and reduplicative identity. In J. Beckman, L. Walsh-Dickey, and S. Urbanczyk, eds., *UMOP 18*. Amherst: GLSA, 249-384.
- McCawley, J. (1968). *The Phonological Component of a Grammar of Japanese*. The Hague: Mouton.
- Muller, J. (1999). A unified mora account of Chuukese. *WCCFL XVIII*. Stanford: CSLI.
- Myers, S. (1997). OCP effects in Optimality Theory. *NLLT* 15:847-92.
- Nash, D. (1980). *Topics in Warlpiri Grammar*. PhD dissertation, MIT.
- Poser, W. (1984). *The Phonetics and Phonology of Tone and Intonation in Japanese*. PhD dissertation, MIT.
- Prince, A. and P. Smolensky (1993). *Optimality Theory: Constraint Interaction in Generative Grammar*. Ms., Rutgers University and University of Colorado, Boulder.
- Selkirk, E. (1994). Optimality Theory and featural phenomena. Lecture notes, Linguistics 730, University of Massachusetts, Amherst.
- Smith, J. (1998). Noun faithfulness and word stress in Tuyuca. *ESCOL '97*. Ithaca: CLC Publications.
- Smith, J. (1999). Noun faithfulness and accent in Fukuoka Japanese. *WCCFL XVIII*. Stanford: CSLI.
- Smith, J. (in prep.). Augmentation, prominence, and neutralization. Ms., University of Massachusetts, Amherst.
- Steriade, D. (1993). Positional neutralization. Talk presented at NELS 24, University of Massachusetts, Amherst.
- Steriade, D. (1997). Phonetics in phonology: The case of laryngeal neutralization Ms., UCLA.
- Trubetskoy, N. (1939 [1969]). *Principles of Phonology*. C. Baltaxe, trans. Berkeley/Los Angeles: University of California Press.
- Zoll, C. (1997). Conflicting directionality. *Phonology* 14:263-286.
- Zoll, C. (1998). Positional asymmetries and licensing. Ms., MIT.