

## Category-specific effects

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### 1. Introduction

The difference among lexical categories such as noun, verb, and adjective is a fundamental one in the study of morphology and syntax. Formatives of different categories are traditionally distinguished on the basis of both distributional and morphological criteria.

In addition to their morphosyntactic differences, lexical categories can sometimes also be distinguished on the basis of their phonological behavior. This point has been discussed, among others, by Cohen (1964 [1939]), Postal (1968), Smith (1997, 2001), Myers (2000), and Cable (2004). However, the question of phonological differences among lexical categories is not something that has received much systematic, cross-linguistic discussion in the phonological literature.

This chapter surveys a number of category-specific effects and catalogs them, identifying generalizations or overarching patterns where possible. A discussion of noun/verb differences is given in §2, and the behavior of adjectives is examined in §3. Alternatives to incorporating category-specific rules or constraints into the phonological grammar are discussed in §4, but none of the alternatives considered can fully account for category-specific effects in phonology. Conclusions and implications are presented in §5.

### 2. Lexical category effects in phonology: Nouns versus verbs

This section examines cases of lexical category effects in phonology, with a focus on the basic distinction between nouns and verbs. (Adjectives, which seem to pattern as an intermediate category, are discussed in §3 below.)

The examples are organized first according to which lexical category shows a greater degree of phonological privilege: nouns (§2.1 and §2.2), verbs (§2.3), or neither (§2.4). Here, phonological privilege is generally understood to mean ability to support a greater array of phonological contrasts, whether this is manifested as a larger number of underlying distinctions, a larger array of surface patterns, or a greater resistance to assimilation or other phonological processes. In the framework of Optimality Theory (Prince & Smolensky 2004), greater phonological privilege is formalized in terms of a relatively higher rank for faithfulness constraints and a relatively lower rank for markedness constraints. Within each section, the examples are classified according to the type of phonological phenomenon that is involved in the category-specific pattern. A summary chart is provided in §2.5; to preview the results, cases of noun privilege are the most common, with a few cases each of verb privilege or distinct patterns of phonological requirements. Prosodic and suprasegmental phenomena are much more frequently attested than segmental or featural phenomena.

#### 2.1 *Phonological privilege in nouns*

The examples discussed in this section are all cases where nouns show greater phonological privilege than verbs. The phonological phenomena for which nouns have privilege range over suprasegmental and prosodic effects; strikingly, there do not seem to be straightforward cases of segmental or featural cases of noun privilege.

### 2.1.1 Stress, accent, and tone

In Spanish, the location of stress is lexically contrastive for nouns but not for verbs (Harris 1983; Garrett 1996). Nouns may bear stress on the antepenultimate, penultimate, or final syllable; near-minimal pairs exemplifying antepenultimate and penultimate stress are shown in (1a). Verb forms may appear with surface penultimate or final stress (1b), but the location of stress is determined by the inflectional affix that the verb form bears.

#### (1) Stress location in Spanish

- (a) Nouns: stress is lexically contrastive (data from Castillo & Bond 1948; Solá 1981)

<i>Antepenultimate stress</i>		<i>Penultimate stress</i>	
[ sáβana ]	‘bed sheet’	[ saβána ]	‘savannah’
[ káskara ]	‘shell, rind, husk’	[ kaskáða ]	‘waterfall, cascade’
[ tórtola ]	‘dove’	[ tortúya ]	‘turtle’
[ bíspera ]	‘eve, day before’	[ espéra ]	‘wait, delay’

- (b) Verbs: stress is determined by inflectional affix (data from Garrett 1996: 72-73)

[ láβ-o ]	‘wash-1SG.PRESENT.INDIC’	[ laβ-é ]	‘wash-1SG.PRETERITE.INDIC’
[ láβ-a ]	‘wash-3SG.PRESENT.INDIC’	[ laβ-ó ]	‘wash-3SG.PRETERITE.INDIC’

Modern Hebrew has a similar pattern, in which nouns have lexical contrasts for stress, but stress is completely predictable for verbs (Becker 2003).<sup>1</sup>

A pattern that resembles Spanish, but for pitch accent rather than stress, is (Tokyo) Japanese (McCawley 1968). In nouns, pitch-accent location is lexically contrastive; accent may appear on any syllable, and there are minimal sets among disyllabic nouns (2a). For verbs, there is a lexical contrast between accented and unaccented stems, but much as in Spanish the accent location in an inflected form is determined by the inflectional category (2b).

#### (2) Pitch-accent location in Japanese (data from Hirayama 1960)

- (a) Nouns: location of accent and presence/absence of accent both contrastive (-ga marks nominative case and is included to distinguish finally accented from unaccented nouns)

<i>Initial accent</i>		<i>Final accent</i>		<i>Unaccented</i>
[ háji-ga ]	‘chopsticks’	[ haǰí-ga ]	‘bridge’	[ haji-ga ] ‘edge’
[ káki-ga ]	‘oyster’	[ kakí-ga ]	‘fence’	[ kaki-ga ] ‘persimmon’
[ kíbi-ga ]	‘millet’	[ kibí-ga ]	‘sensation’	
		~ [ kimí-ga ]		[ kimi-ga ] ‘you (INFORMAL)’

- (b) Verbs: presence/absence of accent contrastive, but location of accent predictable

<i>Accented stem</i>		<i>Unaccented stem</i>	
[ kaké-ruu ]	‘hoist-NONPAST’	[ kake-ruu ]	‘be.lacking-NONPAST’

<sup>1</sup> See §3.2 below for further discussion of the Hebrew case, in which adjectives show a pattern intermediate between the noun and verb patterns.

[ káke-te ]	‘hoist-GERUND’	[ kake-te ]	‘be.lacking-GERUND’
[ kake-nágara ]	‘hoist-while’	[ kake-nagara ]	‘be.lacking-while’

Similar patterns, in which nouns have more contrastive pitch accent choices than verbs, include other Japanese dialects (Haraguchi 1977), Proto-Korean (Whitman 1994), Sibe (Kubo 2008), and Ancient Greek (Devine & Stephens 1994).

Finally, an analogous pattern can be found for tone as well. In Mono (Olson 2005), nouns have unpredictable, lexically specified tone shapes. By contrast, verb surface tone patterns are entirely predictable based on their inflectional forms, although there is some evidence from deverbal derivational forms that even verbs may have underlying tone contrasts.

(3) Tone in Mono

(a) Nouns: Any tone possible on any syllable (Olson 2005: 51)

[ gósá ]	‘type of green’	[ zúwā ]	‘flour’	[ lóbà ]	‘clothes’
[ kākó ]	‘leaf’	[ lēngā ]	‘slit drum’	[ jāwò ]	‘firewood’
[ bùdú ]	‘buttocks’	[ zàjā ]	‘anvil’	[ gbàdò ]	‘grub’

(b) Verbs bear tone according to their tense/aspect/modality inflection (Olson 2005: 47-49)

<i>Non-future:</i>	H on first verb syllable; L on any other syllables
<i>Future:</i>	H on syllable preceding verb; L on all verb syllables
<i>Imperative:</i>	L on first verb syllable
<i>Subjunctive:</i>	M on first verb syllable
<i>Stative:</i>	Reduplicate first verb syllable; reduplicant bears HL; verb root bears L
<i>Certainty:</i>	Reduplicant bears HM; M on first verb-root syllable; L on any other syllables

Other languages in which nouns have more tone contrast possibilities than verbs (either in complexity of underlying tonal melody, in how contrastive the location of a H tone is within the word, or in resistance to tonal alternations) include Proto-Bantu and various modern Bantu languages (Kisseberth & Odden 2003), Gã (Paster 2000), and Slave (Rice 1987).

2.1.2 Prosodic shape

In Hebrew (Glinert 1988; Bat El 1994), as well as in closely related Arabic (Ryding 2005), all verbs are subject to a restriction on their prosodic shape — they must fit into one of a number of disyllabic templates. Nouns in Hebrew may also be templatic, but they need not be, particularly in the case of loanwords. In (4), a templatic nouns and verbs derived from those nouns are shown; the verbs are consistently templatic, being bisyllabic and (here) showing the /i e/ vocalism of the *pi?el* template.

(4) Prosodic shape in Hebrew (Bat El 1994: 577-578)

(a) Nouns: Need not be disyllables	(b) Even derived verbs fit disyllabic templates
[ xantariʃ ] ‘nonsense’	[ xintref ] ‘to talk nonsense’
[ télegraf ] ‘telegraph’	[ tilgref ] ‘to telegraph’
[ sinxróni ] ‘synchronic’	[ sinxren ] ‘to synchronize’
[ ksilofon ] ‘xylophone’	[ ksilfen ] ‘to play the xylophone’
[ nostálgia ] ‘nostalgia’	[ nistelg ] ‘to be nostalgic’

A different kind of prosodic shape effect is found in Mbabaram (Dixon 1991). In this language, long vowels are relatively rare, but they are found only in nouns (5), never in verbs.

- (5) Long vowels in Mbabaram appear in nouns but not in verbs (Dixon 1991: 357)

<i>Form with long vowel (noun)</i>		<i>Minimally contrasting form, for comparison</i>	
[ gu:ɾ ]	‘nulla nulla’	[ guɾ ]	‘elbow’
[ ja:ɾ <sup>(ə)</sup> ]	‘spear’	[ ja-ɾ <sup>ə</sup> ]	‘give-past’
[ nɔ:mbi ]	‘big red wallaroo’		
[ gawí:r ]	‘tomahawk’		
[ nambú:ɾ ]	‘big brown snake’		

### 2.1.3 Absence of patterns involving segmental contrasts

All the cases of noun privilege reviewed above involve some kind of prosodic contrast, either related to tone, accent, or stress, or related to word shape or size. Even the noun-specific vowel-length contrast in Mbabaram is a prosodic one rather than a segmental one, since vowel length is not a segmental feature on par with [±high] or [±round], but instead results from the association of one segmental melody to two timing units.

One apparent case of noun privilege that does involve segmental features is found in Nivkh. However, Shiraishi (2004) demonstrates that several apparent noun/verb asymmetries in Nivkh can be analyzed as a straightforward case of Base Identity or cyclicity, since nouns can appear unaffixed in Nivkh but verbs cannot. (See §4.1 below for further discussion of the relationship between lexical category effects and the distinction between free and bound stems.)

## 2.2 Phonological augmentation in nouns

In several languages, nouns are subject to word-minimality requirements that do not hold of verbs. At first glance, this pattern looks like a case of verb privilege, since requirements are being imposed specifically on nouns. However, there is one circumstance in which being a phonologically privileged position correlates with being subject to requirements that do not affect other positions. Positional augmentation, in the sense of Smith (2002), is a pattern in which a phonologically privileged position is required to have a certain property that makes it more perceptually salient. So augmentation is a type of neutralization — all instances of position P must have property X — but unlike other types of phonological neutralization, it is actually a diagnostic for phonological strength.

Word minimality has been analyzed as a requirement for a (morphological) word to be coextensive with a well-formed prosodic word (Prince 1980; Broselow 1982; Crowhurst 1992). It can therefore be classified as a case of positional augmentation (note that content morphemes are often subject to minimality effects in contrast to function morphemes). Thus, the noun-specific minimality effects discussed in this section are compatible with the claim that nouns have greater phonological privilege than verbs have.

In Chuukese (Goodenough & Sugita 1980; Muller 1999), nouns, but not verbs, are subject to a bimoraic word-size minimum. There is a general requirement, affecting both nouns and verbs, that the word-final mora not surface, so underlying final vowels are deleted if short and shortened if long. But when this truncation process would result in a monomoraic surface form, nouns undergo vowel

lengthening, while verbs do not. As a result, there is a surface contrast between CVC and CV:C for verbs, but not for nouns, because \*CVC nouns are ungrammatical.

(6) Word minimality in Chuukese (final codas do not contribute weight; initial geminates do)

(a) Nouns: minimally bimoraic (data from Muller 1999: 395)

<i>CCVC: already bimoraic</i>	/ kkeji /	[ kkej ]	‘laugh’	
	/ tʃtʃara /	[ tʃtʃar ]	‘starfish’	
<i>*CVC: undergoes lengthening</i>	/ fasa /	[ fa:s ]	‘nest’	*[ fas ]
	/ fæne /	[ fæ:n ]	‘building’	*[ fæn ]

(b) Verbs: no bimoraic minimum (data from Goodenough & Sugita 1980: xiv-xv)

[ fan ]	‘go aground’	[ fa:n ]	‘break open (as a boil)’
[ mæ:r ]	‘move, be shifted’	[ mæ:r ]	‘grow (as a plant)’

For more about why Chuukese cannot be simply reduced to a difference between free and bound forms — while the apparently similar word-minimality pattern in Mono (Olson 2005) could be thus reduced — see §4.1.2 below.

Other languages in which nouns, but not verbs, are subject to a minimality requirement include Chukchee and Koryak (Krause 1979).

### 2.3 Phonological privilege in verbs

In the languages discussed in this section, verbs support more phonological contrasts than nouns, but, unlike the cases in §2.2 above, the requirements specific to nouns are not obviously classifiable as cases of noun augmentation. That is, verbs show a greater degree of phonological freedom than nouns without this being a side-effect of nouns being required to have some property of greater perceptual salience.

#### 2.3.1 Tone

In Ewe nouns (Ansre 1961), the contrast between H and L tone is neutralized in syllables with voiced obstruent onsets; only L is possible in that context. However, verbs may have H or L tone with any class of onset consonant.

(7) Consonant/tone cooccurrence restrictions in Ewe

(a) Nouns: voiced obstruent onset may not cooccur with H tone (Ansre 1961: 27-28)<sup>2</sup>

<i>Voiceless obstruents:</i>	[ φú ]	‘bone’	[ φù ]	‘sea’
	[ tú ]	‘gun’	[ tè ]	‘yam’

2 The examples shown here are slightly modified from Ansre (1961), as follows: In the original, the L-tone examples for voiceless obstruents and for sonorants are shown in combination with a specifier [lá], glossed ‘the’; e.g., [φū lá] ‘the sea’. This is because the L tone in syllables with these onset types has a mid (M) allotone when not in final position, and Ansre wished to demonstrate the M tone on these forms. I have removed the specifier and adjusted the gloss and tone mark accordingly, because the distinction between M and L allotones of the L tone is not of concern here.

<i>Sonorants:</i>	[ jí ]	‘cutlass’	[ à-jè ]	‘the trick’
	[ ɲó ]	‘worm’	[ à-ɲè ]	‘the rubber’
<i>Voiced obstruents:</i>	(H tone unattested)		[ βù ]	‘blood’
			[ dà ]	‘snake’
(b) Verbs: onset consonants and tones cooccur freely				
<i>Voiceless obstruents:</i>	[ fá ]	‘is cold’	[ fù ]	‘is white’
	[ tú ]	‘to shut’	[ tù ]	‘to grind’
<i>Sonorants:</i>	[ jó ]	‘to call’	[ jò ]	‘to hurry’
	[ ɲé ]	‘to break’	[ ɲè ]	‘to groan’
<i>Voiced obstruents:</i>	[ bú ]	‘to lose’	[ bù ]	‘to respect’
	[ vó ]	‘to rot’	[ vò ]	‘to be free’

### 2.3.2 Segmental deletion

A few authors have noted cases of diachronic segmental deletion that have affected nouns, but not verbs, indicating a greater degree of phonological privilege for verbs in these cases.

Postal (1968: 248-9) describes a diachronic sound change in Mohawk in which word-final stops were lost in nouns (except for nouns that were reduplicating animal names), but were retained in verbs.

#### (8) Loss of final stops in Mohawk (Postal 1968: 248)

(a) Nouns: final stop absent (compare morphologically related verbs)				
	<i>Nouns</i>		<i>Related verbs</i>	
	[ 'kâ:sereh ]	‘vehicle’	[ ke?serehta'nû:we?s ]	‘I like vehicles’
	[ o'dzistoh ]	‘star’	[ kdzistohkwa'nû:we?s ]	‘I like stars’
	[ 'oshes ]	‘syrup, honey’	[ keshesta'nû:we?s ]	‘I like honey’
	[ 'katshe? ]	‘bottle, can’	[ ketshe?ta'nû:we?s ]	‘I like cans’
	[ 'oh]dʒʌ? ]	‘bone’	[ k[dʒʌ?ta'nû:we?s ]	‘I like bones’
(b) Verbs: surface word-final stops occur				
	[ 'i:sek ]	‘eat it’		
	[ ra'kâ:rut ]	‘let him make a hole’		

Another case is that of Paamese (Crowley 1997: 243-244), in which proto-Paamese \*/l/ has been lost in northern Paamese in a variety of environments, including word-initially; but word-initial \*/l/ has been preserved in verbs specifically.

(9) Loss of initial \*/l/ in northern Paamese does not apply to verbs

(a) Nouns show loss of initial \*/l/ (Crowley 1997: 243-4)

\*leiai → [ eiai ] ‘bush’  
 \*la:la → [ a:ia ] ‘kind of bird’

(b) Verbs preserve initial \*/l/ (Crowley 1997: 244)

\*leheie → [ lehei ] ‘(s)he pulled it’  
 \*loho → [ loh ] ‘(s)he ran’  
 \*la:po → [ la:po ] ‘(s)he fell’

In both these cases, it seems that a marked segment (a particular type of word-final coda in Mohawk; a high-sonority word-initial onset in Paamese) is being tolerated in verbs even though it is not tolerated in nouns. If this is the correct interpretation, it seems that these are cases of greater phonological privilege for verbs.

### 2.4 Distinct restrictions on nouns and verbs

This section presents cases in which neither nouns nor verbs appear to have a greater array of phonological contrasts; both categories are subject to phonotactic requirements. However, the requirements that hold of nouns and those that hold of verbs are distinct.

#### 2.4.1 Default stress assignment

In Lenakel (Lynch 1975, 1978), stress is predictable in all forms, but secondary stress assignment is different for nouns than for verbs. In nouns (10a), secondary stresses are assigned rightward from the primary stress, and initial syllables do not necessarily bear stress. In verbs (10b), the initial syllable always bears a secondary stress (unless the second syllable bears the main stress), and additional secondary stresses are assigned leftward from the initial syllable.

(10) Default stress assignment in Lenakel

(a) Nouns: secondary stress assigned rightward from the main-stress syllable

/ kamatoa / [ kɑ̃.mɑ.dó.a ] ‘kind of taro’  
 / nim<sup>w</sup>akilakil / [ ni.m<sup>w</sup>ð.gə.lá.gəl ] ‘beach’  
 / tup<sup>w</sup>alukaluk / [ tu.b<sup>w</sup>ð.lu.gá.luk<sup>h</sup> ] ‘lungs’

(b) Verbs: secondary stress assigned leftward from the initial syllable

/ r-im-olkeikei / [ r̃.məl.géj.géj ] ‘he liked it’  
 / n-im-ar-olkeikei / [ ñ.mɑ.rəl.géj.géj ] ‘you (pl.) liked it’  
 / n-im-am-ar-olkeikei / [ ñ.mɑ.m̃ɑ.rəl.géj.géj ] ‘you (pl.) were liking it’  
 / t-n-ak-am-ar-olkeikei / [ t̃.nɑ.g̃ɑ̃.mɑ.rəl.géj.géj ] ‘you (pl.) will be liking it’

A similar, although less phonologically straightforward, case is that of English (Kelly 1988), which has a preference (though not an absolute requirement) for initial or trochaic stress in disyllabic nouns versus final or iambic stress in disyllabic verbs. See additional discussion of this claim in §4.3 below.

### 2.4.2 Predictable tonal patterns

In Lamang (Wolff 1983), nouns and verbs each have predictable tone, but different factors determine the surface tones in each case. Noun tones are determined by the class of the onset consonant, interacting with various phrase-level and assimilatory effects (11a). The basic pattern is that tone is low when the onset is a voiced obstruent (as for nouns in Ewe; see §2.3.1 above), and tone is high<sup>3</sup> when the onset consonant is a sonorant, a voiceless obstruent, or one of [b] or [d], which Wolff (1983: 28) describes as “laryngealized” but “only...incidentally ‘implosive’ on some occasions.” Verb tones, on the other hand, are entirely determined by the inflectional category of the verb (11b), except for two exceptional verb roots that seem to pattern like nouns, with the onset-related tone assignment overriding the usual inflectional tones.

#### (11) Predictable tone patterns in Lamang

##### (a) Nouns: L after voiced obstruent, H otherwise (Wolff 1983: 67-8)

<i>Voiced obstruents (L)</i>	<i>Voiceless obstruents (H)</i>	<i>Sonorants (H)</i>
[ ɣ <sup>w</sup> à ] ‘mountain’	[ ʔá ] ‘cow’	[ éwé ] ‘mouth’
[ dzè̀vò ] ‘hand’	[ útáká ] ‘country’	[ m̀kílí ] ‘rat (spec.)’

##### (b) Verbs: tone determined by inflectional category (Wolff 1983: 77)

[ k̀l̀l̀ ] ‘I take (CONTINUOUS)’	[ k̀l̀l̀ ] ‘I take (DURATIVE CONTINUOUS)’
[ k̀k̀l̀l̀ ] ‘I have begun to take (PERFECT II)’	[ k̀k̀l̀l̀ ] ‘I have taken (PERFECT I)’
[ k̀l̀l̀j̀ ] ‘that I take (SUBJUNCTIVE I)’	[ k̀l̀l̀j̀ ] ‘I took (AORIST)’

Lamang is typologically unusual in that, unlike nouns and verbs, function morphemes do have lexically contrastive tones (Wolff 1983: 74). As discussed also in §6, it is much more typologically common for lexical morphemes to have greater possibilities for phonological contrast than function morphemes do than the reverse. (Ideophones, which Wolff calls “expressives,” also have contrastive tones.)

### 2.4.3 Absence of patterns involving segmental contrasts

One apparent case of a language that has slightly different segmental inventories in nouns and verbs is Michif (Bakker 1997). However, this difference is probably not strictly speaking a lexical category effect, as Michif is a mixed language in which nouns and verbs tend to fall into different lexical strata as well.

## 2.5 Summary: Survey of category-specific effects

The category-specific effects reviewed in this section, involving a difference in phonological behavior between nouns and verbs, are summarized in (12).

3 In some cases a preceding low tone causes this potential high tone to assimilate and become low (Wolff 1983: 67). In addition, there are certain phrase-level dissimilatory effects as well as an “accent” that may boost tone on the antepenultimate syllable of the phrase (see summary of predictable tone effects in nouns in Wolff 1983: 72).

## (12) Noun/verb differences in phonological behavior

<i>Language</i>	<i>Phenomenon</i>	<i>N/V pattern</i>
Spanish Hebrew Japanese Proto-Korean Sibe Ancient Greek Mono Proto-Bantu Slave Hebrew Mbabaram	stress stress accent accent accent tone tone tone prosodic shape prosodic shape	N privilege
Chuukese Chukchee, Koryak	prosodic shape prosodic shape	N augmentation
Ewe Mohawk Paamese	tone diachronic segment deletion diachronic segment deletion	V privilege
Lenakel Lamang	stress tone	Distinct but predictable

Noun privilege (plus noun augmentation, which as noted above is arguably related to noun privilege) appears to be the most common pattern, with relatively fewer cases of verb privilege and distinct predictable patterns for nouns and verbs. It is also noteworthy that nearly all of these examples involve suprasegmental properties like stress, accent, and tone, or else prosodic shape (word minimality, word shape, and vowel length). The only cases involving segmental or featural phenomena that have emerged in this survey are the two examples of diachronic segment deletion that affects nouns but spares verbs.

### 3. Beyond noun and verb: The behavior of adjectives

Adjectives are in a sense intermediate between nouns and verbs morphosyntactically, and their phonological behavior reflects this fact as well. In some languages, adjectives fall together either with nouns or with verbs in terms of their phonological patterns, and the grouping they form seems to correlate with the nature of adjectival inflectional morphology in the language (§3.1). In other languages, adjectives seem to enjoy “partial privilege” — they lie between nouns and verbs on a continuum of phonological behavior (§3.2).

#### 3.1 *Adjectives as a subcase of nouns or verbs*

In a language with category-specific phonological patterns, adjectives often pattern either with nouns or with verbs, as shown in (13).

## (13) Adjective behavior generally correlates with adjective inflection type

<i>Language</i>	<i>Phenomenon</i>	<i>N/V pattern</i>	<i>Adjective behavior</i>	<i>Adjective inflection</i>
Japanese Ewe	accent tone	N privilege V privilege	same as V	V-type
Spanish Mono Mbabaram Hebrew	stress tone prosodic shape prosodic shape	N privilege N privilege N privilege N privilege	same as N	N-type
Hebrew	stress	N privilege	N > A > V	N-type
Mandarin	reduplication	Distinct	Distinct	isolating language
Lenakel	stress	Distinct	depends on role?	depends on role?

In general, the category with which adjectives form a class seems to correlate with the type of morphological inflection that the adjectives undergo. When adjectives inflect for nominal categories such as person, gender, number, or case — as in Spanish, Mono, Mbabaram, and Hebrew — they tend to pattern phonologically with nouns. Analogously, when adjectives inflect for verbal categories such as tense, mood, or aspect — as in Japanese and Ewe — they tend to pattern phonologically with verbs.

Three of the languages listed in (13) present additional complications, however. In Hebrew, adjectives inflect for nominal categories, but their behavior with respect to stress is actually intermediate between that of nouns and verbs. Mandarin is a language that does not have much of an inflectional system, but here again, adjectives show a pattern that is distinct from both nouns and verbs. These two cases are discussed in §3.2, along with an additional case, Finnish, that shows distinct behavior between nouns and adjectives even when they bear the same inflectional morphemes. Finally, Lenakel appears to show a tight correlation between inflectional morphology and category-specific phonology; this language is discussed further in §4.2 below.

### 3.2 *Adjectives as an intermediate category*

While many languages show adjectives patterning together either with nouns or with verbs, Hebrew stress, Mandarin reduplication, and Finnish mutation and deletion are phonological phenomena in which adjectives have their own specific pattern. However, these cases suggest that even when adjectives show distinct behavior, they nevertheless fall between nouns and verbs with respect to phonological privilege.

Becker (2003) discusses the case of stress in Hebrew, in which nouns, adjectives, and verbs all show distinct behavior. The default stress pattern is “mobile” stress, in which stress is attracted to the right edge of the word: mobile stress falls on the final syllable when a form is unaffixed, or on the rightmost suffix. All verbs have mobile stress. Adjectives and nouns have a phonological contrast between mobile stress and “fixed” stress, where stress remains on a particular syllable of the base. But there is a further difference between adjectives and nouns in that when adjectives have fixed stress, they always have stress on the final syllable of the root, whereas nouns have lexical contrasts for the location of fixed stress.

## (14) Stress contrasts in Hebrew

- (a) Nouns: location of fixed stress is lexically contrastive (Becker 2003: 1-2)

*Mobile stress*

[ dikdúk ]      ‘grammar-sg’      [ dikduk-ím ]      ‘grammar-pl’

*Fixed stress*

[ kópírajter ]	‘copywriter-sg’	[ kópírajter-im ]	‘copywriter-pl’
[ díktátor ]	‘dictator-sg’	[ díktátor-im ]	‘dictator-pl’
[ tút ]	‘strawberry-sg’	[ tút-im ]	‘strawberry-pl’

- (b) Adjectives: fixed stress is always root-final (Becker 2003: 1-2)

*Mobile stress*

[ tóv ]	‘good-sg’	[ tov-ím ]	‘good-pl’
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*Fixed stress*

[ malján ]	‘rich-sg’	[ malján-im ]	‘rich-pl’
[ fonológ-i ]	‘phonological-sg’	[ fonológ-i-im ]	‘phonological-pl’

- (c) Verbs: all verbs have mobile stress (Becker 2003: 1)

[ ʃamár ]	‘keep-sg’	[ ʃamr-ú ]	‘keep-pl’
[ bizbéz ]	‘spend-sg’	[ bizbez-ú ]	‘spend-pl’

As Becker (2003) observes, this means that adjectives have greater phonological freedom than verbs, but not as much as nouns, making them an intermediate category.

In Mandarin, N, A, and V show distinct behavior with respect to reduplication (Feng 2003). Disyllabic nouns do not reduplicate at all (although monosyllabic nouns do). Disyllabic adjectives reduplicate in the shape AB → AABB (15a), while disyllabic verbs reduplicate in the shape AB → ABAB (15b). Some adjective or verb bases may reduplicate in both shapes, in which case the AABB form is an adjective, and the ABAB form is a verb (15c).

- (15) Adjective versus verb reduplication patterns in Mandarin (Feng 2003: 2)<sup>4</sup>

- (a) Adjectives: AB stem reduplicates with AABB pattern

[ kán.tɕîŋ ]	‘clean’	[ kán.kán.tɕîŋ.tɕîŋ ]	‘clean (intensified)’
[ mʲîŋ.pǎi ]	‘clear’	[ mʲîŋ.mʲîŋ.pǎi.pǎi ]	‘clear’

- (b) Verbs: AB stem reduplicates with ABAB pattern

[ tɕʰîŋ.tɕʷú ]	‘celebrate’	[ tɕʰîŋ.tɕʷú.tɕʰîŋ.tɕʷú ]	‘celebrate a little’
[ tǎ.sàw ]	‘clean up’	[ tǎ.sàw.tǎ.sàw ]	‘clean up a little’

- (c) Shape of reduplicated form determines its category

<i>Adjective base</i>	[ káw.çîŋ ]	‘happy’
<i>AABB = adjective</i>	[ káw.káw.çîŋ.çîŋ ]	‘happy (intens.)’
<i>ABAB = verb</i>	[ káw.çîŋ.káw.çîŋ ]	‘have some fun’

4 Mandarin tone marks are given in accordance with IPA usage, rather than pinyin usage as in Feng (2003).



Again, it is somewhat difficult to interpret this pattern in terms of relative phonological privilege, because both mutation and deletion involve a change to the input form. However, mutation, the pattern favored by nouns, does preserve all input segments (even though certain distinctive feature values are changed), so it is not out of the question to view the correlation between mutation for nouns versus deletion for adjectives as a consequence of greater noun privilege.

### 3.3 *Adjective patterns as scale conflation*

The examples reviewed and discussed in §3 are generally compatible with one of the following scales.

(18) Scales of phonological privilege by lexical category

- (a) { N        A } > V
- (b) N        > { A        V }
- (c) N        > A        > V

This pattern is very suggestive of the general phenomenon of *markedness conflation* (de Lacy 2004), in which there is a universal markedness scale  $X > Y > Z$ , but on a language-specific basis, adjacent levels of the scale can be conflated and consequently pattern as a single larger class with respect to that dimension of markedness. In other words, positing a universal scale of phonological privilege for lexical categories, as in (18c), is compatible with the existence of languages that conflate the middle category, A, with either N (18a) or V (18b).

## 4. On the effectiveness of non-phonological explanations for category-specific effects

The discussion so far has focused on demonstrating that there are languages in which words that belong to distinct lexical categories also show distinct phonological behavior. However, there are important questions that have not yet been addressed. Namely, does the phonological grammar actually need to make reference to lexical categories? Or can all apparent category-specific phonological phenomena be reduced to epiphenomena, simple outcomes of the interaction between phonology and other modules of the grammar such as morphology or syntax? Finally, to the extent that there are category-specific effects in phonology, does this require reference to the same lexical category labels used by the morphosyntax, or should it be handled in the same way as cases of exceptional phonological behavior by arbitrary classes of morphemes?

It turns out that some cases of category-specific phonology can indeed be reduced to other, more basic phenomena. However, this is not true for all cases.

### 4.1 *The free versus bound distinction*

As seen in the chart in (19), there seems to be a high degree of overlap between the lexical categories in a language that have phonological privilege, and the lexical categories in that language that may occur as free forms (i.e., in the absence of obligatory inflection).

## (19) Category-specific phonological privilege and the free/bound distinction

<i>Language</i>	<i>Phenomenon</i>	<i>N/(A)/V pattern</i>	<i>Free/bound</i>
Japanese	accent	N > A,V	N free   A,V bound
Mono	tone	N, A > V	N, A free   V bound
Mbabaram	prosodic shape	N, A > V	N, A free (absolute case)   V bound
Spanish	stress	N, A > V	Some N, A free   V bound
Hebrew	prosodic shape	N, A > V	Some N, A free   V bound
	stress	N > A > V	
Lenakel	stress	N, (A) ≠ V, (A)	N free   A by function   V bound

Indeed, some of the category-specific effects that have been discussed in the literature have been convincingly demonstrated to reduce to a free/bound distinction (§4.1.1). However, there remain cases of category-specific phonology that cannot be directly equated to this type of morphological distinction (§4.1.2).

#### 4.1.1 Category-specific effects that reduce to free/bound effects

One phenomenon that is sometimes found to differentiate nouns and verbs phonologically has to do with word-minimality effects. However, a number of these cases are straightforwardly explained in terms of the free/bound distinction. (The case of Chuukese, discussed in §2.2, is one that does not submit to this type of explanation; see §4.1.2 below for discussion.)

For example, consider Mono. Olson (2005: 75, 79) observes that there are no monosyllabic surface forms of nouns or adjectives, and proposes a process of Subminimal Root Augmentation (SRA) that epenthesizes a copy vowel in the initial position of an underlyingly monosyllabic noun: /CV<sub>1</sub>/ → [V<sub>1</sub>CV<sub>1</sub>]. However, Olson (2005: 82) explicitly notes that the reason SRA never applies to verbs is that verbs must appear with some inflectional affix, and as a result are never monosyllabic on the surface even with a subminimal root. Moreover, Olson (2005: 89, 94) shows that /CV/ noun roots fail to undergo SRA if they bear a plural affix or form part of a compound. In short, *words* must be bisyllabic; only nouns and adjectives may surface unaffixed; therefore, only nouns and adjectives are ever in danger of violating the *general* requirement on word size. No category-specific phonological rule or constraint is required.

There is another way in which being free or bound has implications for privilege in maintaining phonological contrast. In some languages, morphologically complex forms show phonological identity to some aspect of their morphological base forms, an effect that has been modeled in terms of phonological cyclicity, or in terms of phonological constraints that enforce faithfulness to morphologically related forms as well as to input or underlying forms (e.g., Kiparsky 1982, 2000; Kenstowicz 1996; Benua 2000, among others). Schematically, suppose that a language has a simplex form /X/ and a complex form /X+Y/. In the absence of cyclicity effects, the phonological grammar simply applies to the segments in the form /X+Y/ as they appear there. But if there is a cyclicity effect, then some similarity requirement will hold between the surface form of [X+Y] and the surface form of [X], giving rise to a property of [X+Y] which would not be expected if this form were simply subject to the phonological grammar of the language on its own.

Cyclicity effects are relevant in the context of a free/bound distinction because if a root /X/ can never appear unaffixed, as \*[X], then the nonexistent surface form \*[X] never has a chance to influence the

phonology of the morphologically complex form /X+Y/. If nouns and verbs differ precisely in this way, such that [N] is a possible surface form but [V] is not, this could potentially lead to differences in the phonology between [N+affix] and [V+affix] forms: [N+affix] might show cyclicity effects that [V+affix] does not show.

Precisely this argument has been made by Shiraishi (2004) for Nivkh, in which several differences can be observed between noun and verb phonology, including segmental/featural effects (which, as noted above, are rare among category-specific phenomena). Shiraishi implements a Base Identity analysis, in which nouns behave differently from verbs because only nouns have underived surface forms than can affect the phonology of their morphological derivatives. A similar argument has been made by Kenstowicz (1996) for a cluster simplification process in Korean; see also the discussion in Cable (2004).

Thus, for languages in which a phonological distinction between nouns and verbs aligns with a difference between free and bound roots, it is possible that phonological cyclicity could be used in place of category-specific phonological processes.

However, not all cases of category-specific phonology can be handled in this way, as seen in the following section.

#### 4.1.2 Mismatches with the free/bound distinction

The difference between free and bound roots is not always consistent with phonological differences between nouns and verbs. This is true when both nouns and verbs are bound; when both nouns and verbs are free; or when there is a distinction within the class of free forms such that some show more phonological privilege than others.

Spanish provides evidence that lexical category differences in phonology are possible even among bound roots. It is true that verbs are always bound, while nouns and adjectives need not be. Crucially, however, the lexically contrastive penultimate stress pattern can occur even on noun and adjective stems that consist of a bound root and a (productive) gender suffix. Nouns with antepenultimate stress and distinct masculine and feminine forms are given in (20a); adjectives with antepenultimate stress and obligatory gender inflection are given in (20b).

(20) Spanish bound roots with antepenultimate stress (data from Castillo & Bond 1948; Solá 1981)

(a)	<i>Nouns:</i>	<i>masculine</i>	<i>feminine</i>	
		[ náwfray-o ]	[ náwfray-a ]	‘shipwrecked person’
		[ bíyam-o ]	[ bíyam-a ]	‘bigamist’
(b)	<i>Adjectives:</i>	<i>masculine</i>	<i>feminine</i>	
		[ lóβrey-o ]	[ lóβrey-a ]	‘murky, dismal’
		[ prósper-o ]	[ prósper-a ]	‘prosperous, successful’
		[ metóðik-o ]	[ metóðik-a ]	‘methodic’
		[ bénet-o ]	[ bénet-a ]	‘Venetian’
		[ supérflu-o ]	[ supérflu-a ]	‘superfluous’
		[ purpúre-o ]	[ purpúre-a ]	‘purple’
		[ simultáne-o ]	[ simultáne-a ]	‘simultaneous’

If noun- or adjective-specific phonological contrast in Spanish were dependent on nouns and adjectives being able to appear as free, unaffixed forms, these antepenultimate examples would not be possible.

Chuukese (discussed in §2.2 above) provides another example that shows that category-specific effects are not always a consequence of a free/bound distinction. In this language, both nouns and verbs may appear unaffixed,<sup>6</sup> and yet only nouns are subject to a minimality requirement. Likewise, Mandarin Chinese (§3.2) shows a three-way difference between nouns, adjectives, and verbs in reduplication patterns, but this is a language with essentially no inflectional morphology at all.

Finally, the category-specific stress patterns in Hebrew are not compatible with an explanation based solely on the free/bound distinction. Both nouns and adjectives may be atemplatic, which is to say morphologically free; and arguably, this is what correlates with their ability to take the fixed stress pattern (Becker 2003). However, the free/bound distinction cannot further account for the difference between nouns, in which the location of fixed stress is phonologically contrastive, and adjectives, in which fixed stress always falls on the root-final syllable.

#### 4.2 *Type of inflectional morphology*

As previously noted in §3, there is a strong correlation between whether adjectives pattern phonologically with nouns or with verbs, and whether adjectives take inflectional morphology for nominal or verbal categories. A particularly interesting case is Lenakel, where adjectives take verbal inflection when they are predicates, but not when they modify nouns (Lynch 1975, 1978). The presence or absence of verbal morphology on adjectives probably determines whether they take on the stress pattern of nouns or of verbs (J. Lynch, p.c.).

However, this *correlation* between inflectional morphology type and category-specific phonological behavior does not serve as an *explanation*. For example, in languages like Spanish or Mono, it is true that verb stress or tone is entirely determined by the verbal inflectional paradigm (§2.1.1). However, just because verbs take verbal inflectional suffixes does not preclude the logical possibility that verb roots might have stress or tone contrasts as well (which might emerge in some particular inflectional form). That this is often not the case is a fact that requires explanation; the implication is that the phonological grammar does need to enforce the lack of contrast in the verb system.

#### 4.3 *Prosodic factors*

Some cases of apparent category-specific effects can be reanalyzed in terms of syntactic or prosodic factors. For example, in Digo (Kisseberth 1984), tones that originate with the verb root may end up on a following noun. However, Kisseberth shows that this is really an effect of phrase-level tonal phonology; verb tones surface on syllables within the noun because tone-assignment rules refer to the right edges of phonological phrases.

Kelly (1988) argues that the reason behind the different stress preferences (although these are not phonological requirements) for disyllabic nouns and verbs originates in their syntactic and prosodic contexts; nouns prefer to be trochees (with initial stress) since they are typically preceded by an unstressed determiner, and alternation between stressed and unstressed syllables is desirable. Verbs occur in a distinct syntactic and prosodic context, so they prefer to be iambic (with final stress).

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<sup>6</sup> Both categories are also subject to a final-mora truncation process, so roots do not in fact surface faithfully. However, this process does not distinguish between nouns and verbs, so it cannot be the source of the category-specific phonological difference.

Clearly, however, while there may be explanations based in prosodic structure for some apparent cases of category-specific behavior, this approach will not be able to handle all the diverse cases discussed in §2 and §3.

#### **4.4 Morpheme-specific effects**

Whether or not they have category-specific phonological effects, languages typically have single morphemes or classes of morphemes that exhibit exceptional behavior (e.g., Saciuk 1969). Sometimes these classes of morphemes share an etymological origin, as when a language borrows many lexical items from a consistent source and those items have special phonological subpatterns.

This fact leads to the question of whether category-specific effects are meaningfully distinct from morpheme-specific effects. Is there a qualitative difference between assigning certain lexical items a phonology-relevant feature named “[–native],” and assigning certain lexical items a phonology-relevant feature named “[+noun]”? While it is quite conceivable that “[–native]” and “[+noun]” might participate formally in the phonological grammar in the same way, there are arguably important differences between the two. First, lexical categories such as noun, adjective, verb do of course have significance outside the phonological grammar. To the extent that items of the same lexical category pattern the same way phonologically, it seems advisable to use the morphosyntactic category label as a way of recognizing the items that pattern together phonologically as well, instead of invoking an arbitrary, phonology-specific feature. Second, to the extent that the scale of privilege  $N > A > V$  as motivated in §2 and §3 above is supported as a linguistic universal, using the morphosyntactic lexical category labels to derive phonologically relevant classes predicts their relative ability to support phonological contrast in a way that arbitrary, phonology-only labels does not.

#### **4.5 Summary: Alternatives to category-specific phonological rules or constraints**

While there are specific instances of apparent category-specific behavior that may be accounted for by morphological, prosodic, or other factors, there remains a core of cases that do appear to require reference to lexical category within the phonological grammar.

### **5. Conclusions and implications**

In this examination of category-specific phonological phenomena, a number of patterns have emerged. Most, although perhaps not all, cases appear to be consistent with a universal scale of phonological privilege,  $N > A > V$ . Furthermore, most cases appear to involve prosodic and suprasegmental phenomena rather than segmental or featural phenomena. Finally, there appear to be correlations between phonological behavior and type of inflection, seen especially in the case of adjectives. However, purely morphological or prosodic-phrasing factors do not seem to provide adequate accounts for category-specific phenomena, indicating that the phonological grammar must be able to refer to lexical categories.

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#### **References**

- Ansre, Gilbert. 1961. *The tonal structure of Ewe*. Hartford: Hartford Studies in Linguistics.  
Anttila, Arto. 2002. Morphologically conditioned phonological alternations. *Natural Language and Linguistic Theory* 20. 1-42.  
Bakker, Peter. 1997. *A language of our own*. Oxford: Oxford University Press.

- Bat El, Outi. 1994. Stem modification and cluster transfer in Modern Hebrew. *Natural Language and Linguistic Theory* 12(4). 571-596.
- Becker, Michael. 2003. Lexical stratification of Hebrew: The disyllabic maximum. In Yehuda Falk (ed.), *Proceedings of the Israel Association for Theoretical Linguistics* 19.
- Benua, Laura. 2000. *Transderivational identity: Phonological relations among words*. New York: Garland.
- Broselow, Ellen. 1982. On the interaction of stress and epenthesis. *Glossa* 16. 115-132.
- Cable, Seth. 2004. Phonological noun-verb dissimilarities in Optimal Paradigms. Paper presented at the MIT Workshop on Paradigm Structure.
- Castillo, Carlos & Otto F. Bond (eds.). 1948. *The University of Chicago Spanish dictionary*. New York: Pocket Books.
- Cohen, Marcel. 1964. Catégories de mots et phonologie. In Carroll E. Reed (ed.), *Études phonologiques dédiées à la mémoire de M. le Prince N. S. Trubetzkoy*. (Reprint with new preface of Travaux du Cercle Linguistique de Prague 8, 1939.) 36-42. University, AL: University of Alabama Press.
- Crowhurst, Megan. 1992. *Minimality and foot structure in Metrical Phonology and Prosodic Morphology*. Doctoral dissertation, University of Arizona.
- Crowley, Terry. 1997. *An introduction to historical linguistics*, 3rd edn. Oxford: Oxford University Press.
- Devine, A.M. & Laurence D. Stephens. 1994. *The prosody of Greek speech*. New York: Oxford University Press.
- Dixon, R.M.W. 1991. Mbabaram. In R.M.W. Dixon & Barry J. Blake (eds.), *Handbook of Australian languages*, vol. 4. 348-402. Melbourne: Oxford University Press.
- Feng, Guanjun. 2003. Lexical category specific constraints: Mandarin verb versus adjective reduplication. In F. Nihan Ketrez, Justin M. Aronoff, Monica Cabrera, Asli Ciger, Shadi Ganjavi, Milena Petrova & Isabelle Roy (eds.), *USC Working Papers in Linguistics* 1. 1-12. Los Angeles: USC.
- Garrett, Susan. 1996. Another look at Spanish stress and syllable structure. *CLS* 32. 61-75.
- Glinert, Lewis. 1988. *The grammar of Modern Hebrew*. Cambridge: Cambridge University Press.
- Goodenough, Ward H. & Hiroshi Sugita. 1980. *Trukese-English dictionary*. Philadelphia: American Philosophical Society.
- Haraguchi, Shôsuke. 1977. *The tone pattern of Japanese: An autosegmental theory of tonology*. Tokyo: Kaitakusha.
- Harris, James. 1983. *Syllable structure and stress in Spanish: A nonlinear analysis*. Cambridge, MA: MIT Press.
- Hirayama, Teruo. 1960. *Zenkoku akusento ziten*. Tokyo: Tôkyôdô.
- Kelly, Michael H. 1988. Phonological biases in grammatical category shifts. *Journal of Memory and Language* 27. 343-358.
- Kenstowicz, Michael. 1996. Base identity and uniform exponence: Alternatives to cyclicity. In Jacques Durand & Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. 365-394. Salford: University of Salford.
- Kiparsky, Paul. 1982. From cyclic phonology to Lexical Phonology. In Harry van der Hulst and Norval Smith (eds.), *The structure of phonological representations I*. Dordrecht: Foris. 131-175.
- Kiparsky, Paul. 2000. Opacity and cyclicity. *The Linguistic Review* 17. 351-366.
- Kisseberth, Charles & David Odden. 2003. Tone. In Derek Nurse & Gérard Phillipson (eds.), *The Bantu languages*. 59-70. London: Routledge.
- Kisseberth, Charles. 1984. Digo tonology. In G.N. Clements & John Goldsmith (eds.), *Autosegmental Studies in Bantu Tone*. 105-182. Dordrecht: Foris.
- Krause, Scott. 1979. *Topics in Chukchee phonology and morphology*. Doctoral dissertation, University of Illinois at Urbana-Champaign.
- Kubo, Tomoyuki. 2008. A sketch of Sibe phonology. *Gogaku kenkyuu fooramu* 16. 127-142.
- Lacy, Paul de. 2004. Markedness conflation in Optimality Theory. *Phonology* 21(2). 145-199.
- Lynch, John D. 1975. Lenakel phonology. *University of Hawaii Working Papers in Linguistics* 7(1). i-vii and 1-244.
- Lynch, John D. 1978. *A grammar of Lenakel*. (Pacific Linguistics B55.) Canberra: Australian National University.
- McCawley, James D. 1968. *The phonological component of a grammar of Japanese*. The Hague: Mouton.

- Muller, Jennifer S. 1999. A unified mora account of Chuukese. In Sonya Bird, Andrew Carnie, Jason D. Haugen & Peter Norquest (eds.), *WCCFL 18: Proceedings of the 18th West Coast Conference on Formal Linguistics*. 393-405. Malden, MA: Cascadilla Press.
- Myers, Scott. 2000. Boundary disputes: The distinction between phonetic and phonological sound patterns. In Noel Burton-Roberts, Philip Carr & Gerard Docherty (eds.), *Phonological knowledge: Conceptual and empirical issues*. 245-272. Oxford: Oxford University Press.
- Olson, Kenneth. 2005. *The phonology of Mono*. Dallas, TX: SIL International.
- Paster, Mary. 2000. *Issues in the tonology of Gã*. Honors thesis, Ohio State University.
- Postal, Paul M. 1968. *Aspects of phonological theory*. New York: Harper and Row.
- Prince, Alan S. 1980. A metrical theory for Estonian quantity. *Linguistic Inquiry* 11. 511-562.
- Prince, Alan S. & Paul Smolensky. 2004. *Optimality Theory: Constraint interaction in generative grammar*. Malden, MA: Blackwell.
- Rice, Keren D. 1987. Metrical structure in a tone language: The foot in Slave (Athapaskan). *CLS* 23, vol. 2. 239-252.
- Ryding, Karin C. 2005. *A reference grammar of Modern Standard Arabic*. Cambridge: Cambridge University Press.
- Saciuk, Bohdan. 1969. The stratal division of the lexicon. *Papers in Linguistics* 1(3). 464-532.
- Shiraishi, Hidetoshi. 2004. Base-Identity and the noun-verb asymmetry in Nivkh. In Dicky Gilbers, Maartje Schreuder & Nienke Knevel (eds.), *On the boundaries of phonology and phonetics*. 159-182. Groningen: University of Groningen.
- Smith, Jennifer L. 1997. Noun faithfulness: On the privileged behavior of nouns in phonology. <http://www.unc.edu/~jlsmith/home/pdf/nfaith97.pdf> (1 March, 2009).
- Smith, Jennifer L. 2001. Lexical category and phonological contrast. In Robert Kirchner, Joe Pater & Wolf Wikely (eds.), *Papers in Experimental and Theoretical Linguistics 6: Workshop on the Lexicon in Phonetics and Phonology*. 61-72. Edmonton: University of Alberta.
- Smith, Jennifer L. 2005. *Phonological augmentation in prominent positions*. New York: Routledge.
- Solá, Donald F. (ed.). 1981. *The Random House basic dictionary: Spanish-English, English-Spanish*. New York: Ballantine Books.
- Whitman, John. 1994. The accentuation of nominal stems in Proto-Korean. In Young-Key Kim-Renaud (ed.), *Theoretical issues in Korean linguistics*. 425-439. Stanford: CSLI.
- Wolff, Ekkehard. 1983. *A grammar of the Lamang language*. Glückstadt: Verlag J.J. Augustin.