Parts of speech in phonology

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Overview

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(1)   Phonological phenomena—rules, constraints, processes, phonotactics—are sometimes ***sensitive to parts of speech*** (PoS)

(2)   A typological survey of PoS effects in phonology (Smith 2011) finds:

   (a)   PoS-sensitive phonology shows a strong tendency to conform to a ***hierarchy of phonological privilege***, N > A > V (**§I**)

   (b)   PoS-sensitive phonology is ***similar to***, but ***does not reduce to***, other morphological patterns related to PoS (**§II**)

   • The bound/free distinction, or "inflectional complexity" more generally

   • Inflection for nominal vs. verbal features

(3)   <u>**Proposal:**</u> The phonological grammar can refer to PoS ***category labels*** (**§III**)

   • This has implications for the morphosyntax/phonology interface

(4)   <u>**Further hypothesis:**</u> The N>A>V hierarchy arises through ***learning biases*** (**§IV**)

   • Perhaps differences among PoS, including morphological complexity and psycholinguistic salience, lead to differences in how easily phonological contrasts can be learned

(5)   About the typological survey (Smith 2011)

   (a)   Includes 20 languages (see Appendix B for full list and references)

   (b)   'Sample of convenience'; all information available to me (so far) on languages with PoS-sensitive phonology

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I. The PoS hierarchy of phonological privilege

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(6)   Some phonological patterns are PoS-sensitive

   • Examples in Cohen (1964); Postal (1968); Kenstowicz & Kisseberth (1977); Smith (1997); Myers (2000); Bobaljik (2008); typological discussion in Smith (2001, 2011)

   • Implication: The phonological grammar is able to refer to PoS labels (§III)

   (a)   See §II for evidence that reference to PoS in phonology is necessary

   (b)   See §III for implications of this claim for the architecture of the grammar

(7)   PoS-sensitive phonological patterns have a striking tendency to follow the hierarchy of privilege **N > A > V**

   Phonological privilege is taken here to mean:

   (a)   Ability to ***support phonological contrasts*** (avoid neutralization of contrasts; (9)–(11))

   (b)   Ability to ***undergo augmentation processes*** (increase in salience (Smith 2002); (12))

(8) This hierarchy is instantiated by languages in which

    (a) only **nouns** are **privileged** (N>{A, V}) | (see (9))

    (b) only **verbs** are **restricted** ({N, A}>V) | (see (10))

    (c) **adjectives** are **intermediate** (N > A > V) | (see (11))

A. Examples

(9) *Only **nouns** are privileged—phonological **contrast***
Japanese pitch accent (McCawley 1968; data from Hirayama 1960)

N | contrast	A | no contrast	V | no contrast
Accent may occur on any syllable	*Determined by inflectional form*	*Determined by inflectional form*
[há.ʃi-.ga] 'chopsticks-NOM'	[a.tsɯ́-.i] 'hot-NONPAST'	[ka.ké-.rɯ] 'hoist-NONPAST'
[ha.ʃí-.ga] 'bridge-NOM'	[á.tsɯ-.kɯ] 'hot-ADVERB'	[ká.ke-.te] 'hoist-GERUND'

(10) *Only **verbs** are restricted—phonological **contrast***
Spanish stress (Harris 1983; data from Castillo & Bond 1948; Solá 1981; Garrett 1996)

N | contrast	A | contrast	V | no contrast
Stress may be final, penultimate, antepenultimate	*Stress may be final, penultimate, antepenultimate*	*Determined by inflectional form*
[sá.βa.na] 'sheet'	[me.tó.ði.k-o] 'methodic'	[lá.β-o] 'wash-1SG.PRES.IND'
[sa.βá.na] 'savanna'	[fa.βo.rí.t-o] 'favorite'	[la.β-é] 'wash-1SG.PRET.IND'

(11) ***Adjectives** are intermediate—phonological **contrast***
Hebrew stress (Becker 2003)   Note: 'mobile stress' = always at right edge of word

N | 2 degrees of contrast	A | 1 degree of contrast	V | no contrast
Stress may be mobile or fixed	*Stress may be mobile or fixed*	*Stress always mobile*
[dikdúk]–[dikduk-ím] 'grammar-SG', '-PL' (*mobile*)	[tóv]–[tov-ím] 'good-SG', '-PL' (*mobile*)	[bizbéz]–[bizbez-ú] 'spend-SG', '-PL' (*mobile*)
[diktátor]–[diktátor-im] 'dictator-SG', '-PL' (*fixed*)	[malján]–[malján-im] 'rich-SG', '-PL' (*fixed*)	[ʃamár]–[ʃamr-ú] 'keep-SG', '-PL' (*mobile*)
Fixed stress on any syllable	*Fixed stress only root-final*	
[kópirajter-im] 'copywriters'	[malján-im] 'rich-PL' -PL'	*(no fixed stress)*
[diktátor-im] 'dictators'	[fonológ-i-im] 'phonological	

(12) *N > V—**augmentation** in word size*
Chuukese word minimality (Muller 1999; data from Goodenough & Sugita 1980: xiv-xv)

• Both N and V undergo a truncation process—final short vowel deleted, long vowel shortened

N | must be minimally bimoraic	V | no minimality requirement
If form is too small (CVC), vowel lengthens	*Single-mora (CVC) forms legal; contrast with CV:C*
/kkeji/ → [kkej] (*already bimoraic*) 'laugh'	/mære/ → [mær] 'move, be shifted'
/fæne/ → *[fæn] → [fæːn] 'building'	/mæːri/ → [mæːr] 'grow (plant)'

B. Typological survey

(13) PoS and phonological privilege—typology (Smith 2011: §2.5; references in Appendix B)

    (a) Majority pattern: Consistent with the hierarchy N > A > V

PoS pattern	*Language*	*Phonological phenomenon*
N contrast preservation	Spanish	stress
	Hebrew	stress
	Japanese	pitch accent
	Proto-Korean	pitch accent
	Sibe	pitch accent
	Ancient Greek	pitch accent
	Mono	tone
	Gã	tone
	Proto-Bantu	tone
	Hebrew	prosodic shape
	Mbabaram	prosodic shape
N augmentation	Chuukese	prosodic shape
	Chukchee, Koryak	prosodic shape
N augmentation?	Paamese	diachronic segment deletion(?)

    (b) More complex pattern (no PoS has obvious privilege)

PoS pattern	*Language*	*Phonological phenomenon*
Distinct, but predictable	Lenakel	stress
	Lamang	tone
	Arabic	prosodic shape
	Itelmen	prosodic shape

    (c) Counterexamples to the N > A > V hierarchy

PoS pattern	*Language*	*Phonological phenomenon*
V privilege	Ewe	tone
V privilege?	Mohawk	diachronic segment deletion(?)

(14) *Summary:* PoS and phonological privilege

    (a) The hierarchy N > A > V is *robust*, but also has a few *exceptions*

    (b) This pattern suggests that the hierarchy arises in the course of language acquisition / grammar learning (see §IV)

II. PoS-sensitive phonology and its relation to other morphological factors

(15) The hierarchy of phonological privilege resembles other morphological patterns

    (a) N > V   ←(?) the distinction between *free and bound forms*

    (b) A is intermediate   ←(?) relationship with *N vs. V inflectional features*

    • However, PoS-sensitive phonology can exist independently of these two factors

    • Implication: The phonological grammar can refer to PoS labels (§III)

A. PoS effects in phonology cannot always be reduced to free vs. bound

(16) In some languages, N/V correlates with a ***free/bound distinction***

    (a)   *Straightforward scenario:* N are free, V are bound

    (b)   *Or:* N have a member of their paradigm with zero inflection; V do not

    (c) Some apparent PoS effects in phonology can be treated as free/bound effects

- **Korean** (Kenstowicz 1996); **Nivkh** (Shiraishi 2004)

(17) However, PoS-sensitive patterns cannot all simply be equated to phonological differences in bound vs. free forms (see also Bobaljik 2008 for related discussion)

    (a) **Spanish stress** (10): PoS difference when both are **bound**

- N, A have stress contrast; V do not
- V are always bound, but even bound N, A allow the stress contrast

    (b) **Chuukese word size** (12): PoS difference when bound/free status is **same**

- N must be minimally bimoraic; V show no such augmentation effect
- Both N and V are free(?) (both undergo truncation)

    (c) **Hebrew stress** (11): PoS difference when both are **atemplatic**

- N may have 'fixed stress' on any syllable; A 'fixed stress' only stem-final
- Both N and A with fixed stress are atemplatic forms (Becker 2003)

    (d) **Itelmen word shape**: PoS difference in whether an epenthesis process applies only in the specific word-forms where its phonological environment is strictly met (N), or whether it applies across the whole paradigm (V)

- Cable (2005) proposes that this difference reduces to the free/bound distinction: it is bound forms that must have a consistent paradigm
- Bobaljik (2008) demonstrates that the PoS-based generalization is empirically accurate, but the free/bound-based one is not
  - Some N are bound, but still have N-style epenthesis
  - Some V derive from 'category-neutral' roots, with a free form, but still have consistent epenthesis throughout the V paradigm

B. Adjective behavior cannot always be reduced to N/V inflectional type

(18) The phonology of the category A often correlates with its inflectional ***features***

    (a) Spanish A inflect for *gender, number = **N-type*** | Phonology: {**N, A**} > V (10)

[rox-o]	'red-M.SG.'	[rox-a]	'red-F.SG.'
[rox-os]	'red-M.PL.'	[rox-as]	'red-F.PL.'

    (b) Japanese A inflect for *tense, aspect = **V-type*** | Phonology: N > {**A, V**} (9)

[aka-i]	'red-NONPAST'	[aka-kɯ-te]	'red-CONTINUATIVE-GERUND'
[aka-katta]	'red-PAST'	[aka-keɾeba]	'red-PROVISIONAL'

(19)   Additional examples of this correlation (Smith 2011: §3)

(a)   Adjectives have N-type inflection and phonology

Language	Phenomenon	A phonology	A inflection
Spanish	stress		
Mono	tone	**same as N**	**N-type**
Mbabaram	prosodic shape		
Hebrew	prosodic shape		

(b)   Adjectives have V-type inflection and phonology

Language	Phenomenon	A phonology	A inflection
Japanese	accent	**same as V**	**V-type**
Ewe	tone		

(20)   However, inflectional features do not always determine A behavior

(c)   Pattern is more complicated (Smith 2011: §3)

Language	Phenomenon	A phonology	A inflection
Hebrew	stress	**N > A > V**	**N-type**
Mandarin	reduplication	**Distinct**	**(~isolating)**
Lenakel	stress	**depends on role?**	**depends on role?**

C.   What role do these morphological factors play in PoS-sensitive phonology?

(21)   *Summary:* The morphological properties *free/bound* and *A inflectional-feature type* are **not the direct cause** of PoS effects in phonology

(a)   Generally speaking, these factors are consistent with the hierarchy N > A > V

(b)   However, in an individual language, PoS-sensitive phonology may operate independently of these factors (→ §III)

(c)   These patterns might function as **learning biases in language acquisition** (§IV)

III. PoS-specific phonology and the architecture of the grammar

(22)   *Proposal:*

Because PoS-specific phonological patterns cannot be reduced to other morphological factors (§II), the phonological grammar must be able to **refer to PoS labels**

(a)   Implementation in Optimality Theory (Prince & Smolensky 2004): Some **constraints are relativized** to particular PoS (Smith 2001)

(b)   Implementation in a rule-based model: Some **rules are designated** as applying to, or not applying to, particular PoS (Postal 1968)

(23)   Given that PoS information is available to the phonological component:

→ there are various implications for the architecture of the grammar

(24) Where is PoS information represented in the grammar?

    (a) If PoS is stored in lexical entries (basic or derived), it can feed into both the morphosyntax and the phonology

    (b) In some models, roots/lexical entries do not have a PoS designation (e.g., Baker 2003; Borer 2005; Embick & Marantz 2008)

- If these approaches are correct, evidence from PoS-sensitive phonology should help constrain models of the morphosyntax–phonology interface
- Namely, the phonology must be able to interface with the morphosyntax at (or after) whatever level of representation determines PoS

(25) Is the N > A > V hierarchy of privilege itself part of the grammatical system?

    (a) If so, it looks like another example of a ***markedness scale***

- Analogues in phonology: sonority (Prince & Smolensky 2004), place of articulation (Lombardi 2001), nasalization (Walker 1998), etc.
- Analogues in morphosyntax (see also Aissen 2003 for a review): animacy (Silverstein 1976), case (Keenan & Comrie 1977), definiteness (Croft 1988)

    (b) If so, it might be support for 'continuum models' of PoS in morphosyntax (e.g., Ross 1972; Comrie 1975; Croft 1990)

- A scale N > A > V does not automatically fall out from a binary-feature model with [±N, ±V] (Chomsky 1970, Baker 2003)

(26) Does the N > A > V hierarchy emerge as a consequence of language acquisition and/or language change? (Or is it innate?)

- This question is separate from (25); if N > A > V is a consequence of learning biases in acquisition, it could still be *either...*

    (a) an explicit part of the grammar, *or*

    (b) an epiphenomenon, such that N > A > V has no status in the grammar itself, but individual patterns that are learned follow this hierarchy of privilege

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IV. The N > A > V hierarchy and biases in language acquisition

(27) Where does the N > A > V hierarchy of privilege come from?

- Just because rules or constraints *refer to* PoS (§III), this does not itself logically require the existence of an *implicational hierarchy* among PoS

(28) Hypothesis / areas for future research:

- The N > A > V hierarchy arises from a ***bias in language acquisition***

We have already seen:

    (a) This hierarchy is not an absolute requirement in the grammatical system—there are exceptions

    (b) Morphological factors such as free/bound or inflectional-feature type look like rough versions of the hierarchy

Now we will further consider:

(c) There are several external factors suggesting that PoS are differently represented in the linguistic or conceptual system
  - Inflectional "complexity"
  - Psycholinguistic differences—acquisition, aphasia studies

(d) PoS-specific effects are overwhelmingly prosodic (rather than segmental)
  - This fact may also have a learnability-based explanation

A. Free/bound revisited: Inflectional complexity as a possible source of learning bias

(29) Hypothesis: If V tend to be more "inflectionally complex" than N, it may be the case that learners have more cognitive resources available to learn complex phonological patterns in N than they can learn in V

  - For recent evidence that *simplicity* in natural-class descriptions or phonological rules leads to a learning advantage, see Chambers et al. (2010), Peperkamp et al. (2006), Skoruppa et al. (2009), and the review in Moreton & Pater (to appear)

(30) Program for future research: Quantify "inflectionally complex", and look for correlations with PoS-specific effects in phonology

  (a) Do V tend to occur with inflection *more often* than N do in a given language? (By word-form? By token?)
  (b) Do V inflectional systems tend to have *more paradigm cells* than N systems?

(31) A first step: Can we empirically substantiate the commonly held intuition that V are "more likely to be inflected" than N? → **Yes.** (see Appendix A for details)

  - Preliminary investigation using WALS database (Dryer & Haspelmath 2011)
  (a) N inflection represented by *plural* (Dryer 2011a) and/or *case* (Iggesen 2011)
  (b) V inflection represented by *tense/aspect* (Dryer 2011b)
  (c) 921 languages can be coded YES/NO for 'morphological' marking in *both* N, V

  (d) N/V comparison
   (i)   *Languages with N inflection* also have V inflection **94%** of the time
   (ii) *Languages with V inflection* also have N inflection **only 76%** of the time
   (iii) The difference between N inflection totals and V inflection totals is significant (McNemar's test; one-tailed, $p < 0.000001$)

(32) Interesting case: **Ewe tone** (Ansre 1961) goes *against* N>A>V hierarchy of privilege

  - V have *more* tone contrasts than N

**V	contrast** *Syllables with a voiced obstruent onset may occur with either high or non-high tone*		**N	no contrast** *Syllables with a voiced obstruent onset may only occur with non-high tone*	
[b**ú**] 'to be lost'	[v**ó**] 'to rot'	—	—
[b**ù**] 'to respect'	[v**ò**] 'to be free'	[βù] 'blood'	[dà] 'snake'

(33) Implications of the Ewe pattern

    (a) Ewe goes against hierarchy of privilege because **V > N** (phonological contrast)

    (b) Status of inflectional morphology somewhat controversial

       • Many inflectional markers are probably clitics rather than affixes (see Westermann 1930; Nurse n.d.)

    (c) But at least V do not seem to be *more* free, or have *less* inflection, than N

    (d) Implication: Inflectional complexity is probably not the only factor behind PoS effects in phonology

       • Can a further look at Ewe provide clues to other relevant learning biases?

B. Psycholinguistic differences as a source of learning biases

(34) Possible psycholinguistic differences among PoS

    (a) Acquisition

    There is some evidence that N are acquired earlier and in greater numbers than V, even when typologically (and culturally) distinct languages are compared (recent reviews: Ogura et al. 2006; D'Odorico & Fasolo 2007)

    (b) Aphasia

    There is some evidence that N-related and V-related abilities are dissociated (recent reviews: Rapp & Caramazza 2002; Mätzig et al. 2009)

C. PoS effects are prosodic, not segmental

(35) PoS-sensitive phonological processes are overwhelmingly ***prosodic*** in nature

    (a) Attested: stress, pitch accent, tone, and word size/prosodic shape

    (b) Strikingly absent: segmental characteristics such as voicing or nasality

Stress	Spanish, Hebrew, Lenakel
Pitch accent	Japanese, Proto-Korean, Sibe, Ancient Greek
Tone	Mono, Proto-Bantu, Ewe, Lamang
Word size/ prosodic shape	Hebrew, Mbabaram, Chuukese, Chukchee, Koryak, Arabic, Itelmen
Diachronic segment deletion(?)	Paamese, Mohawk

(36) Implications of this asymmetry

    (a) Although PoS are clearly relevant for phonology, the interaction between morphosyntax and phonology is restricted to a particular class of phenomena

    (b) Where does this restriction come from?

       • UG (linguistic competence)?—Restrictions on the morphosyntax/ phonology interface as part of the linguistic system?

       • Another learning bias in language acquisition?

(37) Why looking at this as another learning bias seems promising

    (a) Hayes & Steriade (2004) compare phonetically complex generalizations about obstruent voicing against simpler generalizations about syllable weight

        • They suggest that learning prosodic structure (stress, syllable weight) is more difficult because it requires more abstraction from the surface signal, leading to greater formal simplicity in the generalizations learned

    → Does this greater abstraction / greater formal simplicity encourage attention to broad categories such as PoS?

    (b) Albright (2008) conducted an experiment on adult English speakers to see if existing lexical-statistical differences in segment structure between N and V would be generalized to nonce words (wordlikeness task with rating scale)

        • The segmental differences between N and V were not generalized

        • In Albright's interpretation, these differences have thus not been learned

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V. Conclusions, implications, and prospects for future research

(38) Phonological processes can be sensitive to PoS

    (a) Conclusion: The phonological grammar refers to PoS labels

    (b) Implication: This provides a further source of evidence for

        • the representation of PoS in the linguistic system

        • the morphosyntax/phonology interface

(39) PoS-sensitive phonology tends to follow a hierarchy of privilege, N > A > V

    (a) Conclusion: If this is part of the grammatical system, it supports a continuum model of PoS rather than a binary-feature representation

    (b) Future research: Is there evidence that N > A > V arises from a learning bias? If so, what is the source of the bias?
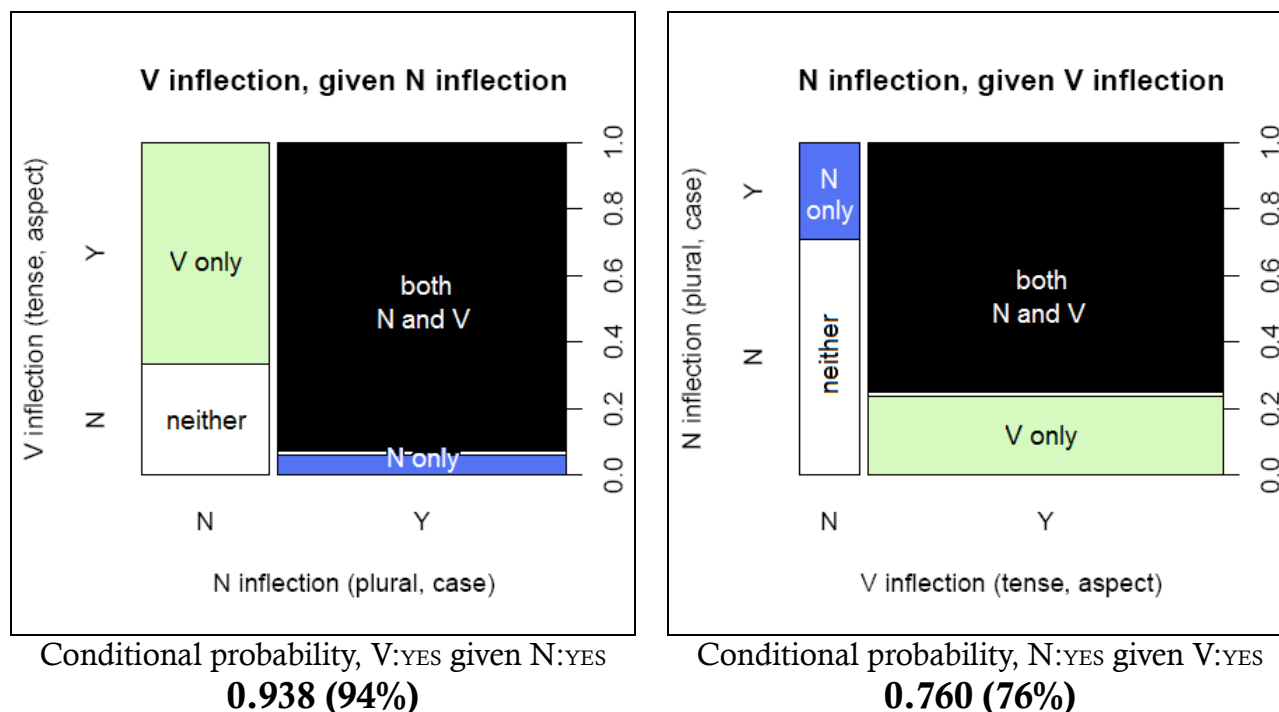

Acknowledgements

Appendix A: Details of the WALS analysis for N and V inflection

(40) Preliminary empirical investigation with language data from the WALS database (Dryer & Haspelmath 2011)

    (a) N inflection is represented by *plural* (Dryer 2011a) and/or *case* (Iggesen 2011)

        • code YES if language has 'morphological' marking for either; NO if neither

    (b) V inflection is represented by *tense/aspect* (Dryer 2011b)

        • code YES if language has 'morphological' marking; NO if not

    (c) Sample consists of languages that have YES or NO values for both N and V

(41) Results (921 languages in sample)

    (a) The most common pattern is for a language to have N:YES and V:YES (65.0%)

    (b) V:YES (85.5%) is more common than N:YES (69.3%)

    (c) Does the presence of N inflection *imply* the presence of V inflection? → **Yes.**
McNemar's test (one-tailed, $p < 0.000001$) shows that the proportion of languages with N inflection and the proportion of languages with V inflection are significantly different

V inflection, given N inflection	**N inflection, given V inflection**
Conditional probability, V:YES given N:YES **0.938 (94%)**	Conditional probability, N:YES given V:YES **0.760 (76%)**

Appendix B: Citations for the typological survey

(42) Citations for languages with PoS-sensitive phonology discussed in Smith (2011)

	Language	Affiliation	Source
(a)	Ancient Greek	Greek	Devine & Stephens (1994)
(b)	Arabic	Semitic	Ryding (2005)
(c)	Chukchee, Koryak	Chukotko-Kamchatkan	Krause (1979)
(d)	Chuukese	Micronesian	Muller (1999), Goodenough & Sugita (1980)
(e)	Ewe	Kwa	Ansre (1961)
(f)	Gã	Kwa	Paster (2000)
(g)	Hebrew	Semitic	Becker (2003)
(h)	Itelmen	Chukotko-Kamchatkan	Bobaljik (1998, 2008)
(i)	Japanese	Japonic	McCawley (1968)
(j)	Lamang	Chadic	Wolff (1983)
(k)	Lenakel	Oceanic	Lynch (1975, 1978)
(l)	Mandarin	Sino-Tibetan	Feng (2003)
(m)	Mbabaram	Paman	Dixon (1991)
(n)	Mohawk	Northern Iroquoian	Postal (1968)
(o)	Mono	Banda	Olson (2005)

(p)	Paamese	Oceanic	Crowley (1997: 243-244)
(q)	Proto-Bantu		Kisseberth & Odden (2003)
(r)	Proto-Korean		Whitman (1994)
(s)	Sibe [Xibe]	Southern Tungusic	Kubo (2008)
(t)	Spanish	Romance	Harris (1983)

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