Phonology **35** (2018). Supplementary materials

Environmental shielding is contrast preservation

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Supplementary materials

These supplementary materials contain four appendices and a bibliography:

The materials are supplied in the form provided by the author.

Appendices for "Environmental shielding is contrast preservation"

Appendix A: list of shielding languages

Key for appendices A-C

Shaded = shielding occurs in this context

Not shaded = shielding not known to occur in this context

The language names provided in appendices A-C are those used by SAPhon.

Evidence = type of evidence found for a vocalic nasality contrast, in addition to the author's description. (MP = minimal or near-minimal pairs; NVNE: nasal vowels in non-nasal environments; –: no additional evidence available)

V-Ṽ?	(Evidence)	Shielding contexts			Language	Family	Source	Appendix B
		NV	VN]$_\sigma$	V]$_\sigma$N				
Yes	MP	■			Aché	Tupí	Roessler (2008)	#1, p. 4
Yes	MP	■			Aguaruna	Jivaroan	Overall (2007)	#2, p. 4
Yes	MP	■			Amahuaca	Panoan	Osborn (1948)	#3, p. 5
Yes	MP	■	■	■	Amarakaeri	Harakmbet	Tripp (1955)	#4, p. 5
Yes	MP	■	■		Amundava	Tupí	Sampaio (1998)	#5, p. 6
Yes	MP	■			Andoke	(Isolate)	Landaburu (2000a)	#6, p. 6
Yes	MP	■			Apiaká	Tupí	Padua (2007)	#7, p. 7
Yes	MP		■		Apinayé	Macro-Ge	Oliveira (2005)	#8, p. 7
Yes	–	■	■		Arára do Mato Grosso	Isolate	da Rocha D'Angelis (2010)	#9, p. 8
Yes	MP	■			Arikapú	Macro-Ge	Arikapú et al. (2010)	#10, p. 8
Yes	NVNE	■			Asurini do Xingú	Tupí	Pereira (2009)	#11, p. 9
Yes	MP	■			Avá-Canoeiro	Tupí	Borges (2006)	#12, p. 9
Yes	MP	■			Barí	Chibchan	Mogollón (2000)	#13, p. 10
Yes	MP	■			Chimila	Chibchan	Malone (2006, 2010)	#14, p. 10
Yes	MP	■			Chiriguano (Chané)	Tupí	Dietrich (1986)	#15, p. 11
Yes	MP	■			Chiriguano (Izoceño)	Tupí	Dietrich (1986)	#16, p. 11
Yes	MP		■		Dâw	Nadahup	Martins (2004)	#17, p. 12
Yes	NVNE	■			Epena	Choco	Harms (1984)	#18, p. 12
Yes	MP	■	■	■	Hup	Nadahup	Epps (2008)	#19, p. 13
Yes	MP	■			Jabutí	Macro-Ge	Ribeiro & van der Voort (2010)	#20, p. 13
Yes	NVNE	■	■		Júma	Tupí	Abrahamson & Abrahamson (1984)	#21, p. 14
Yes	NVNE	■			Kaapor	Tupí	Garcia Lopes (2009)	#22, p. 14
Yes	NVNE	■	■	■	Kaingang (São Paolo)	Macro-Ge	Cavalcante (1987)	#23, p. 15
Yes	NVNE	■	■		Kakua	Kakua-Nukak	Cathcart (1979)	#24, p. 15
Yes	NVNE	■			Karajá	Macro-Ge	Ribeiro (2012)	#25, p. 16

V-Ṽ?	(Evidence)	Shielding contexts			Language	Family	Source	Appendix B
		NV	VN]$_\sigma$	V]$_\sigma$N				
Yes	MP	■			Karapanã	Tucanoan	Metzger & Metzger (1973)	#26, p. 16
Yes	MP	■	■	■	Karitiâna	Tupí	Storto (1999), Everett (2007)	#27, p. 17
Yes	MP	■	■		Karo	Tupí	Gabas (1998)	#28, p. 17
Yes	NVNE	■			Kotiria	Tucanoan	Waltz & Waltz (1972)	#29, p. 18
Yes	MP		■		Krahô	Macro-Ge	Popjes & Popjes (2009)	#30, p. 18
Yes	NVNE	■	■	■	Krenak	Macro-Ge	Pessoa (2012)	#31, p. 19
Yes	NVNE	■	■		Krinkati-Timbira	Macro-Ge	Alves (2004)	#32, p. 19
Yes	MP	■			Kubeo	Tucanoan	Chacon (2012)	#33, p. 20
Yes	MP	■			Mako	Salivan	Labrada (2015)	#34, p. 20
Yes	MP	■			Makuráp	Tupí	Braga (1992)	#35, p. 21
Yes	MP		■		Mamaindé	Nambiquaran	Eberhard (2009)	#36, p. 21
Yes	NVNE	■			Maxakalí	Macro-Ge	Campos (2009)	#37, p. 22
Yes	NVNE	■			Mbyá	Tupí	Thomas (2014)	#38, p. 22
Yes	NVNE		■		Mebengokre	Macro-Ge	Salanova & Silva (2011)	#39, p. 23
Yes	MP		■		Mundurukú	Tupí	Picanço (2005)	#40, p. 23
Yes	MP	■			Myky	(Isolate)	Montserrat (2010)	#41, p. 24
Yes	MP		■		Nadëb	Nadahup	Barbosa (2005)	#42, p. 24
Yes	MP	■			Nhandeva	Tupí	Costa (2007)	#43, p. 25
Yes	MP	■	■	■	Nukak	Kakua-Nukak	Mahecha et al. (2000)	#44; p. 25
Yes	NVNE	■			Pai Tavytera	Tupí	Cardoso (2008)	#45, p. 26
Yes	MP	■			Piratapuyo	Tucanoan	Klumpp & Klumpp (1973)	#46, p. 26
Yes	MP	■			Poyanáwa	Panoan	De Paula (1992)	#47, p. 27
Yes	MP	■			Puinave	(Isolate)	Girón (2007)	#48, p. 27
Yes	MP	■			Secoya del Aguarico	Tucanoan	Johnson & Levinsohn (1990)	#49, p. 28
Yes	MP	■			Secoya del Putumayo	Tucanoan	Vallejos (2013)	#50, p. 28
Yes	NVNE	■			Sharanawa	Panoan	Pike & Scott (1962)	#51, p. 29
Yes	NVNE	■			Sirionó	Tupí	Gasparini (2012)	#52, p. 29
Yes	MP	■			Suyá	Macro-Ge	Guedes (1993)	#53, p. 30
Yes	MP	■			Tapayuna	Macro-Ge	Camargo (2010)	#54, p. 30
Yes	MP	■			Tenharim	Tupí	Sampaio (1998)	#55, p. 31
Yes	NVNE	■			Ticuna of San Martín de Amacayacu	Isolate	Montes Rodríguez (2005)	#56, p. 31
Yes	NVNE	■			Tupinambá	Tupí	Jensen (1984), Moore et al. (1993)	#57, p. 32
Yes	MP	■	■		Uru-Eu-Wau-Wau	Tupí	Sampaio (1998)	#58, p. 32

V-Ṽ?	(Evidence)	Shielding contexts			Language	Family	Source	Appendix B
		NV	VN]$_\sigma$	V]$_\sigma$N				
Yes	MP				Waimaha	Tucanoan	Stolte & Stolte (1976)	#59, p. 33
Yes	NVNE				Wari'	Chapakuran	Everett & Kern (1997)	#60, p. 33
Yes	NVNE				Wayampi (Alto Jarí)	Tupí	Jensen (1984)	#61, p. 34
Yes	NVNE				Wayampi (Ampari)	Tupí	Jensen (1984)	#62, p. 34
Yes	NVNE				Xavánte	Macro-Ge	Quintino (2000)	#63, p. 35
Yes	MP				Xetá	Tupí	Vasconcelos (2008)	#64, p. 35
Yes	–				Yagua	Peba-Yaguan	Peña (2009)	#65, p. 36
Yes	MP				Yuhup	Nadahup	Martins (2005)	#66, p. 36

Appendices for "Environmental shielding is contrast preservation"

Appendix B: additional information on shielding languages

#1: Aché (Tupí; Roessler 2008)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k NASAL: m, n, ɲ, ŋ

The oral allophone licensed by shielding depends to some extent on vocalic context: ND occurs only between a nasal and an oral vowel. D also occurs in this context, as well as all other oral contexts. In addition, the distribution of NDs is mostly limited to stressed syllables (p. 45):

> *"A primeira observação importante é que o contorno nasal das pré-nasalizadas é muito curto. Essencialmente em síabas átonas a nasalidade desaparece."*

There appears to be reduction in stressless syllables, which may be explain why more Ds are attested in this context (p. 45):

> *"Note-se que em sílabas átonas, entre duas vogais orais, as oclusivas sonoras podem se realizar como aproximantes ou fricativas totalmente orais…"*

Nasal vowels do not appear to be limited to any particular position.

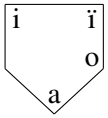
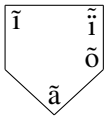
#2: Aguaruna (Jivaroan; Overall 2007)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u a
Nasal vowel inventory	ĩ ɨ̃ ũ ã
Stop inventory	VOICELESS: p, t, ts, tʃ, k, ʔ NASAL: m, n

Regarding nasal vowels: Overall (2007:51–52) notes that all Ṽs can be derived from underlying VN sequences. But there is no evidence that Ṽ is derived synchronically from VN: VN could just as well be the historical source of Ṽ.

Regarding details of shielding: word-internally, NDs are the preferred oral variant. In word-initial position, Ds and NDs are in free variation. In some lexical items shielding is compulsory, while in the rest of the lexicon it is optional. Shielding typically does not occur when the N is followed by a single word-final /a/; it is more likely to occur when the N precedes a high vowel or when it is word-initial, followed by a single vowel (i.e. not a diphthong). Shielding is also prohibited when it would result in the creation of two successive NCs (*NCVNC); see p. 53 of Overall for more discussion of all of these points.

#3: Amahuaca (Panoan; Osborn 1948)

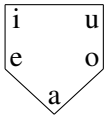
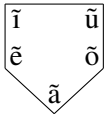
Shielding contexts	Prevocalic (NV → NDV)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, ʔ NASAL: m, n

Osborn (p.48), on the distribution of shielding:

> *"The nasals m and n are voiced [...] The allophone nasal plus homorganic voiced stops occurs before oral vowels when the nasal occurs other than in morpheme initial or following another consonant..."*

In addition, there appear to be no restrictions on the distribution of nasal vowels (Osborn p. 189).

#4: Amarakaeri (Harakmbet; Tripp 1955)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$) Onset (V]$_\sigma$N → V]$_\sigma$DN)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, ʔ NASAL: m, n, ŋ

The analysis I assume is based on the presentation of Amarakaeri orthography on Tripp pp. 11–12, as well as generalizations that emerged while looking through the dictionary. The description of shielding is from the orthography. The claim that oral allophones only occur adjacent to oral vowels is based on an examination of the dictionary. And while Tripp treats nasal and oral allophones as separate phonemes, I found no evidence to support this claim.

Regarding shielding: different places of articulation are differently affected. For labials, /m/ → [mb] preceding oral vowels. For alveolars, /n/ → [nd] preceding oral vowels; /n/ → [dn] following oral vowels. The status of velar consonants is unclear; they may be derived from alveolars.

#5: Amundava (Tupí; Sampaio 1998)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k, k^w, ʔ NASAL: m, n, ɲ, ŋ, ŋ^w

Regarding shielding: the distribution of allophones is to some extent dependent on place of articulation. For labials and alveolars, we find: variation between D, N, and ND in initial position (preceding an oral vowel); ND between nasal and oral vowels, and variation between N and DN (following an oral vowel) word-finally. Velars have no pre-oralized allophone (*gŋ), but otherwise their distribution is the same.

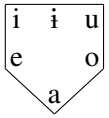
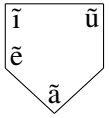
Vowel nasality contrasts may be neutralized preceding nasal consonants: oral vowels do not appear to be able to precede either nasal or postoralized stops (see p. 44).

#6: Andoke (Isolate; Landaburu 2000a)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɯ u e ɤ o a ʌ ɒ
Nasal vowel inventory	ĩ ẽ ɤ̃ õ ã ɒ̃
Stop inventory	VOICELESS: p, t, k VOICED/NASAL: M, N, J

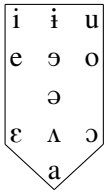
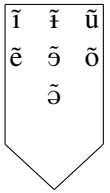
In Landaburu's description, the nasal consonants are treated as allophones of an underlying oral series. As there is no other evidence for nasal spreading, however, an analysis under which the oral allophones are derived from underlying nasal phonemes is equally appropriate, and indistinguishable from Landaburu's given the available data.

#7: Apiaká (Tupí; Padua 2007)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, ʔ NASAL: m, n, ŋ

Regarding shielding: the distribution of allophones depends on place of articulation (p. 29). For labials, we find: [b] initially, [mb] in stressed oral syllables, and [m] elsewhere. Alveolars pattern like labials, with the exception that [nd] can also appear before stressed syllables. For velars, we find: [ŋg] in stressed oral syllables (when following a nasal vowel), [g] initially and between post-stress oral vowels, and [ŋ] elsewhere.

#8: Apinayé (Macro-Ge; Oliveira 2005)

Shielding contexts	Coda (VN]$_\sigma$ → VD]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, tʃ, k, ʔ PRENASAL: mb, nd, ɲdʒ NASAL: m, n, ɲ, ŋ

Apinayé is unique in the shielding typology in that NDs are granted phonemic status (there are a limited number of N vs. ND minimal pairs; see Oliveira pp. 39ff for examples). But the distribution of NDs is restricted: they can only appear in stressed syllable onsets before oral vowels (whereas Ns and Ts can appear in all onsets and codas). Shielding is fairly limited in this system: bilabial /m/ may be realized as [b] word-finally, following non-front mid oral vowels. (Note however that Ham's 1961 analysis treats NDs as allophones of Ns, despite the presence of several minimal pairs; under this analysis there is less neutralization, and much more shielding, going on.)

Regarding the distribution of nasal vowels: contrasts in vocalic nasality are neutralized after nasal consonants.

#9: Arára do Mato Grosso (Isolate; da Rocha D'Angelis 2010)

Shielding contexts	Prevocalic (NV → NDV, DV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e ə o ɛ ɔ a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k NASAL: m, n, ɲ, ŋ

Regarding the phoneme inventory: da Rocha D'Angelis presents two hypotheses about the phonemic inventory (p. 3); here I (arbitrarily) follow the first.

Regarding shielding: in between two oral vowels, Ds are the preferred oral allophones. Word-initially, Ds and NDs are in free variation. There are several exceptional forms in which an oral (or postoralized) consonant precedes a nasal vowel (see da Rocha D'Angelis p. 3).

#10: Arikapú (Isolate; Arikapú et al. 2010)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ü u ï ä e o a
Nasal vowel inventory	ĩ ũ ä̃ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, ʔ NASAL: m, n

Regarding shielding: its presence is not discussed, but can be inferred from a look through the lexicon: for example, all <b>s are followed by oral vowels and all <m>s are followed by nasal vowels. The oral allophones of Ns are generally realized as NDs (p. 3):

> *"...a ortografia prática empregada neste vocabulário inclui alguns símbolos que não refletem um contraste fonológico, mas que têm um valor alofônico: b (alofone do m, geralmente pronunciado como [mb]) e d e dj (ambos alofone do n, geralmente pronunciado como [nd] and [ndj] respectivamente)."*

#11: Asurini do Xingú (Tupí; Pereira 2009)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ ã
Stop inventory	VOICELESS: p, t, tʃ, k, ʔ VOICED: dʒ NASAL: m, n, ŋ

Regarding the inventory: it's unclear if what I claim are affricates are really underlyingly affricates, or rather the fricatives they're in free variation with ([ʃ] and [ʒ]).

Regarding shielding: Ns are realized as NDs between nasal and oral vowels. Ns are realized as Ds in all other contexts preceding oral vowels. See Pereira p. 71 for a summary of the distribution.

#12: Avá-Canoeiro (Tupí; Borges 2006)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^w NASAL: m, n, ŋ

Shielding occurs variably in all oral contexts. The frequency of shielding appears to be, to some extent, dialect-dependent; the Goiás dialect does not have shielding at all (Borges p. 84). Shielding that results in plain oral consonants is only attested in the Estado do Tocatins dialect (see p. 84).

Regarding the distribution of vowel nasality: regressive nasalization (i.e. neutralization of vowel nasality contrasts) is discussed on Borges pp. 90-91.

#13: Barí (Chibchan; Mogollón 2000)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: t, k VOICED: b, d NASAL: m, n, ɲ

Regarding shielding, Mogollón writes (p. 720):

> *"El fonema /m/ tiene dos alófonos: [m] y [∼b]. Se realiza nasal, labial [m], en posición inicial de palabra precediendo a una vocal nasal y en posición intervocálica, en contextos nasales. En posición inicial de palabra, cuando la vocal es oral varía libremente con el fono oclusivo, labial, prenasal [∼b], excepto en palabras monosilábicas, en éstas solo se da [∼b]."*

Other places of articulation do not have this word-initial restriction; they differ from the labials in other non-crucial ways. Globally, voiced stops phonemically contrast with nasal stops. Voiced stops occur before oral or nasal vowels, and are prenasalized (as are all other obstruents) when they follow a nasal vowel.

#14: Chimila (Chibchan; Malone 2006, 2010)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i u e o a
Nasal vowel inventory	ĩ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, ʔ VOICED: b, d, g NASAL: m, n, ŋ

The inventory assumed here is from Malone (2006). Malone (2006) and Malone (2010) make different claims about whether or not vocalic nasality is contrastive; in this chapter I have followed Malone's (2006) claim that it is.

Malone (2010) claims that vocalic nasality is contrastive only in onomatopoetic forms and interjections. Nasal vowels are attested elsewhere in the lexicon, but only in underlying forms. He speculates that the shielding observed in the language can be traced to an earlier stage of the language in which nasality was contrastive (p. 10). I am unsure what to make of this claim – if underlyingly nasal vowels never surface as nasal, how does Malone (2006) know which underlying vowels to transcribe as nasal and which to transcribe as oral?

#15: Chiriguano, Chané (Tupí; Dietrich 1986)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	Probably not
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^w, ʔ NASAL: m, n, ŋ

Regarding the distribution of nasal vowels: Dietrich claims that vocalic nasality is only contrastive in stressed syllables (though nasal vowels are transcribed elsewhere), but then notes (p. 94) that the presence vs. absence of shielding in final position reveals to the listener the oral vs. nasal status of the final vowel, which is otherwise hard to determine.

> *"A pesar de neutralizarse la oposición oral/nasal de las vocales en posición final y a pesar de realizarse en la norma la correspondiente cualidad archifonemática oral, siempre es posible, en caso que se hallen consonantes nasalizables en sílaba final, averiguar si tal sílaba es fonológicamente oral o nasal"*

This leads me to think that nasality is contrastive outside of stressed syllables, but that the contrast is just more difficult to hear. (There is also long-distance nasal harmony; this is described as a separate phenomenon; see Dietrich pp. 63–64).

Beyond shielding, there are additional restrictions on the distribution of NCs: even if all vowels are oral, two NCs are not allowed to co-occur across a single vowel (Dietrich p. 63).

#16: Chiriguano, Izoceño (Tupí; Dietrich 1986)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	Probably not
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^w, ʔ VOICED: g^w NASAL: m, n, ŋ

Regarding the distribution of nasal vowels: Dietrich claims that vocalic nasality is only contrastive in stressed syllables (though nasal vowels are transcribed elsewhere), but then notes (p. 94) that the presence vs. absence of shielding in final position reveals to the listener the oral vs. nasal status of the final vowel, which is otherwise hard to determine.

> *"A pesar de neutralizarse la oposición oral/nasal de las vocales en posición final y a pesar de realizarse en la norma la correspondiente cualidad archifonemática oral, siempre es posible, en caso que se hallen consonantes nasalizables en sílaba final, averiguar si tal sílaba es fonológicamente oral o nasal"*

This leads me to think that nasality is contrastive outside of stressed syllables, but that the contrast is just more difficult to hear. (There is also long-distance nasal harmony; this is described as a separate phenomenon; see Dietrich pp. 63–64).

Beyond shielding, there are additional restrictions on the distribution of NCs: even if all vowels are oral, two NCs are not allowed to co-occur across a single vowel (Dietrich p. 63).

#17: Dâw (Nadahup; Martins 2004)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɯ u e ɤ o ɛ ɔ a
Nasal vowel inventory	ĩ ɯ̃ ũ ɛ̃ ɔ̃ ã
Stop inventory	VOICELESS: p, t, c, k, ʔ VOICED: b, d, ɟ, g NASAL: m, n, ɲ, ŋ GLOTTALIZED NASAL: $m^{ʔ}$, $n^{ʔ}$, $ɲ^{ʔ}$

Regarding the distribution of shielding: it applies to glottalized and non-glottalized coda nasals alike, in syllables with both short and long vowels.

Regarding the distribution of vocalic nasality, it's explicitly noted that oral and nasal vowels contrast in stressed and stressless syllables alike (p. 62):

> *"Todas as vogais orais e nasais ocorrem em sílabas átonas e tônicas."*

#18: Epena (Choco; Harms 1984)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e ə o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ ə̃ õ ã
Stop inventory	VL. ASPIRATED: p^h, t^h, k^h VOICELESS: p, t, tʃ, k, ʔ NASAL/VOICED: m/b/mb, n/d/nd, g/ŋg

Regarding shielding: the postoralized allophone occurs between a nasal and an oral vowel; if the preceding vowel is not nasal, then the fully oral allophone occurs. The nasal allophone occurs preceding a nasal vowel. Harms does not claim that [g] has a fully nasal allophone; however, all examples of [g] and [ŋg] appear to precede an oral vowel: I was unable to find any forms in which [g] precedes a nasal vowel.

#19: Hup (Nadahup; Epps 2008)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$ Onset (V]$_\sigma$N → V]$_\sigma$D, V]$_\sigma$DND)
Variability?	None mentioned
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e ə o æ a ɔ
Nasal vowel inventory	ĩ ɨ̃ ũ æ̃ ã ɔ̃
Stop inventory	VOICELESS: p, t, c, k, ʔ NASAL: m, n, ɲ, ŋ GLOTTALIZED: b', d', j', g'

Morphemes are generally monosyllabic; shielding occurs in both onset ([^{n}dûː] 'grandchild', p. 54) and coda ([tôd^{n}] 'hollow log', p. 55). In VN-V contexts, N can be realized as D or DND, with specific details of realization to some extent dependent on place of articulation (Epps p. 54–60). (It's unclear whether or not intervocalic shielding would occur in monomorphemic words, as I have not been able to find any relevant disyllabic words.) Epps does not take a stance on whether the oral or nasal allophones are underlying, but the available data are fully consistent with a shielding analysis, i.e. with an analysis under which the nasal allophones are underlying.

#20: Jabutí (Macro-Ge; Ribeiro & van der Voort 2010)

Shielding contexts	Prevocalic (NV → DV)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ʉ u ə ɛ o a
Nasal vowel inventory	ĩ ɛ̃ õ ã
Stop inventory	VOICELESS: p, ps, t, tʃ, k VOICED: bz, dʒ NASAL: m, n

Ribeiro & van der Voort provide the following description of shielding (p. 532):

> *"…we assume that the language…does not have a set of voiced plosive consonant phonemes that are distinct from nasal consonants. The distribution of [b] and [d] versus [m] and [n] appears to be largely complementary, [b] and [d] occurring basically only before oral vowels, and [m] and [n] before either nasal or oral vowels."*

The one N vs. D minimal pair that has been cited involves a loanword (fn. 12, p. 532).

#21: Júma (Tupí; Abrahamson & Abrahamson 1984)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k VOICED: g NASAL: m, n, ɲ, ŋ

Regarding the distribution of oral allophones: Ns are realized as NDs before oral vowels. Ns are realized as DNs word-finally (which is the only place codas are allowed), following oral vowels.

Regarding the distribution of vocalic nasality: it's not clear that oral and nasal vowels contrast before nasals (NDs or Ns). This isn't explicitly discussed, however, and the authors only state that oral vowels in nasal contexts are lightly nasalized (p. 10):

> *"Pode-se prever uma ligiera nasalização de qualquer vogal que for seguida de uma nasal, ou de uma variante pré-nasalizada de uma consoante nasal, como por exemplo: m, n, n [ŋ?], mb, nd, ŋg."*

#22: Kaapor (Tupí; Garcia Lopes 2009)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	Probably
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^w NASAL: m, n, ŋ, ŋ^w

Regarding the distribution of shielding: only the labial /m/ and alveolar /n/ have oral allophones. The fact that /n/ has oral allophones isn't described on Garcia Lopes's p. 48, but can be inferred from the table of phones on p. 45, where an [nd] allophone is listed.

Regarding the distribution of vocalic nasality: while Garcia Lopes does not discuss this, the vocalic nasality contrast appears to be limited to stressed, word-final position… and in all examples provided to illustrate shielding, shielding occurs word-finally. In other words: the distribution of shielding appears to track restrictions on the distribution of vocalic nasality contrasts.

#23: Kaingang, São Paolo (Macro-Ge; Cavalcante 1987)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$) Onset (V]$_\sigma$ → V]$_\sigma$DN)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e ə o ɛ ɔ a
Nasal vowel inventory	ĩ ə̃ õ ɛ̃
Stop inventory	VOICELESS: p, t, č, k NASAL: m, n, ɲ, ŋ

Cavalcante (p. 18) describes shielding as a process in which an oral or a nasal consonant is optionally inserted in between a nasal consonant and an oral vowel.

> *"(insere-se opcionalmente uma consoante não nasal homorgânica vozeada entre uma vogal oral e uma consoante nasal, e vice-versa, ou seja, insere-se uma consoante nasal homorgâmica vozeada entre uma consonante nasal e uma vogal oral)."*

The distribution of allophones can be characterized as follows: N → DN, NN / V_ Ṽ (across word boundaries, NN is the only available allophone); N → ND, NN / _ V; N → N / elsewhere.

#24: Kakua (Kakua-Nukak; Cathcart 1979)

Shielding contexts	Prevocalic (NV → NDV, DV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ e o a
Nasal vowel inventory	ĩ ɨ̃ ẽ õ ã
Stop inventory	VOICELESS: p, t, k VOICED/NASAL: b/m, d/n, g/ŋ

In initial position, Ns are realized as NDs before oral vowels. Ns are realized as DNs in coda position, following oral vowels. Ns are realized as Ns in all other contexts. Cathcart treats the oral allophones of Ns as the underlying phonemes, but recognizes that this choice is arbitrary (from Cathcart p. 11):

> *"La serie nasal podría haberse utilizado como fonema. Se optó por la serie oral debido a la facilidad de representarse."*

With regards to the status of contrastive nasality: vocalic nasality is treated as a suprasegmental property (p. 23), but the data presented are equally compatible with an analysis in which vowels phonemically contrast for nasality.

#25: Karajá (Macro-Ge; Ribeiro 2012)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u ɪ ɨ ʊ e ɘ o ɛ (ə) ɔ a
Nasal vowel inventory	ĩ ɘ̃ õ ã
Stop inventory	VOICELESS: (tʃ), k VOICED/NASAL: b/m, d/n, (dʒ) IMPLOSIVE: ɗ

Regarding the phonemic inventory: above, consonantal phonemes in parentheses are not independent phonemes, but derived through consonant palatalization preceding high vowels. Phonemic status of schwa is "problematic" (Ribeiro 2012:87).

Regarding shielding: nasal /m/ and /n/ are in complementary distribution with oral /b/ and /d/ (Ribeiro pp. 83–84, see quote below). Shielding occurs before all vowels but /a/.

> *"...in Karajá the voiced stops /b/ and /d/ do not contrast phonologically with their nasal counterparts. They are pronounced as fully oral consonants before oral vowels and fully nasal consonants before nasal vowels [...]"*

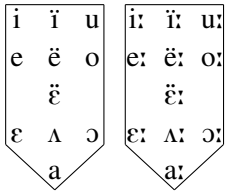
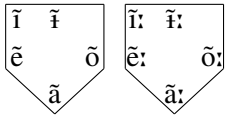
#26: Karapanã (Tucanoan; Metzger & Metzger 1973)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k NASAL: m, n, ŋ

Regarding shielding: Ns are realized variably as Ds or NDs before oral vowels and word-initially. Between oral vowels, Ns are realized as Ds; between a nasal and an oral vowel, Ns are realized as NDs. Metzger & Metzger treat the oral allophones of the nasal phonemes as basic. The oral and nasal allophones are in complementary distribution, however, so the nasal allophones could just as well be basic.

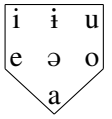
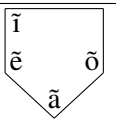
Regarding other phenomena involving nasality: it's mentioned at the end of the description (Metzger & Metzger p. 131) that nasal harmony is present, but it's not clear how extensive this process is, i.e. whether or not the shielding facts can be explained as a consequence of harmony.

#27: Karitiâna (Tupí; Storto 1999, Everett 2007)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$) Onset (V]$_\sigma$ → V]$_\sigma$DN)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k NASAL: m, n, n̆, ŋ

The distribution of allophones, according to Storto (1999:25ff), is: N → ND / Ṽ_ V, #_ V (older speakers only); N → DN / V_Ṽ, V_#; N → D / #_ V (younger speakers only); N → DND / V_V; N → N / elsewhere. Storto (1999) notes that the palatal nasal lenites intervocalically (p. 27). She also notes (p. 30) that the presence of medionasals is somewhat speaker-dependent (see also Everett 2007): others pronounce them as NDs or plain Ds. When pronounced as NDs, the previous vowel is nasalized (it's not clear whether or not contrasts in vocalic nasality are neutralized).

#28: Karo (Tupí; Gabas 1998)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None mentioned
Contextual restrictions on V–Ṽ?	Probably
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, c, k, ʔ VOICED: b, g NASAL: m, n, ŋ

Shielding is contextually restricted: it occurs only in stressed syllables. This restriction on shielding appear to track a restriction on the distribution of vocalic nasality contrasts. Throughout the description it is apparent that nasal vowels occur predominantly in stressed position (though there are several exceptions; see e.g. Gabas p. 57 for a form with nasality outside of stressed position).

Regarding other phenomena involving nasality: nasality optionally spreads regressively from onset nasals (see Gabas pp. 63–64).

#29: Kotiria (Tucanoan; Waltz & Waltz 1972)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VL. ASPIRATED: p, t, k VL. UNASPIRATED: p^h, t^h, k^h VOICED/NASAL: b/m, d/n, g/ŋ

Regarding shielding: Ns are only realized as Ds when both surrounding vowels are oral; /wãhãŋa/, for example, is realized as [wãhãŋa]. Waltz & Waltz treat the oral allophones of the nasal phonemes as basic. The oral and nasal allophones are in complementary distribution, however, so the nasal allophones could just as well be basic.

> *"...completa simitría dentro de las oclusivas y continuas con sus variantes nasales."*

#30: Krahô (Macro-Ge; Popjes & Popjes 2009)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ï u e ë o ɛ ɛ̈ ɔ a
Nasal vowel inventory	ĩ ï̃ ũ ẽ ë̃ õ ɛ̃ ɛ̈̃ ɔ̃ ã
Stop inventory	VOICELESS: p, t, k NASAL: m, n, ŋ

A few details about shielding: the only restriction on the distribution of DNs noted by Popjes & Popjes is that they "occur only following an oral vowel" (p. 9). In all examples provided, however, shielding only occurs in coda position. Velar /ŋ/ also varies allophonically with /ŋg/ and /g/, but this doesn't appear to be an instance of shielding as this variation takes place before both oral and nasal vowels.

#31: Krenak (Macro-Ge; Pessoa 2012)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$) Onset (V]$_\sigma$N → V]$_\sigma$DN)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u ɛ ə o a
Nasal vowel inventory	ĩ ũ ɛ̃ õ ɜ̃
Stop inventory	VOICELESS: p, t, tʃ, k, ʔ VD. NASAL: m, n, ɲ, ŋ VL. NASAL: m̥, n̥, ɲ̥, ŋ̥

Shielding is generally more frequent in stressless syllables (quote from Pessoa p. 113):

> *"Isto [shielding] ocorre com menos frequência, muitas vezes em sílabas não acentuadas, mas também ocorrem em sílabas acentuadas."*

But shielding in coda, following oral vowels, occurs more often in stressed (final) syllables (p. 122):

> *"…tais segmentos tendem a ocorrer em meio ou final de palavra, geralmente em sílibas acentuadas. Sua realização está também relacionada à presença obrigatória de vogais orais como núcleo da sílaba."*

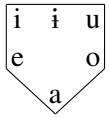
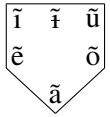
A few more details: in prevocalic position, NDs cannot precede /ɛ/ and Ns cannot precede /ɔ/. In a VN]$_\sigma$ context, when shielding fails to apply, the vowel is nasalized (see Pessoa pp. 176ff).

#32: Krinkati-Timbira (Macro-Ge; Alves 2004)

Shielding contexts	Prevocalic (NV → NTV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	i ɨ u e ə o ɛ ɜ ɔ a
Nasal vowel inventory	ĩ ɨ̃ ũ ɛ̃ ɔ̃ ã
Stop inventory	VOICELESS: p, t, tʃ, k, NASAL: m, n, ɲ, ŋ

Shielding in the NV context is restricted to morpheme-initial position. (For discussion of other restrictions on the distribution of the NT allophones, see p. 33.) In addition, shielding in coda position isn't explicitly discussed as such; see Alves pp. 34ff. Shielding in coda only variably occurs, and when it fails, the preceding vowel is nasalized.

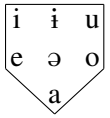
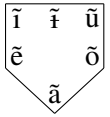
#33: Kubeo (Tucanoan; Chacon 2012)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, tʃ, k VOICED/NASAL: b/m, d/n

The descriptive facts: the voiced consonant series is oral (e.g. D) before an oral vowel and nasal (e.g. N) before a nasal vowel. Chacon treats nasality as a "feature of the entire syllable" (p. 82–83), but I believe the data are equally compatible with an analysis under which vocalic nasality is contrastive and shielding occurs to enhance the vocalic contrast.

Progressive nasal harmony applies across morpheme boundaries; see Chacon p. 86ff for details.

#34: Mako (Salivan; Labrada 2015)

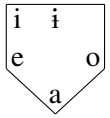
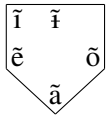
Shielding contexts	Prevocalic (NV → DV)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	ASPIRATED: p^h, t^h VOICELESS: p, t, k, k^w, ʔ VOICED: b, d NASAL: m, n PREGLOTTALIZED: ^{ʔ}b/^{ʔ}m, ^{ʔ}d/^{ʔ}n, ^{ʔ}dʒ/^{ʔ}ɲ

Regarding the distribution of preglottalized stops, Rosés Labrada writes the following:

> *"Available evidence suggests (see all the contexts above, for instance) that the pre-glottalized nasals only occur when the following vowel is a nasal and the pre-glottalized oral stops when the following vowel is oral. This complementary distribution allows me to affirm that the pre-glottalized nasals are allophonic variants of the other three pre-glottalized consonants."*

But the available evidence is equally compatible with an analysis under which the nasal preglottalized consonants are phonemic, and the oral allophones occur adjacent to oral vowels.

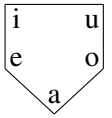
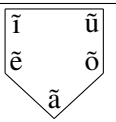
#35: Makuráp (Tupí; Braga 1992)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, tʃ, k, NASAL: m, n, ɲ, ŋ

A note regarding the inventory: It appears that vowels also contrast for length, though this is not explicitly discussed; see Braga pp. 57ff.

Regarding shielding: NDs and Ds are in free variation in initial position, before oral vowels. Ds also occur in stressed oral syllables. Ns generally occur in stressless syllables, but /ŋ/ has an oral allophone [g] that can occur in any prosodic context, between two oral vowels, and /ɲ/ has continuant allophones in this same position. (Note that what I analyze as /ɲ/ is analyzed by Braga as underlying /j/; however, its allophones are in complementary distribution and it behaves very similarly to the other nasal phonemes.)

#36: Mamaindé (Nambiquaran; Eberhard 2009)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	 DIPTHTHONGS: iu, ei, eu, ai, au
Nasal vowel inventory	 DIPTHTHONGS: ĩũ, ẽĩ, ẽũ, ãĩ, ãũ
Stop inventory	VL. UNASPIRATED: p, t, k, ʔ VL. ASPIRATED: p^h, t^h, k^h NASAL: m, n

Nasal place contrasts are neutralized in coda position. The realization of the preoralized variant depends on the vowel that precedes it. Generally speaking, the distribution is as follows: [^{b}m] after oral diphthongs with round vowels (/au/, /eu/); [^{g}ŋ] after the high front vowel (/i/); and [^{d}n] after all of the oral vowels not listed above. (For discussion of some exceptions, see Eberhard p. 91.)

Mamaindé also has a set of contrastively laryngealized vowels, and a set of contrastively laryngealized and nasalized vowels; see Eberhard pp. 98ff for the simple vowels and p. 118ff for the dipthongs. These are however being lost in younger generations.

#37: Maxakalí (Macro-Ge; Campos 2009)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɯ e o a
Nasal vowel inventory	ĩ ɯ̃ ẽ õ ã
Stop inventory	VOICELESS: p, t, c, k, ʔ NASAL: m, n, ɲ, ŋ

It appears that ND and D are in free variation preceding oral vowels (see Campos p. 18).

#38: Mbyá (Tupí; Martins 2003, Thomas 2014)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k, k^w, ʔ NASAL: m, n, ɲ, ŋ, $ŋ^w$

The inventory provided above is a synthesis of information provided by two sources, Martins (2003) and Thomas (2014). Mbyá also has long-distance nasal harmony, but Thomas analyzes long-distance harmony as a process entirely separate from syllable-internal nasal agreement (i.e. shielding).

#39: Mebengokre (Macro-Ge; Salanova & Silva 2011)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None mentioned
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɯ̟ u e ɤ̟ o ɛ ʌ ɔ a
Nasal vowel inventory	ĩ ɯ̟̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k, ʔ VOICED: b, d, dʒ, g NASAL: m, n, ɲ, ŋ

Morpheme-final stops assimilate to the [±nasal] value of a following onset consonant; see Salanova & Silva p. 1532 for discussion.

#40: Mundurukú (Tupí; Picanço 2005)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i e ə o a
Nasal vowel inventory	ĩ ẽ ə̃ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k VOICED: b, d, dʒ NASAL: m, n, ŋ

Regarding shielding: Picanço (p. 26, 76ff) claims that the desire to preserve a contrast is what leads to shielding: "…preoralization is a strategy used by speakers to preserve a phonological contrast." Picanço also notes that the distribution of shielding parallels the distribution of vocalic nasality contrasts. It's not clear, however, that this is significant: vocalic nasality is only contrastive at the morpheme's right edge, and nasals can only appear in coda position word-finally. See fn. 3 on Picanço's p. 77.

Other potentially relevant facts: Mundurukú has a series of contrastively laryngealized (and contrastively laryngealized + creaky) vowels; see Picanço pp. 34ff. Mundurukú also has nasal harmony; see Chapter 6 of Picanço (2005).

#41: Myky (Isolate; Montserrat 2010)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–Ṽ?	Probably
Oral vowel inventory	i y u e ə o a iː yː uː eː əː oː aː
Nasal vowel inventory	ĩ ỹ ũ ẽ õ ã ĩː ỹː ũː ẽː ə̃ː õː ãː
Stop inventory	VOICELESS: p, t, k, ʔ VL. PALATALIZED: p^j, t^j, k^j NASAL: m, n NAS. PALATALIZED: m^j, n^j

Only a few speakers exhibit shielding. Montserrat's description (p. 1):

> *"Alguns poucos falantes (em geral iranxe, e dois ou três myky) realizam m em posição inicial como [mb]: muhu [mbuhu] 'chuva' [. . .]"*

Montserrat does not state that shielding only occurs before oral vowels, but in all examples provided, the following vowel is oral.

In final stressless (or non-high-toned) position, vowel nasalization contrasts can be neutralized. Speakers appear to not be able to distinguish oral from nasal vowels in this context. Shielding only occurs word-initially; thus it only occurs in contexts where the vocalic nasality contrast is licensed.

#42: Nadêb (Nadahup; Barbosa 2005)

Shielding contexts	Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	None discussed
Contextual restrictions on V–Ṽ?	Probably
Oral vowel inventory	i ɨ u e ə o ɛ ʌ ɔ a iː ɨː uː eː əː oː ɛː ʌː ɔː aː
Nasal vowel inventory	ĩ ɨ̃ ũ ɛ̃ ʌ̃ ɔ̃ ã ĩː ɨ̃ː ũː ɛ̃ː ʌ̃ː ɔ̃ː ãː
Stop inventory	VOICELESS: p, t, k VOICED: b, d, ɟ, g NASAL: m, n, ɲ, ŋ

Shielding in coda position occurs regardless of whether or not the oral vowel has a nasal pair of the same quality (e.g. /wɔjaˈpəm/ → [wɔjaˈpəᵇm], p. 44). In addition, nasality appears to only be contrastive in (stressed) final position, which is where shielding occurs. In other words, restrictions on the distribution of shielding appear to track restrictions on the vocalic nasality contrast.

Nadêb also appears to have a series of long laryngealized vowels. See Barbosa pp. 52-53.

#43: Nhandeva (Tupí; Costa 2007)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u ɛ ɔ a
Nasal vowel inventory	ĩ ɨ̃ ũ ɛ̃ ɔ̃ ã
Stop inventory	VOICELESS: p, t, ts, tʃ, k, k^{w}, ʔ VD/NASAL: mb/m, nd/n, dʒ/ɲ, ŋg/ŋ, ŋgw/ŋw

Costa analyzes the prenasalized stop allophones as underlying, but an analysis under which the nasals are underlying is equally consistent with the data.

Regarding vowel nasalization: on Costa's p. 90 there is evidence that when shielding fails to apply, the oral vowel is nasalized. In addition, NDs appear to nasalize vowels that precede them; see p. 96. With respect to the data on p. 96, note that the vowel that gets shielded is always word-final, and nasality is only contrastive word-finally (where there is stress).

#44: Nukak (Kakua-Nukak; Mahecha et al. 2000)

Shielding contexts	Prevocalic (NV → DV) Coda (VN]$_{\sigma}$ → VDN]$_{\sigma}$) Onset (V]$_{\sigma}$ → VD]$_{\sigma}$, VDN]$_{\sigma}$)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u ɛ ʌ a
Nasal vowel inventory	ĩ ɨ̃ ũ ɛ̃ ʌ̃ ã
Stop inventory	VOICELESS: p, t, c, k, ʔ VD/NASAL: B, D, J, G

In Mahecha et al.'s (2000) description, the voiced stops are treated as underlying phonemes and the nasals are treated as derived allophones. As far as I can tell, there's no reason to prefer this analysis over another one, in which the oral allophones are derived from underlying nasal stops (i.e. there is shielding).

See Mahecha et al. p. 552 for a discussion of some local nasal harmony: liquids are nasalized when adjacent to a nasal vowel.

#45: Pai Tavytera (Tupí; Cardoso 2008)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^{w} NASAL: m, n, ɲ, ŋ, ŋ^{w}

ND and D appear to be in free variation before oral vowels. There is some variation of what allophones are possible according to place of articulation; see Cardoso p. 212 for a summary.

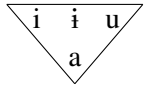
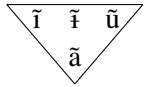
#46: Piratapuyo (Tucanoan; Klumpp & Klumpp 1973)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, ʔ VOICED/NASAL: b/m, d/n, g/ŋ

Regarding the analysis of consonantal alternations: Klumpp & Klumpp treat the oral allophones of the nasal phonemes as underlying. The oral and nasal allophones are in complete complementary distribution, however, so the alternative analysis is available.

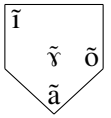
The possibility of nasal harmony is raised on p. 151 (it appears that multiple vowels in a word like to be nasal) but not explored.

#47: Poyanáwa (Panoan; De Paula 1992)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k VOICED/NASAL: b/m, d/n

Regarding the analysis of consonantal alternations: De Paula treats the oral allophones as underlying (thef rationale is given on pp. 57-58). The oral and nasal allophones are in complete complementary distribution, however, so an analysis where the nasal allophones are underlying seems equally appropriate.

#48: Puinave (Isolate; Girón 2007)

Shielding contexts	Prevocalic (NV → DV, NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, ʔ NASAL: m, n

Whether shielding results in a fully oral or a postoralized consonant depends on the vocalic context: postoralized consonants appear word-initially and in between a nasal + oral vowel, while plain oral consonants appear between two oral vowels.

Nasal vowels nasalize preceding and following glides; see Girón pp. 40–41 for discussion.

#49: Secoya del Aguarico (Tucanoan; Johnson & Levinsohn 1990)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^{w}, ʔ VOICED/NASAL: m, d/n

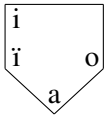
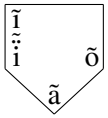
The oral stop [d] is in complementary distribution with nasal [n] (oral [d] appears before oral vowels, and nasal [n] appears before nasal vowels). Johnson & Levinsohn treat the oral allophone as the underlying phoneme, but the nasal allophone could just as well be the underlying phoneme. Note that while there is no oral allophone of [m] recorded, all provided examples of [m] precede a nasal vowel.

#50: Secoya del Putumayo (Tucanoan; Vallejos 2013)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, k, k^{w}, ʔ VOICED/NASAL: m, d/n, dʒ/ɲ

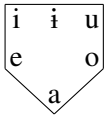
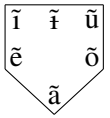
Oral [d] and [dʒ] appear before oral vowels, and nasal [n] and [ɲ] appear before nasal vowels. Vallejos claims that the oral allophones are phonemic, but the data are equally compatible with an analysis under which the nasal allophones are phonemic. In this dialect, shielding appears not to occur for the labial series: [m] is transcribed before both nasal and oral vowels.

#51: Sharanawa (Panoan; Pike & Scott 1962)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, ts, tʃ, c, k NASAL: m, n

Glides are nasalized in between nasal vowels (Pike & Scott p. 6).

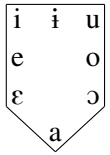
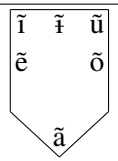
#52: Sirionó (Tupí; Gasparini 2012)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: t, k, kʲ NASAL: m, n, ɲ

The distribution of allophones in Sirionó is a bit surprising. For the bilabial and alveolar nasals (the only ones that exhibit shielding), shielding only occurs if the preceding context is a nasal vowel (or a word boundary): N → ND / #_V, $\tilde{V}$_V, and N → N / #_V, V_$\tilde{V}$, V_V. There are also postoralized palatal and velar allophones ([ɲdʒ]and [ŋg]), but Gasparini analyzes these as allophones of voiceless /tʃ/ and /k/, respectively.

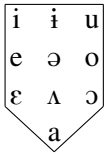
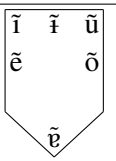
Vowels in Sirionó also appear to contrast for length; see Gasparini pp. 95ff.

#53: Suyá (Macro-Ge; Guedes 1993)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, č, k NASAL: m, n, ñ, ŋ

The bilabial and alveolar postoralized stops appear to be in free variation with nasal stops in all vocalic contexts (see Guedes pp. 52ff for discussion). The velar postoralized allophones only seem to appear preceding oral vowels (see p. 53), though there is some variability. The palatal postoralized affricates ([nǰ] and [nč]) are treated as allophones of plain affricates. However, they appear to be in complementary distribution with the palatal nasal [ɲ], and [nǰ] appears to be in free variation with [ǰ]. Both appear before oral vowels only; [nǰ] and its variant [ǰ] can appear word-initially while [nč] cannot. See Guedes p. 54 for more details.

#54: Tapayuna (Macro-Ge; Camargo 2010)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–Ṽ?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: t, ʈ, k NASAL: m, n, ɲ, ŋ

Before oral vowels, Ns and NDs are in free variation. All nasals except the palatal nasal exhibit shielding. Shielding is variable for the bilabial and alveolar series, but obligatory for the velar series: [ŋ] and [ŋg] are in complementary distribution.

#55: Tenharim (Tupí; Sampaio 1998)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k, k^w, ʔ NASAL: m, n, ɲ, ŋ, $ŋ^w$

The distribution of oral allophones is to some extent dependent on place of articulation; see Sampaio pp. 21ff.

It's possible that contrasts in vocalic nasality are neutralized in coda position: oral vowels do not appear to be able to precede either nasal or postoralized stops (see Sampaio p. 27 for a summary).

#56: Ticuna of San Martín de Amacayacu (Isolate; Montes Rodríguez 2005)

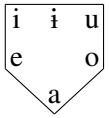
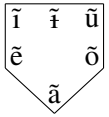
Shielding contexts	Prevocalic (NV → DV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɯ u e o a iː ɯː uː eː oː aː
Nasal vowel inventory	ĩ ɯ̃ ũ ẽ õ ã ĩː ɯ̃ː ũː ẽː õː ãː
Stop inventory	VOICELESS: p, t, tʃ, k, k^w, ʔ VOICED/NASAL: b/m, d/n, ɟ/ɲ, g/ŋ, gw/ŋw

Regarding shielding: Ns are realized as Ns before nasal vowels, and as Ds before oral vowels. Montes Rodríguez treats the oral allophones as underlying. The oral and nasal allophones are in complete complementary distribution, however, so it is also possible to treat the nasal allophones as underlying.

In some dialects, shielding appears to apply only optionally (see Montes Rodríguez p. 104). The contrast in vocalic nasality also appears to be marginally contrastive in these dialects, but only for /o/ and /a/:

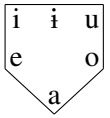
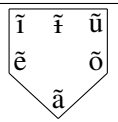
> *"Sin embargo esta oposición es incompleta ya que el proceso parece sólo plenamente cumplido con las vocales /o/ y /a/."*

#57: Tupinambá (Tupí; Jensen 1984; Moore et al. 1993)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, ʔ VOICED: b NASAL: m, n, ŋ

Shielding is obligatory in stressed syllables, but only optional in unstressed syllables. Nasality may only be contrastive in stressed syllables, as it appears to only be transcribed in that position. This restriction, however, isn't explicitly discussed.

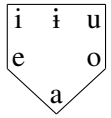
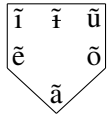
#58: Uru-Eu-Wau-Wau (Tupí; Sampaio 1998)

Shielding contexts	Prevocalic (NV → NDV) Coda (VN]$_\sigma$ → VDN]$_\sigma$)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, tʃ, k, k^w, ʔ NASAL: m, n, ɲ, ŋ, ŋ^w

The distribution of oral allophones is to some extent dependent on place of articulation. For labials and alveolars, we find variation between Ds, Ns, and NDs in initial position, preceding an oral vowel. Between nasal and oral vowels, we find NDs. Word-finally following an oral vowel, we find variation between Ns and DNs. Velars have no pre-oralized allophone (*[gŋ]), but otherwise their distribution parallels the labials and alveolars.

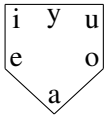
It appears that all vowels preceding nasal or postoralized stops are nasalized (Sampaio p. 44).

#59: Waimaha (Tucanoan; Stolte & Stolte 1976)

Shielding contexts	Prevocalic (NV → NDV, DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k VOICED/NASAL: b/mb/m, d/nd/n, g/ŋg/ŋ

Ns are realized as NDs between nasal and oral vowels. Ns are realized as Ds word-initially, before oral vowels, and between oral vowels. Barnes & Silzer treats the oral allophones as underlying. The oral and nasal allophones are in complete complementary distribution, however, so it is also possible to treat the nasal allophones as underlying.

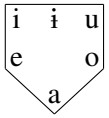
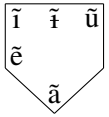
#60: Wari' (Chapakuran; Everett & Kern 1997)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	Probably
Oral vowel inventory	
Nasal vowel inventory	FALLING DIPHTHONGS: $\tilde{e}^{\tilde{i}}$, $\tilde{a}^{\tilde{i}}$, $\tilde{o}^{\tilde{i}}$, $y^{\tilde{i}}$ RISING DIPHTHONGS: $\tilde{\imath}^{\tilde{o}}$, $\tilde{e}^{\tilde{o}}$, $\tilde{a}^{\tilde{o}}$, $\tilde{o}^{\tilde{o}}$
Stop inventory	VOICELESS: p, t, tʃ, k, k^w NASAL: m, mʔ, n, nʔ

/m/ and /n/ are in free variation with postoralized allophones [mb] and [nd]. These allophones appear mainly in stressed syllables and before oral vowels, though there are a couple of examples where this fluctuation precedes a nasal vowel (see e.g. p. 389). The sounds [mʔ] and [nʔ] may be coda allophones of the plain nasals.

The distribution of nasal vowels is also mostly limited to stressed syllables (though see Everett & Kern 1997:396 for an exception), just like the distribution of postoralized allophones.

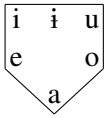
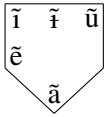
#61: Wayampi, Alto Jarí (Tupí; Jensen 1984)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, k^w, ʔ NASAL: m, n, ŋ, $ŋ^w$

Shielding is optional in stressed syllables, and does not occur in stressless syllables. Nasality may only be contrastive in stressed syllables, but this is not clear from the description. (Jensen proposes a rule (p. 14) that derives word-final nasal vowels from VN sequences. However, this does not rule out the possibility that nasal vowels exist in other positions. In a small lexicon of Wayampí forms (Jensen pp. 33ff), most transcribed nasal vowels are found in final position… but not all (e.g. [piãpè], p. 36).)

Other potentially relevant facts: contrasts in vocalic nasality appear to be neutralized preceding a coda nasal (see Jensen p. 15).

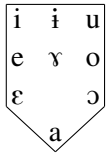
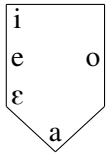
#62: Wayampi, Ampari (Tupí; Jensen 1984)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, k, k^w, ʔ NASAL: m, n, ŋ, $ŋ^w$

Shielding is optional in stressed syllables, and does not occur in stressless syllables. Nasality may only be contrastive in stressed syllables, but this is not clear from the description. (Jensen proposes a rule (p. 14) that derives word-final nasal vowels from VN sequences. However, this does not rule out the possibility that nasal vowels exist in other positions. In a small lexicon of Wayampí forms (Jensen pp. 33ff), most transcribed nasal vowels are found in final position… but not all (e.g. [piãpè], p. 36).)

Other potentially relevant facts: contrasts in vocalic nasality appear to be neutralized preceding a coda nasal (see Jensen p. 15).

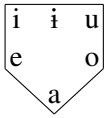
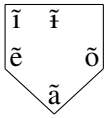
#63: Xavánte (Macro-Ge; Quintino 2000)

Shielding contexts	Prevocalic (NV → DV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, (k) VOICED/NASAL: b/m, d/n

Regarding the inventory: [k] appears to have marginal phonemic status; see Quintino pp. 115ff for discussion. /n/ has nasal allophones [n], [ɲ], and [ŋ]; their distribution is governed by the identity of the following nasal vowel. See Quintino pp. 124ff. There are additional interactions between nasality and laryngealization in Xavánte; see Quintino pp. 123 for illustration and discussion.

Regarding shielding: Quintino analyzes the voiced stop allophones of the nasals as underlying; it is also possible to analyze the nasal allophones as underlying. In some cases, shielding fails to apply (see Quintino p. 123 for more details).

#64: Xetá (Tupí; Vasconcelos 2008)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	Yes
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	
Nasal vowel inventory	
Stop inventory	VOICELESS: p, t, tʃ, k, ʔ VOICED: dʒ NASAL: m, n, ŋ

Ns are variably realized as NDs before oral vowels. Vasconcelos explicitly states that vowels contrast for nasality in all positions within the word; see Vasconcelos pp. 47ff for discussion.

#65: Yagua (Peba-Yaguan; Peña 2009)

Shielding contexts	Prevocalic (NV → NDV)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɨ u e o a
Nasal vowel inventory	ĩ ɨ̃ ũ ẽ õ ã
Stop inventory	VOICELESS: p, t, tʃ, k NASAL: m, n

Peña discusses analyses of Yagua presented by Payne & Payne (1990) and Powlison (1995); I have arbitrarily decided to follow his presentation of Payne & Payne. Powlison's analysis differs only in that it posits a smaller vowel inventory, which isn't crucial for the present purposes.

#66: Yuhup (Nadahup; Martins 2005)

Shielding contexts	Prevocalic (NV → DV) Coda (VN]$_\sigma$ → VDN]$_\sigma$, VD]$_\sigma$) Onset (V]$_\sigma$ → V]$_\sigma$DN)
Variability?	None discussed
Contextual restrictions on V–$\tilde{V}$?	None obvious
Oral vowel inventory	i ɯ u e ɤ o ɛ ɔ a
Nasal vowel inventory	ĩ ɯ̃ ũ ɛ̃ ɔ̃ ã
Stop inventory	VOICELESS: p, t, c, k, ʔ VOICELESS GLOTTALIZED: c^ʔ, k^ʔ VOICED/NASAL: b/bm/m, d/dn/n, ɟ/ɟɲ/ɲ, g/gŋ/ŋ GLOT. VOICED/NAS: b^ʔ/m^ʔ, d^ʔ/n^ʔ, ɟ^ʔ/ɲ^ʔ, g^ʔ/ŋ^ʔ

Martins analyzes the oral allophones of the nasal/oral series as underlying. The oral and nasal allophones are in complete complementary distribution, however, so it is also possible that the nasal allophones are underlying.

Note also that the glottalized series does not license partially oral allophones: in coda position following an oral vowel, /mʔ/ is realized as [bʔ]. Martins (p. 83) notes that this is probably because final glottalized segments are not released.

Appendices for "Environmental shielding is contrast preservation"

Appendix C: list of non-shielding languages

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
Y1	Yes	MP	Achuar-Shiwiar	Jivaroan	Fast (1975)	
Y2	Yes	MP	Akuntsu	Tupí	Aragon (2008)	
Y3	Yes	NVNE	Apalaí	Carib	Koehn & Koehn (1986)	
Y4	Yes	MP	Apurinã	Arawak	Facundes (2000)	
Y5	Yes	MP	Araweté	Tupí	Alves (2008)	
Y6	Yes	MP	Awa-Cuaiquier	Barbacoan	Calvache (2000)	
Y7	Yes	NVNE	Ayoreo	Zamucoan	Bertinetto (2009)	
Y8	Yes	MP	Bakairí (Eastern)	Carib	Meira (2005)	
Y9	Yes	MP	Bakairí (Western)	Carib	Meira (2005)	
Y10	Yes	MP	Barasana-Eduria	Tucanoan	Gomez & Kenstowicz (2000)	[N∼D] due to nas. harm.
Y11	Yes	MP	Baré	Arawak	Aikhenvald (1995)	
Y12	Yes	NVNE	Bésiro	Macro-Ge	Sans (2010)	[N∼D] due to nas. harm.
Y13	Yes	–	Canela	Macro-Ge	de Sá Amado & de Carvalho de Souza (2007)	
Y14	Yes	MP	Cashinahua	Panoan	Kensinger (1963)	
Y15	Yes	NVNE	Cayubaba	(Isolate)	Key (1967)	
Y16	Yes	–	Cha'palaa	Barbacoan	Floyd (2010)	
Y17	Yes	NVNE	Chamacoco	Zamucoan	Huntington (2012)	
Y18	Yes	MP	Desano	Tucanoan	Silva (2012)	[N∼D] due to nas. harm.
Y19	Yes	–	Emberá-Baudó	Choco	Adelaar & Muysken (2004)	
Y20	Yes	MP	Emberá-Catío	Choco	Mortensen (1994)	[N∼D] due to nas. harm.
Y21	Yes	NVNE	Emberá-Chamí	Choco	Aguirre-Licht (1998)	
Y22	Yes	NVNE	Emerillon	Tupí	Rose (2003)	[N∼D] due to nas. harm.
Y23	Yes	NVNE	Gavião do Jiparaná	Tupí	Moore (1984)	
Y24	Yes	NVNE	Gavião do Pará	Macro-Ge	Amado (2004)	
Y25	Yes	MP	Guahibo	Guahiban	Kondo & Kondo (1972)	
Y26	Yes	NVNE	Guajá	Tupí	Nascimento (2008)	
Y27	Yes	NVNE	Guarayu	Tupí	Ureyu (2003)	
Y28	Yes	MP	Huambisa	Jivaroan	Beasley & Pike (1957)	
Y29	Yes	MP	Iñapari	Arawak	Parker (1999)	
Y30	Yes	MP	Jurúna	Tupí	Fargetti (1992)	
Y31	Yes	NVNE	Kaiwá	Tupí	Bridgeman (1961)	[N∼D] due to nas. harm.
Y32	Yes	MP	Kamayura	Tupí	Seki (2000)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
Y33	Yes	MP	Kanoé	(Isolate)	Bacelar (2004)	
Y34	Yes	MP	Katukína (Panoan)	Panoan	Barros (1987)	
Y35	Yes	NVNE	Kayabí	Tupí	Souza (2004)	
Y36	Yes	NVNE	Kithualhu	Nambiquaran	Telles & Wetzels (2011)	
Y37	Yes	MP	Kogi	Chibchan	Gawthorne & Hensarling (1984)	
Y38	Yes	MP	Koreguaje	Tucanoan	Cook & Criswell (1993)	
Y39	Yes	NVNE	Kuikúro-Kakapálo	Carib	Meira & Franchetto (2005)	
Y40	Yes	NVNE	Kuruáya	Tupí	Mendes Junior (2007)	
Y41	Yes	MP	Kwaza	(Isolate)	van der Voort (2000)	
Y42	Yes	NVNE	Latunde	Nambiquaran	Telles & Wetzels (2011)	
Y43	Yes	MP	Macuna	Tucanoan	Smothermon et al. (1995)	[N∼D] due to nas. harm.
Y44	Yes	NVNE	Mosetén de Covendo	Mosetenan	Sakel (2011)	
Y45	Yes	NVNE	Mosetén de Santa Ana	Mosetenan	Sakel (2011)	
Y46	Yes	NVNE	Nheengatú	Tupí	Moore et al. (1993)	
Y47	Yes	NVNE	Northern Emberá	Choco	Hoyos Benítez (2000)	
Y48	Yes	NVNE	Nukini	Panoan	Gomes (2009)	
Y49	Yes	MP	Ocaina	Witotoan	Agnew & Pike (1957)	
Y50	Yes	MP	Páez	(Isolate)	Rojas Curieux (1998)	
Y51	Yes	NVNE	Palikúr	Arawak	Launey (2003)	
Y52	Yes	MP	Panará	Macro-Ge	Dourado (2001)	
Y53	Yes	MP	Paraguayan Guaraní	Tupí	Walker (1999)	[N∼D] due to nas. harm.
Y54	Yes	NVNE	Parkateje	Macro-Ge	de Nazaré de Oliveira (2003)	
Y55	Yes	MP	Pisamira	Tucanoan	de Pérez (2000)	[N∼D] due to nas. harm.
Y56	Yes	NVNE	Rikbaktsa	Macro-Ge	Silva (2005)	
Y57	Yes	MP	Sáliba	Salivan	González Rátiva & Estrada Ramírez (2008)	
Y58	Yes	MP	Sanumá	Yanomam	Borgman (1990)	
Y59	Yes	MP	Sateré-Mawé	Tupí	da Silva (2005)	
Y60	Yes	NVNE	Shuar	Jivaroan	Adelaar & Muysken (2004)	
Y61	Yes	MP	Siona	Tucanoan	Wheeler (2000)	
Y62	Yes	NVNE	Siriano	Tucanoan	Criswell & Brandrup (2000)	[N∼D] due to nas. harm.
Y63	Yes	NVNE	Suruí	Tupí	van der Meer (1982)	
Y64	Yes	NVNE	Tanimuca-Retuarã	Tucanoan	Ardila (2000)	
Y65	Yes	MP	Tapieté	Tupí	González (2005)	[N∼D] due to nas. harm.
Y66	Yes	NVNE	Tapirapé	Tupí	Praça (2007)	
Y67	Yes	NVNE	Tariana	Arawak	Aikhenvald (2003)	[N∼D] due to nas. harm.

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
Y68	Yes	MP	Tatuyo	Tucanoan	Whisler & Whisler (1976)	[N∼D] due to nas. harm.
Y69	Yes	NVNE	Tsáfiki	Barbacoan	Moore (1962)	
Y70	Yes	NVNE	Tsimané	Mosetenan	Sakel (2011)	
Y71	Yes	MP	Tucano	Tucanoan	Welch & West (2000)	[N∼D] due to nas. harm.
Y72	Yes	MP	Tuyuca	Tucanoan	Barnes & Silzer (1976)	[N∼D] due to nas. harm.
Y73	Yes	NVNE	Urarina	(Isolate)	Olawsky (2006)	
Y74	Yes	MP	Waorani	(Isolate)	Saint & Pike (1962)	
Y75	Yes	–	Waurá	Arawak	Richards (1977)	
Y76	Yes	MP	Wayoró	Tupí	de Souza Nogueira (2011)	[N∼D] due to nas. harm.
Y77	Yes	NVNE	Xerénte	Macro-Ge	de Souza (2008b)	[N∼D] due to nas. harm.
Y78	Yes	NVNE	Xokleng	Macro-Ge	Gakran (2005)	
Y79	Yes	NVNE	Yaminawa	Panoan	Faust & Loos (2002)	[N∼D] due to nas. harm.
Y80	Yes	MP	Yanomámi	Yanomam	Migliazza (1972)	[N∼D] due to nas. harm.
Y81	Yes	NVNE	Yora	Panoan	Anonymous (2001)	[N∼D] due to nas. harm.
Y82	Yes	NVNE	Yurutí	Tucanoan	Kinch & Kinch (2000)	[N∼D] due to nas. harm.
Y83	Yes	NVNE	Zo'é	Tupí	Cabral (2009)	[N∼D] due to nas. harm.
N1	No		Abipon	Guaicuru	Najilis (1966)	
N2	No		Achagua	Arawak	Wilson & Levinsohn (1992)	
N3	No		Akurio	Carib	Meira (1998)	
N4	No		Alacalufe (Central)	Alacufan	Barros (2005)	
N5	No		Alacalufe (Southern)	Alacufan	Barros (2005)	
N6	No		Araona	Tacanan	Pitman (1981)	
N7	No		Arara do Acre	Panoan	de Souza (2012)	
N8	No		Arára, Pará	Carib	Ferreira Alvez (2010)	
N9	No		Asháninka	Arawak	Dirks (1953)	
N10	No		Ashéninka (Apurucayali)	Arawak	Payne et al. (1982)	
N11	No		Ashéninka (Perené)	Arawak	Mihas (2010)	
N12	No		Ashéninka (Pichis)	Arawak	Payne (1982)	
N13	No		Asuriní do Tocantins	Tupí	Nicholson (2009)	
N14	No		Ayacucho Quechua	Quechua	Ruiz (1976)	
N15	No		Aymara (Central)	Aymaran	Apaza (2007)	
N16	No		Aymara (Chilean)	Aymaran	Poblete M. & Salas (1997)	
N17	No		Baniwa (Central)	Arawak	Ramirez (2001)	
N18	No		Baniwa (Rio Negro)	Arawak	Mosonyi (2000)	
N19	No		Baure	Arawak	Danielsen (2007)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
N20	No		Bolivian Quechua (Northern and Southern)	Quechua	Bills et al. (1969)	
N21	No		Bora	Boran	Weber & Thiesen (2001)	
N22	No		Border Kuna	Chibchan	Adelaar & Muysken (2004)	
N23	No		Borôro	Macro-Ge	Nonato (2008)	
N24	No		Cabiyari	Arawak	Ramirez (2001)	
N25	No		Cajamarca Quechua	Quechua	Castillo (2006)	
N26	No		Callawaya	Mixed	Adelaar & Muysken (2004)	
N27	No		Camsá	(Isolate)	Howard (1972)	
N28	No		Candoshi-Shapra	(Isolate)	Tuggy (1981)	
N29	No		Capanahua	Panoan	Elías-Ulloa (2009)	
N30	No		Caquinte	Arawak	Swift (1988)	
N31	No		Carib (French Guinea)	Carib	Renault-Lescure (2009)	
N32	No		Carib (Suriname)	Carib	Courtz (2008)	
N33	No		Carib (Venezuela)	Carib	Álvarez (2003)	
N34	No		Carijona	Carib	Meira (1998)	
N35	No		Cashibo-Cacataibo	Panoan	Zariquiey (2011)	
N36	No		Cavineña	Tacanan	Guillaume (2008)	
N37	No		Chachapoyas Quechua	Quechua	Chaparro (1985)	
N38	No		Chacobo	Panoan	Prost (1967)	
N39	No		Chamicuro	Arawak	Parker (2001)	
N40	No		Chaná	Charruan	Jaime & Barros (2013)	
N41	No		Chipaya	Uru-Chipaya	Olson (1967)	
N42	No		Cholon	Hibito-Cholon	Alexander-Bakkerus (2005)	
N43	No		Chorote	Mataco	Gerzenstein (1978)	
N44	No		Chulupí	Mataco	Campbell & Grondona (2007)	
N45	No		Cuiba	Guahiban	Galindo (2000)	
N46	No		Curripaco	Arawak	Granadillo (2008)	
N47	No		Cuzco-Collao Quechua	Quechua	Parker (2007)	
N48	No		Damana	Chibchan	Amaya (2000)	
N49	No		Dení	Arawan	Carvalho (2013)	
N50	No		Ese Eja (Peru)	Tacanan	Chavarria (2012)	See §2.1
N51	No		Ese Ejja	Tacanan	Vuillermet (2012)	See §2.1
N52	No		Ferreñafe Quechua	Quechua	Taylor (1982)	
N53	No		Guajajára	Tupí	Bendor-Samuel (1972)	
N54	No		Guambiano	Barbacoan	Branks & Branks (1973)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
N55	No		Günün Yajich	(Isolate)	Barros (2005)	
N56	No		Guató	Macro-Ge	Postigo (2009)	
N57	No		Guayabero	Guahiban	Keels (1985)	
N58	No		Hixkaryána	Carib	Derbyshire (1985)	
N59	No		Huallaga Huánuco Quechua	Quechua	Weber (1989)	
N60	No		Huitoto, Minica	Witotoan	Minor & Minor (1976)	
N61	No		Huitoto, Murui	Witotoan	Petersen & Patiño (2000)	
N62	No		Ignaciano	Arawak	Ott & Ott (1967)	
N63	No		Ika	Chibchan	Landaburu (2000b)	
N64	No		Ikpeng	Carib	Pachêco (2001)	
N65	No		Inga (Highland)	Quechua	Levinsohn & Jansasoy (2000)	
N66	No		Inga (Jungle)	Quechua	Maffla Bilbao (1976)	
N67	No		Iquito	Zaparoan	Michael (2012)	
N68	No		Itonama	(Isolate)	Crevels (2002)	
N69	No		Jamamadí	Arawan	Dixon (2004)	
N70	No		Japreria	Carib	Oquendo (2004)	
N71	No		Jaqaru	Aymaran	Hardman (1966)	
N72	No		Jarawara	Arawan	Vogel (1993)	
N73	No		Jauja-Huanca Quechua	Quechua	Wroughton (1996)	
N74	No		Kaingang	Macro-Ge	Neto (2007)	
N75	No		Karirí-Xocó (Dzubukuá dialect)	(Isolate)	de Queiroz (2012)	
N76	No		Katukina	Katukinan	dos Anjos (2011)	
N77	No		Kawesqar	Alacufan	Aguilera F. (2001)	
N78	No		Kaxararí	Panoan	Sousa (2004)	
N79	No		Kinikinao	Arawak	de Souza (2008a)	
N80	No		Kokama-Kokamilla	Tupí	Vallejos (2010)	
N81	No		Korubo	Panoan	de Oliveira (2009)	
N82	No		Kulina	Arawan	Adams & de Powlison (1976)	
N83	No		Kunza	(Isolate)	Adelaar & Muysken (2004)	
N84	No		Lokono	Arawak	Pet (1988)	
N85	No		Lule	(Isolate)	Barros (2001)	
N86	No		Macaguán	Guahiban	Lobo-Guerrero & Herrera (2000)	
N87	No		Macushi	Carib	Carson (1981)	
N88	No		Maka	Mataco	Gerzenstein (1994)	
N89	No		Manchinere	Arawak	dos Santos Silva (2008)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
N90	No		Mapoyo	Carib	Mattei-Muller (2003)	
N91	No		Mapudungun	Araucanian	Barros (2005)	
N92	No		Matís	Panoan	Ferreira (2005)	
N93	No		Matsés	Panoan	Fleck (2003)	
N94	No		Mehináku	Arawak	Corbera Mori (2008)	
N95	No		Miraña	Boran	Seifart (2005)	
N96	No		Mochica	(Isolate)	Torero (1997)	
N97	No		Mocoví	Guaicuru	Grondona (1998)	
N98	No		Movima	(Isolate)	Haude (2006)	
N99	No		Muinane	Boran	Walton & Walton (1972)	
N100	No		Muisca	Chibchan	Adelaar & Muysken (2004)	
N101	No		Muniche	(Isolate)	Michael et al. (2013)	
N102	No		Muylaq' Aymara	Aymaran	Coler (2014)	
N103	No		Nanti	Arawak	Michael (2008)	
N104	No		Nomatsigenga	Arawak	Shaver (1996)	
N105	No		North Junín Quechua (San Pedro de Cajas)	Quechua	Adelaar (1977)	
N106	No		North Junín Quechua (Tarma)	Quechua	Adelaar (1977)	
N107	No		Omagua	Tupí	O'Hagan & Sandy (2010)	
N108	No		Panare	Carib	Hall & Villalon (1988)	
N109	No		Panobo	Panoan	Gomes (2010)	
N110	No		Parakanã	Tupí	da Silva (2003)	
N111	No		Paraujano	Arawak	Patte (1989)	
N112	No		Paresí	Arawak	da Silva (2013)	
N113	No		Paumarí	Arawan	Dixon (2004)	
N114	No		Pemon (Arekuna)	Carib	Edwards (1978)	
N115	No		Pemon (Tarepang)	Carib	Pessoa (2006)	
N116	No		Pémono	Carib	Mattei-Muller (2003)	
N117	No		Piapoco	Arawak	Mosonyi (2000)	
N118	No		Piaroa	Salivan	Mosonyi (2000)	
N119	No		Pilagá	Guaicuru	Vidal (2001)	
N120	No		Pirahã	Mura	Everett (1979)	
N121	No		Pumé	(Isolate)	Mosonyi et al. (2000)	
N122	No		Puri	Macro-Ge	Neto (2007)	
N123	No		Resígaro	Arawak	Allin (1976)	
N124	No		Reyesano	Tacanan	Guillaume (2012)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
N125	No		Sabanê	Nambiquaran	Antunes de Araujo (2004)	
N126	No		Salasca Quechua	Quechua	Chango Masaquiza & Marlett (2008)	
N127	No		San Martin Quechua	Quechua	Coombs et al. (1976)	
N128	No		Santiago del Estero Quechua	Quechua	Alderetes (2001)	
N129	No		Saynawa	Panoan	Couto (2010)	
N130	No		Selk'nam	Chon	Rojas-Berscia (2014)	
N131	No		Shanenawa	Panoan	Cândido (2004)	
N132	No		Shawi	Cahuapanan	Barraza (2005)	
N133	No		Shipibo	Panoan	Elías-Ulloa (2010)	
N134	No		Shiwilu	Cahuapanan	Valenzuela & Gussenhoven (2013)	
N135	No		Suruahá	Arawan	Suzuki (1997)	
N136	No		Tacana	Tacanan	Ottaviano & Ottaviano (1965)	
N137	No		Taushiro	(Isolate)	Alicea (1975)	
N138	No		Tehuelche	Chon	Barros (2005)	
N139	No		Tembé	Tupí	Duarte (2003)	
N140	No		Tena Quechua	Quechua	Orr & Wrisley (1981)	
N141	No		Terêna	Arawak	Martins (2009)	
N142	No		Tinigua	(Isolate)	Tobar (2000)	
N143	No		Toba (Lañagashik)	Guaicuru	Klein (1978)	
N144	No		Trió	Carib	Meira (1999)	
N145	No		Trumai	(Isolate)	Guiardello (1999)	
N146	No		Tunebo (Central dialect)	Chibchan	Headland (1997)	
N147	No		Umotína	Macro-Ge	Lima (1995)	See §2.1
N148	No		Uru	Uru-Chipaya	Muysken (2000)	
N149	No		Vilela	(Isolate)	Barros (2001)	
N150	No		Waimiri-Atroarí	Carib	Bruno (2003)	
N151	No		Waiwai	Carib	Hawkins (1998)	
N152	No		Wapichana	Arawak	dos Santos (2006)	
N153	No		Warao	(Isolate)	Romero-Figueroa (1997)	
N154	No		Warekena	Arawak	Aikhenvald (1998)	
N155	No		Wayana	Carib	Tavares (2006)	
N156	No		Wayúu	Arawak	Mansen (1972)	
N157	No		Wichí (Mision la Paz)	Mataco	Avram (2008)	
N158	No		Woun Meu	Choco	Fonnegra (2000)	
N159	No		Xiriâna	Arawak	Ramirez (1992)	

No.	V-Ṽ?	Evidence	Language	Family	Source	Notes?
N160	No		Yaathe	Macro-Ge	da Silva (2011)	
N161	No		Yabarana	Carib	Mattei-Muller (2003)	
N162	No		Yahgan	(Isolate)	Barros (2005)	
N163	No		Yameo	Peba-Yaguan	Liclan & Marlett (1990)	
N164	No		Yánesha	Arawak	Fast (1953)	
N165	No		Yanomamö	Yanomam	Aikhenvald & Dixon (1999)	
N166	No		Yavitero	Arawak	Mosonyi et al. (2000)	
N167	No		Yawalapití	Arawak	Mujica (1992)	
N168	No		Yawanawa	Panoan	Cruvinel (2009)	
N169	No		Yekwana	Carib	Cáceres (2007)	
N170	No		Yine	Arawak	Sebastián & Marlett (2008)	
N171	No		Yucuna	Arawak	Schauer & Schauer (2000)	
N172	No		Yukpa (de Irapa)	Carib	Meira (2003)	
N173	No		Yukpa (Macoíta)	Carib	Hildebrant (1958)	
N174	No		Yuqui	Tupí	Villefañe (2004)	
N175	No		Yurakaré	(Isolate)	van Gijn (2006)	

Appendices for "Environmental shielding is contrast preservation"

Appendix D: summary of vowel neutralization survey

Key for appendix D

Shaded = contrasts in vocalic nasality neutralized in this context

Not shaded = contrasts in vocalic nasality not known to be neutralized in this context

?? = author claims that contrasts in vocalic nasality are neutralized before nasals, but provides only examples of VN]$_\sigma$.

– = independent phonotactic restrictions (i.e. no coda nasals) make this context impossible to examine.

The language names provided in appendix D are those provided by Ethnologue. Where they differ significantly, language names provided by the cited sources are included in parentheses.

No.	Restrictions?	Neut. Contexts			Language	Family	Source
		NV	VN]$_\sigma$	V]$_\sigma$N			
Y1	Yes	■			Aceh	Austronesian	Durie (1985)
Y2	Yes	■			Drubea (Ndumbea)	Austronesian	Gordon & Maddieson (1999)
Y3	Yes	■			Éwé	Niger-Congo	Westermann (1930)
Y4	Yes		■		Gbaya-Bossangoa (Gbeya)	Niger-Congo	Samarin (1966)
Y5	Yes		■	??	Hindi	Indo-European	Ohala (1975)
Y6	Yes	■			Ho-Chunk (Winnebago)	Siouan	Miner (1989)
Y7	Yes	■	■	■	Khana	Niger-Congo	Ikoro (1996)
Y8	Yes	■	■		Kiowa	Kiowa-Tanoan	Watkins (1984)
Y9	Yes	■			Lakota	Siouan	Rood & Taylor (1996)
Y10	Yes	■			Mazatec, Jalapa de Díaz	Otomanguean	Silverman et al. 1995
Y11	Yes	■	■	??	Mbay	Nilo-Saharan	Keegan (1997)
Y12	Yes	■	–	■	Mixtec, Atatláhuca	Otomanguean	Alexander (1980)
Y13	Yes	■	–		Mixtec, Coatzospan	Otomanguean	Gerfen (1999)
Y14	Yes	■	–	–	Mbembe	Niger-Congo	Kemmermann (2014)
Y15	Yes	■	–	–	Me'phaa, Malinaltepec (Tlanpaneca)	Otomanguean	Suárez (1983)
Y16	Yes	■			Navaho	Athabaskan	Sapir & Hoijer (1967)
Y17	Yes	■	■	■	Niellim (Lua)	Niger-Congo	Boyeldieu (1985)
Y18	Yes	■	–		Nupe-Nupe-Tako	Niger-Congo	Dunstan (1969)
Y19	Yes	■	–		Oka-Akoko	Niger-Congo	Oyebade (1985)
Y20	Yes	■			Paicî	Austronesian	Gordon & Maddieson (2004)
Y21	Yes	■	–		Sanumá	Yanomaman	Borgman (1990)
Y22	Yes	■	■	■	Saramaccan	Creole, English based	McWhorter & Good (2012)
Y23	Yes		■		Saint Lucian Creole French	Creole, French based	Carrington (1984)

No.	Restrictions?	Neut. Contexts			Language	Family	Source
		NV	VN]$_\sigma$	V]$_\sigma$N			
Y24	Yes	■			Supyire	Niger-Congo	Carlson (1994)
Y25	Yes	■	■	■	Tewa, Rio Grande	Kiowa-Tanoan	Speirs (1966)
Y26	Yes		■	■	Tîrî	Austronesian	Osumi (1995)
Y27	Yes	■	–		Urarina	(Isolate)	Olawsky (2006)
Y28	Yes	■			Vai	Niger-Congo	Welmers (1976)
Y29	Yes		■	■	Xârâcùù	Austronesian	Lynch (2002b)
Y30	Yes	■			Yakoma	Niger-Congo	Boyeldieu (1975)
Y31	Yes	■	–		Yoruba	Niger-Congo	Bamgbose (1966)
Y32	Yes	■	–		Yuchi	(Isolate)	Crawford (1973)
N1	None discussed				Akan	Niger-Congo	Dolphyne (1988)
N2	None discussed				Angolar	Creole, Portuguese Based	Lorenzino (1988)
N3	None discussed				Anguthimri	Pama-Nyungan	Crowley (1981)
N4	None discussed				Apache, Chiricahwa	Athabaskan	Hoijer (1945)
N5	None discussed				Apalaí	Cariban	Koehn & Koehn (1986)
N6	None discussed				Assiniboine	Siouan	Levin (1964)
N7	None discussed				Avatime	Niger-Congo	Kropp Dakubu & Ford (1988)
N8	None discussed				Awutu, Efutu	Niger-Congo	Obeng (2008)
N9	None discussed				Baré	Arawakan	Aikhenvald (1995)
N10	None discussed				Belize Kriol English	Creole, English based	Greene (1999)
N11	None discussed				Biloxi	Siouan	Einaudi (1976)
N12	None discussed				Brazilian Portuguese	Indo-European	de Medeiros (2011)
N13	None discussed				Breton	Indo-European	Press (1987)
N14	None discussed				Canela-Krahô	Macro-Ge	Popjes & Popjes (1986)
N15	None discussed				Cemuhî	Austronesian	Lynch (2002a)
N16	None discussed				Chickasaw	Muskogean	Munro (2005)
N17	None discussed				Choctaw	Muskogean	Broadwell (2005)
N18	None discussed				Dagaare	Niger-Congo	Bodomo (1997)
N19	None discussed				Dangme	Niger-Congo	Kropp Dakubu (1987)
N20	None discussed				Dene (Chipewyan)	Athabaskan	Li (1946)
N21	None discussed				Dogon, Jamsay	Niger-Congo	Heath (2008)
N22	None discussed				Dogon, Tommo So	Niger-Congo	McPherson (2013)
N23	None discussed				Emberá	Chocoan	Herrera (2002)
N24	None discussed				Fon	Niger-Congo	Lefebvre & Brousseau (2002)
N25	None discussed				French	Indo-European	Cohn (1990)
N26	None discussed				Gbaya Kara	Niger-Congo	Monino & Roulon (1972)

No.	Restrictions?	Neut. Contexts			Language	Family	Source
		NV	VN]$_\sigma$	V]$_\sigma$N			
N27	None discussed				Hupdë	Nadahup	Epps (2008)
N28	None discussed				Ijo	Niger-Congo	Dunstan (1969), Harry (2004)
N29	None discussed				Jèrriais (Norman French)	Indo-European	Liddicoat (1994)
N30	None discussed				Kaapor	Tupian	Kakumasu (1986)
N31	None discussed				Kabba	Nilo-Saharan	Moser (2004)
N32	None discussed				Karok	(Isolate)	Bright (1957)
N33	None discussed				Koromfé	Niger-Congo	Rennison (1997)
N34	None discussed				Kwaza	(Isolate)	van der Voort (2004)
N35	None discussed				Makaa	Niger-Congo	Heath (2003)
N36	None discussed				Mbum	Niger-Congo	Hagège (1970)
N37	None discussed				Mohawk, Akwesasne	Iroquoian	Bonvillain (1973)
N38	None discussed				Newar, Dolakha	Sino-Tibetan	Genetti (2007)
N39	None discussed				Ngäbere (Guaymí)	Chibchan	Pacheco (2008)
N40	None discussed				Ngambay	Nilo-Saharan	Vandame (1963)
N41	None discussed				Ngbaka	Niger-Congo	Thomas (1963)
N42	None discussed				Nishnaabemwin	Algonquian	Valentine (2001)
N43	None discussed				Ojibwa, Eastern	Algonquian	Bloomfield (1956)
N44	None discussed				Onondaga	Iroquoian	Barrie (2015)
N45	None discussed				Osage	Siouan	Quintero (2004)
N46	None discussed				Otomi, Mezquital	Otomanguean	Hess (1968)
N47	None discussed				Páez	Paezan	Jung (2008)
N48	None discussed				Popoloca, Mezontla	Otomanguean	Veerman-Leichsenring (1991)
N49	None discussed				Quapaw	Siouan	Rankin (2005)
N50	None discussed				Seneca	Iroquoian	Chafe (2015)
N51	None discussed				Siwu	Niger-Congo	Kropp Dakubu & Ford (1988)
N52	None discussed				Slave	Athabaskan	Rice (1989)
N53	None discussed				Songhay, Koyra Chiini	Nilo-Saharan	Heath (1999a)
N54	None discussed				Songhay, Koyraboro Senni	Nilo-Saharan	Heath (1999b)
N55	None discussed				Suga (Nizaa)	Niger-Congo	Endresen (1991)
N56	None discussed				Susu	Niger-Congo	Houis (1963)
N57	None discussed				Tariana	Arawakan	Aikhenvald (2003)
N58	None discussed				Tewa, Santa Clara	Kiowa-Tanoan	Hoijer & Dozier (1949)
N59	None discussed				Tiwa, Northern, Taos	Kiowa-Tanoan	Trager (1946)

No.	Restrictions?	Neut. Contexts			Language	Family	Source
		NV	VN]$_\sigma$	V]$_\sigma$N			
N60	None discussed				Tsimané (Mosetén)	Mosetenan	Sakel (2004)
N61	None discussed				Tuscarora	Iroquoian	Mithun Williams (1976)
N62	None discussed				Vute	Niger-Congo	Guarisma (1978)
N63	None discussed				Wampanoag (Massachusett)	Algonquian	Goddard & Bragdon (1988)
N64	None discussed				Wandala	Afro-Asiatic	Frajzyngier (2012)
N65	None discussed				Waorani (Auca)	(Isolate)	Saint & Pike (1962)
N66	None discussed				Yuki	Yukian	Sawyer & Schlichter (1984)

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