*NT recast as cue constraints

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Background:
Voiced oral stops following a homorganic nasal are less marked than voiceless oral stops in the same position, a generalization captured by Pater's (1999) OT constraint called here *NT. This constraint has been criticized almost from the beginning (e.g., Hyman 2001) because it cannot predict the full typological range of rescue mechanisms. In addition, *NT can be criticized for duplicating the tasks of phonetics in the phonology (see Haspelmath's 2006 critique on markedness constraints in general).

Neglected *NT patterns:
In the present talk we take up three problems with the original *NT constraint. Firstly, it has nothing to say about the common pattern (Kadima 1969, Huffman & Hinnebusch 1998) in which postnasal voiceless stops are aspirated, so that a two-way laryngeal contrast between voiced and voiceless stops is enhanced, rather than neutralized, in postnasal position, cf. (1a), as e.g., in Kongo (Kerremans 1980).

(1a) NT → NT^h (b) {NT, NT^h} → NT^h (c) {$NT^{(\text{ʾ})}$, NT^h} → $NT^{(\text{ʾ})}$
ND → ND ND → ND N̤D → N̤D

Secondly, *NT has nothing to say about languages which not only contrast aspiration in stops but also have contrastive voicing (T, T^h, D). In several of these three-way laryngeal contrast languages, a voicing contrast is maintained post-nasally, while the aspiration contrast neutralizes: cf. (1b), e.g., in Cinsenga, Chichewa (Miti 2001) and Tumbuka (Vail 1972). And thirdly, *NT has nothing to say about languages with a three-way laryngeal stop contrast of voiceless depressors, voiceless aspirated and plain voiceless with optional ejection (N̤D, T^h, $NT^{(\text{ʾ})}$) which neutralize the contrast between aspirates and plain voiceless postnasally, as in, e.g., Zulu (Doke 1926) and Xhosa (Jessen 2002), cf. (1c).

Our proposal:
In the present talk we employ the BiPhon model by Boersma (2006), which models the mapping between phonological and phonetic representations via cue constraints. These independently needed cue constraints make phonetically-based markedness constraints such as *NT redundant. What is more, cue constraints can account for the range of laryngeal alternations in the NT context.
As work like Ohala & Ohala (1993) and Solé (2012) observes, a phonetically voiceless stop is easily perceived as voiced in postnasal position because it has a weak release burst, which in non-postnasal position is a cue for voiced stops, only. That is, postnasal voiceless stops minimally violate the following cue constraint:

(2) *[weak burst]/T/: "Don't map a weak burst in the auditory representation onto a voiceless plosive in the phonological representation, and vice versa"

This cue constraint is responsible for the perceptual dispreference of NT. Languages can employ further cues to postnasal voiceless stops, such as aspiration, which strengthens the plosive bursts and therefore enhances the postnasal voicing contrast. If realized with aspiration, postnasal voiceless stops do not violate the cue constraint in (2) but the following aspiration cue constraint:

(3) *[aspiration]/T/: "Don't map aspiration in the auditory representation onto a voiceless plosive in the phonological representation, and vice versa"

Languages of type (1a) with a two-way laryngeal contrast that use aspiration as phonetic enhancement of a postnasal voicing contrast can simply be accounted for by ranking the

aspiration cue constraint (3) below the burst cue constraint (2), cf. tableau 1. Language types that show merger of laryngeal contrasts, on the other hand, involve an interaction of the high-ranked burst cue constraint with low-ranked DEP [spread glottis], cf. tableau 2. The common occurring languages that neutralize postnasal voicing are faithful to [spread glottis] but violate DEP [voice], cf. tableau 3.

Zulu and Xhosa, both languages of type (1c), seem to go against the expected pattern, because they neutralize the contrast between aspirated and plain voiceless in favor of the plain voiceless stops, which are auditorily closer to the plain voiceless depressors than the aspirated voiceless stops would be. However, this language type is typologically unusual in having the same three-way laryngeal contrast in postnasal stops and in clicks. Both the stop and the click series with optional ejection show a silence after the burst release, which is a more reliable auditory cue to this class than aspiration, since aspiration is often masked by a click release (Jessen 2002). Zulu and Xhosa thus employ an additional silence cue constraint *[silence]/T$^{(')}$/ that is higher-ranked than the aspiration cue constraint (3) in the formal account of this language type, cf. tableau 4.

Tableau 1: languages of type 1a that allow aspiration as enhancement strategy:

|NT|	DEP (voice)	DEP (spr. glottis)	*[weak burst] /T/	*[silence] /T$^{(')}$/	*[aspiration] /T/
/ND/[ND]	*!				
/NT/[NT]			*!		
☞ /NT/[NT^h]					*
/NT^h/[NT^h]		*!			

Tableau 2: languages of type 1b in which enhancement via aspiration results in merger:

|NT|	DEP (voice)	*[weak burst] /T/	*[aspiration] /T/	*[silence] /T$^{(')}$/	DEP (spr. glottis)
/ND/[ND]	*!				
/NT/[NT]		*!			
/NT/[NT^h]			*!		
☞ /NT^h/[NT^h]					*

Tableau 3: languages traditional *NT can account for, with merger of voicing contrast:

|NT|	DEP (spr. glottis)	*[weak burst] /T/	*[aspiration] /T/	*[silence] /T$^{(')}$/	DEP (voice)
☞ /ND/[ND]					*
/NT/[NT]		*!			
/NT/[NT^h]			*!		
/NT^h/[NT^h]	*!				

Tableau 4: languages of type 1c (with clicks) that neutralize the aspiration contrast:

|NT^h|	DEP (sl. voice)	*[weak burst] /T/	*[aspiration] /T/	*[aspiration] /T^h/	*[silence] /T$^{(')}$/	DEP (spr. glottis)
/N̤D̤/[N̤D̤]	*!					
/NT$^{(')}$/[NT^h]			*!			
☞ /NT$^{(')}$/[NT$^{(')}$]					*	*
/NT^h/[NT^h]				*!		

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