Microvariation inside typological space

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Microvariation, conceived as minimal difference between closely related varieties V1 and V2 (or subsequent stages in language change), has often been represented in OT as minimal reranking of constraints (see, among others, van Oostendorp, in prep, Alber, 2001, in press). This model of microvariation is too coarse, for two reasons:

i. minimal constraint reranking does not guarantee minimal effects on the output of the grammar: reranking of constraints C1 and C2 may have minimal effects on the output, but it may as well have huge effects or none at all.

ii. learners of V1 and V2 have only access to the output of a grammar, not to the grammar itself. Hence they will be compelled to acquire minimally different outputs, which do not necessarily correspond to minimally different grammars.

It is proposed here that microvariation must be studied considering the typology of a phenomenon as a whole (Alber&Prince, in prep.): only considering the whole typology can we be sure that V2 is the closest neighbor of V1 and that there is not a V3 which is more similar. In a first step, the fundamental properties of the typology, expressed in terms of ranking conditions, will be determined (Alber&Prince, in prep.). They limit the typological space in which microvariation can occur. Next, the output-structures (optima) generated by the ranking conditions are examined: V1 and V2 will be closest neighbors, if they display a maximum of shared optima. Two varieties therefore display microvariation when they share the highest possible number of optima inside a typology.

Consider as an example of microvariation (simplified here for the purpose of illustration), g-spirantization in Dutch and German varieties. At some historical stage, g-spirantization affected /g/ in all contexts in Standard Dutch (D), but it targets only /g/ in coda position in Northern German varieties (NG), while no spirantization of /g/ takes place in Southern German varieties (SG) (Ito&Mester 1999, Alber, 2001):

(1)		'go' and 'day'	grammar	optima	description
	a. D	[x]aan, daa[x]	*g >> F&F/hd	X, $X]_{coda}$	g -> x in all contexts
	b. NG	[g]ehen, Ta[x]	F/hd >> *g >> F	g, $X]_{coda}$	g-> g in onset, g-> x in coda
	c. SG	[g]ehen, Ta[k]	F >> *g	g, $g]_{coda}$	g-> g (modulo final devoicing)

In the grammar of g-spirantization, the markedness constraint *g, bans [g] from the output, F favors faithful output-mapping of /g/ in general and F/hd favors a faithful mapping of /g/ in onset position. The distance between the grammars in (1) could be described as a stepwise demotion of *g, first under F/hd (in NG) and then under F (in SG). However, minimal reranking of other constraints in the grammar does not produce similar minimal effects. For instance, reranking between *g and F leads us directly from D to SG. And reranking between the two faithfulness constraints produces no effect whatsoever, if *g >> F&F/hd or F >> *g.

Investigating the typology of g-spirantization with the help of OTWorkplace (Prince&Tesar 2007-2013), we find that the phenomenon is characterized by two properties, expressed by the ranking conditions, F<>*g (complete vs. incomplete faithfulness) and *g<>F, F/hd (complete vs. incomplete unmarkedness), generating the 3 attested languages:

(2)	*g>>F	F >> *g
*g >> F&F/hd	X, $X]_{coda}$ (D)	contradiction
F ∨ F/hd >> *g	g, $X]_{coda}$ (NG)	g, $X]_{coda}$ (SG)

(SG is characterized by the property value F >> *g, which entails F ∨ F/hd >> *g. The combination of values F >> *g and *g >> F&F/hd is excluded by contradiction)

Dutch is in a microvariation relationship with NG, sharing the optimum X] (g -> x in coda) and NG is similar to SG in that they share the optimum g (g-> g in general). Dutch and SG do not share any optimum and hence have to be considered more distant from each other.

In this very simple example, minimal differences in shared optima correspond to minimal differences in ranking conditions: Dutch and NG share the ranking condition *g>>F and NG and SG share F ∨ F/hd >> *g, while Dutch and SG do not share any ranking condition.

Characterizing microvariation in terms of minimal differences in ranking conditions of properties of the typology allows us to narrow down considerably the spectrum of what is a minimal grammatical difference. Yet, minimal grammatical difference in this sense does not determine all details of the microvariation pattern of shared optima. Thus, a stress typology determined by a set of basic metrical constraints (e.g. TROCHEE and IAMB, determining foot-type, ALL-FT-L and ALL-FT-R, responsible for the directionality in foot-positioning, PARSE-s, favoring parsing of syllables into feet) will be characterized, among others, by properties determining foot-type and foot-position (Alber&Prince, in prep.):

(3) Typical properties in a metrical typology: a. foot-type: TROCH <> IAMB
b. foot-position: ALL-FT-L <> ALL-FT-R

A change of ranking in foot-type generates language pairs which differ in all strings longer than one syllable and thus has a bigger effect on the structure of output optima than a change in the value of foot-position, which affects only odd-numbered strings:

(3)	foot-type: shared optima: strings > 1						shaded: shared optima
	Troch >> Iamb	-X-	-Xu-	-Xu-o-	-Xu-Xu-	-Xu-Xu-o-	
	Iamb >> Troch	-X-	-uX-	-uX-o-	-uX-uX-	-uX-uX-o-	
	foot-position: shared optima: all even strings + 1syll						
	AFL >> AFR	-X-	-Xu-	-Xu-o-	-Xu-Xu-	-Xu-Xu-o-	
	AFR >> AFL	-X-	-Xu-	-o-Xu-	-Xu-Xu-	-o-Xu-Xu-	
X = footed and stressed syllable, u = footed, but unstressed syllable, o = syllable not parsed into foot							

The prediction of our approach thus is that language families will vary more easily in terms of foot-positioning rather than in terms of foot-type. This prediction is borne out for the family of Australian languages (source: Hayes, 1995, UD Phonology Lab Stress Pattern Database): out of 24 Australian languages examined, 22 (91,6%) are trochaic, 0 are iambic and 2 (8,3%) are of mixed foot-type; 17 languages (70,8%) are left-aligning, while 6 (25%) can be considered to be right-aligning (1 language is ambiguous). The variability in foot-positioning thus is much greater than the variability in foot-type.

Similar conclusions can be drawn for the properties of sparse footing (one foot per word, e.g. Xu-o-o-o-), weakly dense footing (word parsed entirely into binary feet, e.g. Xu-Xu-o) and strongly dense footing (word parsed entirely into feet, e.g. Xu-Xu-X) where variability between weakly dense and strongly dense structures is attested, since it affects only odd-numbered strings while variability between sparse and weakly/strongly dense patterns is not, because it would affect all strings longer than three syllables.

Thus an analysis of microvariation in terms of ranking conditions (properties) characterizing a typology narrows down considerably the space of possible neighboring languages and can be further refined by determining closest neighbors in terms of shared optima. Only analysis inside a typology guarantees discovery of the closest neighbor, at all.

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