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NOTES AND REVIEWS

ON GLOTTALIC CONSONANTS

LYLE CAMPBELL

Joseph Greenberg¹ recently presented a number of generalizations concerning glottalic consonants (ejectives (or explosives), and injectives (or implosives)) based on a cross-linguistic comparison of such sounds in a large number of languages. His is indeed an exciting study. Some of Greenberg's generalizations were further sharpened by Eric Hamp.² The purpose of this note is to present evidence which will lead to even greater refinement of some of these generalizations.

The first generalization is, "the implosive is normally voiced, but voicelessness occurs typically in word final where ordinary 'voiced obstruents are subject to devoicing'" (Greenberg, 126-7) Stated as a general tendency this seems true, but there are some notable exceptions. In several Mayan languages (e.g. Quiché, Tzutujil, Cakchiquel, Pokomam, Pokomchi', Uspantec, etc.) the segment of the glottalic series which corresponds to the voiceless uvular (post-velar) stop of the plain series is a VOICELESS imploded uvular stop, [ʔq].³ This segment is voiceless and imploded in all positions. Since

Greenberg seemed to have no information on imploded uvulars, the question of voicing for implosives in that position should be left open for further investigation.

The second generalization I wish to consider is stated by Greenberg as, "injectives tend to have front articulation, ejectives to have back articulation" (p. 127). "For injectives . . . the bilabial is clearly the favored point of articulation . . . it very nearly holds that if a language has one injective obstruent, it is ʔb; if it has two they are ʔb and ʔd (the most common pattern); if there are three they are ʔb, ʔd, and ʔj . . . ; and if four they are ʔb, ʔd, ʔj and ʔg" (p. 128). This generalization is qualified by Greenberg to allow for languages which have ʔd as the only injective, and to allow Kinga (Bantu) with ʔg as its only injective as an exception. Stated as a general tendency, this generalization also seems true. However, the Mayan languages mentioned above constitute somewhat of a counter-example. These have the following:

p	t	ʃ	c	k	q
ʔb	t'	ʃ'	c'	k'	ʔq

where the labial and uvular of the glottalic series are imploded while the others of the series are ejectives. In this case, Greenberg's implication chain does not hold true (the back injective ʔq would imply that the other stops of the series should be injectives as well). I would suggest that a possible reason for the labial and uvular being injectives (opposed to the other ejectives of the series) may have something to do with their being at the periphery of the oral cavity; they are unified by the feature of 'gravity' in an earlier theory of distinctive features. These sounds fall into a natural class defined acoustically by lower as opposed to higher non-periodic spectral energy.

¹ Some generalizations concerning glottalic consonants, especially implosives, *IJAL* 36. 123-45 (1970).

² Maya-Chipaya and typology of labials, in *Papers from the sixth regional meetings of the Chicago Linguistic Society*, pp. 20-2 (1970).

³ This is documented in the following: Eunice V. Pike, *Dictation exercises in phonetics*, Summer Institute of Linguistics, Glendale, California, p. 51 (1946); W. Cameron Townsend, *Cakchiquel grammar*, in Benjamin Elson (ed.), *Mayan studies I*, Summer Institute of Linguistics publ. 5, Norman, Oklahoma, p. 10 (1960); Lyle Campbell, *Historical linguistics and Quichean linguistic prehistory*, unpublished dissertation, UCLA, p. 112 (1971).

I am following Greenberg's notation with [ʔq], [ʔb], etc. for injectives (others have symbolized these as [b̥] or [bʰ]).

It is important to mention these counter-examples from Mayan languages because it is precisely the Mayan languages (along with the Hausa) which Greenberg presented as paradigm cases illustrating the generalization of injectives favoring front articulation and ejectives back articulation (p. 134).

Hamp (1970) has sharpened this generalization to the following, "Ingressives favour the front; egressives disfavour it, and as a corollary ejectives favour the back" (p. 21). This conclusion is based on evidence from the number of languages which either lack labials altogether, or show a deficiency in the labial region. When there is a gap in the labial region, it is (almost) always the voiceless labial stop *p* that is missing. Hamp further notes that vanishing *p* seems always to pass through a spirant stage (p. 21). Thus Hamp reformulates Greenberg's generalization to add that egressives, not just ejectives, disfavor the front region of articulation, notably the labial. He suggests that because ejectives more strongly disfavor the front, they have come more forcibly to scholars' attention. This leads to the speculation that a given point of articulation will be disfavored by egressives in proportion to their phonetic pressure (strength of articulation) (p. 21).

Hamp's formulation seems to me to be correct and necessary if we are to be able to explain the many gaps and sound changes away from voiceless labial stops. However, there are many exceptions which should cause us to add the additional clause to the generalization that it may easily be violated if there is good reason to do so. Some examples of exceptions are:

- 1) Roumanian *k* > *p* before dental consonants (e.g. *opt* < *octo eight*).
- 2) PIE **k*^w > Greek *p*.
- 3) Proto-Mixe-Zoquean **k*^w > *p* in Mixe and Tapachultec.
- 4) Proto-Muskogean **k*^w > *p* in Creek.
- 5) **b*, **d*, **g* > *p*, *t*, *k* respectively in Germanic (in Grimm's law).

In such cases we may be able to point to other considerations which allow us to predict a resultant *p* in spite of the generalization against it.⁴ The point is, we must take care not to place too much explanatory weight on the valid generalization that egressives tend to disfavor front articulation (especially labial). Against the few exceptions mentioned, one could present untold cases of changes which follow the prediction of the generalization. Nevertheless, we can never be sure when some language will choose to violate it.

A final point to consider concerns possible historical origins of injectives. Greenberg presents strong evidence for the following sources.

- 1) Injectives might arise from a sound shift changing voiced plain to voiced implosive stops (a documented case of such an origin is in Sindhi) (p. 134).
- 2) A *ʃ* can originate from a previous *gb* (presumably implosive) by loss of the velar closure (p. 136).
- 3) A cluster of a voiced plain consonant and a glottal stop may result in implosives (evidence from Austronesian languages) (p. 137).
- 4) A plain voiced stop may develop preglottalized allophones when followed by a voiceless vowel or consonant and preceded by a voiced vowel, as in Papago (p. 137).

The imploded stops in the Mayan languages seem not to have come from any of these sources, and therefore a further possible source for injectives must be considered. In Mayan languages it is clear that many of the injectives have come from original ejective (glottalized) consonants. For example, the ?*q* mentioned above seems to have come

⁴ For example, we may be able to say that the pressure of symmetry accounts for the resultant voiceless labial stop in the Germanic sound shift. We might be able to refer to the feature of 'gravity' together with 'roundness' in the labiovelars which become *p* (since both *p* and *k*^w are 'grave' and inherently share a labial quality, it is not unnatural for *p* to result).

from *q' (ejective). Tzutujil and Mam⁵ have further changed *t' (ejective) to ?d in recent times. We might speculate that these changed in accordance with response to Greenberg's generalization about implosives favoring the front; the imbalance of a system with ?b and ?q may have exerted pressure, creating more front injectives. Whether or not this is the case, what is obvious is that glottalized (ejective) consonants provide yet another possible origin for injectives.

Since I am discussing Greenberg's implications for change, one final Mayan example needs mentioning. Proto-Mayan seems unquestionably to have had:

*p	*t	*ʕ	*č	*k	*q
*?b	*t'	*ʕ'	*č'	*k'	*q'

which seems to follow the generalization nicely that ingressive favor the front (?b being the only injective) and egressive

(especially ejectives) favor the back. However, the languages of the Yucatecan and Cholan-Tzotzilán subgroups have undergone an innovation since Proto-Mayan times:

$$?b \rightarrow p' / _ V \begin{cases} \text{fricative} \\ \text{sonorant} \end{cases}$$

That is, the injective ?b became ejective p' whenever the following consonant within a root was either a fricative or a sonorant.⁶ This change would seem to go against the generalization about ingressesives favoring forward points of articulation, but egressives (especially ejectives) disfavoring them. Perhaps an explanation lies in the fact that anticipation of a following continuant or sonorant consonant led to a reduction in the rarefaction of the air in the supraglottal cavity, lessening the likelihood of implosion. This I leave for professional phoneticians to investigate.

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⁵ The injective ?d is documented for Tzutujil in Campbell, *op. cit.*; James L. Grimes, *The linguistic unity of Cakchiquel-Tzutujil*, *IJAL* 34. 108 (1968). It is documented for Mam in John Robertson, et al., *Mam basic course*, BYU press (1969).

⁶ This change was pointed out to me by Terrence Kaufman; it is discussed in greater detail in Campbell *op. cit.*