

## **Functional, non-functional or multi-functional? Of covert gestures and free variation**

**Koen Sebregts**

**koen.sebregts@gmail.com**

**James M Scobbie**

***Queen Margaret University***

**jscobbie@qmu.ac.uk**

Functional approaches to phonology (Flemming 1995, Boersma 1998, Hayes et al. 2004) characterise phonology as a struggle between two – just two – forces, widely seen as having opposite tendencies, namely ease of perception and ease of articulation. In doing so, they often impart on the speaker either “selfish”/”lazy” or “altruistic” behaviour. Reductions and casual speech forms are seen as selfish – the speaker is trying to get away with as little effort as possible to get the message across – whereas enhancement or hyperarticulated forms are seen as altruistic, in that the listener is maximally aided in his or her perception, even at the expense of considerable articulatory cost. Differently-biased labels for these forces could be “efficiency” and “redundancy”. In Functional OT, these speaker intentions are not only considered to be forces shaping speaker performance (as in Lindblom 1990), but in fact formalised as grammatical principles. Examples of selfishness constraints in functional OT are Kirchner's (2001) LAZY, and Boersma's (1998) \*GESTURE, which both penalise expending articulatory effort. Language change phenomena such as lenition and deletion are then claimed to arise from the progressive promotion in ranking of such constraints.

These approaches to speaker selfishness or altruism have come under attack from both theoretical and empirical arguments. The main problem from a purely theoretical point of view is whether functional pressures that vary with characteristics of the speaker and/or the speech event (such as the rate of speech or formality) have a place at all in a formal grammar, if its aim is to generate all and only the possible forms in a language (Hale and Reiss 2000). Furthermore, by modelling the reduction of speech gestures, these approaches may be unnecessarily recapitulating diachronic events in a synchronic grammar (Blevins 2004; Silverman 2006). There is also the pressing question of what these purportedly “functional” constraints actually mean. What counts as “reduction” or “enhancement”? Kirchner (2001), for instance, analyses synchronic alternations between initial stops and intervocalic fricatives as involving context-dependent effort reduction in the case of the latter. However, while stops require greater tongue displacement than fricatives, the latter require a more precise articulatory configuration in order to be executed successfully (Laver 1994). Pouplier (2003) shows that it is not only the quantification of effort cost that is a problem, but also that notions of effort are never context-free, but need to be seen within a complex of dynamic gestural coordination. The danger is that naïve pseudo-phonetic and pseudo-psycholinguistic functional drivers are brought into play through consideration of well-understood diachronic and cross-linguistic tendencies without any convincing conceptual underpinnings.

One possible solution to this problem is to explore phonological patterns in greater detail, using techniques from phonetics, psycholinguistics or sociolinguistics, for example, to seek evidence for or against these functional tendencies, and to provide the data needed to show how synchronic variation can be codified into diachronic categories. For example, technological advances in instrumental phonetic research reveal new evidence that simply seems at odds with the idea that speakers are either selfish or altruistic. We present examples of such new research, showing “non-functional” language variation, covert articulatory effort, and the social relevance of equally covert articulatory variation. Such cases are very informative for the debate on functional

phonology, as well as for an ultimate understanding of systematic patterns of speaker behaviour. They provide evidence in favour of higher-level abstract units, such as the segment. All these examples show a total absence of selfish or altruistic behaviour on the part of speakers from the perspective of phonological theory as well as simplistic models of gestural reduction.

1. In both Dutch and Scottish English, there is variable covert rhoticity, i.e. the presence of articulatory gestures related to a rhotic consonant (such as coronal upward movement for an alveolar or retroflex constriction) without measurable acoustic consequences (Scobbie and Sebregts 2010; Scobbie, Stuart-Smith and Lawson 2008). The expenditure of articulatory effort without acoustic payoff in any commonly understood way seems decidedly non-functional, and also warns against analysing weakening or deletion on a purely impressionistic perceptual basis. A similar case is that of labio-dental *r* in some varieties of English, which has been shown to variably involve an alveolar gesture in addition to the primary labio-dental one.
2. In a number of rhotic varieties of English, as well as in some varieties of Dutch, the main acoustic correlate of *r* is a lowered F<sub>3</sub>. This acoustic result can be achieved by at least two different basic tongue configurations: “bunched” palatal and retroflex (Delattre 1965, Guenther et al. 2003). Individual speakers have been found to vary between the two, and the distribution of this variation can be socially relevant (Lawson, Stuart-Smith and Scobbie, 2010 accepted).
3. Variation between a vocalised and a non-vocalised variant of /l/ in the speech of a Scottish English speaker shows co-existing variants, which are not in a simple full vs. reduced relationship. The vocalised variants may in fact include gestures not present in the non-vocalised ones, greatly problematising received notions of reduction. There is no evidence that the choice of one form over another aids the speaker vs. the listener (Scobbie and Pouplier 2009).

These results show that the articulatory behaviour of speakers is more complex than can be concluded on the basis of perceptual or introspective data alone. They also show that it is not likely to be a binary distinction between speaker- or listener-oriented in the way assumed by functional OT approaches that formalise articulatory laziness and/or perceptual enhancement. Instead, speakers are more likely to emulate, to the best of their abilities, the patterns found in their speech community, including the socially- stratified variation and weakly perceptible contrasts they may contain. They are able to use the range of patterns codified arbitrarily in the grammar of their language community to move in a multidimensional space, which is far removed from the homogeneous speech community of ideal speakers and hearers assumed in traditional generative approaches, as well as more modern conceptions such as Articulatory Phonology.

Speakers slide between different combinations of complex instantiations of articulations, and insofar as these are functional, the functions go far beyond those relevant for establishing simple inventories of phonemes or the distribution of allophones on similar models. The functional content of speech can dynamically transmit (to different degrees of intentionality) different indexical information about social status, attentional demands, physical states, interpersonal relationships, all in addition to lexical and prosodic information. Speaker laziness and listener-oriented enhancement may well play a role as performance factors in everyday interaction, and so ultimately contribute to shaping the sound patterns of a language diachronically (Pierrehumbert 2001), but as formal grammatical principles they are insufficient. Within the narrow purview of a generative approach to phonology such principles need not be – and on the basis of our data are unlikely to be – present in the synchronic grammar.

## References

- Blevins, J. 2004. *Evolutionary Phonology*. Cambridge: CUP
- Boersma, P. 1998. *Functional Phonology. Formalizing the Interactions between articulatory and Perceptual Drives*. The Hague: HAG (LOT dissertation series 11).
- Delattre, P. 1965. *Comparing the Phonetic Features of English, French, German and Spanish: An Interim Report*. Heidelberg: Julius Groos Verlag.
- Flemming, E. 1995. *Auditory Representations in Phonology*, Phd Dissertation, UCLA.
- Guenther, F. H., Espy-Wilson, C. Y., Boyce, S. E. Matthies, M. L. Zandipour, M. & Perkell, J. S. 1999. Articulatory tradeoffs reduce acoustic variability during American English /r/ production. *JASA*: 105: 2854-2865.
- Hale, M. and Reiss, C. 2000. Phonology as cognition. In Burton-Roberts, N., Carr, P. & Docherty, G. (eds). *Phonological knowledge: conceptual and empirical issues*. Oxford: OUP, 161-184.
- Hayes, B., Kirchner, R. & Steriade, D. 2004. *Phonetically-based Phonology*. Cambridge: CUP.
- Kirchner, R. 2001. *An Effort-based Approach to Consonant Lenition*. New York: Routledge.
- Laver, J. 1994. *Principles of Phonetics*. Cambridge: CUP.
- Lawson, E., Stuart-Smith, J. & Scobbie, J.M. 2010 accepted. The social stratification of tongue shape for postvocalic /r/ in Scottish English. *Journal of Sociolinguistics*.
- Lindblom, B. 1990. Explaining phonetic variation: a sketch of the H&H Theory. In Hardcastle, W.J. & Marchal, A. (eds.) *Speech Production and Speech Modelling*, 403-439. Dordrecht: Kluwer.
- Pierrehumbert, J.B. 2001. Exemplar dynamics: word frequency, lenition and contrast. In: Bybee, J. and P. Hopper, P. (eds.) *Frequency effects and emergent grammar*. Amsterdam: John Benjamins.
- Pouplier, M. 2003. The dynamics of error. In Solé, M.-J., Recasens, D. & Romero, J. (eds.), *Proceedings of the 15th International Congress of the Phonetic Sciences, Barcelona*. 2245- 2248.
- Scobbie, J.M. & Pouplier, M. 2009. Syllable Structure and External Sandhi: An EPG Study of Vocalisation and Retraction in Word-final English /l/. *QMU Speech Science Research Centre Working Papers* WP-17.
- Scobbie, J. & Sebregts, K. 2010. Acoustic, Articulatory, and Phonological Perspectives on Allophonic Variation of /r/ in Dutch, in: Folli, R. & Ulbrich, C. (eds.) *Interfaces in Linguistics. New Research Perspectives*. Oxford: OUP.
- Scobbie, J.M., Stuart-Smith, J. and Lawson, E. 2008. Final Report for “Looking variation and change in the mouth: developing the sociolinguistic potential of Ultrasound Tongue Imaging” (ESRC Research Grant RES-000-22-2032)
- Silverman, D. 2006. *A Critical Introduction to Phonology: Of Sound, Mind, and Body*. New York: Continuum.