

## Substance use in moderation: Contrast and content in phonological features

Daniel Currie Hall, Saint Mary's University

**Two forms of phonetic arson** While the current notion of 'substance-free' phonology owes its name to Hale & Reiss (2000), its essence is reminiscent of Fudge's (1967: 26) proposal that "phonologists (above all, generative phonologists) ought to burn their phonetic boats and turn to a genuinely abstract framework." In recent work that adopts this view, there are two distinct ways of burning the phonetic boats. Hale & Reiss (2008) claim that UG provides a set of phonological features with which the learner parses phonetic inputs from the beginning of the acquisition process. In their model, phonological features have phonetic substance in that they can be straightforwardly transduced from the phonetic signal, but phonology itself is substance-free in that it has no access to the content of these features. This approach yields transparent representations by permitting arbitrary rules. The other approach to substance-free phonology (e.g. Blaho 2008) rejects the idea of universal, phonetically contentful features. In this view, learners set up feature systems based on phonological patterning, yielding elegant and formally natural computation by allowing arbitrary correspondences between features and their phonetic realizations. In Mielke's (2008: 99) Emergent Feature Theory, for example, a learner faced with a process involving a set of segments that do not constitute a phonetically natural class might posit an abstract feature identifying them as "the segments that do X." These two varieties of substance-free phonology are both motivated in part by the apparent impossibility of accounting for the range of attested phonological patterns using only phonetically definable features (especially universal features as posited by works such as Jakobson et al. 1952; Chomsky & Halle 1968; Clements & Hume 1995) and simple and natural rules. Something, it seems, must give: either the representations or the computation must allow for a greater degree of arbitrariness. Another motivation is the desire to avoid the redundant formal encoding of physiological facts: Hale & Reiss (2000) argue that no insight is to be gained by positing phonetically motivated universal markedness constraints, and Mielke (2008) argues against attributing to UG an inventory of features that could be derived from the properties of the human vocal and auditory apparatus.

**Missing the boat** Theories in which phonetic substance is altogether banished from phonology, though, can end up looking surprisingly similar to phonetically based theories in the explanations they posit for phonological patterns that *are* phonetically 'natural.' If phonology is oblivious to phonetic content, then the fact that so many phonological patterns make phonetic sense must be attributed to phonetics itself. In the case of substance-free theories, the influence of phonetics can exert itself only through acquisition and diachrony, rather than through phonetically based synchronic rules or constraints, but if phonology is "a genuinely abstract framework," then much of its burden of explanation must be shifted to phonetics. Is anything lost in this transfer? This paper argues that something is lost; that it can be regained through the moderate use of phonetic substance in phonology; and that the banishment of substance has been based in part on unwarranted assumptions about the rigidity of phonological representations.

Mielke's case for emergent features draws support from the existence of phonological patterns involving unnatural classes of sounds. If phonology is "a genuinely abstract framework," it offers little reason for skepticism about such patterns. They may arise diachronically through uncommon combinations of phonetically natural changes, but the synchronic learner can easily represent them. However, Hall (2010) and Godfrey (2012) show that several of the 'unnatural' patterns reported by Mielke are subject to reanalysis either as natural or as combinations of natural patterns with independent motivation. For example, what Mielke treats as deletion of nasals before the unnatural class of nasals and fricatives (to the exclusion of obstruent stops) in Bukusu, Hall (2010) analyzes as independently motivated patterns of nasal effacement before fricatives, nasal place assimilation, and a systematic ban on geminates. There is, then, at least a methodological case to be made for pursuing a theory that forces one to look for naturalness.

**Assumptions about features** Substance-free phonology is, in part, a reaction to the apparent failures of putatively universal systems of phonetically contentful features. But these failures are not necessarily the fault of substance *per se*. Fudge (1967), for example, cites Bloomfield (1933) and Nida (1949) in noting that organizing tables of phonemes according to their phonological behaviour is often analytically useful but at odds with phonetic reality; rather than following them in dismissing such tables as mere conveniences for the researcher, he dismisses phonetic reality from phonology altogether. In his treatment of Tswana, a feature numbered 1 encompasses the odd-looking class of ejectives, voiced plosives, glottal stop, and *l*, and is associated with a rather baroque realization rule. But if one allows (a) that phonetically meaningful features may be other than those posited by Jakobson et al. (1952), and (b) that the naturalness of any set of phonemes can be evaluated only in light of what it contrasts with, then the class in question can be described as the Tswana obstruents that lack [spread glottis] ([l] being a predictable allophone of /d/).

**Contrast and content** The proponents of substance-free approaches are entirely correct in observing that the phonetic properties of phonemes do not dictate their phonological behaviour. But there is a way of curtailing the role of substance without eliminating it altogether. Contrastive specification based on a cross-linguistically variable hierarchy of features, as proposed by Dresher (2009), offers a principled explanation for the fact that phonemes that have a particular phonetic property are sometimes ignored by phonological processes that refer to the feature corresponding to that property. Consider an example from Mackenzie (2013). A three-way contrast among implosives and voiced and voiceless plosives may be encoded by either of two hierarchical orderings of [voice] and [constricted glottis]. If [c.g.] takes wider scope, it distinguishes the implosives, and [voice] is relevant only for the plosives; if [voice] takes wider scope, it distinguishes the voiceless plosives, and [c.g.] is relevant only for voiced stops. As Mackenzie shows, both possibilities are attested. Ngizim [voice] harmony requires agreement between plosives, but ignores implosives. Hausa [c.g.] harmony requires agreement between (homorganic) voiced stops, but ignores the voiceless plosives. Under this view, the task of the learner in acquiring phonological representations is to set up a system of features that is just sufficient to differentiate the phonemic inventory and that allows for the encoding of observed patterns. If the features themselves must be phonetically interpretable, then the learner's job is simplified, and the analyst's hypothesis space is constrained. Representations are substantive enough to make 'natural' patterns the norm, but also abstract enough to account for the fact that phonetics does not determine phonological destiny.

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