

# Emergent features and contrastive hierarchies: What condition Halle’s (1959) conditions are in

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Morris@100 • MIT • September 2023

How do we preserve and update the insights of SPR without universal features?  
“*Se vogliamo che tutto rimanga come è, bisogna che tutto cambi.*” —Giuseppe Tomasi di Lampedusa

## 1 Introduction

In *The Sound Pattern of Russian* (SPR), Morris Halle (1959: 19, 21, 24, 29–30, 41) specified “six formal conditions which phonological descriptions must satisfy”. Although phonological theory in the past 64 years has moved away from some of the concrete details of Halle’s conditions, we believe that the broader goals and questions behind them are enduringly relevant. In this presentation, we argue for an updated interpretation of these conditions, translating what we take to be the intellectual core of Halle’s project into a contemporary theoretical context. In short, Halle’s conditions were an attempt to create a universal phonological theory with meaningful restrictions on what a possible phonological system is. His theory made certain assumptions about distinctive features that are now no longer widely held. We argue that the sort of phonological theory he was aiming at can still be attained; however, to do so we have to make certain other changes to some central assumptions of phonological theory.

## 2 Condition (2) – Distinctive features: “A specific, narrowly restricted set”

We begin with Halle’s Condition 2, quoted in (1):

(1) Condition 2 (Halle 1959: 19):

“The phonetic properties in terms of which segments are characterized belong to a specific, narrowly restricted set of such properties called the *distinctive features*. All distinctive features are binary.”

A common understanding of “specific, narrowly restricted set” is that phonological features are innate and universal: much work has followed Jakobson, Fant, and Halle (1952) and Chomsky and Halle (1968) in positing fixed lists of features provided by UG. This has been a productive approach; many phonological patterns can be insightfully described using one of these feature systems (or variants). Universal feature theories have the methodological advantage of being readily falsifiable: when we find a pattern that *cannot* be given a satisfactory account using the hypothesized set of features, that tells us something about human language. But in this century there have been mounting arguments against innate phonological features and for features that are ‘emergent’—i.e., induced by the learner (Blaho 2008; Mielke 2008; Samuels 2011; Cowper and Hall 2014). Two such arguments are sketched in (2):

(2) Arguments against universal features

- a. Not all languages use the same modality: if signed and spoken languages draw their phonological features from the same universal set, then either the substantive content of those features must be very abstract, or else there is very little overlap in the features used by the two categories of languages. Either way, the predictive value of hypothesizing a universal feature system is significantly attenuated.
- b. Even within a single modality, there are many cases in which the ‘same’ feature seems to have different boundaries in different languages—e.g., Mielke (2005) discusses cross-linguistic variation in whether nasals and laterals pattern as [–continuant] or [+continuant].

We contend that it is possible to preserve the notion that features are “narrowly restricted” without requiring that they come from a predetermined inventory. That is, there must still exist an innate mechanism through which features are acquired which in some way accounts for the restrictions. If we maintain Halle’s assumption that features have phonetic content (or at least phonetic correlates), then some of these restrictions come from the limits of production and perception. The range of possible features is also constrained by a general cognitive bias against discontinuous categories (Heffner, Idsardi, and Newman 2019).

### 3 Condition (5) – The number of features is “reduced to a minimum”

What crucially distinguishes featural representations from phonetic impressions, though, is that they reduce and abstract the information in the phonetic signal. Condition (2) posits that features are binary (and thus categorical rather than gradient), and it refers to them as *distinctive* features—that is, they encode phonemic distinctions. The idea that phonological representations involve a reduced amount of information is further spelled out in Condition (5), quoted in (3):

(3) Condition 5 (Halle 1959: 29–30):

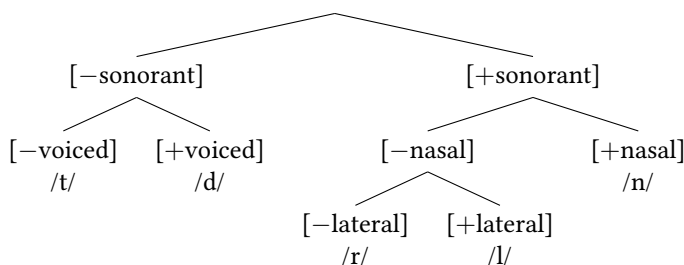
“In phonological representations, the number of specified features is consistently reduced to a minimum compatible with satisfying Conditions (3) and (4).”

Condition (5) has often been understood as requiring that underlying representations must not contain any redundant features, and is a predecessor of later theories of underspecification. In SPR, its application is limited by Condition (3), which requires phonological representations to contain enough information to derive the corresponding surface forms, and Condition (4), which requires them to be capable of expressing morphological and phonological rules and constraints. For example, Halle (1959: 52–53) appeals to Condition (4) in justifying the use of the features  $[\pm\text{vocalic}]$  and  $[\pm\text{consonantal}]$  in Russian, where they identify phonotactically important major classes of segments, but are mostly redundant in distinguishing individual phonemes.

### 4 Hierarchical contrastive specification of features

If features are emergent and language-particular rather than innate and universal, it is all the more important to have a theory of how feature specifications are assigned. ‘Full’ specification is not an option—absent a definitive list of features, it is meaningless to say segments are specified for ‘all’ of them. We propose that contrast should be the defining criterion, and that it should be applied by dividing the inventory hierarchically, producing tree structures like Halle’s (1959: 46) Figure I-1. No feature is assigned unless it marks some phonemic contrast that has not already been encoded, but features higher in the tree are retained even if subsequent (i.e., lower) features make them logically redundant. For example, in (4),  $[-\text{sonorant}]$  is made redundant by  $[-\text{voiced}]$  in /t/, and  $[\text{+sonorant}]$  is made redundant by  $[\text{+nasal}]$  in /n/; nevertheless,  $[\pm\text{sonorant}]$  is retained in (4) because it makes a group-level contrast between  $[-\text{sonorant}]$  /t, d/ and  $[\text{+sonorant}]$  /r, l, n/.

(4) Fragment of a contrastive feature hierarchy



This approach, elaborated in Hall (2007), Dresher (2009), Dresher and Hall (2021), and elsewhere, makes it possible to preserve Halle’s assumption that features have phonetic substance, contra Blaho (2008) and Mielke (2008), who allow emergent features to represent phonetically arbitrary sets of segments that pattern together phonologically. Contrast can help us understand why phonologically active classes sometimes exclude segments that seem to share their defining phonetic properties.

## 4.1 Vietnamese

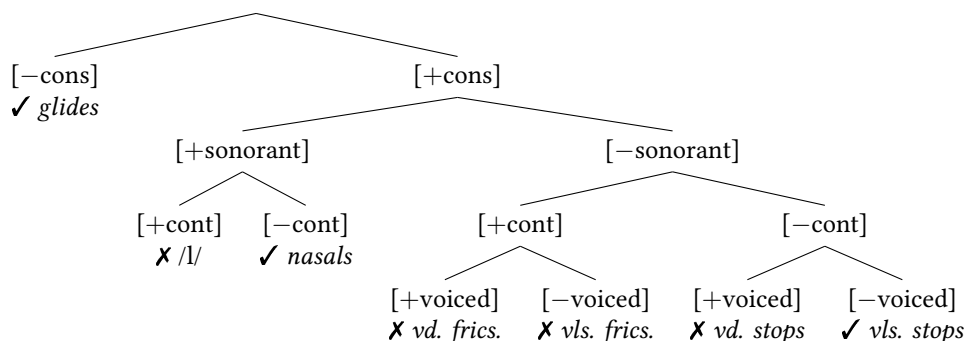
For example, Mielke (2008: 144) notes that sonorant consonants and voiceless obstruents pattern together to the exclusion of voiced obstruents in several languages, even though voiced obstruents would be included in any category that includes sonorants and voiceless obstruents, given full specification in just about any theory of universal features. One such case is Vietnamese, in which glides, nasals, and voiceless stops (5a) are the only consonants permitted in the coda of a syllable (Pham 2001: 4–5). With a contrastive hierarchy, there is no need to posit phonetically unnatural features here. If  $[\pm\text{consonantal}]$  is assigned before  $[\pm\text{continuant}]$ , then both  $/j/$  and  $/l/$  are continuant, but only  $/l/$  is contrastively continuant, and thus specified  $[+\text{continuant}]$ . Similarly, if  $[\pm\text{sonorant}]$  is assigned before  $[\pm\text{voiced}]$ , then  $[\pm\text{voiced}]$  will be contrastive—and thus specified—only in the  $[-\text{sonorant}]$  subtree. One can then say that Vietnamese disallows coda consonants with the marked feature values  $[+\text{continuant}]$  and  $[+\text{voiced}]$ , a cross-linguistically common pattern.

(5) Vietnamese consonants: natural classes?

a. Consonants allowed (✓) and disallowed (✗) in codas

✓ glides	✗ voiced fricatives
✗ $/l/$	✗ voiceless fricatives
✓ nasals	✗ voiced stops
	✓ voiceless stops

b. Vietnamese contrastive hierarchy:  $[+\text{continuant}]$  and  $[+\text{voiced}]$  disallowed in codas



## 4.2 Schaffhausen German

Underspecification can also help us understand how patterns generalize. Mielke (2008: 91–93) discusses an example in dialects of Swiss German spoken in and around Schaffhausen, where  $/r/$  triggers lowering of  $/o/$  to  $[ɔ]$  (6). Some dialects have extended this pattern so that  $[ɔ]$  also occurs before other sonorants, and/or before coronal obstruents (Robinson 1976). Mielke claims that this extension is based on phonetic similarity. But while  $/r/$  is often realized as coronal  $[r]$  or  $[r]$  in Swiss German, in the area of Schaffhausen it is often uvular  $[ʁ]$ , or, in coda position, vocalized to  $[ɐ]$  (Leemann, Schmid, Studer-Joho, and Kolly 2018). This makes it easier to see why  $/r/$  would trigger lowering in the first place, but then why would the pattern extend to coronal rather than dorsal consonants?

(6) Generalization in German dialects of lowering before  $/r/$ : natural classes?

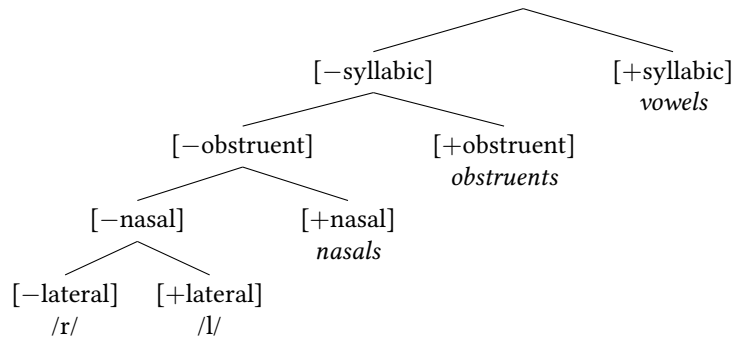
a.  $/o/$  lowers to  $[ɔ]$  before  $/r/$  in Schaffhausen

b. Some dialects extend the pattern from  $/r/$  to

other sonorants	<i>Generalization:</i> $/r/$ is a sonorant.
coronal obstruents	<i>Generalization:</i> Why coronals? Schaffhausen $/r/$ is uvular.

The phonetic variability of  $/r/$ , and the fact that it does not contrast in place with any other phonemic liquids, suggest that it is not specified for place. Compare the remark by Trubetzkoy (1939: 65) that the phonological content of German  $/r/$  is “very poor, actually purely negative” (7a). Using Trubetzkoy’s features and markedness values, we can translate his remarks into the tree in (7b).

- (7) German /r/ according to Trubetzkoy (1939).
- a. Trubetzkoy (1939: 65)  
 “Wir haben gesehen, daß das deutscher *r* nur zu *l* in einem eindimensionalen Oppositionsverhältnis steht. Sein phonologischer Gehalt ist sehr arm, eigentlich rein negativ: es ist kein Vokal, kein bestimmter Geräuschlaut, kein Nasal, und kein *l*”
  - b. Features of German /r/ based on Trubetzkoy (1939)



If it is true in Swiss German that coronal is the unmarked place of articulation, as Friedrich, Lahiri, and Eulitz (2008) have shown experimentally for Standard German, then the analogical extension is based on phonological, not phonetic, similarity.

## 5 Conclusion

Giving up universal features—one of the cornerstones of SPR—thus does not mean abandoning Halle’s program altogether. On the contrary, emergent features reveal the central importance of a Hallean approach to contrast in phonological representations.

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