

The check-list

Halle's Condition 2 and the form and meaning of phonological features

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OVERVIEW: CONDITION 2

Halle (1959: 19)

Condition (2): 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.

In accepting Condition (2), one commits oneself to characterizing all segments in all languages in terms of **a restricted check list of attributes** like “nasality, voicing, palatalization, etc.”, with regard to which the only relevant question is “does the segment possess the particular attribute?” It follows, therefore, that differences between segments can be expressed only as differences in their feature composition and that consequently **segments (even in different languages) can differ from each other only in a restricted number of ways.**

OVERVIEW: CONDITION 2

In other words:

- 1 Segments are sets of features
- 2 Features are binary
- 3 Features are drawn from an innate universal set
- 4 Features have phonetic content

These fundamental assumptions of SPR are all more or less controversial 51 years later.

1: SEGMENTS ARE SETS OF FEATURES

HOW ELSE COULD SEGMENTS BE REPRESENTED?

One possibility:

- ▶ Segments (or unsegmented utterances) are represented exactly as spoken/heard, in full phonetic detail.
- ▶ This is the view of Exemplar Theory (e.g., Johnson 1996, 2007; Pierrehumbert 2001, 2002; Cole 2009).
- ▶ Under this view, there is no such thing as phonology in the Hallean sense of discrete symbolic computation mapping from syntactic structures to phonetic representations (as described by Chomsky & Halle (1965: 98)).
- ▶ Instead of phonology, there is only phonetics and psychology.
- ▶ Categorical generalizations are emergent, or epiphenomenal, or even illusory.

1: SEGMENTS ARE SETS OF FEATURES

HOW ELSE COULD SEGMENTS BE REPRESENTED?

The opposite extreme:

- ▶ Phonemes are primitives, and are simply enumerated.
- ▶ We could represent them alphabetically or numerically.
- ▶ This would be a very literal-minded way of representing the “nothing but differences” that Saussure (1916) said there were.
- ▶ Householder (1959): Phonemes are primes. But features are useful, too.
- ▶ Householder (1965): Halle is silly to insist on feature matrices, because they are hard to read and waste ink.

1: SEGMENTS ARE SETS OF FEATURES

HOW ELSE COULD SEGMENTS BE REPRESENTED?

Are Householder's phonemes-as-primitives really the opposite of Exemplar Theory?

Householder (1966: 100)

I am quite unwilling to grant that our brain-storage has any great use for economy; instead I feel that extravagant redundancy is built in all along the line, and table look-up rather than algorithm is the NORMAL behaviour. That a speaker every time he uses the word *straw* subliminally regenerates all other features of the initial 's' from a stored form characterized only as non-vocalic is simply beyond my intuitive capacity.

1: SEGMENTS ARE SETS OF FEATURES

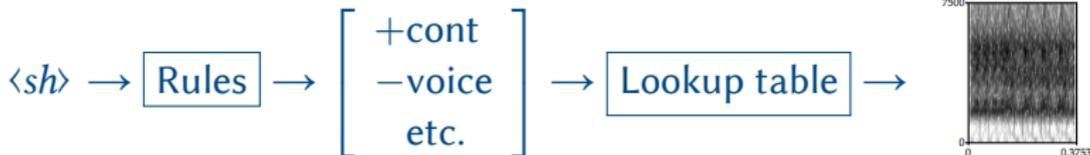
HOW ELSE COULD SEGMENTS BE REPRESENTED?

On the other hand:

Householder (1966: 100)

Finally, let me say that beside the semantic, phonological and syntactic features stored in the lexicon I would also require for languages like English the orthographic form, and would make use of economical rules to derive most of the phonological features from that form.

I'm not sure exactly how all this would fit together.



1: SEGMENTS ARE SETS OF FEATURES

FROM NUMBERS TO FEATURES

Suppose we start with the idea of just numbering phonemes:

Segment	Description		Word	Representation
0	voiceless coronal stop	(t)	<i>sigh</i>	$\langle 2, 51, 11 \rangle$
1	voiced coronal stop	(d)	<i>spied</i>	$\langle 2, 4, 51, 11, 1 \rangle$
2	voiceless coronal fricative	(s)	<i>tie-dyes</i>	$\langle 0, 51, 11, 1, 51, 11, 3 \rangle$
3	voiced coronal fricative	(z)		
4	voiceless labial stop	(p)	:	:
5	voiced labial stop	(b)		
:	:	:		
11	high front unrounded glide	(j)		
:	:	:		
51	low central unrounded vowel	(a)		
:	:	:		

1: SEGMENTS ARE SETS OF FEATURES

FROM NUMBERS TO FEATURES

But why not make the numbers *mean* something (Gödel 1931)?

We could decompose them into bits:

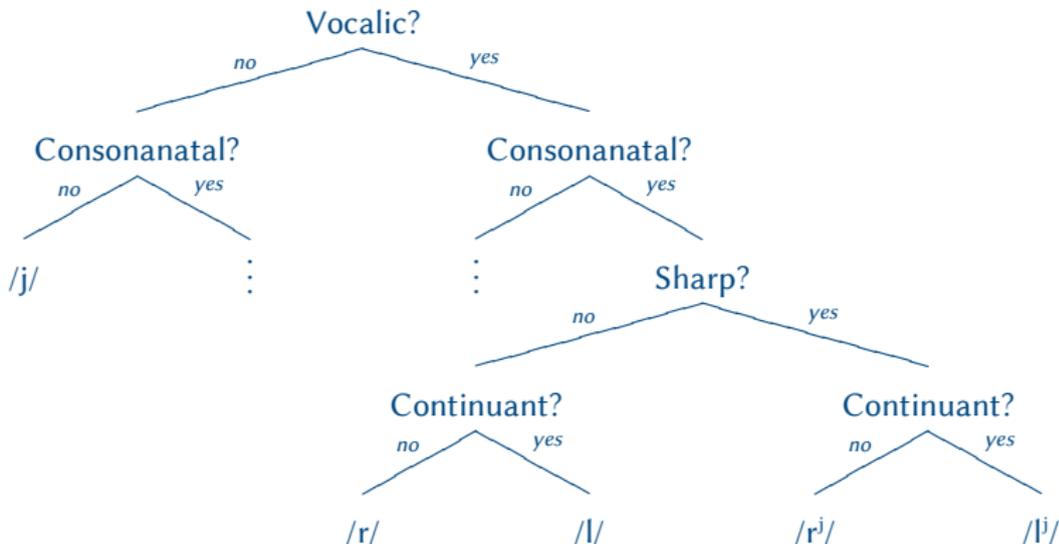
32	16	8	4	2	1	Description	
Vocalic	Back	High	Lab.	Cont.	Voice		
0	0	0	0	0	0	voiceless coronal stop	(t)
0	0	0	0	0	1	voiced coronal stop	(d)
0	0	0	0	1	0	voiceless coronal fricative	(s)
0	0	0	0	1	1	voiced coronal fricative	(z)
0	0	0	1	0	0	voiceless labial stop	(p)
0	0	0	1	0	1	voiced labial stop	(b)
⋮	⋮	⋮	⋮	⋮	⋮		⋮
0	0	1	0	1	1	high front unrounded glide	(j)
⋮	⋮	⋮	⋮	⋮	⋮		⋮
1	1	0	0	1	1	low central unrounded vowel	(a)
⋮	⋮	⋮	⋮	⋮	⋮		⋮

And now we have binary features!

1: SEGMENTS ARE SETS OF FEATURES

WHY FEATURES?

- ▶ Why might we want to do this?
- ▶ Cherry et al. (1953): To measure information content.



Playing Eleven Questions with Russian phonemes

1: SEGMENTS ARE SETS OF FEATURES

WHY FEATURES?

- ▶ Why else?
- ▶ Halle (1962): To allow for economical encoding of general rules.

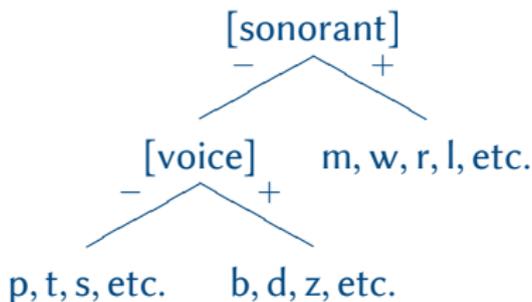
$$\text{▶ } a \rightarrow \text{æ} / \text{ ___ } \left\{ \begin{array}{c} i \\ e \\ \text{æ} \end{array} \right\}$$

- ▶ $a \rightarrow \text{æ} / \text{ ___ } [-\text{back}]$
- ▶ This means that we can use a simplicity metric to evaluate not conservation of ink (*pace* Householder), but whether our rules are capturing generalizations.

1: SEGMENTS ARE SETS OF FEATURES

FEATURES AND CONTRAST

- ▶ The big idea of features: a unified means of identifying segments, describing segments, and defining structural changes.
- ▶ This raises an interesting question:
 - Q: Does the phonological component of the grammar (need to) see more features of phonemes than are necessary for identification?
 - A: The Contrastivist Hypothesis: No.
(See Hall 2007; Dresher 2009, among others.)
- ▶ This turns contrastive specification from a matter of efficient storage to a hypothesis about how segments behave.



1: SEGMENTS ARE SETS OF FEATURES

FEATURES AND ANALOGY

- ▶ There may also be a role for features in Exemplar Theory.
- ▶ Exemplar models often make use of **analogy**:

Gahl & Yu (2006: 213)

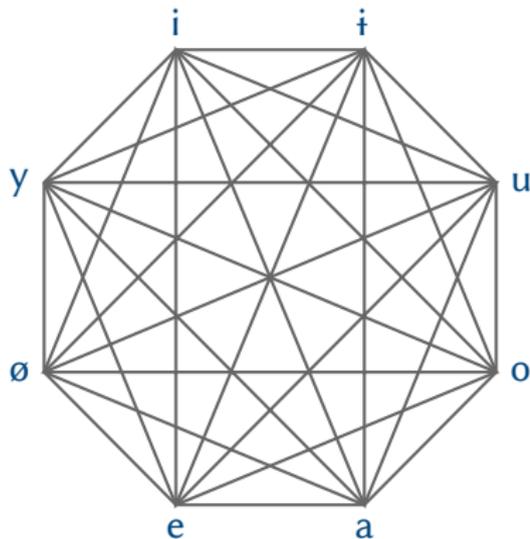
An exemplar-based speech processing system recognizes inputs and generates outputs by analogical evaluation across a lexicon of distinct memory traces of remembered tokens of speech.

- ▶ Mielke (2004: 94): Features are abstractions that facilitate analogical change.

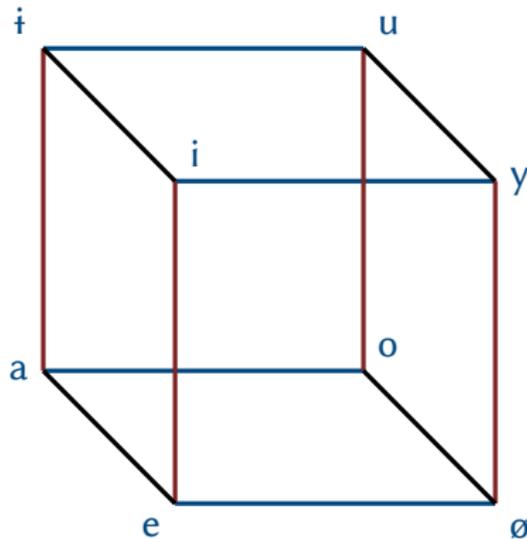
1: SEGMENTS ARE SETS OF FEATURES

FEATURES AND ANALOGY

Mielke (2008: 31) on Jakobson (1942) on Turkish vowel features:
“Reducing 28 binary relations to three”



Phonemes to phonemes



Features to features

1: SEGMENTS ARE SETS OF FEATURES

FEATURES AND ANALOGY

- ▶ Suppose we have a hypothetical language with this vowel inventory...

i y ɨ u
e ø a o

- ▶ ...and the following tendency begins to emerge:
-ler is realized as -lar after o
- ▶ How might we analogically expand the pattern?
- ▶ What other vowels might trigger it?
- ▶ How might it apply to another suffix, such as *-in*?
ler : lar :: in : ?
- ▶ To complete the analogy, we need something like features.
- ▶ Minimally, analogy requires us to be able to distinguish *dimensions* and not just distances in phonetic space.

2: FEATURES ARE BINARY

Halle (1959: 20)

No examples have been adduced by various critics that would seriously impair the validity of the binary scheme.

- ▶ Halle (1957: 65) described binarity as the “most controversial proposition” of the Jakobsonian feature system.
- ▶ Today it is perhaps the least controversial.
- ▶ Current feature systems are mostly either binary or unary.
- ▶ In either case, the contrasts they make are binary.
- ▶ Unary features address the kinds of markedness problems discussed in chapter 9 of Chomsky & Halle (1968).
- ▶ A defense of the number one: “Is the privative project still worth pursuing?” at OCP 6

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

- ▶ Hale & Reiss (2003) claim that phonological primitives (features) are *necessarily* innate.

Jackendoff (1990: 40), quoted by Hale & Reiss (2003: 219)

In any computational theory, ‘learning’ can consist only of creating novel combinations of primitives already innately available.

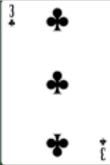
- ▶ Hale & Reiss present an analogy using playing cards.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

Playing cards with Hale & Reiss (2003):

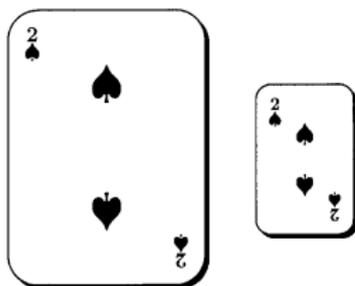
- ▶ Primitives supplied by UG:
 - ▶ features: $[\pm\text{PICTURE}]$, $[\pm\text{RED}]$
 - ▶ operator: $\&$
- ▶ A couple of possible grammars:
 - ▶ G_5 : $[\text{+RED}] \& [-\text{PICTURE}]$
 - ▶ G_6 : $[\text{+RED}]$

Input:					
Parse:	$\begin{bmatrix} +\text{RED} \\ -\text{PICT} \end{bmatrix}$	$\begin{bmatrix} +\text{RED} \\ -\text{PICT} \end{bmatrix}$	$\begin{bmatrix} +\text{RED} \\ +\text{PICT} \end{bmatrix}$	$\begin{bmatrix} -\text{RED} \\ -\text{PICT} \end{bmatrix}$	$\begin{bmatrix} -\text{RED} \\ +\text{PICT} \end{bmatrix}$
G_5 :	✓	✓	*	*	*
G_6 :	✓	✓	✓	*	*

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

- ▶ UG constrains the set of features that can occur in linguistic representations and in the grammars that operate on them.
- ▶ Other contrasts may be perceptible, but if they are not encoded in innate features, they cannot be linguistically significant:



Two linguistically identical cards (Hale & Reiss 2003: 225)

- ▶ If UG provided no features at all, then we would assign everything the null parse, and no grammar would be possible.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

Hale & Reiss (2003: 225)

For a learner for whom these contrasts are perceptible, any theory which fails to recognize innate primitives within the card-grammar domain will fail to properly constrain the set of possible grammars — i.e., the primitives of grammar construction **CANNOT** arise from the primitives of perception.

We have been forced to the logical conclusion that there must be something at the initial state of the grammar in order to allow learning to occur.

However, one might object: ‘Maybe there are more basic primitives at the initial state? For example, if we are sensitive to the difference between straight and curved lines we could discover the distinction between ♦ and ♥?’ This is perfectly reasonable. It just means that, say, ‘straight’ vs. ‘curved’ are the innate primitives. But **YA GOTTA START WITH SOMETHING!**

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

- ▶ I'm not convinced.
- ▶ Features may be innate. They might even *have* to be innate.
- ▶ But I don't think toy grammars with cards can demonstrate this.

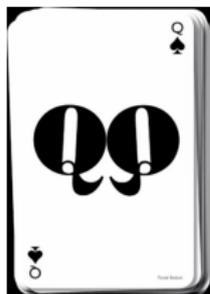
3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

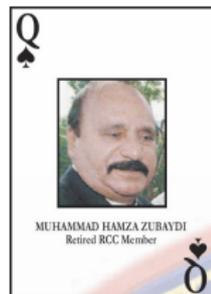
- ▶ A competent poker player knows the ‘grammar’ of poker.
- ▶ They can evaluate hands without having seen all 2 598 960 of them, using the categories {A, 2, 3, ..., J, Q, K} and {♠, ♦, ♣, ♥}.
- ▶ In identifying categories, the competent poker player abstracts away from visually salient but ludologically irrelevant details.



Royal Canadian Mint



hat-qrj4 design



U.S. Defense Intelligence Agency

La Dame de pique (Пиковая дама)

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

- ▶ A sufficiently attentive person might even become a competent poker player simply by observing the outcomes of a large number of games, without ever receiving explicit instruction.
- ▶ The categories {A, 2, 3, ..., J, Q, K} and {♠, ♦, ♣, ♥} are pretty obviously not innate.
- ▶ Our ability to assign cards to these categories is clearly learned, and based on more general abilities of pattern recognition.
- ▶ The ‘more basic primitives’ that *are* innate are so far removed from the abstract categories as to be of no possible relevance to a theory of poker, and relevant only in quite extreme cases to the question of what constitutes a possible card game.
- ▶ If anything, the card analogy seems to show that human beings *can* learn computational systems with non-innate primitives—though of course it does not show that language is learned this way.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

- ▶ Hale & Reiss's (2003) argument also touches on the theory of contrast alluded to earlier.
- ▶ The Toronto School approach:

The Successive Division Algorithm (Dresher 2009)

- Begin with no feature specifications: assume all sounds are allophones of a single undifferentiated phoneme.
- If the set is found to consist of more than one contrasting member, select a feature and divide the set into as many subsets as the feature allows for.
- Repeat step (b) in each subset: keep dividing up the inventory into sets, applying successive features in turn, until every set has only one member.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

The Hale & Reiss objection, if I understand it correctly, goes like this:

- ▶ How can you possibly go from representing two sounds identically to representing them differently?
- ▶ If your grammar represents them identically, then you can't tell them apart—you can't suddenly realize “Oh, these two things are different” if you don't know they *are* two things.
- ▶ If your grammar already parses them differently, then you can't *discover* that they are different, because you already know it.

Plato (380 B.C.E.): Meno's Paradox

(cf. Drescher 2003)

SOCRATES: You argue that a man cannot enquire either about that which he knows, or about that which he does not know; for if he knows, he has no need to enquire; and if not, he cannot; for he does not know the very subject about which he is to enquire.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?

Hale & Reiss (2003: 227–228, fn. 6) deny a reviewer's charge of equivocation. So let's see if we can resolve this by analogy instead:

- ▶ *H. sapiens* is a social animal.
- ▶ Our brains are wired in such a way as to be good at recognizing one another as individuals.
- ▶ (Our brains probably don't come with any specific individuals hard-wired into them.)
- ▶ Our brains also know something about how to parse **stages** of individuals (Carlson 1977; Kratzer 1995) into individuals.
- ▶ No particular special status is assigned to the stages; they are just temporal subparts of the individuals.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *MUST BE* INNATE?



Dupond

← Suppose you meet M. Dupond.
Later, you see M. Dupont.
You think that he is the same
individual you saw before.
Eventually you learn otherwise.
(Maybe you see them together;
maybe it's something subtler.)



Dupont

- ▶ You now know that the stages you've seen belong to two separate individuals.
- ▶ You may have some trouble identifying which stages were Dupond-stages and which were Dupont-stages.
- ▶ **You've gone from one category to two.**

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *ARE NOT* INNATE?

The opposite end of the spectrum:

- ▶ Features *are not* innate (Fudge 1967; Mielke 2004, 2008; Blaho 2008, among others).
- ▶ Some objections to innate/universal features:

Mielke (2004: §1.5.1): Evolution

For all distinctive features, including the uncommon ones, to have emerged in the human genome, humans must have been exposed to contrasts motivating **all of them** at some time before the life of a common ancestor of all modern humans who would have all these features (all humans). **[Emphasis added.]**

- ▶ But this seems to presuppose that individual features must be coded, and selected for, independently. We don't know that this is necessary—or even possible.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *ARE NOT* INNATE?

- ▶ Signed and spoken languages (Mielke 2004: §1.5.2; Blaho 2008: 4–5)
 - ▶ If signed and spoken languages *use* the same set of features, then those features must be fairly abstract.
 - ▶ Alternatively, there could be one set of more phonetically concrete features made available by UG, of which signed and spoken languages use very different subsets.
 - ▶ In principle, loanword adaptation might be a good way of investigating this, but signed/spoken contact more typically involves calques or is mediated by orthographic channels.

3: FEATURES ARE DRAWN FROM AN INNATE UNIVERSAL SET

FEATURES *ARE NOT* INNATE?

► Unnatural classes

- Mielke (2004, 2008) found hundreds of examples of ‘unnatural classes’ of segments that pattern together phonologically, but which cannot be captured by intersections of features in any of three standard feature theories (Jakobson, Fant & Halle 1952; Chomsky & Halle 1968; Clements & Hume 1995).
- Hall (2010): At least four of these unnatural classes aren’t so unnatural after all.
- We need to look critically at these cases.
- As Mielke pointed out in discussion at MOT, we need to look critically at alleged natural classes, too.

4: FEATURES HAVE PHONETIC CONTENT

TWO FLAVOURS OF SUBSTANCE-FREE PHONOLOGY

Two flavours of substance-free phonology:

- ▶ Hale, Kissock & Reiss (2007): Features have phonetic content, but phonology doesn't care what that content is.
 - ▶ arbitrary rules, transparent features
- ▶ Blaho (2008): Features do not have a fixed phonetic content, and are purely phonological.
 - ▶ elegant rules, arbitrary features
- ▶ This is reminiscent of the contrast between Halle (1959); Chomsky & Halle (1965) and Lamb (1964); Fudge (1967).

4: FEATURES HAVE PHONETIC CONTENT

TWO FLAVOURS OF SUBSTANCE-FREE PHONOLOGY

- ▶ Fudge (1967): Features are purely phonological.
- ▶ Features can be arbitrarily labelled with numbers and letters; their translation into phonetic content is handled by language-specific realization rules.
- ▶ E.g., this rule for realizing feature #1 in Tswana (Fudge 1967: 18):

$$1 \rightarrow \left\{ \begin{array}{l} \text{Ejective release} / \left\{ \begin{array}{l} \text{--- a} \\ \dots 3 \dots [\text{--- b}] \end{array} \right\} \\ \text{Contact} / \left\{ \begin{array}{l} [\text{--- (i)}][\text{close vowel}] \\ \text{--- (ii)} \end{array} \right\} \\ \text{Lateral} / \text{--- (i)} \\ \text{No articulatory effect or Contact} \\ \quad \text{(free variation)} \quad / \text{C--- b q} \\ \text{No articulatory effect} / \text{C--- b} \\ \text{Contact or Occlusion (free variation)} \end{array} \right\}$$

4: FEATURES HAVE PHONETIC CONTENT

TWO FLAVOURS OF SUBSTANCE-FREE PHONOLOGY

- ▶ Mielke (2004, 2008): Features are emergent, and based on phonological patterns rather than phonetic properties.
- ▶ This predicts that ‘crazy’ classes should be possible, but rare.
- ▶ Two ‘crazy’ classes in Thompson (Mielke 2004: 168–170, citing Thompson & Thompson 1992):

$$t \rightarrow \emptyset / \left\{ \begin{array}{c} n \\ n' \\ ? \\ h \end{array} \right\} - \left\{ \begin{array}{c} \int \\ x^w \\ n \end{array} \right\}$$

4: FEATURES HAVE PHONETIC CONTENT

TWO FLAVOURS OF SUBSTANCE-FREE PHONOLOGY

- ▶ If unnatural classes are represented in terms of emergent features, rather than as lists of segments, then we might expect these features to do things—like spread.
- ▶ If there is a feature whose extension in the phonemic inventory is $/j, n, x^w/$, what would we expect to result from spreading it?
- ▶ The motivation for emergent features is that such classes of segments cannot be characterized intensionally.
- ▶ Of course, as Mielke (to appear) points out, the following are theoretical claims, not necessary truths:

Mielke (to appear)

- 6 CLAIM: The distinctive features that define segmental contrasts are also used to define changes in alternations.
- 7 CLAIM: The same features are also used to define classes of sounds which may be involved in alternations.

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*

A Torontonion *via media* (with substance use in moderation):

- ▶ Features are supplied by UG.
- ▶ Features have some phonetic content:
 - ▶ They specify phonetic **dimensions** of contrast.
 - ▶ The phonetic boundaries between feature values are *not* universal.
 - ▶ E.g., [+low] means ‘lower than [−low],’ not ‘ $F1 > n$ Hz’ or ‘Jaw lower than n cm’ for some specific value of n .
- ▶ Assignment of features is limited by contrast, and informed by phonological activity.

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*: DIMENSIONS OF CONTRAST, NOT FIXED PHONETIC POINTS

- ▶ Rice (1995): two vowel place features, Coronal and Peripheral.
- ▶ Up to four vowels may contrast in place/rounding at any height.
- ▶ The features have phonetic content:
 - Coronal: front higher F2
 - Peripheral: back/round lower F2
- ▶ The interpretation of a representation depends on the system of contrasts in which it appears:

unmarked $\left\{ \begin{array}{l} /i/ \text{ in contrast with Coronal and Peripheral} \\ /i/ \text{ in contrast with Peripheral only} \end{array} \right.$

- ▶ The representation of a segment depends on the system of contrasts in which it appears:

$/i/ \left\{ \begin{array}{l} \text{unmarked in contrast with Peripheral } /u/ \\ \text{Coronal in contrast with unmarked } /i/ \end{array} \right.$

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*: DIMENSIONS OF CONTRAST, NOT FIXED PHONETIC POINTS

- ▶ The boundaries between categories can differ from one language to another.
- ▶ This is most obvious in the case of vowel features, but need not be limited to them.
- ▶ Mielke (2005): Laterals and nasals are ‘ambivalent’ as to whether they pattern with [+continuant] or [–continuant] segments.
- ▶ We don’t have to say that [+continuant] universally includes or excludes segments with central oral contact but lateral or nasal airflow.
- ▶ Nor do we have to abandon the notion that UG provides such a feature as [±continuant].
- ▶ Instead, we could just say that [+continuant] just means ‘more continuant than [–continuant]’.

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*: INFORMED BY PHONOLOGICAL ACTIVITY

Blaho (2008: 14–15)

[The Toronto school's] assumption, although it is not stated explicitly, seems to be that specifying the segments of an inventory so that each segment has a unique featural makeup is the *only* factor to be taken into account when features are assigned. However, this assumption is contrary to their practice. [...T]hese authors 'allow' the use of evidence from phonological processes when determining feature specifications.

Hall (2007: 57)

Hall (1998) and Mercado (2002) have argued that the SDA crucially makes divisions on the basis of how segments interact with other segments. In a theory in which only contrastive features are phonologically active, it is necessary that contrasts in phonological behaviour take precedence over contrasts in phonetic implementation.

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*: INFORMED BY PHONOLOGICAL ACTIVITY

- ▶ Sometimes phonemes contrast only in phonological behaviour, and not in surface phonetic realization.
- ▶ Compton & Dresler (2008): Vowels in some Inuit dialects:

[coronal]		[labial]
/i/	/ə/	/u/
[low]		
/a/		

- ▶ /i/ and /ə/ are both realized phonetically as [i].
- ▶ Still, they are separate phonemes and must be distinguished.
- ▶ ‘Strong’ /i/ triggers palatalization on consonants.
- ▶ It is phonetically ‘more coronal’ only in that its coronality (potentially) occupies a longer span at the surface.

4: FEATURES HAVE PHONETIC CONTENT

A TORONTONIAN *VIA MEDIA*: INFORMED BY PHONOLOGICAL ACTIVITY

- ▶ Blaho's (2008: 14) argument: If you can use phonological activity to decide *which* contrastive features to assign, then you can use it to assign redundant features, too, because this “requires no extra learning mechanism.”
- ▶ But the Contrastivist Hypothesis is not a hypothesis about what kinds of learning mechanisms are available; it's about how phonemic contrast constrains featural representations.

CONCLUSIONS

- ▶ The view of features set out in Halle's Condition 2 remains contentious...
- ▶ ...even among theorists whose overall views of phonology have much in common.
- ▶ My check-list:

Segments consist of features	+
Features are binary	∅
Features are universal	+
Features have phonetic content	+

- ▶ Even within each of these points, there is much to be explored and worked out.
- ▶ Where will things stand when *SPR* is 101? (A possible theme for NAPhC 31...?)

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