

Universal trends vs. language-particular variation in feature specification:  
comments on Elan Dresher's paper

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1. Points of similarity between ED / NC:
  - a) fundamental role of contrast in the organization of sound systems
  - b) contrasts are defined in terms of feature values
  - c) feature hierarchy (cf. Jakobson & Halle 1956)
  - d) sparse feature specification
2. Major difference: NC stresses similarities across languages, ED stresses differences  
this is a difference in emphasis, as NC recognizes crosslinguistic differences and ED  
recognizes that variation is within limits  
the obvious questions:
  - how does ED account for universal trends in feature specification?
  - and how does NC account for variation?I will address the latter question here
3. Clements (2001) argues for a general principle of representational economy according to  
which features are specified in a given language only to the extent that they are needed in  
order to express generalizations about the phonological system.
  - the features present in lexical and phonological representations are those members of  
the universal feature set that can plausibly be assumed to be retained by speakers as a  
result of their linguistic experience
  - following a similar logic, features and feature sets are autosegmentalized in a given  
language only to the extent needed to express generalizations in that language
4. Features and tiers are present in representations only if lexically contrastive or if lexically  
or phonologically activated
  - lexical level: form in which words are stored in long-term memory
  - phonological level: form in which words are processed for production
5. A feature is *distinctive* (or contrastive) in a given segment if it is required to distinguish  
that segment from another.

More specifically, two segments  $S_i, S_j$  are distinct if a feature present in one is absent in  
the other. Distinctness in this sense is illustrated in the schematic example below, in  
which feature F is present only in segment  $S_1$  and feature G is present only in segment  
 $S_2$ . All three segments are distinct.

$S_1$	$S_2$	$S_3$
F		G
6. A feature value is *active* in any segment or segment class which satisfies a term in a rule or  
constraint mentioning that feature.

## 7. How are inventories specified? Zoque consonants (Clements 2001):

## a) full specification (assuming binary and one-valued features)

	p	t	ts	tʃ	c	k	s	ʃ	m	n	ɲ	ŋ	w	l	y	h	ʔ
[sonorant]	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-
[labial]	+								+				+				
[coronal]		+	+	+	+		+	+		+	+			+	+		
[dorsal]						+						+					
[strident]		-	+	+	-		+	+									
[voiced]	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-
[nasal]	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-
[posterior]		-	-	+	+		-	+		+			-	+			
[spread]																+	
[constricted]																	+
[continuant]	-	-	-	-	-	-	+	+	-	-	-	-	+	-	+	+	-

## b) sparse lexical specification (only marked contrastive feature values are present)

	p	t	ts	tʃ	c	k	s	ʃ	m	n	ɲ	ŋ	w	l	y	h	ʔ
[sonorant]									+	+	+	+	+	+	+		
[labial]	+								+				+				
[dorsal]						+						+					
[strident]			+	+			+	+									
[nasal]									+	+	+						
[posterior]					+	+		+		+					+		
[spread]																+	
[constricted]																	+
[continuant]							+	+									

## 8. Algorithm is similar to the SDA (cf. Dresher 2003, 2004, etc.):

- features are arrayed in an ordered list (following the universal hierarchy)
- features are entered proceeding from the top down
- only marked contrastive feature values are entered (e.g. no nasal specification for /ɲ/)  
[coronal] is unmarked and noncontrastive
- feature values characterize all realizations of the phoneme in which they are entered.

Examples: a value for [ $\pm$ distributed] is not entered in a segment some of whose realizations are apical and some are laminal; a value for [ATR] is not entered in a suffix which alternates between [+ATR] and [-ATR]

## 9. What is the universal feature hierarchy?

- the basic idea is that some features are exploited in forming an inventory in priority to features located lower in the hierarchy
  - earlier proposals: Jakobson 1949, Jakobson & Halle 1956
  - more recent proposals: Dinnsen 1992, Calabrese 1994
- the order is assumed to be fixed
  - e.g., given [ $\pm$ sonorant] > [ $\pm$ lateral], values for [ $\pm$ sonorant] must be entered before values for [ $\pm$ lateral] can be entered.
- it may be a partial ordering: some features may not be mutually ranked. E.g., Halle & Jakobson (1956) do not order their feature-equivalents of [ $\pm$ round] and [ $\pm$ back]

10. Zoque skips [ $\pm$ voiced] as there are no contrastively voiced sounds in the inventory  
 -- this is not a "reranking" of the universal hierarchy but simply failure to employ a feature, a possibility recognized by Jakobson & Halle (1956)  
 --- features "skipped" in this way are readily available for incorporation in the system through internal change or external factors (borrowing)
11. What explains the universal hierarchy? Clements (2004) suggests *robustness*, based on:  
 - good auditory contrast obtained without great articulatory difficulty  
 - good combinability with other features, cf. [ $\pm$ sonorant] vs. [ $\pm$ lateral]
12. Stevens & Keyser (1989) propose a two-point hierarchy based on phonetic considerations:  
 - primary features: [ $\pm$ sonorant], [labial], [coronal], [dorsal], [ $\pm$ continuant]  
 - secondary features: all others
13. Clements (2004) elaborates this hierarchy based on the relative frequency of contrasts in UPSID:  
 a. [ $\pm$ sonorant], [labial], [coronal], [dorsal]  
 b. [ $\pm$ continuant], [ $\pm$ posterior]  
 c. [ $\pm$ voiced], [ $\pm$ nasal]  
 d. [glottal]  
 e. others
14. Feature activation: Zoque has a regular process of stop voicing after nasals:  
 pama 'clothing'                      m-bama 'my clothing'  
 tatah 'father'                        n-datah 'my father'  
 tsima 'calabash'                    n-dzima 'my calabash'  
 kama 'cornfield'                    ŋ-gama 'my cornfield'

The redundantly voiced stops are presumably phonological as they are identical to the distinctively voiced stops in the Spanish-derived loanword stratum of the lexicon.

15. Phonological specification of Zoque ([+voiced] is activated):

	p	t	ts	tʃ	c	k	b	d	dz	dʒ	j	g	s	ʃ	m	n	ɲ	w	l	y	h	ʔ	
[sonorant]															+	+	+	+	+	+	+		
[labial]	+						+								+			+					
[dorsal]						+						+						+					
[strident]			+	+					+	+				+	+								
<b>[voiced]</b>							+	+	+	+	+	+											
[nasal]															+	+	+						
[posterior]				+	+					+	+			+			+				+		
[spread]																						+	
[constricted]																							+
[continuant]													+	+									

[+voiced] is lexically redundant but phonologically active.

16. A tentative hierarchy for vowel features (preferred rather than strict rankings)  
 high  
 coronal  
 low, labial, ATR/RTR  
 dorsal

## 17. Why we need a feature hierarchy: some small-inventory systems compared

	<u>good</u>	<u>bad</u>	<u>features used ("bad")</u>	<u>violation</u>
A.	i a	i u	coronal	high > coronal
B.	i u a	i ə a	high, low	coronal > low
C.	i u ε a	i u a ɔ	high, labial	coronal > labial
D.	i u a	i ɪ a	high, ATR	coronal > ATR
E.	i u e o a	i i ʉ a	high, coronal, dorsal	low > dorsal or labial > dorsal or ATR > dorsal

18. The ranking in (16) only allows limited variation (= free order of high, labial, ATR/RTR), and is too strict in some respects. For example, it incorrectly excludes the Yawelmani (Yowlumne) Yokuts system shown in the "bad" column in C. This system, though less frequent than the "good" system shown to its left, nevertheless occurs.

19. Exchangeable features. Most systems that do not conform to the ranking in (16) involve exchanges between high and low, coronal and labial, or coronal and dorsal. What these "exchangeable features" have in common is that they are implemented along the same acoustic scale:

	<u>scale</u>
high ~ low	F1
coronal ~ labial	F2
coronal ~ dorsal	F2

We must therefore build some flexibility into the scale in (16) by allowing these features to be exchanged in a given system. For example, the "bad" system in 17C is derivable by exchanging the positions of coronal and labial on the scale (16). Note that this is the *only* bad system in (17) that is recoverable in this way. Thus, the scale (16) together with the exchangeable features provides for variation within strict limits.

20. However the rankings in (16) may still expressed preferred rankings. Example: high > low expresses the generalization that low is typically noncontrastive in languages, while high is usually contrastive.

21. Illustration: two Niger-Congo ATR vowel harmony systems compared:

Standard Igbo		Ikwere	
i	u	ɪ	u
ɪ	ʊ	ɪ	ʊ
e	o	e	o
	ɔ	ɛ	ɔ
a		a	

The vowel pairs /i ~ ɪ/, /u ~ ʊ/, /o ~ ɔ/ alternate in both languages. But in Standard Igbo we find /e ~ a/ while in Ikwere we find /e~ɛ/.

22. Analysis: Igbo high > labial > ATR; Ikwere high > coronal, low > ATR.

	Igbo							Ikwere									
	ɪ	ɪ	u	ʊ	e	a	o	ɔ	ɪ	ɪ	u	ʊ	e	ɛ	o	ɔ	a
high	+	+	+	+					high	+	+	+	+				
labial			+	+			+	+	coronal	+	+			+	+		
ATR	+		+		+		+		low								+
									ATR	+		+		+		+	

Igbo differs from Ikwere in 1) exchanging coronal and labial, 2) not employing low.

23. A second difference between the ED and NC frameworks lies in the notion of feature activation, proposed by NC but not ED. Both agree that contrastive features may be active and that active features may be contrastive. Only NC allows noncontrastive features to be active. As this theory is the less restrictive in this respect, evidence must be offered.
24. Zoque (see earlier): [+voiced] is redundant but specified at the phonological level. This may, however, be a "post-lexical" process as it has no morphological conditions or lexical exceptions.
25. Tahltan consonant harmony (Clements 2001). The feature coronal is not lexically distinctive but spreads in consonant harmony.

26. Coronal obstruents occur in five series:

<i>(simple)</i>	<i>lateral</i>	<i>apical</i>	<i>laminal</i>	<i>palato-alveolar</i>
d	dɭ	dz	dð	dʒ
t	tɭ	ts	tθ	tʃ
t'	tɭ'	ts'	tθ'	tʃ'
	ɭ	s	θ	ʃ
	l	z	ð	ʒ

27. Distinctive feature specifications, after Shaw (1991):

	strident	distributed	posterior
palato-alveolar: tʃ, dʒ			+
apical: ts, dz	+		
laminal: tθ, dð		+	

28. Lexical specification of selected consonants (relevant features only):

	b	d	dl	dz	dð	dʒ	g
labial	+						
dorsal							+
posterior						+	
strident				+			
distributed					+		
lateral			+				

Assumption: [strident] is a coronal dependent, [lateral] is not (Shaw 1991, Clements & Hume 1996, Clements 2001)

Note that [coronal] is not specified as it is unmarked, and not contrastive: all places of articulation are distinguished without it.

29. Examples of consonant harmony: /-s-/ '1st sg. subject marker'

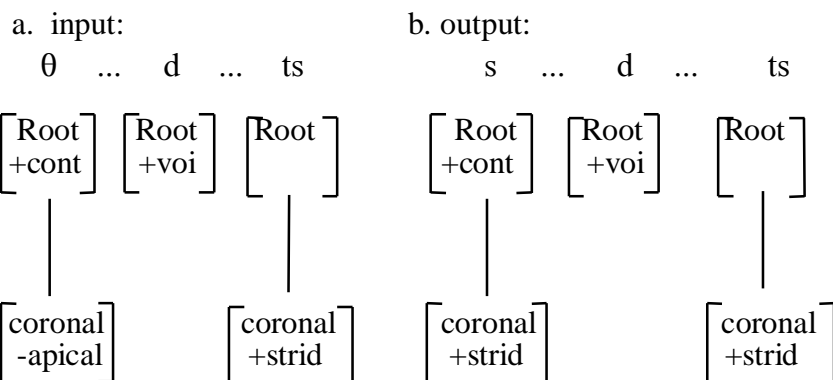
s → θ:	θɛ-θ-ðɛɫ	'I'm hot'
	dɛ-θ-k <sup>w</sup> ɔθ	'I cough'
	ɛ-θ-du:θ	'I whipped him'
s → ʃ:	hudi-ʃ-tʃa	'I love them'
	ɛ-ʃ-dʒmi	'I'm singing'
	ya-ʃ-tʃ'etʃ	'I splashed it'
s → s: (elsewhere)		
	ɛ-s-k'a:	'I'm gutting fish'
	ɛ-s-dan	'I'm drinking'

30. /-θ-/ '1st dual subject prefix'

θ → s:	dɛ-s-idzɛɫ	'we shouted'
	xa-s-i:dɛts	'we plucked it'
	dɛ-s-it'ʌs	'we are walking'
θ → ʃ:	i-ʃ-itʃotɫ	'we blew it up'
	u-ʃ-idʒɛ	'we are called'
θ → θ: (elsewhere)		
	dɛ-θ-igtɫ	'we threw it'
	na-θ-iba:tɫ	'we hung it'

30. AGREE (marked coronal): Within the word, [coronal] nodes bearing marked feature values must be identical.

31. Example: xa-θ-i:dɛts → xasi:dɛts



In Tahltan, the /t/ and /tʰ/ series are transparent to coronal harmony because their unmarked [coronal] feature is neither lexically specified (28), nor phonologically activated by (30).

32. English plural rule. Lexical specification by the universal feature hierarchy according to the algorithm proposed in Clements (2001):

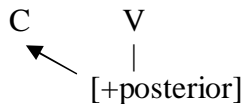
	f	θ	s	ʃ
labial	+			
posterior				+
strident			+	

At the phonological level, the OCP [coronal, +strident] activates the redundant value [+strident] in /ʃ/ and triggers vowel epenthesis (e.g. Yip 1988)

examples: bus, buses [sɪz] contrastive [+strident] triggers the OCP  
bush, bushes [ʃɪz] redundant [+strident] triggers the OCP

33. Posteriorization of /s/ to /ʃ/ before /i/ (many languages)

The spreading feature is [+posterior]. This feature is redundant in vowels, as all coronal vocoids are [+posterior].



34. Coronal/labial harmony in Ikwere (see vowels in 21)

the vowel prefix is realized as follows:

a	before	a	à-kpá	'to touch'
e	before	i e	è-bé	'to find'
ɛ	before	ɪ ɛ	è-yǎ	'to push'
o	before	u o	ò-gbú	'to kill'
ɔ	before	ʊ ɔ	ò-gó	'to deny'

SPREAD: [coronal] and [labial] (N.b.: ATR values are accounted for independently by ATR harmony) -- but only [coronal] is contrastive (see 22)

35. A problem in Ewe phonology (Niger-Congo, Ghana)

Ewe consonants include the following illustrative subset (see Capo 1981, 1991):

	t	tʃ	k
b	d	dʒ	g
m	n		

Vowels are contrastively oral or nasal.

Tone are lexically /H, M/. Tone rules activate an allophonic L tone (see below).

36. The allophonic status of the nasals [m n].

[m] and [n] are in complementary distribution with [b] and [d] as follows:

- [m] and [n] occur only before nasal vowels
- [b] and [d] occur only before oral vowels

(syllabic word-final -m can be derived from a full tone-bearing syllable)

Sonorants follow the same pattern:

oral sonorants (w, y, etc.) occur before oral vowels

nasalized sonorants (w̃, ÿ, etc.) occur before nasal vowels

37. Analysis: Ewe (and other Gbe languages) lacks contrastive nasal consonants  
The feature [nasal] is not lexically specified in consonants.

38. Voiced obstruents trigger the insertion of a L tone in noun-initial syllables.

/bá/      bǎ  
but: /tá/      tá  
      /lá/      lá  
      /bǎ́/      mǎ́

39. Analysis. (It is assumed here that the top-ranked feature in Gbe as in many other West African languages is [obstruent] rather than [sonorant])

lexical feature specification of selected consonants (relevant features only):

	b	v	t	d	ɖ	l
obstruent		+	+	+		
labial	+	+				
continuant		+				
voiced				+		
apical					+	

Note the absence of + specifications for [obstruent] in /b/ and /ɖ/; this feature is lexically indeterminate in these segments since they are realized as obstruents [b ɖ] or as sonorants [m n] according to the context.

40. Nasalization

C	V	
↙		
	[+nasal]	

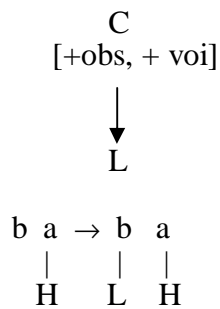
subject to \*[+obstruent,+nasal]  
/bǎ́/ → mǎ́ but /ɖǎ́/ → [ɖǎ́] (obstruents do not undergo nasalization)

41. The phonological inventory now includes nasals. As [nasal] is activated it is specified in the phonology as shown at the right:

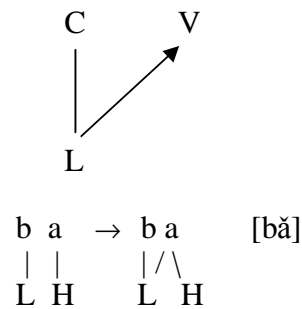
	b	v	t	d	ɖ	l	m	n	ĩ
obstruent		+	+	+					
labial	+	+					+		
continuant		+							
voiced				+					
<b>nasal</b>							+	+	+
apical					+				



## 42. L tone insertion (nouns)



## 43. L tone spreading



## 44. L tone insertion activates noncontrastive values of [+voiced] and [+obstruent] (cf. (41)):

	b	v	t	d	ɖ	l	m	n	ɲ
<b>obstruent</b>	+	+	+	+	+				
labial	+	+					+		
continuant		+							
<b>voiced</b>	+	+		+	+				
nasal							+	+	+
apical					+				

45. Summary: /b/ is crucially *not* [+obstruent] for the purposes of nasal spreading, but *must be* [+obstruent] for the purposes of L tone insertion, even though this value is noncontrastive. L tone itself is noncontrastive, but undergoes subsequent spreading.46. Eastern Gbe dialects (e.g. Fon) are similar to Ewe except that *all* voiced consonants, including sonorants, trigger L tone insertion; here we find the patterns

/bá/      bǎ  
/lá/      lǎ  
but:    /tá/      tá

Here a further noncontrastive feature value ([+voiced] in sonorants) is activated in the phonology, where it spreads to other segments by (43).

## 47. Summary: sources of variation in the framework of Clements (2001):

- some features are unordered in the universal feature hierarchy
- some features are exchangeable
- languages vary as to which noncontrastive features are activated in the phonology

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