

Dresher, B. Elan (2009) *The Contrastive Hierarchy in Phonology*.

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This book presents a history and new theory of contrast in phonology. ‘Contrast’ was and remains a major concept for many phonological theories. Oversimplifying slightly, those features that make a segment distinct from other inventory members are phonologically special: either contrastive features are the only ones that are specified, or rules can specifically refer to them alone. The concept of contrast can be found at the heart of some of the earliest theorizing about phonological systems (e.g. Trubetzkoy 1939, Martinet 1960) and was a driving force behind many subsequent theories (e.g. Kiparsky 1985, Archangeli 1984, Calabrese 2005).

Chapters 1 and 2 present basic issues in theories of contrast. The rest of the book is fairly evenly divided between history and the new theory. The history begins in chapter 3 with Sapir and continues through the Prague School (Trubetzkoy 1939), Hockett (1955), SPE (Chomsky & Halle 1968), Lexical Phonology (Kiparsky 1982), to Optimality Theory (Prince & Smolensky 2004) in chapter 6, segueing into the new theory in chapter 7. The history is invaluable; it is ideal for graduate-level phonological courses and is clearly and concisely written.

The rest of this review will focus on the theory. It is defined in sections 2.3, 2.6, 2.7.2, 4.7, and 6.4. Evidence is provided in chapter 7, and other theories are compared in chapter 8. The theory has been presented elsewhere in a variety of other publications written or cowritten by the author, but I believe that this is its first unified presentation. A number of dissertations and articles have been based on the theory, included in the references at

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<http://www.chass.utoronto.ca/~contrast/archive.html>, and it is closely allied to a theory of markedness developed by the author with Keren Rice at the University of Toronto; however, the book focuses on contrast, not markedness.

There are two core mechanisms: the Successive Division Algorithm (SDA), and the Contrastive Hierarchy of features (CH). The CH is a language-specific order of segmental features. The SDA determines which features in a language's inventory are contrastive. The SDA takes the first member of the CH and examines the inventory. If the feature can be used to split the inventory into two nonempty subsets then all segments are specified for that feature; otherwise, the segments are not specified for that feature. The algorithm then moves to the next feature in the CH and reapplies the algorithm to each subset.

For example, suppose the CH has the order $| \text{[nasal]} > \text{[voice]} |$ and a language's inventory has only the consonants $/p \ b \ m \ n/$. The feature $[\text{nasal}]$ can be used to bifurcate the set into $/p \ b/$ vs. $/m \ n/$, so $/p \ b/$ are specified $[-\text{nasal}]$ and $/m \ n/$ are $[\text{+nasal}]$. Moving on to the feature $[\text{voice}]$, the elements of the set $/p \ b/$ can be split into $[-\text{voice}]$ and $[\text{+voice}]$ members, so both $/p/$ and $/b/$ are specified for $[\text{voice}]$. However, the $/m \ n/$ set cannot be bifurcated by $[\text{voice}]$, so neither are specified for it. The result is an inventory where $/p/$ is $[-\text{voice}, -\text{nasal}]$, $/b/$ is $[\text{+voice}, -\text{nasal}]$, but $/m/$ and $/n/$ are $[\text{+nasal}]$ with no specification for $[\text{voice}]$. Of course, the algorithm continues until $/m/$ and $/n/$ are featurally distinct.

The SDA seems to be fully worked out in its formal implementation and is shown to work with both privative and equipollent features. However, the theory of the CH is not developed. It is not clear what the elements of the CH are, and how to determine the CH for a specific language: "Analyses of many languages ... suggest a certain amount of variation in the

[Contrastive] feature hierarchy ... The limits of this variation remain to be determined” (pp. 167, 168).

Some other aspects of the overall theory have not yet been fully worked out. For example, an argument is advanced that contrast can be relativized to phonological position or morphological class: inventories in one domain may not have the same contrastive features as those in another domain (section 7.5; see the discussion of metaphony below). However, the exact domains which define distinct inventories within a language are not identified, and it is unclear whether a language may opt to ignore particular domains, though some preliminary proposals are presented.

The predictive power of the theory resides in the fact that (at least output) segments lack noncontrastive features. Consequently, phonological processes cannot refer to those features (or at least those features cannot trigger phonological processes). The SDA doesn’t dictate that noncontrastive features *must* be absent from representations, but full feature specification is clearly rejected (e.g. section 8.6). The evidence presented in chapter 7 revolves around this point: that it is only possible (or at least easier) to make sense of phonological processes if reference to noncontrastive features is not possible.

Overall, I found it difficult to evaluate the evidence presented. Getting the right CH for a language is crucial, but without knowing how a language’s CH is discovered and how position influences contrastiveness it is hard to know if the proposals work. The analyses are not set within a particular phonological framework, so it is hard to be sure of the proposal’s predictions as they will depend in part on the properties of the particular phonological framework employed.

The evidence starts with Inuit/Inupiaq languages (section 7.2.1). There is no dialect that has palatalization triggered by /i/ when the SDA predicts that its /i/ is unspecified for [coronal].

For example, with an inventory of /i u a/, /i/ is not specified for [coronal] and so palatalization cannot occur. In contrast, in dialects with /i ə u a/ the /i/ is contrastively specified for [coronal], and so such dialects may have palatalization. This is a strong prediction: when the SDA produces an /i/ that is not specified for [coronal], there can be no /i/-triggered palatalization. However, the prediction depends on the CH for these languages having [labial] ordered before [coronal]; otherwise, [i] will be specified for [coronal] even in an /i u a/ inventory (and [u] will be unspecified for place). Ultimately, the validity of the argument relies on showing how learners are forced to a CH where | coronal > labial | in these cases.

The most extensively discussed case is Classical Manchu (CM), drawing on Zhang (1996) (section 7.4.1). The CM vowels are /i u ʊ ə a ɔ/. With a CH of | low > coronal > labial > ATR |, /i/ is unspecified for [ATR] while /u ʊ ə a/ all carry ATR specifications (or with a privative feature only [u] and [ə] are specified as [ATR]). There is an ATR harmony system, and only /u/ and /ə/ trigger it; /i/ does not. There is also a labial harmony process, but – in line with the SDA – only /ɔ/ triggers it because it is specified for [labial] while /u/ is not. The correlation between the SDA's feature specifications and the triggers of ATR and labial harmony is interesting. However, a challenge in evaluating this case is that the language is no longer spoken; there are only written records and there is controversy over whether there was a /u~/ʊ/ distinction as opposed to a /u~/o/ or a /y~/u/ contrast (Vago 1973, Ard 1984, Hayata 1980, Zhang 1996:34ff). Also, the distribution of /u/ and /ʊ/ is very limited. There are a few words in which /u/ and /ʊ/ contrast but they are rather marginal; otherwise, [ʊ] and [u] do not appear in the same phonological surface environment ([ʊ] appears only after uvular consonants, and [u] only appears in other environments). Zhang (1996) argues that there is an underlying /u~/ʊ/

distinction, but the arguments are complex and – given that the language is dead – will probably always be somewhat uncertain. Cases in living languages are provided in the remaining subsections of 7.4 (Spoken Manchu, Xibe, Nez Perce and some languages with labial harmony). Unfortunately, the analyses are short (about a page for each) and somewhat tentative.

Other major evidence for the CH involves metaphony in Romance languages, where suffix high vowels force stressed mid vowels to raise (e.g. Pasiego (Montañas) Spanish *g[ó]rdo~g[ú]rd-u*; *ab[jé]rtos~ab[jí]rt-u*). Following Dyck (1995), it is argued that metaphony is triggered by a high vowel only if that vowel has a contrastive height feature. It is crucial to assume here that suffix (or specifically ‘desinential’) vowels form their own inventory separate from stem vowels. If suffixes only have the vowels /i u a/ (or /e o a/), no vowel will be specified for [+high] (assuming a CH in which | low > high |). However, if the suffix vowels are /i e a o u/, metaphony could be triggered by [i] and [u]. In comparison, in dialects with /i a o u/ suffix vowels the theory predicts that if there is metaphony /u/ but not /i/ will trigger it: [i] does not contrast with a front mid vowel so has no height specification, but [u] contrasts with [o] so must be specified as [high]. Reportedly, the prediction is borne out (at least, the dialects have only a “marginal, archaic” contrast between /i/ and /e/). This is an interesting argument and at the very least a striking correlation. However, it raises the question of how desinential vowels form their own inventory for the purpose of the SDA. Could some languages *not* count desinential vowels as a separate inventory? If so, the exact predictions about metaphony become extremely complex, relying on specific CHs and inventories to be selected by the learner. Section 7.5 offers some initial ideas about how domains are established, proposing that they should correspond to single grammatical categories. It is clear that when theories of the CH and inventories are

developed further they will make striking and strong predictions about when metaphony is impossible.

Evidence from loanword adaptation in Hawai'ian and New Zealand Maori (usually just called 'Māori') is also presented. In Māori, English [s z ʃ] are borrowed as [h] (e.g. English [bɪʌʃ]~Māori [pa'raihe]); in Hawai'ian they are borrowed as [k] ([pa'laki]). Following Herd (2005), it is proposed that the adaptation difference is due to a difference in inventory structure. In Māori [h] is the sole glottal consonant, and with an appropriate CH it ends up essentially unspecified for features (or at least marked features). So, “/h/ plays the role of default obstruent... Therefore [s, z, ʃ] → /h/” (p.202). However, in Hawai'ian /h/ contrasts with [ʔ]; in comparison there are no other dorsals apart from [k]. With an appropriate CH, [k] ends up effectively unspecified for features.

However, it is possible to see the adaptations as misperception or straightforward matching of phonetic realizations. In Māori, /h/ has a wide range of realization: for some speakers it varies in place of articulation from [ʃ] to [h]. In fieldwork conducted in 2000, one of my consultants (male; 45 years old; Te Teko – Matātua dialect) had a realization ranging from [ç] to [χ]; in fact, the majority of the consultant's /h/ articulations were rather far forward. From a purely perceptual point of view, English [s z ʃ] would have sounded remarkably close to phonetic realizations of Māori /h/ making it a natural target for straightforward adaptation by phonetic matching.

Māori is actually remarkable in adapting strident fricatives to [h]; the usual strategy in Polynesian languages is to adapt them as the stop [t] when there are no strident fricatives in the target language (Kitto 1997). There is no [t] in Hawai'ian, so [k] is the closest stop perceptually

to the coronals [s z ʃ] (the other choices are [p] and [ʔ]). So, in a sense Hawai'ian is well behaved while the Māori adaptation is special, but the uncharacteristically wide variation in the realization of Māori /h/ makes it a more desirable target for adapting English sibilants. In short, there are alternative accounts that are worth exploring with regard to Polynesian loanword adaptation. On the other hand, the CH analysis does not necessarily conflict with phonetic facts in Māori; in fact, if lack of feature specification *predicts* phonetic variability, then the Māori facts fit quite well with the theory. In short, it is not yet conclusive that the Māori and Hawai'ian adaptations provide evidence for the SDA and CH.

To conclude, the theory presented has profound implications for phonology. However, this book is simply too short to do it justice – there are only about 100 pages devoted to defining the theory, exploring its predictions, and comparing it to alternatives. To fully evaluate the theory and understand its implications, future work needs to make headway on theories of the CH (which features it contains and how learners determine it), how position interacts with the SDA, and how a learner applies the SDA. Specific implementations in particular linguistic frameworks should also be provided. More compelling evidence can be presented by showing that the theory deals insightfully with phenomena that have been the subject of a great deal of attention (e.g. epenthesis, neutralization, place and voice assimilation, vowel neutralization). The Inuit, Manchu, and Romance metaphony case studies showed only some of what the theory predicted for triggering processes; future work will need to provide a detailed exploration of what the theory predicts about which segments should undergo particular processes and what the targets of those processes are predicted to be.

Overall, I believe this book makes a valuable contribution in providing a history of contrast in phonological theory, and is ideal for graduate courses -- I intend to use it. The theory

is complex and has several components; the book mainly focuses on one of them – the Successive Division Algorithm. Given the interrelatedness of the components, it is hard to judge the theory’s validity at this point. However, I believe when it is developed further it will make very precise and subtle predictions that will provoke a great deal more research.

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