

Contrast and Redundancy in Optimality Theory

In pre-OT generative phonology, issues of contrast, redundancy, and underspecification represented active research areas for many years. For example, Stanley (1967) argues that it is arbitrary which feature is left blank in lexical entries in cases in which there is a mutual implication between two features [+f] and [+g] in some environment. He suggests that fully specified lexical entries avoid this arbitrariness. With the advent of OT, redundancy and underspecification have largely faded from view. Little, if any, attention is paid to the issue of redundant features in current discussions in OT. The purpose of this paper is to show that, as a consequence of the OT tenets of Richness of the Base (ROTB) and Lexicon Optimization (LO), redundant features will be specified in optimal lexical representations. We illustrate this by considering the treatment of voicing and aspiration in Swedish and Turkish.

In word-initial position in Swedish, two types of stops are found: (pre)voiced and voiceless aspirated. (Aspirated and voiced stops are found in other positions as well, but we focus on initial position since this is sufficient to illustrate our point.) Examples are given in (1).

- | | | | | | |
|-----|----------------------|--------|--|--------|---------|
| (1) | [p ^h]uck | 'puck' | | [b]ad | 'bath' |
| | [t ^h]ak | 'roof' | | [d]äck | 'deck' |
| | [k ^h]ub | 'cube' | | [g]ap | 'mouth' |

Consider an OT account of this distribution. Assuming that voiced stops are specified on the surface as [+voice] and aspirated stops as [spread glottis] ([sg]), it might appear that a faithfulness constraint ID[Laryngeal], ranked above the markedness constraints prohibiting voiced obstruents (*voice), spread glottis segments (*sg), and voiced aspirated segments (*voi/sg), would be sufficient. However, this leads to an unattested three-way contrast in surface forms, as illustrated in (2) (where we omit *voi/sg). In order to derive the actual two-way contrast here, some constraint requiring that voiceless stops be [sg] must be present in the grammar, crucially dominating ID[Lar]. As shown in (3), this grammar correctly designates the aspirated stop output as optimal for voiceless inputs, regardless of the underlying specification for [sg].

(2)

/t/ak	ID[Lar]	*voi	*sg	/d/äck	ID[Lar]	*voi	*sg	/t ^{sg} /ak	ID[Lar]	*voi	*sg
☞ tak				täck	*!			tak	*!		
dak	*!	*		t ^[sg] äck	**!		*	dak	**!	*	
t ^[sg] ak	*!		*	d ^[sg] äck	*!	*	*	☞ t ^[sg] ak			*
				☞ däck		*					

(3)

/t/ak	[-voi] is [sg]	ID[Lar]	*voi	*sg	/t ^{sg} /ak	[-voi] is [sg]	ID[Lar]	*voi	*sg
tak	*!				tak	*!	*		
dak		*	*!		☞ t ^[sg] ak				*
☞ t ^[sg] ak		*		*	dak		*!*	*	*

Now we have an account of the surface distribution, but are left with an indeterminacy about the lexical representation. Since, at least in word-initial position, the specification of [sg] is predictable from the specification for [voice], it might seem that it is not necessary to ever have [sg] in the input—as in Lombardi (1999), where aspiration is disregarded completely.

However, LO chooses /t^[sg]ak/ as the optimal lexical representation for [t^hak], because this yields the most faithful mapping from input to output, as illustrated in (4).

(4)

Input	Output	[-voi] is [sg]	ID[Lar]	*voi	*sg
/tak/	t ^[sg] ak		*!		*
☞ /t ^{sg} ak/	t ^[sg] ak				*

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Hence, features that have been thought of as redundant will, by LO, necessarily be present in the underlying representation. If we take LO seriously, redundant features cannot be ignored in either surface or lexical representations.

Turkish also has surface aspirated stops and voiced stops. At first glance, Turkish appears to be like German, which can be analyzed with an underlying [sg] contrast, with surface voicing resulting from passive voicing. However, Turkish root-final stops exhibit a three-way difference in behavior that is neutralized to a two-way distinction in word final position, as illustrated by the data in (5).

- (5) a. k^hap 'container' k^habi 'container-3SG. POSS.'
 b. sap 'stem' sap^hi 'stem-ACCUS.'
 c. ad 'name' adi 'name-3SG. POSS.'

Crucially, root-final voiceless stops in Turkish exhibit two patterns of behavior; one group, in (5a), undergoes voicing in intervocalic position; the second group (5b) is uniformly voiceless. We can straightforwardly account for the Turkish facts if we assume, following Kallestinova (2003), that the intervocalic voicing of non-[sg] stops results from passive voicing. Stops that are underlyingly [sg] are always voiceless (and aspirated intervocalically). Stops that are always voiced are straightforwardly analyzed as underlyingly specified for [voice], (5c). This is illustrated in (6), (7), and (8).

(6)

/at ^{sg} /+i	ID[Lar]	*sg	*voi	/at ^{sg} /	ID[Lar]	*sg	*voi
☞ at ^[sg] i		*		☞ at ^[sg]		*	
adi	*!*		*	ad	*!*		*
ati	*!			at	*!		

(7)

/ad/+i	ID[Lar]	*sg	*voi	/ad/	ID[Lar]	*sg	*voi
at ^[sg] i	*!*	*		at ^[sg]	*!*	*	
☞ adi			*	☞ ad			*
ati	*!			at	*!		

(8)

ka/p/+i	ID[Lar]	*sg	*voi	ka/p/	ID[Lar]	*sg	*voi
kap ^[sg] i	*!	*		kap ^[sg]	*!	*	
kabi	*!		*	kab	*		*
☞ kapi				☞ kap			


In the phonetics, PASSIVE VOICE yields [kabi]

Inkelas (1995) disregards the surface aspiration in Turkish and argues that the facts in (5) necessitate both the reformulation of LO, and what amounts to ternary-valued voice. Actually, however, the principles of OT require that the aspirated stops be [sg], and the non-alternating voiced stops be [voice]. This means that a possible input with no laryngeal specification can be voiced intervocalically (by passive voicing), and voiceless elsewhere. Underlying [sg] stops stay [sg] throughout, and those specified as [voice] remain voiced.

The Turkish example is particularly interesting because, if we take seriously the OT tenets of ROTB and LO, we are forced to assume both [voice] and [sg] in input representations. Once we do this, the recalcitrant Turkish facts receive a straightforward solution, with no revision of LO and no ternary-valued [voice]. McCarthy (2003), who also considers the consequences of LO and ROTB for the structure of underlying representations, makes a different, but related point, arguing that ROTB and LO will solve a long-standing indeterminacy in the underlying specification of final vowel length in Arabic.

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