Explaining unnatural gaps in variation

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The free combination of independent phonological events is (implicitly) assumed by and built into the mechanisms of phonological models (e.g., derivational (Chomsky & Halle 1968), OT (Prince & Smolensky 1993/2004)). Thus, phonological processes/phenomena that are independent in terms of their content and conditioning are supposed to apply to forms independently of one another. Given two such independent phenomena (e.g., aspiration and [l]-velarization in British English), they will occur or will not occur depending on whether the phonological descriptions of one (***pee***, ***eel***), both (***peel***) or neither (*leap*, *seem*) are met. As a consequence, it follows that if phonological variation occurs in independent dimensions, it should apply orthogonally. Variants in one dimension are expected to combine freely with variants in the other dimension. Given two independent dimensions, Variation I between properties A and B and Variation II between properties 1 and 2, and forms that can be subject to both, all four combinations are predicted: A1, A2, B1, B2. It is a problem for any analysis if a systematic gap should occur under these conditions, i.e., if one (or more) of the predicted forms is ill-formed (systematically unattested). It is possible to take a brute-force approach to the problem and handle such an odd state of affairs by positing constraints specific to the gap (similarly to the unnatural constraints of Hayes et al. 2009) or resorting to diacritic marking, but an approach that can connect such a seemingly "unnatural" gap to other properties/regularities of the system is preferable. In this paper we examine some gaps of this type in the possessive paradigms of nouns in Hungarian. We argue that the gaps, which appear to result from an "unnatural" interaction of two independent dimensions of variation, can be explained by constraints of paradigmatic uniformity (analogy), prescribing systematic partial identity of different forms in the paradigm.

The Hungarian possessive suffix has [j]-initial (yodful) and vowel-initial (yodless) allomorphs with a third person possessor and/or a plural possessee (the "Y-suffixes"). Some nouns take the yodful possessive suffixes only (paːr-**jɑ** 'her/his pair'), some only the yodless ones (kaːr-**ɑ** 'her/his damage') and some, those in the zone of variation for yodfulness, take both (tor-**ɑ** % tor-**jɑ** 'her/his wake'). The possessive suffixes also alternate harmonically: with low **ɑ~ɛ** (kaːr-**ɑ** vs. bøːr-**ɛ** 'her/his skin', and paːr-**jɑ** vs. zyːr-**jɛ** 'her/his mess') high **u~y** (kaːr-**uk** 'their damage' vs. bøːr-**yk** 'their skin', and paːr-**juk** 'their pair' vs. zyːr-**jyk** 'their mess').

Most Hungarian suffixes are subject to backness harmony. Back stems take only back suffixes, front stems only front ones, but harmonically variable stems (e.g., Bɛ stems, whose final syllable, containing **ɛ**, is preceded by a syllable with a back vowel, e.g., hotɛl 'id.') are in the zone of variation for harmony and take both front and back suffixes (e.g., hotɛl-**ɛ**m % hotɛl-**o**m 'my hotel'), cf. Hayes & Cziráky Londe (2006).

Variation in yodfulness and backness harmony are *independent* in phonological content and conditioning. Thus, stems that are in the zone of variation of both yodfulness and backness harmony are expected to vary by taking *four* allomorphs of the relevant suffixes (front yodless, front yodful, back yodless, back yodful). They do so indeed in 3rd person plural possessor singular possessee, i.e., when the suffix vowel is high **u~y**: e.g., hotɛl-**yk** % hotɛl-**uk** % hotɛl-**jyk** % hotɛl-**juk** 'their hotel'. However, when the suffix vowel is low **ɑ~ɛ**, e.g., with 3rd person singular possessor forms, the back yodless allomorph is *systematically* missing: hotɛl-**ɛ** % hotɛl-**jɛ** % hotɛl-**jɑ**, but *hotɛl-**ɑ** 'his/her hotel'. The existence of this gap

is corroborated by extensive web searches for *all* (more than a hundred) harmonically variable Bɛ stems, as well as the intuition of native speakers. The absence of the form *hotɛl-**ɑ** is not due to a general ban on the yodless back possessive allomorph **-ɑ** since we do find it in harmonically variable stems, *if* there is no variation in yodfulness: e.g., notɛs-**ɛ** % notɛs-**ɑ** 'his/her notebook'). It is also not a dispreference for having "too many" allomorphs, since all four are available when the suffix vowel is high. This situation is unexpected under standard assumptions on how independent (variable) phonological phenomena interact (see above) and seems an entirely arbitrary and unnatural restriction.

The gap and the asymmetry in the behaviour of high vs. low vowel possessive Y-suffixes is related to the quality of *suffix-initial vowels* elsewhere within the possessive subparadigm of nouns, which are high **u~y** and **o~ɛ**. The gap and the asymmetry is due to the fact that **u, y**, and **ɛ** occur both in Y-suffixes and elsewhere in the possessive subparadigm but **ɑ** only occurs in Y-suffixes and **o** only occurs elsewhere.

We propose an OT analysis which does not involve any ad-hoc constraints to ban the nonoccurring allomorph. The main idea is that those forms are licensed in a paradigm that receive analogical support (in some respect) from other forms in same paradigm or other paradigms of the same type. We show that the seemingly unnatural gap is the result of the interaction of independently motivated constraints of paradigm uniformity expressing analogical support that select the optimal possessive subparadigm. The constraints prescribe uniformity in (i) harmonic suffix behaviour, (ii) the quality of suffix initial vowels and (iii) the syllabic affiliation of stem-final consonants within the paradigm. The candidates evaluated by the constraints are not word forms, but paradigms (cf. McCarthy 2005). The candidate set consists of the logically possible possessive subparadigms resulting from the combination of one, more than one, all or none of the available affix allomorphs with a stem rather than an infinite number of candidate paradigms by Gen (Archangeli & Pulleyblank 2015). In this case, with 4 forms potentially, there are $2^4 = 16$ possible subparadigms. These subparadigms are compared to other portions of the paradigm of the given stem and to the paradigms of stems belonging to the same noun class. In this way we can show that (i) the ungrammaticality of forms with yodless back suffix allomorphs whose vowel is *low* (*hotɛl-**ɑ**) and (ii) the asymmetry, i.e., the simultaneous existence of forms with yodless back suffix allomorphs whose vowel is *high* (hotɛl-**uk**), is not arbitrary but follows from the properties of other forms of the relevant stem's paradigm, as well as from the need to maintain paradigm uniformity.

REFERENCES

Archangeli, Diana and Douglas Pulleyblank. 2015. Phonology without universal grammar. *Frontiers in Psychology*. 6.

Chomsky, Noam; Halle, Morris. 1968. *The Sound Pattern of English.* New York: Harper and Row.

Hayes, Bruce, and Zsuzsa Cziráky Londe. 2006. Stochastic phonological knowledge: the case of Hungarian vowel harmony. *Phonology* 23: 59–104.

Hayes, Bruce, Kie Zuraw, Péter Siptár and Zsuzsa Londe. 2009. Natural and unnatural constraints in Hungarian vowel harmony. *Language* 85: 822–863.

McCarthy, John J. 2005. Optimal paradigms. In: Laura J. Downing, T. A. Hall and Renate Raffelsiefen (eds.), *Paradigms in Phonological Theory*. Oxford: Oxford University Press. 170–210.

Prince, Alan and Paul Smolensky. 1993/2004. *Optimality Theory: Constraint Interaction in Generative Grammar.* Ms. Rutgers University, New Brunswick, and University of Colorado, Boulder. [Published by Oxford: Blackwell, 2004.]