The Centrality of Underlying Representations: Evidence from Reanalysis
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As the title indicates, I want to argue that URs are indispensable elements of phonological analysis. My strategy will be to display, in a single language, a set of alternations that are analyzed with opposite polarity or directionality in different parts of the lexicon—a kind of analytic minimal pair for UR choice. Because there will be time to treat only this one example, I want to emphasize that I consider it representative of a relatively large set of cases showing that speakers may reanalyze the directionality of an alternation in the course of its history. If that's true, then, given an alternation, the identity of the underlying alternants is a fundamental analytic parameter.

One methodological point. Much of the material we deal with will involve diachronic developments, including change in progress. Our focus throughout, however, will be on what diachrony can tell us about synchronic analytic decisions and the principles that drive those decisions—that is, about questions of synchronic description and explanation.

The talk is organized into three sections, an introduction, a case study from Korean, and a conclusion.

1. Introduction: Competition and variation in morphophonology

I want to start with a quotation from Andrew Garrett: "[M]orphological production involves competition between the retrieval of memorized forms and the creation of new ones by rule ... if existing ones are not learned, remembered, or accessed fast enough." (Garrett 2008:128; see also Marcus et al. 1992, Albright 2002)

While I think it's clear that morphological production doesn't always involve competition of this sort, it's sufficient for our purposes if it sometimes does. I focus on this quotation because the concept of the "competition between the retrieval of memorized forms and the creation of new ones by rule" provides a natural interpretation of a situation that I will represent as in (1).

\[
(1) \quad X \xrightarrow{Y_0} \begin{array}{c} Y_1 \sim Y_0 \\ \vdots \\ Y_n \sim Y_0 \end{array}
\]

In (1), X alternates depending on the individual lexical item with a range of Y_i (i = 0, 1, 2, ..., n). In some items, X alternates unconditionally with Y_0; in others, it alternates instead with some other Y_i but with the latter varying with and tending over time to be replaced by Y_0. The X/Y_0 alternation, that is, is being extended at the expense of the other alternations. The suggested interpretation of (1) is that X is underlying, Y_0 is derived by rule from X, and the remaining Y_i are lexicalized forms that compete with Y_0. If X occurs in environment E and the various Y_i in environment E', the rule deriving Y_0 will be (2), and lexical items in which X alternates with Y_i other than Y_0 will have the form (3).

\[
(2) \quad X \rightarrow Y_0 / E'
\]

\[
(3) \quad \{ ...Y_i / E'... \}
\]

In (3), Y_i must be listed in addition to the default form X because it is not derivable by rule from that form and is in that sense irregular.
If we now make the further assumption that lexical entries tend to be simplified over time by elimination of material in excess of a single phonological form, the element "...Yi / E'..." in (3) will be subject to loss—in Garrett’s terms, subject to not being "learned, remembered, or accessed fast enough". To the extent that it is not, we will observe variation in environment E’ between memorized Y₀, Y₁ etc. and regularly derived Y₀, since in the absence of the element "...X_i / E'...", the X of (3) will undergo rule (2). Over time, this variation will tend to be resolved in favor of Y₀.

Call the above interpretation of the situation in (1) the "regularization account". It’s worth noting the nature of the analytic decisions presupposed by the regularization account of (1). First, because the various Yᵢ contrast in environment E’ but are neutralized to X in environment E, the choice of X as underlying in (1) constitutes a neutralizing choice of underlying representation, one that targets neutralized rather than contrastive values of alternating features or segments. Second, because the choice of X as underlying puts the alternations of X with the various Yᵢ in competition with each other for the role of regular alternation, the choice of Y₀ as derived by rule—equivalently, the induction of rule (2)—represents a denaturalizing choice of regular alternation (and an example of rule inversion (Vennemann 1972); for the term "denaturation", see Nevins and Vaux 2007). We will return below to this pair of analytic decision-types.

The regularization account of (1) is not the only possible interpretation of that state of affairs, however. On what I will call the "UR-Reassignment account", the various Yᵢ contrast in underlying representations and are neutralized to X in environment E. On this account, variation between Y₀ and the remaining Yᵢ reflects relexicalization—specifically, the fact that Y₀, Y₁ etc. have been or are in the process of being relexicalized as Y₀.

Which of these two accounts of (1) should we adopt? I will approach this question by identifying three criteria or requirements that an account of (1) should plausibly satisfy and comparing the performance of the regularization and UR-reassignment accounts on each of them.

**Criterion 1:** Treatment of productivity

If the X/Y₀ alternation is productively extended to innovative X, an account of (1) should provide a natural understanding of that fact.

**Criterion 2:** Treatment of variation

An account of (1) should provide a natural understanding of the variation that characterizes (1) and of the diachronic directionality of that variation—that is, of the fact that the X/Y₀ alternation is being extended.

**Criterion 3:** Explanatory adequacy

An account of (1) should be based on analytic decisions that can be motivated in terms of explanatory principles of some plausibility and generality.

As we will see, it is Criterion 3 that most clearly differentiates the regularization and UR-reassignment accounts of (1), providing what I will claim to be decisive evidence in favor of the former.

2. Cluster reduction and coda neutralization in Korean

Korean obstruents undergo automatic neutralization of laryngeal (C : Cʰ : C) and manner (t : s : c) contrasts syllable-finally. As a result, the fifteen obstruents p pʰ pʰ t tʰ tʰ s sʰ c cʰ c cʰ k kʰ kʰ kʰ that contrast in onsets are reduced in codas to the three possibilities p t k. Obstruents other than p t k that appear at the end of verb and noun stems appear unchanged before vowel-initial suffixes and clitics as a result of resyllabification, but alternate with their neutralized counterparts before consonants. Cluster-reduction processes feed coda neutralization, so that there are alternations of clusters with p t k as well.
Korean coda neutralization alternations are stable in verbal inflection, but unstable in nominal inflection. Korean noun stems ending in coronal obstruents, first of all, instantiate (1) above with $X = t$, $Y_0 = s$, and $Y_1 \cdots Y_4 = c^h, t^h, c, t$, as shown in (4).

\[
\begin{align*}
&\text{(4) } t \sim s \\
&\text{ } \downarrow \\
&c^h \sim s
\end{align*}
\]

The $t/s$ alternation, in other words, is being extended at the expense of the other alternations of (4); in particular, the $t/t$ alternation has been almost completely eliminated (there is also a degree of mutual influence among the remaining three irregular alternations that we will ignore). There are parallel patterns of regularization for $X = p$ and $X = k$, as shown in (5) and (6). In these cases, $Y_0 = X$, so that it is the zero alternation that is being extended, resulting in leveling. Because the variation of (5) and (6) is subject to a greater range of interpretations than that of (4), it is the latter that we will concentrate on here.

On the regularization account of (4), $t$ is underlying in the $t/s$ alternation, and $s$ is derived by rule (7), which in its essentials goes back to Ko 1989 (the environment requires the undergoing segment to be both syllable-initial and final in a noun stem).

\[
\text{(7) } t \rightarrow s / \_ \_ \_ n]
\]

The four remaining $Y_i$ are lexicalized alternants that compete with regular $s$ in the prevocalic environment. The lexical representation of a stem like historical *juch “traditional four-stick game” is thus as in (8) (a more concise representation is achievable with the use of angled brackets).

\[
\begin{align*}
&\text{(8) } \left\{ \begin{array}{c}
\text{juch}^b \\
\text{jut}
\end{array} \right\}
\end{align*}
\]

Variation is the result of ongoing loss of the environmentally restricted irregular allomorph /juch/; when lexical retrieval fails for that allomorph, the /t/ of the default representation /jut/ will undergo rule (7) before a vowel-initial clitic, resulting in forms like innovative accusative [jusɨl], replacing conservative [juchɨl].

Let us now look at the UR-reassignment account of (4). On that account, the five $Y_i$ are underlying, and $t$ in environment $E$ is the result of coda neutralization. Variation between innovative /jus/ and conservative /juc/ will be the reflection of variation between an innovative UR /jus/ and a conservative UR /juc/. While the lack of detailed expositions of UR-reassignment analyses in the literature creates some indeterminacy here, I will assume that, under the UR-reassignment account of (4), the innovative UR /jus/ reflects a constraint to the effect that in noun stems, a stem-final coronal must be $s$.

The conservative UR /juc/ fails to conform to this constraint and is destined for obsolescence as a result.

Let us now evaluate the degree to which the regularization and UR-reassignment accounts of (4) satisfy the three criteria we proposed above, the criterion of productivity, the criterion of variation, and the criterion of explanatory adequacy.

Recent loanwords in Korean display productive extension of the $t/s$ alternation to innovative $t$. Thus, for example, /lopot/ "robot" has the accusative /lopot + il/ [robosɨl], the dative /lopot + e/ [robose], and so on for all vowel-initial clitics. On the regularization account of (4), such extension follows from rule (7). On the UR reassignment account, it follows from the constraint limiting stem-final coronal to $s$. 
It is not uncommon in the literature see the productivity or generality of an alternation invoked in support of an innovative rule and against a UR-reassignment account of the extension of the alternation. Thus, with regard to English "intrusive r":

"... restructuring scenarios in which /a/ is replaced by /əɹ/ in underlying representations ... fail to account for the regular and productive nature of r-intrusion ..." (Bermúdez-Otero 2011:2037)

And with regard to Uyghur y-zero and r-zero alternations:

"... to say that all long-vowel roots have been historically reanalyzed as ending y or r ... relegates to the domain of arbitrary lexical content something that otherwise receives a simple phonological explanation." (Vaux 2008:46–47)

For present purposes, though, given that the extension of the Korean t/s alternation can be accounted for under either the regularization account or the UR reassignment account of (4), I will take the productivity criterion not to weigh decisively in favor of either of those accounts.

Consider next the requirement that an account of (4) provide a natural treatment of the variation inherent in that situation.

Under the regularization account, that variation is precisely the "competition between the retrieval of memorized forms and the creation of new ones by rule" envisioned by Garrett and others, and the gradual advance of the regular forms at the expense of the irregular is the result of lexical simplification in progress. On that scenario, then, both the variation itself and its diachronic directionality can be attributed to relatively uncontroversial mechanisms.

Under the UR-reassignment scenario, on the other hand, the variation in question involves competition between multiple UR candidates, and both the competition itself and its eventual outcome are less clearly motivated. Among the questions that need to be answered under that scenario are (a) what form do the lexical entries of stems with multiple UR candidates take and (b) what is the basis of the markedness relation between the UR candidates? The criterion of variation, then, appears to favor the regularization account over the UR-reassignment account. The possibility that the missing details of the UR-reassignment account could be filled in by further investigation, however, can be seen to render this argument, too, less than fully decisive.

Consider finally the criterion of explanatory adequacy. To begin with, let us ask what explanatory principles are available to motivate the regularization account of (4), whose two main claims are that t is underlying and that there is a rule changing it to s syllable-initially. Consider first the choice of underlying forms. To this point, we have equated the syllable-final and syllable-initial environments of the two sets of segmental alternants with position before consonant-initial and vowel-initial clitics, respectively. Syllable-final alternants, however, appear word-finally as well as pre-consonantally; this is because noun stems frequently occur uninflected as the result of the deletion of clitics, particularly those marking structural case.

The occurrence of the syllable-final alternants of (4) word-finally gives the corresponding morpheme alternants the status of isolation forms and provides a plausible motivation for their choice as underlying; by the same reasoning, alternants ending in p and k will be underlying in (5) and (6). The claim that neutralized morpheme alternants are basic in Korean nominal inflection because of the salience or independence resulting from their status as isolation forms goes back at least to Ko 1989 (Ito 2010:365–366); for discussion of the relevance of isolation forms cross-linguistically, see Kenstowicz 1996.

As we have noted, the choice of p t k as underlying in (4)–(6) represents a neutralizing choice of URs. This choice creates a distinction among five types of t-stems that must be distinguished lexically, as well as three types of p-stems and five types of k-stems. The fact that at each point of articulation, there is one alternation that is being extended at the expense of the others, however, indicates that, in each case, that alternation has been chosen as regular. If we now ask on what basis that choice has been made, the apparent answer is lexical frequency (Ko 1989, Albright 2008, among others). The frequency in the Sejong Corpus (www.sejong.kr) of each of the stem-types of (4)–(6) is shown in (9), with data from the concordance program Geuljabi II as applied to the .txt files of Kim and Kang 2000.
In each case, then, it is the alternation with the highest lexical frequency that is being extended, making the choice of regular alternation in the Korean case amenable to explanation in terms of a generalized version of type frequency that applies in principle both to the choice of URs and the choice of regular alternations (de Chene in press). In sum, the regularization account of (4) is naturally seen as the result of two well-motivated analytic decisions, a neutralizing choice of URs based on the tendency to take isolation forms as underlying and a deneutralizing choice of regular alternation based on type frequency.

Let us now turn to the question of what the prospects are for a principled explanation of the UR-reassignment account of (4). To the best of my understanding, any explanation of UR reassignment in (4) or of the putative constraint limiting stem-final coronals to s will appeal to the lexical statistics of (9) as well; this is, for example, the approach taken by Nevins and Vaux (2007:47). In and of themselves, though, lexical imbalances like those of (9) are insufficient to produce UR reassignment. This is made clear by parallel statistics for Korean verb stems, shown in (10).

Apart from the fact that there is no clear winner among the coronals, the lexical statistics of (10) are broadly parallel to those of (9). But in contrast to those of (9), the statistics of (10) are phonologically inert, occasioning no apparent reassignment of URs. More generally, lexical imbalances of the sort shown in (9)–(10) are ubiquitous, but apparent reassignment of URs is relatively rare, so that it is clear that the former are not sufficient to produce the latter.

Unless the UR-reassignment account of (4) can be supplemented with a criterion determining when lexical frequency imbalances lead to UR reassignment and when they don’t, then, it is likely to remain without plausible motivation. And it is difficult to be optimistic about the prospects for such a criterion within a theory of UR reassignment. This is because it is precisely in the context of the rival regularization account that the contrast between the phonologically active lexical statistics of (9) and the phonologically inert lexical statistics of (10) makes sense: the neutralizing choice of URs postulated by the regularization account for noun stems puts the members of the three sets of alternations in (9) in direct competition with each other for the role of regular alternation, and it is only at this point that lexical statistics come into play.

The criterion of explanatory adequacy, then, appears to favor the regularization account of (4) (and of (4)–(6) generally), where the two basic claims of that account are that neutralized preconsonantal alternants are underlying and that there is a
t-to-s rule of the form (7). This analysis of Korean cluster simplification and coda neutralization alternations, however, holds only for the inflection of nouns. For verbal inflection, the stability of the same alternations argues that the analysis of them that is in force involves no irregularity. This, in turn, is possible only if contrastive prevocalic alternants are underlying. With respect to this set of alternations, then, Korean nominal and verbal inflection constitute an analytic minimal pair for UR choice, with neutralized alternants underlying for nouns and contrastive alternants underlying for verbs. If such a situation is possible, the concept of UR is clearly an indispensable one.

3. Conclusion: Toward a database of reanalyses

The two analytic decisions we have identified in the Korean case, a neutralizing choice of URs followed by a deneutralizing choice of regular alternation, define a type of reanalysis that has theoretical implications of some interest. First, if neutralizing UR choice does occur with any regularity, it calls into question the idea that, in analyzing inflectional alternations, speakers are looking to maximize some a priori desirable property of the analysis as a whole—for example, predictability of nonbasic alternants, as entailed by the feature-counting evaluation metric of classical generative phonology (Chomsky and Halle 1968) or predictability of inflected forms (Albright 2002:ix and passim). Second, apart from cases in which the null alternation is taken to be regular and leveling results, the choice of a regular alternation from a set of competing alternatives represents the induction of an innovative phonological rule, one that does not originate in sound change. Study of the properties of alternations that speakers have generalized in this way offers a window on the conditions defining a possible phonological rule that is independent of the constraints imposed by sound change. For example, alternations resulting more or less directly from sound change will in general involve a close phonetic relation both between the basic and the derived alternants, on the one hand, and between the derived alternant and the environment, on the other. With regard to the induction of innovative rules, however, historical and experimental evidence seem to converge in suggesting that while the phonological distance between the alternants is a crucial variable, the relationship between the change and the environment is far less important (Moreton and Pater 2012:711-712).

It is with these considerations in mind that I have taken the first steps toward creating a database or inventory of reanalyses that involve neutralizing UR choice and the induction of an innovative rule, concentrating on cases in which the innovative rule belongs to the word-level phonology. I hope to report in more detail on this database on another occasion.