Phonologists commonly distinguish informally between automatic and nonautomatic alternations, where an automatic alternation, to a first approximation, is one required by an exceptionless phonotactic constraint. The idea that there are important differences between automatic and nonautomatic alternations goes back to the beginnings of modern phonology in the work of Kruszewski (1881, 1883). Starting with the advent of generative phonology and continuing into the era dominated by the optimality theoretic paradigm, however, mainstream phonological thought has assumed, mostly without comment, that there is no theoretically significant distinction that correlates with the automatic or nonautomatic status of an alternation. In this paper, I propose that automatic and nonautomatic alternations differ in the principles on the basis of which they are analyzed by speakers—the principles, that is, according to which speakers set up basic or underlying representations for alternating morphemes and determine the mapping from underlying to surface representations. In particular, I will claim that while automatic alternations are analyzed according to a simple principle that takes the individual feature specification as its basic unit and minimizes divergence between underlying and surface forms, nonautomatic alternations are analyzed according to principles that refer to morpheme alternants and privilege "salient" alternants and alternations, such as those with high type frequency. Throughout, the focus will be on the alternations of inflectional morphology.

The proposal to be made here can be clarified by dividing it into two parts. The first is the claim that there exist two modes of phonological analysis, differentiated by the units they target and the principles they employ. This claim is of interest because it calls into question the position, characteristic of both classical generative phonology and of Optimality Theory, that there is a single evaluation procedure for phonology, a single set of explanatory principles according to which phonological analyses are chosen. This first claim may be motivated by observing that, as will become clear below, the mode of analysis that privileges salient alternants and alternations can be identified with the principles that govern analogical extension or leveling of alternations over time. As a result, the existence of two distinct modes of phonological analysis may be seen to follow from the fact that while many synchronic patterns of alternation result from the phonologization of sound change, some result instead from the operation of analogy.

The second of the two subclaims into which the present proposal can be divided is that the domains of application of the two modes of phonological analysis postulated correspond, respectively, to the sets of automatic and nonautomatic alternations. This claim provides a first approximation to an understanding of the division of labor between the two modes of analysis in question. Given that an alternation that is automatic at one point in time is very often nonautomatic at some later point, however, it raises at the same time the question of the conditions that trigger the transition from one state to the other. This question will be returned to in section 3.

Among the background assumptions that will be important below are the generative distinction between observational, descriptive, and explanatory adequacy and the concept that analogical change proceeds by the elimination of lexical irregularity. The distinction between observational and descriptive adequacy is crucial for the phonology of nonautomatic alternations because such alternations typically allow multiple observationally adequate analyses, at most one of which can be meet the criterion of descriptive adequacy. The distinction between descriptive and explanatory adequacy will be of equal importance below because of the claim that it is precisely at the level of explanatory principles that automatic and nonautomatic phonology are crucially different.

With regard to the course of analogical change, I assume first that an irregular morpheme alternant is one that is neither basic nor derivable from a basic alternant by rule and that such an alternant may be coded in a lexical entry either by listing or by a diacritic feature—that is, an exception feature or (minor) rule feature. In the case of an alternation that

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1 In the generative period, the clearest antecedent for this point of view is the Natural Generative Phonology of Vennemann (1971, 1972) and Hooper (1976, 1979). That framework differs from the one assumed here in taking the determinants of UR choice in morphophonology to be semantic (Vennemann 1972:240, Hooper 1979 §3); for discussion, see de Chene 2014a §5.
speakers take not to be rule-governed, all nonbasic alternants will be irregular, and the elimination of irregularity will result in leveling in favor of basic alternants. If an alternation is analyzed as rule-governed, on the other hand, elimination of irregular alternants will result in the appearance of regular substitutes generated from basic forms by application of the rule in question. In this case, then, elimination of irregularity will result in the extension of the regular alternation.

The paper is organized in the following way. Section 1 motivates the existence of two modes of phonological analysis by arguing that there are both cases in which speakers choose underlying representations on the basis of criteria of salience and cases in which such criteria would give counterfactual results and are thus clearly not employed. Section 2 then examines an extended example in which what was originally a single automatic alternation retains its automatic character in verbal inflection but has been reanalyzed in nominal inflection, resulting in a cascade of ongoing analogical changes that affect the latter only. The example will thus be seen to constitute a kind of minimal pair for the two modes of analysis postulated. Section 3 turns to the problem of determining the conditions under which speakers take an alternation to be automatic and when, on the other hand, they subject it to reanalysis in terms of criteria of salience. Section 4 is a brief conclusion.

1. Two Modes of Phonological Analysis

There is reason to believe that in many cases, speakers' choice of basic or underlying representations (below, URs) for alternating morphemes accords with one or more of the four principles below:

(1) a. URs are identified with isolation forms, when those exist.
    b. URs are identified with the most frequent alternants in inflectional paradigms.
    c. URs are drawn from a consistent environment over a lexical class.
    d. URs coincide with surface alternants.

Adoption of URs in accordance with (1a) is illustrated by the ongoing changes in Korean noun inflection that we will examine in section 2 below and by the reanalysis of Maori verb inflection made famous by Hale (1973). (1b) is illustrated by the reanalysis that resulted in the Portuguese rule of Lowering (see e.g. Harris 1974), which takes e o to e ş under stress in verb paradigms. That rule, which will be discussed in section 3 (see also de Chene 2014a), presupposes that stressless alternants of verb stems were taken as basic. Since those alternants occur in roughly 85% of verbal inflectional categories, their basic status can be attributed to (1b). (1b) is phrased so as to apply to stem alternations, but there is a parallel principle that identifies the URs of alternating affixes with the alternants that co-occur with the widest range of lexical stems. Adoption of URs in accordance with that principle is exemplified by the ongoing changes in Japanese verb inflection treated in de Chene 2014a. (1c) and (1d), finally, are illustrated by all of the cases just referred to as well as by a wide range of other examples, although they are presumably to be understood as consequences of more specific principles such as (1a) and (1b) rather than as independent criteria of UR choice.

We have briefly surveyed examples that appear to confirm the usefulness of the principles of (1). Alongside such examples, however, it is not difficult to find data that appear to falsify those principles. Kenstowicz and Kisseberth (1977:18-19, 26-27, 31-33), for example, showed many years ago that a very simple data set involving two automatic alternations of Russian appears to falsify all four at once. The alternations in question are akan'e, as a result of which atonic /o/ merges with /a/, after plain consonants the two vowels merge as [ɐ] in immediately pretonic and [ə] in other atonic syllables; after palatal(ized) consonants, unstressed /o a/ undergo a further shift (ikan'e) to /i/ [ɪ], merging with unstressed /i e/ (see e.g. Bethin 2012:427-428).
(2) a. vráč "doctor"      c. vráš "enemy"      e. stól "table"    g. pírak "pie"
   b. vráč-á    d. vrag-á    f. stol-á    h. pira-á

As a comparison of the forms for "doctor" and "enemy" shows, it is suffixed forms that reveal underlying values for the voicing alternation; the UR for "enemy" must thus be /vrag/, in violation of (1a). As a comparison of "enemy" and "table" shows, it is unsuffixed forms that reveal underlying values for the $o \sim a$ alternation. The UR for "table" must thus be /stol/; this violates (1b), because that alternant occurs in only two of the noun's twelve case forms (singular and plural), the nominative and accusative singular. (1c) is violated by the combination of /vrag/ and /stol/, since the former appears in suffixed forms and the latter in unsuffixed. Finally, when both alternations appear in the same stem, as is the case for "pie", the fact that suffixed forms reveal underlying voicing values and unsuffixed forms reveal underlying values for the $o \sim a$ alternation precludes taking either alternant as basic; the UR must be a composite of the existing alternants (here, /pírog/), in violation of (1d).

In arguing that URs for the alternations of (2) have not been chosen according to the principles (1), it is important to be clear concerning what consequences we would expect if UR choice had in fact proceeded on the basis of those principles. If URs for (2) were identified with isolation forms in accordance with (1a), first of all, the URs for "doctor" and "enemy" would be /vráč/ and /vráš/, creating a division of the lexicon within the class of obstruent-final stems depending on whether or not that obstruent undergoes voicing intervocally. In this situation, as the Korean example to be presented in section 2 suggests, we would expect either the alternating or the nonalternating pattern to be taken as regular, depending on which is the more frequent. If the alternating pattern were taken as regular, there would be an intervocalic voicing rule to which nonalternating stems would be lexically marked exceptions, and we would expect to see gradual elimination over time of the exception feature, leading to extension of the alternation. If the nonalternating pattern were taken as regular, on the other hand, intervocalic voicing would be a minor rule applying only to stems marked to undergo it, and we would expect to see gradual elimination over time of the corresponding rule feature, leading to leveling of the alternation.

In the same way, if URs for (2) were identified with the paradigmatically most frequent allomorph in accordance with (1b), the URs for "enemy" and "table" would be /vrag/ and /stol/, creating a division of the lexicon within the class of stems whose last vowel is /a/ depending on whether or not that /a/ alternates with /o/ under stress. Again, we would expect either extension or leveling of the alternation depending on whether the alternating or the nonalternating pattern was chosen as regular. Choosing URs in accordance with (1c), if we take the candidate environments to coincide with the presence versus absence of an overt suffix, would have the results of following (1a) if unsuffixed alternants were basic and the results of following (1b) if suffixed alternants were. Conforming with (1d) while allowing violations of (1c), finally, so that nouns showing only the voicing alternation would have URs coinciding with suffixed alternants and nouns showing only the $akan'e$ alternation would have URs coinciding with unsuffixed alternants, would limit lexically marked irregularity to the small group of nouns that display both alternations, but require a separate principle for determining their URs.

As applied to the alternations of (2), then, principles (1) entail lexical irregularity and, if we assume that lexical irregularity tends over time to be eliminated, instability in the form of gradual leveling or extension of one of the alternations. Conversely, if there is no indication of instability for the alternations in question, we can conclude that those alternations counterexemplify principles (1). With regard to vowel reduction, lack of instability is confirmed by Bethin (2012:428), who states that after nonpalatalized consonants the alternation "is complete in all positions within stems as well as in derivational and inflectional suffixes in the native lexicon ... and shows no paradigm effects in [C[ontemporary] S[standard] R[ussian]]$^3$. With regard to final devoicing, I can cite no parallel denial of instability, but will assume that, given the attention the alternation has received, lack of reference to instability in the literature can be taken as evidence that the alternation is in fact stable.

$^3$ The further reduction that occurs after palatal(ized) consonants (fn. 33) does display counterphonological blocking, but only in certain inflectional suffixes (Bethin 2012:428-429).
It thus seems clear that while there are alternations for which criteria like those of (1) are crucial in understanding speakers' choice of analysis, there are also alternations for which such criteria are irrelevant. Alternations of the latter type must therefore be assumed to be analyzed by speakers in terms of some criterion distinct from the principles of (1).

In other words, as proposed above, there must be more than one mode of phonological analysis available to speakers. In fact, it is clear that what is required for the alternations of (2) is some version of the traditional criterion of phonological predictability, which provides that URs are chosen so as to maximize the degree to which surface forms are predictable in purely phonological terms. The version of this criterion we will adopt here takes the target of UR choice to be the individual feature specification, thus allowing for cases like Russian /pirog/, in which morpheme-sized URs coincide with none of their surface alternants. The claim that URs are chosen at the level of the feature must be qualified to allow for cases in which multiple features, up to the level of a full segment, alternate as a unit; I will thus take "feature", in the relevant contexts, to be shorthand for "minimal covariant feature bundle".

The intuition I will pursue about why the alternations of (2) are not subject to principles like (1) is that their failure to be is a result of their automatic status, and the intuition I will pursue about UR choice for automatic alternations is that it minimizes differences between underlying and surface forms. In fact, in characterizing an automatic alternation as one required to avoid violation of a phonotactic constraint, we already have a criterion for UR choice: URs are those (feature-level) representations all surface deviations from which can be explained in terms of the need to satisfy the relevant constraint. In the Russian case, the operative constraints prohibit word-final voiced obstruents and unstressed o. The proposed criterion will thus give the following results, corresponding with the analysis suggested above.

First, the underlying voicing value of a stem-final obstruent will be that observed intervocically, where both voicing values are possible; this is because only in this case will all deviations from underlying voicing values be attributable to the constraint against final voiced obstruents. Similarly, the underlying rounding value of a nonhigh back vowel (o or a) in a stem-final syllable will be that observed under stress, where both rounding values are possible, since only in this case will all deviations from underlying rounding values be attributable to the constraint against stressless o. I state the analytic criterion in question as (3).5

(3) Given an alternation \([+F] \sim [-F]\) and an alternating morpheme M, if there is a phonotactic constraint C and a choice of \(\alpha\) such that all surface deviations from \([\alpha F]\) in M can be attributed to C, then \([\alpha F]\) is underlying in M.

Below, we will call the mode of analysis based on (3) "A-phonology" (roughly, automatic phonology), and the mode of analysis based on criteria of salience such as (1) "M-phonology" (roughly, morphophonology). As the cases cited to exemplify the principles of (1) show, M-phonology, while constituting a theory of how underlying representations and regular alternations (see section 2) are chosen, is at the same time a (partial) theory of analogy because the choices in question create lexical irregularity and therefore tend to potentiate analogical change.

(3) claims that UR choice in A-phonology targets feature values. In fact, a case like Russian /pirog/, while disconfirming a hypothesis of morpheme-level UR choice, is consistent with the idea that UR choice targets segments rather than features. This is because the two complementary alternations that affect that morpheme, one devoicing the final consonant in unsuffixed forms, the other reducing the preceding vowel in suffixed forms, operate on distinct segments. That two complementary alternations can operate on distinct features within the same segment, however, is shown (as pointed out by Odden (2005:262-263)) by (post-continuant) stem-final voiced stops in Catalan, which are subject when word-final to devoicing and when prevocalic to (allophonic) spirantization and which thus never surface as simultaneously [+voice] and [-continuant] (for examples, see Odden 2005:125, Wheeler 2005:147). I will therefore assume that A-phonological UR choice does indeed target feature values.

The question of the unit targeted by M-phonological UR choice is less straightforward. To begin with, while the principles (1) were stated as targeting morpheme alternants, versions of those principles targeting segments or features

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4 On this point, the present proposal is similar in spirit to Lexicon Optimization (Prince and Smolensky 2004:225).
5 For allophonic alternations, (3) will not determine a UR and will have to be supplemented by a further criterion.
are conceivable as well. Parallel to (1a), for example, we can imagine a principle "underlying feature values are those observed in isolation forms." On the other hand, the idea that M-phonological UR choice targets morph-sized units is supported by cases in which a set of alternations subject to M-phonological analysis has no segmental or featural common denominator. In the case of Japanese verbal suffix alternations (de Chene 2014a), for example, the alternation between consonant-stem and vowel-stem alternants is a vowel-zero alternation in two suffixes, a zero-consonant alternation in five, and a suppletive alternation in two more. The choice of C-stem alternants (which occur with twice as many stems as their V-stem counterparts) as basic is thus apparently the result of targeting that particular set of morphs. I suggest that, while the proposition that M-phonological UR choice targets morph-sized units can be taken as a working hypothesis, further investigation of this issue is necessary.

In this section, we have argued that there are two distinct modes of phonological analysis, modes of analysis to which we have given the names "A-phonology" and "M-phonology". In section 2, we will underline this point by examining a case in which essentially the same set of alternations is subject to A-phonological analysis in one lexical category and to M-phonological analysis in another.

2. Coda Reduction in Korean Verbal and Nominal Morphology

Phonologists sometimes assert that an alternation of X in one environment with multiple Y_i in another must be analyzed by taking Y_i as underlying and X as derived because the reverse directionality would render the alternation unpredictable—specifically, unpredictable in phonological terms (for two recent examples, see Scheer 2011:2938 and Kurisu 2012:311). The data we examine in this section will show that this is an invalid form of argument: while speakers do sometimes take Y_i as underlying in such a situation, they sometimes take X as underlying instead, resulting in a set of competing alternations with the same input.

Both of these analytic possibilities are illustrated by the treatment of alternations resulting from coda reduction processes in Korean, where a wide variety of stem-final obstruents and clusters that appear unaltered before vowel-initial suffixes alternate before consonant-initial suffixes with (unreleased) [p], [t], or [k], the only obstruents allowed in syllable codas. (4) and (5) below display the specific coda reduction alternations that are observed in verb stems and noun stems, respectively, where "coda reduction" is a cover term for (a) reduction of clusters to single consonants and (b) neutralization of laryngeal (e.g. /tʰ/t/) and manner (e.g. /t/s/c/) contrasts. (Parenthesized numbers are stem counts, to be returned to below, which were obtained from the .txt files of Kim and Kang 2000 with the concordance program Geuljabi II.)

(4) Coda Reduction Alternations in Korean Verb Stems

(5) Coda Reduction Alternations in Korean Noun Stems

Given the distinction between A-phonology and M-phonology introduced in section 1, it is reasonable to ask what we would expect from the application of those two modes of analysis to the alternations of (4)-(5). A-phonological analysis, to begin with, requires that (feature-sized) URs be chosen so that surface forms diverge from them only as...
necessary to avoid violating a phonotactic constraint. In the present case, if URs are chosen so that underlying-surface divergences are limited to those required by the constraint that coda obstruents are limited to [p t k], they will coincide with the values observed prevocally, where the full range of contrasts is realized. This is because, since no constraint involving the relevant features applies to the prevocalic environment, there will necessarily be unmotivated underlying-surface divergences if underlying forms differ from prevocalic alternants. An A-phonological analysis will require the postulation of no lexical irregularity and thus predicts that the system of alternations due to coda reduction should be stable. This prediction is correct for the verbal alternations of (4).

M-phonological analysis, in contrast, will result in UR choice on the basis of "salience", a concept for which we have suggested two concrete analogues, high type frequency and status as isolation form. The possibility of UR choice on the basis of type frequency for the alternations of (4)-(5) is not entirely straightforward to evaluate because of indeterminacy regarding the set of verbal and nominal inflectional categories to be assumed. For present purposes, then, I will set that possibility aside. The consequence of identifying URs with isolation forms, however, is clear, in particular for the nominal alternations of (5). This is because, while Korean verb stems require an inflection and do not occur in isolation, noun stems frequently occur uninflected as the result of the deletion of clitics, particularly those marking structural case. In contrast with verbs, then, Korean nouns do have isolation forms. Since coda reduction processes apply word-finally in the same way as they do before a consonant, the result of identifying noun stem URs with isolation forms will be that preconsonantal alternants showing the neutralized finals [p t k] of (5) are taken as basic with respect to contrastive prevocalic alternants.

If neutralized preconsonantal alternants are basic for Korean noun stems, there will be a division of the lexicon depending on whether basic /p/ alternates prevocally with [p], with [pʰ], or with [ps], whether basic /t/ alternates prevocally with [tʰ], with [cʰ], with [c], or with [s], and whether basic /k/ alternates prevocally with [k], with [kʰ], with [kʰ], with [ks], or with [lk]. If speakers respond to this division of the lexicon by choosing one of the competing alternations as regular for each point of articulation, the remaining alternations will be irregular, and subject to gradual elimination over time in favor of the corresponding regular alternation.

In fact, ongoing changes in Korean noun inflection indicate that precisely this state of affairs obtains. The alternations that speakers have taken to be regular, to begin with, are \( p \sim p, t \sim s, \) and \( k \sim k \). As the lexical statistics of (5) indicate, these are the most frequent alternations for their respective points of articulation. The choice of these alternations as regular, then, can be seen as support for the idea of a unified frequency-based principle of M-phonology that determines both what alternants are basic and what alternations are regular (the "Generalized Type Frequency" of de Chene 2014a). In this connection, it is important to note that, for the coda reduction alternations of verbal inflection, which we have seen to be analyzed in A-phonological terms, parallel lexical imbalances, shown in (4), are phonologically inert. Such lexical imbalances acquire analytic significance, in other words, only in the context of a decision to equate URs with neutralized preconsonantal alternants, a decision which places the various alternations at each point of articulation in competition with each other for the role of regular alternation.

Let us consider in a bit more detail the changes that are in progress in Korean noun inflection and the grammatical mechanism underlying those changes. Stems showing regular alternations, first of all, will have lexical representations involving a single phonological form that ends in one of \( p t k \). The fact that stem-final \( t \) alternates with \( s \) before a vowel-initial clitic will be captured by the rule (6) (Ko 1989; the period represents syllable boundary), a rule whose reality is shown by its exceptionless application in the inflection of \( t \)-final loanwords.

\[
(6) \quad t \rightarrow s/\ldots s_
\]

The lexical representation of each noun stem displaying an irregular alternation, on the other hand, will contain two stem allomorphs, (a) the default form ending in one of \( p t k \) and (b) an irregular alternant marked for insertion before a
vowel and ending in a marked obstruent (i.e. one other than p t k) or a cluster. As the result of a tendency to simplify lexical representations by deleting listed allomorphs and diacritic features—anything, that is, in excess of a single phonological form—the irregular alternant gradually undergoes elimination, resulting first in variation between irregular and regularized prevocalic forms and eventually in a situation where regularization is complete and the default form is the sole lexical representation of the stem. For example, the lexical representation of "knee", historically *murɨph, will take the form (7a), and the lexical representation of the name of a traditional game played with four sticks, historically *juc, will take the form (7b).

(7) a. \[
\text{murɨph / } _{-}V \\
\text{murɨ}
\]  

Elimination of the irregular prevocalic alternant of (7a) will result in leveling of that stem's \(p \sim p^h\) alternation in favor of \(p\), while elimination of the irregular prevocalic alternant of (7b) will result, because of rule (6), in extension to that stem of the \(t \sim s\) alternation.7

In this section, we have seen that there are striking differences between the treatment of Korean coda reduction alternations in verbal inflection and their treatment in nominal inflection. At the observational level, the alternations are stable in verbal inflection, but unstable in nominal inflection, with the instability in question evidently to be interpreted as regularization in progress. This observational difference is the result of a corresponding descriptive level difference, namely that while contrastive prevocalic alternants are basic or underlying in verbal inflection, neutralized preconsonantal alternants are basic in nominal inflection. Finally, this descriptive difference follows from the explanatory level difference between A-phonology and M-phonology, with verbal alternations being analyzed in A-phonological terms and nominal alternations in M-phonological terms. In sum, then, speakers' treatment of these alternations constitutes confirmation, in a particularly compact form, of the analytic duality between A-phonology and M-phonology that we introduced and argued for in section 1.

3. Kruszewski's Problem

In the introduction, we noted that identification of the boundary between the two modes of phonological analysis postulated here with the distinction between automatic and nonautomatic alternations provides only a first approximation to an understanding of the division of labor between the modes of analysis in question. The reason for this is that while we know that automatic alternations are frequently reanalyzed as nonautomatic—that is, as no longer attributable to a phonotactic constraint—we do not understand in detail the conditions under which this occurs. In fact, the problem is more general, because there is reason to believe that the reverse transition, from nonautomatic to automatic status, is attested as well. Here, however, I will concentrate on the problem posed by the reanalysis of automatic alternations as nonautomatic. I will call this "Kruszewski's problem", in recognition of the fact that Kruszewski was the first linguist to clearly delineate the differences between automatic and nonautomatic alternations, and in this section will briefly discuss two factors that seem likely to be relevant to it. Those two factors, opacity and phonological distance, can be said to form a natural class, with opacity involving the relationship between the output of a rule and its environment, and phonological distance the relationship between the output of a rule and its input. They are also closely tied to the factors that Kruszewski (1881/1995:12) himself identified as criterial for the distinction between automatic ("first category") and nonautomatic alternations.

3.1 Reanalysis and Opacity

The concept of opacity was introduced by Kiparsky (1971/1982:75, 1976:178-179) as a factor that could render phonological rules difficult to acquire and, as a result, could encourage reanalysis of one or another sort, typically rule

7 The conjunction of leveling and extension as complementary parts of a larger change militates against interpreting the leveling in question either as the result of a constraint requiring identity among surface allomorphs ("OO Correspondence") or as the result of lexical diffusion of coda reduction in the domain of the noun stem (on the latter point, see de Chene 2014b).
reordering or rule loss. A classic example where there is a plausible connection between opacity and reanalysis involves the fate, in Germanic languages, of alternations in verbal paradigms resulting from Verner’s Law. Proto-Germanic voiced fricatives underwent voicing in voiced environments except when the accent immediately preceded, resulting in an alternation in verbal paradigms between voiceless fricatives in present tense and past singular forms, which had original stem accent, and voiced fricatives (later stops in some languages) in past plural forms and the past participle, which had original suffixal accent. The later shift of accent to the first syllable, however, neutralized the alternation’s phonological conditioning factor, leaving speakers with a choice between associating the alternation with specific morphological categories and treating it as listed allomorphy, as in (7) above. It is the latter analysis that was adopted, as subsequent history shows: Verner’s Law alternations have been leveled in all languages, surviving only in isolated forms (English was/were, lose/(for)lorn). And it seems plausible that the reanalysis of the alternations was indeed motivated by the opacity that resulted from the accent shift.

At the same time, however, it seems clear that the existence of opacity does not in itself constitute a sufficient trigger for reanalysis. This is shown by the fact that low-level, uncontroversially automatic processes may be less than fully transparent. Thus for many American English speakers, the rule diphthongizing /æ/ before a voiced velar stop, as in bag [baeɡ] and bang [baen], is countered by nasal POA assimilation in examples like pancake [pɛŋkکɜ][pɛŋкɪkɜ][*pɛŋкɪkɜ], as pointed out by Donegan and Stampe (1979:149). Similarly, Donegan and Stampe (1979:146) note that flapping of coronal stops can be countered by the rule that deletes a nasal before a homorganic voiceless stop (bump [bʌn], bunt [bʌnt], bunk [bʌŋk]): while flapping is essentially obligatory in pat it [pæt], plant it may be either [plæ̃t], with flapping, or, in more careful pronunciation, [plæ̃t], without. Further, in this last form, the nasal deletion rule that counterfeeds flapping at the same time counterbleeds vowel nasalization. In the same way, McCarthy (2007:10-13) gives examples of counterfeeding and counterbleeding interactions in Bedouin Arabic that, like the English examples above, involve phonological processes that are indubitably living and productive.

Further evidence that opacity and automaticity can coexist comfortably comes from the observation that any process that (a) depends on syllable structure and (b) applies in the domain of the word will exhibit opacity at the phrase level if the language in question has phrase-level resyllabification. Thus Spanish debuccalization of s ("Aspiration") in codas is fully transparent as long as a phrase like dos alas “two wings” is realized as [do.ˈsa.la], with phrase-level syllabification bleeding Aspiration, but displays counterbleeding opacity at the phrase level when it applies in the domain of the word, so that dos alas surfaces as [do.ˈha.la] (for discussion of dialectal differences in this regard, see Kaisse 1999). In parallel fashion, the Argentinian Spanish fortition rules of Coronalisation and Consonantalisation, which change onset [j] to [ʃ] and [ʝ], respectively, are countered by phrase-level syllabification in phrases like hay algo [ˈaɾa.lo] "there's something" (Harris and Kaisse 1999:155).8 There is no reason to believe, however, that phrase-level opacity of the sort displayed by Aspiration and Coronalisation/Consonantalisation compromises the automatic status of a word-level rule in the sense of encouraging reanalysis on M-phonological principles.

It would seem, then, that there is no simple implicational relationship between opacity and reanalysis. We would not want to conclude from this, however, that opacity is irrelevant to reanalysis in a case like that of the Verner’s Law alternations. A crucial characteristic of that example is that shift of the accent to the initial syllable resulted (assuming uniformly monosyllabic stems) in a total merger of the triggering and nontriggering environments for voicing within verb paradigms: after the accent shift, no instance of the triggering environment survived intact. This suggests that for present purposes we need to attend to the fact (typically abstracted away from in contemporary discussion (McCarthy 2007:11, Baković 2011:40)) that, as originally defined, opacity is a gradient or scalar notion. The crucial issue for the inception of M-phonological reanalysis, then, is presumably the degree to which the triggering and nontriggering environments for a rule remain distinct.9 There is clearly a need for further research in this area.

8 As Harris and Kaisse’s (1999:155) derivations show, Coronalisation is also counterfed at the word level by rules creating glides through diphthongization and desyllabification.

9 It is worth noting that as total merger of triggering and nontriggering environments is approached, any distinction between counterfeeding and counterbleeding opacity will become irrelevant; while the actual historical development of Verner’s Law involves counterbleeding, counterfeeding opacity occasioned by movement of accent to the final syllable would presumably have led to the same result.
3.2 Reanalysis and Phonological Distance

It is well known that a series of successive sound changes can result in alternations in which there is considerable phonological distance between the alternants ("rule telescoping"), a classic example being the alternation of $p$ with $s$ before $i$ in several Bantu languages (Hyman 1975:174-175, Blevins 2004:69). There is also some reason to believe that greater phonological distance inhibits speakers' abstraction of rules. Thus Comrie (1979) observes, citing data from Welsh, Finnish, and Hungarian, that within a set of broadly parallel segmental alternations, it is those characterized by greater phonological distance between alternants that fail to be extended to loanwords. Similarly, Skoruppa et al. (2008) report that in an experimental setting, single-feature alternations are generalized more freely than alternations involving two or more features.

In the same way, the following example suggests that the phonological distance between alternants can determine whether an alternation is leveled or extended subsequent to reanalysis of underlying forms. In both French and Portuguese, URs for the inherited alternation between stressed [ɛ ɔ] and stressless [e o] in verb stems were evidently identified with stressless alternants; as noted above, the choice of stressless alternants as basic presumably reflects the fact that they occur in the large majority of paradigmatic forms (Pope 1934:351). In French, further changes transformed the original [ɛ] $\sim$ [e] and ɔ $\sim$ [o] alternations into the alternations [je] $\sim$ [s] and [o] $\sim$ [u] by the end of the Old French period (Pope 1934:240-243, 248-249, 350). Subsequently, leveling, for the most part in favor of the stressless alternant, eliminated these (as well as many other) stress-based alternations in most lexical items (see e.g. Nyrop 1979:11-22); in the contemporary language, they survive only in a small number of common verbs (tenir, venir, acquérir, asseoir; mourir, pouvoir, vouloir, mouvoir).

In Portuguese, in contrast, the alternations [ɛ] $\sim$ [e] and [ɔ] $\sim$ [o], rather than being leveled, were extended to stems that originally had nonalternating [e o] (see Williams 1938:206ff.). This development can be understood in the following way. After the URs of verb stems had been reanalyzed as coinciding with stressless alternants, the alternation e/o $\rightarrow$ e/ɔ, as opposed to the competing null alternation, was taken as regular; equivalently, speakers established an innovative rule of lowering under stress in verb stems. At this point, nonalternating stems will have been assigned an exception feature for the lowering rule, and the extension of the alternation will have been the result of gradual elimination of that feature from lexical entries. Crucially, the alternation that was extended involved a difference of only a single feature specification between the alternants. The contrast between leveling in the French case and extension in the Portuguese, that is, suggests that speakers were able to treat the alternations in question as rule-governed only on the condition that the phonological difference between alternants had remained minimal.

As this example suggests, the role of phonological distance in the process of reanalysis is another area that deserves further research. In this regard, it seems clear that we need to look simultaneously at both the loss of rule-governed relationships and their inception subsequent to the reanalysis of underlying forms. Ideally, we will eventually be able to appeal to a convergence of historical and experimental evidence on this issue.

4. Conclusion

At the end of his celebrated article "La nature des procès dits «analogiques»" (1945-49), Jerzy Kuryłowicz makes a comparison between analogical change and rainwater. Just as we can predict what direction rainwater will flow on the basis of gutters and drainpipes but not when it will actually rain, so, he claimed, there are ways of predicting the course that analogy will take if it operates, but no way of predicting for sure when it will. In closing, I would like to suggest that, at least as regards the analysis of phonological alternations, the prospects for a predictive theory of analogical change may not in fact be quite as hopeless as Kuryłowicz thought.

10 On the replacement of the alternation [je] $\sim$ [s] with the alternation [ɛ] $\sim$ [s], see Pope 1934:351-352; on variation between [e] and [ɔ] in pretonic syllables, see Pope 1934:214.
To begin with, it is important to distinguish two aspects of what it might mean to predict the initiation or inception of analogical change in phonology. The distinction between the two arises because, as is often noted, the mere fact that a form is irregular (i.e. neither basic nor derived by rule) does not entail that it will be subject to regularization. Of these two questions, stated below in (8), the first is the one that we identified earlier as "Kruszewski's problem".

(8) a. Under what conditions is an automatic alternation reanalyzed in M-phonological terms, either as non-rule-governed or as governed by a rule that is innovative with respect to the analysis previously in force?

b. Under what conditions does an alternation that is not rule-governed exhibit leveling—that is, the elimination of lexical irregularity?

It might be thought difficult to separate these two questions in practice, since evidence for reanalysis often comes in the form of leveling. Even in the absence of leveling, however, it can be clear that a set of alternations is no longer analyzed in purely phonological terms; an illustration is provided by Anderson's (2011) recent discussion of stress-conditioned allomorphy in Surmiran. At least to some extent, then, problem (8b) can be factored out and abstracted away from in dealing with problem (8a), and insofar as we can do so, the prospects for making progress on (8a) are improved. A natural place to begin on this project would be by attempting to refine the concepts of opacity and phonological distance that we took up in section 3.

But there is a condition attached to working seriously on problem (8a). As long as we adhere to a phonological theory that admits only one mode of evaluation and explanation, that problem will remain essentially hidden. Only when we recognize the duality of phonological analysis and explanation argued for above will it be possible to put that problem into focus and place it on the phonological agenda.


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