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## ATOMIC PHONOLOGY AND VOWEL REDUCTION

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0. Introduction. The recently advanced theory of atomic phonology (Dimnsen 1978) has been shown to adequately account for assimilatory processes as well as phonological neutralizations in numerous empirical investigations (Keel 1977). One area which has received little or no attention within the framework of atomic phonology are processes of strengthening and weakening. In this paper I will test the adequacy of atomic phonology in an analysis of prefix syncope in the High German dialects. In addition to offering strong empirical confirmation for the theoretical basis of atomic phonology, this study will clarify the relationship of sound change and evolving syllable structure in these German dialects.

1. Syncope. One of the most significant innovations in the development of the Germanic languages was the fixation of primary word-stress on the root or initial syllable. The repercussions of this change continue to this day effecting both the phonology and the morphology of the several Germanic languages. One of these effects has been the reduction and loss of unstressed vowels in Modern German dialects. One of the more interesting of these vowel reductions is prefix syncope or the loss of [ə] in the unstressed prefixes ge- and be-. The following examples in standard German orthography illustrate this type of syncope: gsagt vs. gesagt 'said, past participle'; bsonders vs. besonders 'especially' (König 1978:159).

1.1. In the Middle and Upper German dialects we find a high degree of variation in prefix syncope. The loss of [ə] in these environments evidences a marked phonological conditioning of that variation as we proceed from dialect to dialect. The Middle German dialects evidence the fewest instances of syncope. As we move south into the Upper German dialects, including Swiss German, prefix syncope becomes the rule rather than a sporadic exception. In this paper I will argue that based on the principles of atomic phonology attested variation in prefix syncope is predictable. While at first glance the dialectal variations seem to be rather unrelated, they will be shown to be derived via a series of rule additions from a basic rule of prefix syncope.

1.2. We can make the general statement that the loss of pre-tonal -e-/[ə] in the prefixes ge- and be-

occurs in a strictly phonological manner. The degree of loss--the number of forms affected--in a given dialect depends on the nature of the following consonant (the consonant which begins the syllable receiving primary word-stress). The Russian dialectologist Viktor Schirmunski (1952:166) believes that the variation in prefix syncope is just as significant for the classification of the High German dialects as the High German sound shift and the developments in the long vowels and diphthongs.

2. Variations in Syncope. The High German dialects exhibit a five-way differentiation in the loss of -e- in the prefixes ge- and be-:

2.1. Group I. The northernmost group (Low and Middle Franconian, Lower and Upper Hessian, East Middle German) generally retains -e- regardless of the following consonant (examples of syncope/no syncope from Schirmunski 1952:167-169): gəbənə 'gebunden/bound', gəfoən 'gefahren/driven', gəmolgə 'gemolken/milked', gəšəʃə 'geschossen/shot', gəgrəwə 'gegraben/buried', bədreiʃə 'betrügen/deceive'. (Examples from Upper Hessian)

2.2. Group II. In South Hessian and Pfälzisch -e- is lost when followed by voiceless spirants and h. When h is the initial consonant of the stressed syllable, the remaining consonant of the prefix changes into a strongly aspirated stop (fortis). In all other environments -e- is retained: gflogə 'geflogen/flown', gšaid 'gescheit/smart', bsuxə 'besuchen/visit', phəldə 'behalten/keep', khad 'gehabt/had', gəbaud 'gebaut/built', bədaire 'bedeuten/mean', gəwis 'gewiss/certain'. (Examples from South Hessian)

2.3. Group III. In South Franconian, East Franconian and Lower Alsatian -e- is lost in all instances valid for Group II as well as when followed by non-nasal sonorant consonants and the voiced fricative/glide w: glegt 'gelegt/laid', grunə 'geronnen/run', gwise 'gewiesen/pointed'. (Examples from South Franconian)

2.4. Group IV. In Swabian, Upper Alsatian and Bavarian -e- is lost in all possible environments. Prefix initial g is also lost if the loss of -e- occurs before a stop obstruent: brəxt 'gebracht/brought', blibe 'geblieben/remaining', degd 'gedeckt/covered', glagd 'geklagt/complained', gfonde 'gefunden/found', gslage 'geschlagen/beaten', phiede 'behüten/protect'. (Examples from Swabian)

2.5. Group V. In Swiss German -e- loss patterns similarly to that of Group IV. However, differences

in the consonant system, the retention of a lenis-fortis contrast in stop consonants, trigger different results in the reduced prefixes: ksi 'gesehen/seen', kjakt 'gejagt/chased', kmerkt 'gemerkt/noticed', klegä 'gelegen/lain', kxäuft 'gekauft/bought', pšissa 'beschissen/deceived', pxänna 'bekennen/know'.  
(Examples from the Kerenzer dialect)

2.6. Older Syncope. In addition to this relatively recent syncope, there was apparently an older prefix syncope in all dialects before a following sonorant, especially l or r. This syncope occurs in Middle High German times (c. 1200) and is reflected in the standard language as well as in the dialects which do not participate in the later syncope: (Standard German) bleiben from Old High German biliban 'remain', glauben from OHG gilouben 'believe', Gnade from OHG ginada 'grace'; (Ripuarian) ilöve 'glauben/believe', irat 'gerade/immediately'; (Upper Hessian) gnek 'Genick/neck', blaiwə 'bleiben/remain'; (Thüringisch) glege 'gelücke/Glück/luck', grāde 'gerade/immediately'. Different consonant reflexes in Swiss German attest to the isolated development of this process: glix 'gleich/right away', blibä 'bleiben/remain'.

2.7. In certain East Middle German dialects prefix -e- is retained in all instances; it is even inserted in forms where it never existed historically: gəlid 'Glied/limb', gəlands 'Glanz/splendor'.

3. Atomic Phonology. An analysis of prefix syncope as a series of rule additions reveals that it conforms to and supports the general notions underlying atomic phonology. That is, variations on a phonological process derive in a precise manner from a most limited, most specific rule characterizing that process, an atomic rule. The manner of rule generalization, complement rule addition, can be illustrated as follows: In an empirical study of final consonant devoicing we discover that stop obstruents are always part of the focus of the rule of terminal devoicing, sometimes exclusively so. On that basis we would assume that the so-called atomic rule of terminal devoicing is limited to stop obstruents (cf. rule (1)).

$$(1) \quad \left[ \begin{array}{l} \text{-sonorant} \\ \text{-continuant} \end{array} \right] \longrightarrow [-\text{voice}] / \_\_\_\#$$

We would then predict that any variation of the terminal devoicing process must minimally contain rule (1) as a sub-rule. Further, any extension of that process can occur only by the addition of so-called complement rules. Two rules are said to be in a

complement relation if the features identical to the structural descriptions of both rules are sufficient to define precisely the effect of the two rules taken together. For instance, given rule (1), we might encounter a language which exhibits terminal devoicing for stop and continuant obstruents (see rule (2)).

$$(2) \quad [-\text{sonorant}] \longrightarrow [-\text{voice}] / \_\_\_\#$$

Since this rule can be analyzed as rule (1) plus rule (3)

$$(3) \quad \left[ \begin{array}{l} -\text{sonorant} \\ +\text{continuant} \end{array} \right] \longrightarrow [-\text{voice}] / \_\_\_\#$$

and rule (3) is in a complement relation with rule (1) --the features identical to the structural descriptions of (1) and (3) are [-sonorant]#--atomic phonology predicts that such an expansion of rule (1) may occur in natural languages. On the other hand, other logically possible variations such as a rule by which all stops but only labial and velar fricatives are devoiced word-finally would be excluded in principle and would be predicted not to occur in natural languages. Since such a variation would require the addition of rule (4) to rule (1)

$$(4) \quad \left[ \begin{array}{l} -\text{sonorant} \\ +\text{continuant} \\ -\text{coronal} \end{array} \right] \longrightarrow [-\text{voice}] / \_\_\_\#$$

and rules (4) and (1) are not in a complement relation atomic phonology excludes rules such as (4) from being added to the grammar.

4. Analysis. Returning to the case of prefix syncope in the German dialects, we can begin our analysis of that process by examining the data to determine the most basic, most limited rule of -e- loss. We noted at the end of our discussion of the data that there was apparently an older rule of syncope which deleted prefix -e- before a sonorant consonant. Almost all dialects exhibit this stage of the process as well as the standard language. This syncope can be characterized by rule (5).

$$(5) \quad \begin{array}{c} \text{V} \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#C\_\_\_ \left[ \begin{array}{l} +\text{consonantal} \\ +\text{sonorant} \end{array} \right]$$

Is rule (5) then the most basic rule for syncope and the starting point for the further development of the

process? My answer is no. I base this response on two crucial points: First, (5) must apply in dialects where the initial consonant of the prefix is not a stop (see the evidence from Ripuarian) and, second, application of (5) results in different initial consonant clusters, particularly in Swiss German. These points justify classifying the older syncope as a distinct process.

Where, then, does the more general process of prefix syncope begin? Rule (6), which describes the syncope of -e- when followed by a voiceless spirant, seems to be the most limited rule for this process. Rule (6) adequately accounts for the syncope data in the Group II dialects.

$$(6) \quad \begin{array}{c} V \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#[-\text{cont}] \_\_\_ \begin{array}{l} [+cont \\ -\text{voice}] \end{array}$$

The next group of dialects (Group III) syncope -e- before l, r, and w. At first glance, we may wonder why these consonants should function as a class, but closer analysis of redundant features and phonemic inventories of the dialects reveal that l, r and w constitute the class of voiced continuants in these dialects. We can express this additional set of environments for syncope as rule (7).

$$(7) \quad \begin{array}{c} V \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#[-\text{cont}] \_\_\_ \begin{array}{l} [+cont \\ +\text{voice}] \end{array}$$

Since these dialects also evidence syncope before voiceless continuants, we can formulate rule (8) as the more general rule of syncope for Group III dialects.

$$(8) \quad \begin{array}{c} V \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#[-\text{cont}] \_\_\_ [+cont]$$

The southernmost dialects exhibit syncope before all consonants. This situation can be formulated as rule (9).

$$(9) \quad \begin{array}{c} V \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#[-\text{cont}] \_\_\_ C$$

These dialects (Groups IV and V) have in effect added a rule of syncope which is effective in the environment of a following non-continuant consonant. Note that this rule of syncope, rule (10), includes nasal consonants as well as stop obstruents in the environ-

ment, since nasal consonants are redundantly non-continuant.

$$(10) \quad \begin{array}{c} \text{V} \\ [-\text{stress}] \end{array} \longrightarrow \emptyset / \#[-\text{cont}] \_\_\_ [-\text{cont}]$$

At this point we can verify that the extension of the most limited rule of syncope, rule (6), to rules (8) and then (9) occurred according to the principles of atomic phonology. For the Group III dialects, rule (7) which represents a complementary class of segments with respect to the environment of rule (6) is added and results in the generalized rule (8). In a similar fashion rule (10) adds a complementary set of segments to the environment of rule (8) for the dialects in Groups IV and V, resulting in the final rule of prefix syncope, rule (9). Since other logically possible developments in syncope do not in fact occur, syncope in the German dialects provides strong confirmation for the basic principles of atomic phonology.

4. Other Issues. Up to this point we have directed our attention solely to the loss of the unstressed vowel in the prefix. However, the consonants are involved in a development which proves equally significant. The loss of -e- destroys the 'natural' syllable structure of CVCV and creates syllables with initial consonant clusters of the type CCV. Only in the case of two stop obstruents occurring initially does simplification to a CV structure take place. We are left with an array of stop + fricative, stop + sonorant combinations. This development reminds us of the results of the second sound shift in the Upper German dialects: word-initial p, t and k become the affricates pf, ts and kx, respectively. It seems those dialects, particularly Bavarian and Swiss German, are also in the forefront with respect to syncope.

The question that arises is why are these German dialects doing such apparently wierd things at the beginning of a word. Obviously 'natural' syllable structure and 'natural' initial consonant clusters can be sacrificed to achieve some more important end in these dialects. Perhaps the answer lies in our initial discussion of the effects on the Germanic languages of the early fixation of primary word-stress. Why should the Germanic languages have fixed the accent on the lexical root of the word? The obvious answer is in some notion of emphasis on the semantic core of the word. Perhaps somehow these dialects, despite all of the sound changes of the past

2500 years, are still persistently holding to that course, ignoring the well-intentioned constraints of syllable structure and phonotactics.

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