ACCOUNTS OF PHONEMIC SPLIT HAVE BEEN GREATLY EXAGGERATED — BUT NOT ENOUGH

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ABSTRACT

Frequently, an earlier historical stage of a language where a single phoneme has two major allophones yields to a later stage where two phonemes have one major allophone each. Here, schematically, a phonological system where /X/ = (has the realization(s)) [x] and [y] is replaced by a system where /X/ = [x] and /Y/ = [y]. Treatments of such "phonemicization/ phonologization of (former) allophones" tend to exaggerate the importance of distributional factors and underestimate the role of phonetic (dis)similarity, psycholinguistic aspects of categorization, and social considerations. Hence accounts of phonologization require a greater focus on two different sorts of exaggeration: the trend for each successive generation of younger speakers to set itself off from older ones by using phonetically more extreme values of existing phonological variables, and the tendency for such variants to originate, in the first place, via the hyper- and hypo-correct processing and (re)production of perceived speech.

1. INTRODUCTION

Given the current ascendancy of constraint-based, surface-oriented Optimality Theory (OT, as in the work of Prince & Smolensky [34]), contemporary phonologists and diachronicians now cast a less jaundiced eye on Post-Bloomfieldian American Structuralist accounts of phonological change, with their focus on constraints governing the distribution of surface elements. Twaddell's [37] 1938 treatment of High German umlaut is the most famous of these; in 1957, Joos [20] treated it as nothing less than a revolution in diachronic phonology. Korhonen [26] observed in 1971, however, that essentially the same account had already been proposed in Finnish by Valentin Kiparsky [24] in 1932! Be that as it may, Twaddell [37] claimed that the front-rounded phones [ü(:)] and [ö(:)] were not orthographically indicated in Old High German (OHG) because they were respective allophones of /u(:)/ and /o(:)/ conditioned by /i(:)/ or /j/ in a following syllable. When these triggers either were reduced to schwa or disappeared, the new phonemes /ü(:)/ and /ö(:)/ were created; hence Middle High German (MHG) orthography tended to use distinct symbols for them.[1] But there is a logical problem here: if the front-rounded phones [ü(:)] and [ö(:)] were allophonically conditioned by following /i(:), j/, then loss of such triggers should have been accompanied by loss of the fronting-effect which they conditioned. This drawback justifies the assertion that praise for Twaddellian accounts of phonemic split has been greatly exaggerated.

Attempts to resolve the contradiction in Twaddell's [37] treatment have been almost as numerous as they are unknown. Many such accounts (especially early ones) were summarized by Dressler [8] in 1985, Anatoly Liberman [30] in 1991, and Fertig [10] in 1996, while explicit statements on this issue have been made by Dressler [7] in 1972, [Bybee] Hooper [3] and Hyman [13] in 1976, Anttila [2] in 1989, and Haiman [11] in 1994. The consensus of these counter-Twaddellian trends is that phones such as [ü(:)] and [ö(:)] must have become phonemic (for Hyman, "phonologized") BEFORE reduction or loss of [i(:), j]. Since such new phonemes occur in defective distribution, they have received names like "marginal", "quasi-", or "secondary" phonemes. Yet these analyses provide neither any motivation for WHY nor any mechanism for HOW certain former allophones in complementary distribution could become phonologized. In this sense—of giving no reason for why the separateness of such allophones was extended to the point where they were (re)categorized as distinct phonemes—these non-distributional accounts are not exaggerated enough.

Yet precisely two kinds of linguistic exaggeration—motivated in phonetic studies like those made by Ohala [32, 33] in 1989-1993 and in sociolinguistic works like Labov's [27, 28] from 1972-1994—explain why and how certain allophones become phonologized while still in complementary distribution. Crucially, there exist pairs of sounds whose individual phonemic status is unquestioned even though their distribution is sufficiently defective for them to be complementary: e.g., English /h/ and angma, whose phonetic distance is criterial for their distinctness. But there is no reason why the pronunciations of two allophones of a single phoneme cannot, over time, diverge phonetically to a point where they differ phonetically as much as do /h/ and angma—and so undergo phonologization (reanalysis as two distinct phonemes). This is in fact exactly the thrust of Ohala's work: sound changes grow from the exaggeration of physiologically or acoustically motivated phenomena—as in Ohala's "hypocorrection" and "hypercorrection". Another reason for such exaggeration is found in the consistent emphasis of quantitative variationists like Labov on a second overgeneralizing practice: the tendency for a group of younger speakers to mark its generational status by extending the domain of phonological patterns via generalization of their effect, their set of inputs, or their environment.

Without fear of exaggeration, then, we may conclude that phonological reanalysis can indeed occur before the loss of a conditioning environment. Below, I support this finding by expanding, in turn, on each of the preceding three paragraphs.

2. TWADDELL AND THEN TWADDLE

Responding in 1897 to the consternation provoked when he was reported dead while still very much alive, what Mark Twain [pseudonym of Samuel L. Clemens (1835-1910)] wrote to the London correspondent of the *New York Journal* was: "The report of my death was an exaggeration"—often quoted as "(Reports or) Accounts of my death have been greatly exaggerated". In the case of Twaddell's [37] 1938 treatment of High German umlaut, however, exactly the opposite holds: reports of the viability of this account have been greatly exaggerated.

After all, the basic assumption that the OHG [ü(:), ö(:)]-allophones of the phonemes /ü(:), ö(:)/ existed ONLY in the conditioning presence of a following /i(:), j/ is hardly compatible with the claim that such front rounded allophones became phonemicized after—and because—their former conditioning was LOST (since one would instead simply expect [ü(:), ö(:) to have been lost, in favor of [u(:), o(:)]. But precisely this is implied by Twaddell [37] and had explicitly been stated six years earlier by V. Kiparsky [24]. Discussing the parallel development of the (presumably pre-OHG) low front vowel [ä]—originally an allophone of /a/—V. Kiparsky suggested that MHG "speakers['] fe[e]l[ing]... that the sound [ä] was a different phoneme from the phoneme /a/... happened after the transition of unstressed [i] ... to the indefinite vowel ... [schwa]" (p. 245; my translation of the German version in Korhonen [26]—RDJ).

As documented in great detail by A. Liberman [30] in 1991, "the same fatal question"—the same "paradox of phonologization... as presented by Twaddell's school"—began to elicit individual reactions of bewilderment and even "absolute dismay" (pp. 126-127) during the 1950's, and these isolated critical voices have been heard right up to the present. Yet, "despite all its weaknesses, Twaddell's model stands like a rock in all the phonological tempests of the last half-century", with "...[s]tandard texbooks... and surveys... singl[ing]... out the 'American' explanation of umlaut as the greatest achievement of phonology" (p. 127). Cf. Joos's [20] view in 1957: "Nowadays we expect every discussion in historical phonology to be in harmony with 'phonemic theory'... and... [its] principal role..., but... [Twaddell's] paper [37] was a startling novelty when... published—except for those who... saw that this was plainly the right way to do things...[. Though a] large fraction of... linguistic[s]... has its origin in Germanic philology, ...[t]his paper begins to repay the debt" (p. 87).

Essentially disguising the conceptual problems of Twaddell's [37] approach with a convenient term, Hoenigswald [12] in 1960 gave the name "secondary split" to "the situation in which a change elsewhere in the system ... turn[s] the allophones of one phoneme into distinct phonemes...[. B]riefly, allophones become phonemes when part or all of their determining environments fall together without at the same time canceling the phonetic difference between the allophones in question" (pp. 93-94). Here, the brute-force inclusion of "without at the same time canceling the phonetic difference" directly reflects the insoluble difficulty of any approach which denies that phonemicization occurs prior to the loss of the former conditioning environment. I.e., since the relevant upgrading of allophones cannot really follow the environmental neutralization in question, the only remaining possibility is to posit two absolutely simultaneous but independent changes: phonemic split, and loss of one or more conditioning factors. But, in the latter case, there is no apparent reason why phonemicization should suddenly sunder the phonemic unity constituted by a state of complementary distribution, or why such a split should accompany environmental neutralization.

That serious, inherent flaws of this sort should have escaped Twaddell's [37] notice is understandable: he was reacting to the atomistic methods of many Neogrammarians. But the twaddle involved in purveying exactly the same views to students almost sixty years later is hard to comprehend. Cf., e.g., Trask [36], writing in 1996 on the "development... called *loss of the conditioning environment*[:] the... [segment] that had formerly conditioned... [one] allophone ... was lost, and hence the distribution ... was no longer predictable; thus...[,] the former phoneme split in... two...[—]one phoneme simply divide[d]... into two phonemes" (p. 78; original emphasis). Still, the fact that this view remains common cannot be held against the surprisingly numerous scholars who have discussed its problems at length and suggested alternatives, even though their arguments have had little resonance in the literature.

3. SO PHONOLOGIZATION IS EARLY—BUT WHY?

Just as V. Kiparsky [24] anticipated by six years Twaddell's [37] phonologization-via-environment-loss account of OHG/MHG umlaut, so A. Liberman [30] has observed (p. 126) that, as early as 1931, "Jakobson [16] realized the intrinsic weakness" of the "model that we associate with Twaddell" and "never commented on ... [the] article". Liberman also lists numerous articles (in Russian) by Soviet scholars of the 50's and 60's who emphasized the internal contradictions involved in assuming phonemicization at (or after) the exact moment of environmental neutralization and therefore came to the only reasonable remaining conclusion. This is, namely, that phonemicization/phonologization must precede the loss of a former conditioning environment, and that morphosemantic, morpholexical factors are likely to play a crucial role thereby. Likewise, Fertig [10] at some length and Janda [17] in passing (p. 197; cf. also pp. 216-217n.10) observe that a number of American and European scholars reached exactly this conclusion regarding OHG/MHG umlaut in the 60's and 70's—and that the perspective of these writers has simply been ignored.

As might be expected from the ability of historically-minded generative phonologists to use long derivations to maintain underlying forms from much earlier eras despite the phonetic vicissitudes which have altered their surface forms, most pre-OT generativists adopted basically an updated Twaddellian view. Thus, concerning OHG/MHG, P. Kiparsky [22] wrote in 1971 that "...[t]he elimination of the conditioning *i* and *j* turned the umlaut rule opaque...[; a]t some point AFTER this took place, umlaut STARTED to be reanalyzed as a morphologically conditioned process" (p. 634; emphasis added). In the face of this view (essentially the party line), little or no headway was made by the divergent claims of Dressler [7, 8], [Bybee] Hooper [3], and Hyman [13] in the 70's and 80's, or by Haiman [11] in the 90's. Rather, their phonologization-before-environment-loss approach, with its phonemes in complementary distribution, later elicited from P. Kiparsky [23] the reaction (p. 657) that, e.g., "Korhonen['s] (1969, pp. 333-335) suggest[ed] quasi-phonemes" [25] are "perceptually implausible", and so to be dispreferred to an (analogical) "*priming effect* ...[whereby r]edundant features are likely to be phonologized if... [a] language's phonological representations have a class node to host them" (original emphasis).

Yet precisely the case of OHG/MHG umlaut shows that P. Kiparsky's proposal is untenable, since there certainly is no motivation, in an underspecification analysis, for assigning vowels a [round] feature or a Labial node, and appealing to the presence of a general V[owel]-Place node wildly overpredicts what sort of vocalic changes are possible and so should have been observed in the course of over a millennium. Still, P. Kiparsky's [23] paper is useful in revealing what it is that makes both diachronic and synchronic phonologists reject (or at least ignore) with such vehemence the numerous and repeated claims that have been made for phonemes in complementary distribution: their proponents "do not spell out the conditions under which allophones acquire this putative quasi-distinctive status..." (p. 657). This trait suffices to give marginal/quasi-/secondary phonemes the status of Pandora's box: if some apparent phonemes with multiple allophones are really disguised sets of phonemes in complementary distributions, where and how can one draw the line and say that not all allophones are actually distinct phonemes?

Actually, a principled answer to this question has been given at least twice (in roughly the same form), but it unfortunately has suffered from insufficient explicitness, in the case of Ebeling's [9] 1960 version (pp. 136-139), and from having been undercut by a conjoined contradictory proposal, in the case of the 1976 avatar diffidently discussed (pp. 86-91) by [Bybee] Hooper [3]. The crucial element here involves PHONETIC SIMILARITY VS. DISSIMILARITY (DIFFERENCE)—i.e., PHONETIC DISTANCE—between sounds which begin as co-allophones (all belonging to the same phoneme) and end as distinct phonemes. [Bybee] Hooper (p. 90) cautiously raised the possibility that the "difference between ... [two sounds might be] too great phonetically for them to be considered mere variants of one another, and that they will be interpreted as separate entities...[;] there may be substantive constraints on what may be a natural alternation...[,] and ... alternations that progress beyond the natural limit may lead to restructuring". (Cf. also Comrie's [4] 1979 study of morphophonemic exceptions and phonetic distance.)

Lamentably, though, [Bybee] Hooper [3] prefaced these remarks with a discussion (p. 90) which falls into the very contradiction plaguing Twaddellians: "as... [a nasal] conso-

nant weakens, ... language learners will ... confront... a nasalized vowel followed by a consonant so weakened that the [vowel's] nasality will not be considered redundant, ...but rather ... a nonpredictable feature...". But, once again, it seems that such vocalic nasality would have been attenuated along with its conditioning nasal consonant—unless the vowel in question had already been reanalyzed as distinctively nasal. There thus indeed remains a need for a solid foundation that can anchor attempts to invoke phonetic distance as a force in phonemicization. Nor does [Bybee] Hooper (or Ebeling [9]) cite existing sociolinguistic research which provides a mechanism to yield increases in phonetic distance between allophones.

4. PHONETICS, PSYCHES, & SOCIAL FACTORS

4.1. Phonetic Distance & Phoneme-as-Category

Yet the wherewithal for rendering (more) plausible the proposition that former co-allophones may end up as distinct phonemes even while they are still in complementary distribution —and for reasons having to do with phonetic distance—has long been at hand. After all, it is a commonplace of introductory phonology-courses that, because of their great phonetic dissimilarity, English /h/ and angma must be reckoned as distinct phonemes, even though their defective distributions are in fact complementary. But we can then ask if any known principle of phonological change would prevent two sounds which originally were allophones of the same phoneme from eventually becoming as phonetically distant as /h/ and angma. In fact, no such principle exist, and so there is nothing to rule out long- or even short-term developments whereby former co-allophones ultimately come to be so phonetically dissimilar that they are recategorized as realizing two separate phonemes.

The crucial element here is indeed (re)categorization. For all the current emphasis on cognitive science in contemporary linguistics, it is difficult to resist the conclusion that the dominant strain of generative phonology, despite its mentalist origins and orientation, continues to shlep along essentially an anti-mentalist post-Bloomfieldian structuralist notion of the phoneme as primarily a distributional category. And the Achilles' heel of this category is phonetic (dis)similarity. In no other (sub)discipline would any self-respecting researcher seriously employ the default assumption that any two entities occuring in complementary distribution are members of the same cognitive category unless they are too dissimilar from each other. Instead, a perspective with something like exactly the opposite orientation makes a lot more sense: that entities are unlikely to be members of the same category unless they are extremely similar (preferably along several, but at least along one or more, dimensions), and then only if they occur in complementary distribution. In that case, a phonologist would always bear the main burden of proving that any two putative co-allophones in fact possess sufficient phonetic similarity to be categorized as instantiating the same phoneme.

Of course, what would help most to resolve this line of debate is psycholinguistic data regarding categorization in and of itself. In fact, some such evidence exists, and it tends to falsify the expectations of synchronic and diachronic phonemicists. E.g., in 1961, Moulton [31] wrote (here in my translation—RDJ) that "the normal speaker is simply not aware of the allophones of his/her native language"—a claim which he adduced as an explanation for the alleged fact that, "in a normal orthography (i.e., apart from scholarly phonetic transcriptions, etc.) allophones of the same phoneme are NEVER, EVER distinguished in writing" (original emphasis). To begin with, the last claim here is simplify false, as shown in 1976 by Voyles' [38] discussion (pp. 21-22) of five allophonic distinctions reflected in some of the very OHG texts discussed by Moulton. More crucially, though, relatively recent psycholinguistic research by Derwing, Nearey, & Dow [5], reported on in 1986, shows (p. 53; original emphasis) that "*some* sub-phonemic differences can be perceived by phonetically untrained monolingual speakers", and "a more powerful experimental design aimed at more specific questions might well show that … other distinctions are also perceptible, at least to some speakers", their data already exhibiting "a range of variation which is highly suggestive in this regard".

Hence Derwing et al. [5] argue (pp. 53-54) that, "...[t]aken together with... Jaeger's [1980] study [14], ... this gradation in fact suggests... that it is perhaps quite incorrect to regard the phoneme as the sharply defined kind of category that one finds in classical set theory". Rather, it is "something more akin to a 'natural category' (in the [1973] sense of Rosch ... [35]), i.e. one that is best represented by a particular prototype exemplar, with other members tailing off gradually...[;] see Jaeger & Ohala..." [15] (who wrote in 1984). Indeed, I would argue that, given the way in which, from an original unity, allophones develop from one another, differentiate, diverge, and may eventually come to be reinterpreted as members of distinct mental entities, phonemes are radial categories in the 1987 sense of Lakoff [29]. Such developments in fact show close parallels with the 1996 treatment of diminutive semantics by Jurafsky [21], who documents the various sorts of extensions and transfers through which a word for 'child' can acquire—or shift to—a disparate set of meanings like 'small', 'pet', 'imitation', 'partitive', 'affection', 'exactness', 'contempt', and/or 'hedging' (cf., e.g., p. 542). This is the direct counterpart of the disparate expansions by which the elements and generalizations of phonology can become "unnatural" (as in Anderson's [1] 1981 study of such phenomena).

In the case of allophones, the issue of origins has already been addressed often and at length by Ohala [32, 33] and many others. It bears repeating, however, that Ohala's findings have increasingly focused on exaggerated reactions to percepts by listeners, rather than articulatory machinations by speakers. Thus (simplifying drastically), "hypercorrection" exaggerates the undoing of conditioned allophonic effects, while "hypocorrection" allows excessive acceptance of allophonic divergence as a prototypical phonemic target. Hence "this account of sound change is entirely non-teleological...[;] sounds... [do not] change in order to be easier to pronounce, to be easier to hear... [or] learn, or to ... create any significant improvement or defect in language.... The only teleology … need[ed]... is that listeners do their best to imitate the pronunciations they hear (or think they hear) in others' speech and thus adhere to the pronunciation norm ([32], p. 191). Yet this last statement requires minor rephrasing in order to accomodate the final sort of exaggeration to be discussed here: the fact that, while speakers always seem to orient their speech toward others' pronunciation, based on what they perceive, there are circumstances in which their articulatory intent is to exceed the production of their models, in order to mark themselves socially through speech. It is this mechanism which gives the differentiation of allophones a persistence and a direction that can ultimately eventuate in phonologization.

4.2. Phonetic Distance via Generational Change

In his 1972 summary of the results from his earlier fieldwork on Martha's Vineyard, Labov [27] reported (p. 167) that successive generations of Vineyarders showed increasingly greater indexes of centralization for the diphthongal variables (ay) and (aw), as in *knife* and *house*—findings corroborated by instrumental records as well as impressionistic transcriptions. Generalizing from these and similar data, Labov characterized (p. 178) the 3rd stage in the mechanism of sound change as involving "hypercorrection from below[the level of—explicit —social awareness]" (on hypercorrection in general, cf. the 1992 study by Janda & Auger [19]). "Successive generations of speakers within the same subgroup [as the speakers originating the change], responding to the same social pressures,

carr[y]... the linguistic variable further along..., beyond the model set by their parents...[, so that] the variable is now defined as a function of group membership and age level".

The 7th and 8th stages of such "[sound-]change from below" also involve exaggerations. "The movement of the linguistic variable within the linguistic system always le[a]d[s] to readjustments... of other elements.... The[se] structural readjustments le[a]d to further... changes ... associated with the original change. However, other subgroups which enter... the speech community in the interim adopt... the older ... change as a ... norm... and treat... the newer... change as stage 1. This *recycling*... appears to be the primary source for the continual origination of new changes. In the following development, the second ... change may be carried beyond the level of the first change" ([27], p. 179; Labov's 1972 emphasis).

Similarly, in the 1998 view of Downes [6] (pp. 237-240), the reason why sound-changes tend to be generalized to new contexts—and extended in their effects—is that this constitutes the only way for younger speakers in a social group both to show their solidarity with older members (by sharing participation in the change via the use of common innovative forms) and yet also to set themselves apart (by extending the use of a variant to unique new contexts or degrees where it is not in fact phonetically motivated). This mechanism is persistent, directional, and incremental (apparently "continuous", or at least gradual), and so it remains synchronically relevant for every speaker and generation that maintains a given phenomenon as an active sociolinguistic variable—thereby obviating the need for any ill-defined notion of trans-generational inertia to push matters along over time. In fact, Labov's [28] 1994 conclusion (p. 84) is that such "*[g]enerational change* is the normal type of linguistic change...—most typical of sound change and morphological change" (cf. also the forthcoming discussion by Janda [18]).

When such quantitative documentation of socially motivated exaggeration is combined with psychophonetic research on the origins of phonological change in another kind of exaggeration, and viewed in the light of existing psycholinguistic studies of categorization (especially of phonemes vs. allophones), the solidity of the conclusion that phonemicization/phonologization of an allophone can precede loss of its conditioning environment can hardly be exaggerated.

NOTES

1. Purely for ease of exposition, I here omit most discussion of the High German unrounded-vowel changes of short /a/ usually to [e] (so-called "primary umlaut"; cf. the recent discussion by Janda in [17], pp. 173-174) but sometimes to [æ] ("secondary umlaut"), and of long /a:/ to [æ:].

REFERENCES

[1] Anderson, S. 1981. Why Phonology Isn't "Natural". *Linguistic Inquiry*, **12**, 493-539.

[2] Anttila, R. 1989. *Historical and Comparative Linguistics* [2nd ed.]. Amsterdam: Benjamins.

[3] [Bybee] Hooper, J. 1976. *An Introduction to Natural Generative Phonology*. New York: Academic Press.

[4] Comrie, B. 1979. Morphophonemic Exceptions and Phonetic Distance. *Linguistics*, **17**, 51-60.

[5] Derwing, B., Nearey, T., & Dow, M. 1986. On the Phoneme as the Unit of the "Second Articulation". *Phonology (Yearbook)*, **3**, 45-69.

[6] Downes, W. 1998. *Language and Society* [2nd ed.]. Cambridge: Cambridge University Press.

[7] Dressler, W. 1972. *Allegroregeln rechtfertigen Lentoregeln....* Innsbruck: ... Beiträge zur Sprachwissenschaft.

[8] Dressler, W. 1985. *Morphologization: The Dynamics of Derivation*. Ann Arbor: Karoma.

[9] Ebeling, C. 1960. *Linguistic Units*. Hague: Mouton.

[10] Fertig, D. 1996. Phonology, Orthography, and the Umlaut Puzzle. In Lippi-Green, R. & Salmons, J. (eds.), *Germanic Linguistics....* Amsterdam: Benjamins, 169-184.

[11] Haiman, J. 1994. Ritualization and the Development of Language. In Pagliuca, W. (ed.), *Perspectives on Grammaticalization*. Amsterdam: Benjamins, 3-28.

[12] Hoenigswald, H. 1960. *Language Change and Reconstruction*. Chicago: University of Chicago Press.

[13] Hyman, L. 1976. Phonologization. In Juilland, A. (ed.), *Linguistic Studies Offered to Joseph Greenberg on... His 60th Birthday, 2...: Phonology*. Saratoga: Anma Libri, 407-418.

[14] Jaeger, J. 1980. Testing the Psychological Reality of Phonemes. *Language & Speech*, **23**, 233-253.

[15] Jaeger, J. & Ohala, J. 1994. On the Structure of Phonetic Categories. In Brugman, C. & Macaulay, M. (eds.), *Proceedings of ...[BLS 10 (1994)]*. Berkeley: BLS, 15-26.

[16] Jakobson, R. 1931. Prinzipien der historischen Phonologie. *Travaux du Cercle Linguistique de Prague*, **4**, 247-267.

[17] Janda, R. 1998. German Umlaut: Morpholexical All the Way Down from OHG.... *Rivista di Linguistica*, **10**, 165-234.

[18] Janda, R. forthcoming. Beyond "Pathways" and "Unidirectionality".... To appear in *Language Sciences*, **21** (1999).

[19] Janda, R. & Auger, J. 1992. Quantitative Evidence, Qualitative Hypercorrection...[, &] Sociolinguistic Variables.... *Language & Communication*, **12**, 195-236.

[20] Joos, M. 1957. [Editorial Comment]. In Joos, M. (ed.), *Readings in Linguistics (I)*. New York: ACLS, 83. [Reprinted in Chicago: University of Chicago Press (4th ed.), 1966, 83.]

[21] Jurafsky, D. 1996. Universal Tendencies in the Semantics of the Diminutive. *Language*, **72**, 533-578.

[22] Kiparsky, P. 1971. Historical Linguistics. In Dingwall, W. (ed.), *A Survey of Linguistic Science*. College Park: University of Maryland, 576-642 (plus 643-649 [Discussion]).

[23] Kiparsky, P. 1995. The Phonological Basis of Sound Change. In Goldsmith, J. (ed.), *The Handbook of Phonological Theory*. Oxford: Blackwell, 640-670.

[24] Kiparsky, V. 1932. Johdatusta fonologiaan. *Virittäjä*, **36**, 230-250. [Partial German translation in [26], 80.]

[25] Korhonen, M. 1969. Die Entwickling der morphologischen Methode [Technik] im Lappischen. *Finnisch-ugrische Forschungen*, **37**, 203-362.

[26] Korhonen, M. 1971. Nachtrag. *Finnisch-ugrische Forschungen*, **39**, 80.

[27] Labov, W. 1972. *Sociolinguistic Patterns*. Philadelphia: University of Pennsylvania Press.

[28] Labov, W. 1994. *Principles of Linguistic Change, Volume 1: Internal Factors*. Oxford: Blackwell.

[29] Lakoff, G. 1987. *Women, Fire, and Dangerous Things: What Categories Reveal About the Mind*. Chicago: University of Chicago Press.

[30] Liberman, A. 1991. Phonologization in Germanic: Umlauts and Vowel Shifts. In Antonsen, E. & Hock, H. (eds.), *Stæfcræft....* Amsterdam: Benjamins, 125-137.

[31] Moulton, W. 1961. Zur Geschichte des deutschen Vokalsystems. *Beiträge zur Geschichte der deutschen Sprache und Literatur*, **83**, 1-35.

[32] Ohala, J. 1989. Sound Change Is Drawn from a Pool of Synchronic Variation. In Jahr, E. (ed.), *Language Change: Contributions....* Berlin: Mouton de Gruyter, 173-198.

[33] Ohala, J. 1993. The Phonetics of Sound Change. In Jones, C. (ed.), *Historical Linguistics....* London: Longman.

[34] Prince, A. & Smolensky, P. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar. Technical Reports, Rutgers University Center for Cognitive Science*, **2**.

[35] Rosch, E. 1973. Natural Categories. *Cognitive Psychology*, **4**, 328-350.

[36] Trask, L. 1996. *Historical Linguistics*. London: Arnold.

[37] Twaddell, W. 1938. A Note on Old High German Umlaut. *Monatshefte für deutschen Unterricht*, **30**, 177-181.

[38] Voyles, J. 1976. *The Phonology of Old High German*. Wiesbaden: Steiner.