On Explaining Sound Change – A Comparison of Language Change Theories

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1. Introduction

> Die Sprache ist gerade insofern Object und selbstständig, als sie Subject und abhängig ist. Denn sie hat nirgends, auch in der Schrift nicht, eine bleibende Stätte, sondern muss immer im Denken aufs neue erzeugt werden, und folglich ganz in das Subject übergehen […].
> (Humboldt, 1822/1996, p. 226)

1.1 Language Change Beyond Synchrony and Diachrony

There seems to be little doubt that languages "change". However, proving this common assumption with evidence from our daily life is rather difficult. One might refer to neologisms as a source of new lexical material that enter a language or loanwords from other languages that become regularly used in colloquial speech. The word *touché*, for example, which was originally used in French to acknowledge a hit in fencing, is now used sarcastically in colloquial English to show that the argument from the interlocutor is valid and to acknowledge the interlocutor's victory. Thus, the borrowed word has acquired a new semantic and pragmatic function.

This evidence is mostly not sufficient to proof the hypothesis that languages change. Rather, these are instances of synchronic variation in a speech community and cannot be regarded to display language change. From a synchronic perspective, the only evidence we can find is that there are differences a) in the ways to express an idea[1], hence the notion of variation, and b) an unequal dissemination and acceptability of items. The latter can be illustrated with an example of grammaticalization in German, whereby the verb "bekommen" is losing its lexical meaning 'to receive' and takes over the role of an auxiliary in the passive construction.

(1) a) Maria bekommt ein Buch geschenkt.
b) Maria bekommt den Führerschein entzogen.
c) Maria bekommt geholfen.

Most German speakers would accept a) where "bekommen" still has the basic meaning of 'to receive something'. The variant b) has lost this semantic because Mary does not receive, but lose something, hence b) shows stronger influence of grammaticalization. Finally, variant c) is predicted to be least accepted by native speakers. However, not all speakers agree equally which forms are acceptable.[2] This illustrates that changes spread unequally in a speech community

[1] „Idea" is used here as the mental concept that is associated with a sound pattern, hence the *signifié* in Saussure's model of the linguistic sign.

[2] This seems to be the reason why innovative language use is often stigmatized by certain groups of speakers. They have a lower acceptability regarding this one variant and therefore attach stigma to it. Laymen discussions of language change likewise reflect the phenomenon that novel forms are somehow "worse" than the old ones –

and that variation in the expression of an idea (here: the passive construction) is the basis for studying language change from a synchronic perspective. Consequently, it is not surprising that ongoing changes are studied by sociolinguists who analyze the spread of a novel form in a speech community. [3]

It follows that we only have scarce evidence for the claim that languages change from the view of the language state.[4] It is necessary to compare language states in a sufficient time interval in order to trace language change. We are therefore compelled to characterize language change as a historical phenomenon (cf. Croft, 2000, p. 1) and subsequently enter the field of diachronic linguistics. The predominantly synchronic approach to linguistics in the Saussurean tradition could not, except for sociolinguistic research, contribute to the explanation of language change. Indeed, Saussure himself defined language as a conventional sign system, whose nature seems to resist any kind of modification because each state is the product of the former state. Saussure saw no reason why speakers would choose a different convention for communication than the one they obtained from their parents (cf. Saussure, 2014, 108f.). The famous comment on the question of language change reflects the aporia to explain it convincingly: "Time changes all things; there is no reason why language should escape this universal law" (Saussure, 2014, p. 113).

1.2 Overview of the Literature – Some Accounts

The question of why languages change has been widely discussed in the last 100 years,[5] producing many different approaches to explain the phenomenon. In the structuralist tradition the notion of language as a *system* has yielded different accounts of what the driving force of language change is. The concept of speech economy has been invoked several times in those frameworks (cf. Ronneberg-Sibold, 1988; Werner, 1989; Wurzel, 1997), most prominently by Jespersen (1894). In contrast to the prevailing conception of language change as decay in the nineteenth century, Jespersen offered a contrasting view on language change. According to him,

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an idea that reaches back to a notion of August Schleicher in the 19th century. He associated language change with decay, especially with reference to the emergence of analytical means to express grammatical functions; cf. the summary in Putschke (1998).

[3] It is beyond the scope of this study to outline the theories of language change developed by sociolinguists such as Labov (1994, 2020), Jim Milroy (2000), James Milroy (1997, 2003) and many other. Cf. also the conclusions drawn in Boas and Pierce (2020)

[4] Coseriu (1974, p. 12) argues similarly against the synchronic analysis of language change: "Ebensowenig wandelt sich *die Sprache in der synchronischen Betrachtung,* und ebensowenig ist es möglich, auf irgendeine Weise „den Wandel (als solchen) in der Synchronie nachzuweisen", denn der erste Schritt in dieser Art der Sprachbetrachtung besteht darin, bewußt von der Entwicklung und dem Wandel abzusehen."

[5] Language change has been not only subject to debate in the last 100 years, of course, but its puzzlement is as old as thinking about language is. Antiquity also addressed the problem of language change, most famously in Plato's "Cratylus".

languages become more economical and therefore more efficient in the course of their development. The drift from a synthetic to an analytical language type is interpreted by Jespersen as improvement by economizing speech. While this radical view is not supported anymore because language change is not assumed to improve the language nor have a final end point, some theorists still use the notion of economy to explain processes of language change. More recent and sophisticated instances of those theories are, for example, optimality theory (see e.g. McMahon, 2000).

In the context of the so-called *pragmatic turn* the role of the speaker was focused. The theories and concepts that emerged were subsequently also applied to historical linguistics and gave rise to a speaker-oriented approach to language change (on which see Coussé & Mengden, 2014; Gvozdanovic, 1997). A quite different approach was taken by generativist linguists. The high variability of spoken speech that functions as the input material in the acquisition process is one reason that leads to differences in the children's grammar compared to their parent's grammar. Specifically, children have to infer the grammar (or at least certain parameters) from the heterogeneous data that the environment gives the learners access to, giving rise to slightly altered learner grammars. Thus, the generative approach locates language change in the acquisition process and thereby models it as differences in the grammars (e.g. Lightfoot, 1999).

In the light of this theoretic pluralism the question of whether it is possible to unite the different approaches stood in the center.[6] The major problem in synthesizing the theories seemed to be the fact that they all have quite different assumptions of what a language *is*. The structuralist notion sees language as an abstract system, while the generativist view locates language in the cognitive faculty of the speaker. Unlike any of these, the pragmatic approach views language as a communicative instrument to pursue certain goals.

Eventually, a rather old theory was proposed as a new framework to synthesize the different approaches: Darwin's *evolutionary theory*. This research paradigm is certainly among the most popular in current debates (for an overview and applications see Jäger, Eckardt, & Veenstra, 2008; monographic presentations are e.g. Ritt, 2004, Lass, 1997; Mufwene, 2017). One of the notions that was proposed in the evolutionary paradigm is, for example, the notion of *exaption* in language change (e.g. Lass, 1997; van de Velde & Norde, 2016). Further, not immediately relevant discussions in the secondary literature will be indicated in the footnotes.

It will be the goal of this study to draw the conclusions from three different language change theories to explain *why* languages change. The lexical and morpho-syntactic examples of

[6] As an example of the attempt to combine Wurzel's *markedness theory* with Keller's *invisible-hand theory*, see Wurzel (1997) and Keller (1994, p. 155).

language change briefly presented above seem to be generally easier to explain than phonological changes. I argue that sound change is harder to motivate than changes in any other level of language, because, as is generally known, phonemes are the smallest unit that separate words from another. They do not carry, unlike e.g. morphemes, a specific meaning, therefore the question of why phonemes change is particularly challenging.

2. Methodology

This study compares a structuralist theory (Wurzel's *markedness theory*), a pragmatic theory (Keller's *invisible-hand theory*) and an evolutionary theory (Croft, 2000) with reference to sound change. The aim is to compare the different strategies of the respective theories in explaining changes in the phonological system. In order to do that, I will consider one example of phonological change in the Old English period and try to apply the theories to this specific instance of sound change. It needs to be stressed, however, that the sound change from Old English has merely illustrative function. It is not the primary goal of this study to find the most convincing explanation for the sound change in question.

The research question for this study can be stated as follows: How can the structuralist, pragmatic and evolutionary theory of language change explain sound change? It is obvious that we are interested in the different approaches these theories take in explaining sound change. In applying the theories to our sample change *breaking* in Old English (see chapter 3), we will be able to detect difficulties and contradictions, leading to a comparative evaluation of the three theories. Since theories are designed to make complex phenomena such as language change comprehensible, it is especially important to not lose oneself in the theoretical realm. The practical link to *breaking* in Old English will help us not to be 'lured' by the theoretical grounding. Highly formalized theories tend to be very popular because their way of abstracting from reality is often fascinating. The practical perspective will help us not to lose track of reality.

This study aims at assessing the theories in terms of their explanatory power for sound change. This seems appropriate because the aim is to compare the explanations of sound change that these theories offer.

The selection of the theories was not accidental. On the contrary, they are very different in nature in that their proponents stem from different traditions and schools. This was indeed intended because the evolutionary approach promises to incorporate different theories. We may observe in which way an evolutionary approach is successful in doing so.

The sound change *breaking* was chosen because this seems a rather interesting case. Firstly, diphthongizations are hardly instances of speech economy, which is often invoked to explain sound change. Secondly, breaking is a very important sound change for Old English, as will be shown, since it has far-reaching consequences for the morphological system in Old English. However, only very few theoretical works have tried to motivate *breaking*.[7] Traditional accounts content themselves with the description of the change (e.g. Campbell, 1959).

The paper is structured as follows. The next chapter will present and, as far as necessary, discuss the sample sound change *breaking.* Chapter 4 discusses the epistemological problems of change and explanation, both of which lie at the heart of language change theories. In the main part of this study, each theory is presented and then discussed with the sample sound change (chapter 5). Chapter 6 discusses the findings, followed by a conclusion and a general outlook (chapter 7).

3. Presentation of the Sample: Breaking in Old English

Before the theories are presented and can be applied to the sample sound change, it is necessary to summarize the problem of the sound change under discussion. We will compare the sound change called "breaking" in the pre-Old English period as it is presented in different grammars of Old English.

Breaking is one of the most important and disputed sound change in the history of English. It is agreed that breaking is one of the very early sound changes leading to the Old English period (see also below). According to the textbook account, breaking generally refers to the diphthongization of a front vowel in certain environments (cf. Mitchell & Robinson, 2012, p. 38). The relevant changes can be stated as follows.

i) Before -*h*, -*h*C[8], -*r*C:

æ > ea, e.g. *bearn* ('child'), *eahta* ('eight'), *seah* ('he saw')

e > eo, e.g. *feoh* ('cattle'), *eolh* ('elk'), *weorþan* ('become')

ii) Before -*l*[9]C, but not -*lh*:

æ > ea, e.g. *healp* (1st pret. 'help'), *eall* ('all')

iii) Before -*h* and -*h*C

[7] Among those is Smith (2007).
[8] C stands for any consonant.
[9] The *l* is supposed to be pronounced back in the throat, hence can be compared to what is known as dark [ɬ].

> ī > īo > very often ēo, e.g. *betwēoh* ('between'), *lēoht* ('light')
>
> (Mitchell & Robinson, 2012, 38f.)

Note that this is not a phonetic transcription but a graphemic representation. For convenience, only long vowels are marked with the diacritic. In addition to long *ī* in point iii) above, short *i* also breaks regularly before [w] (cf. *niowul* 'prostrate'). Short *e* also breaks before [w] as in *eowu* 'ewes', but [w]-breaking is less regular than in the other environments and shall not bother us here. It is disputed whether diphthongization before [w] in fact belongs to breaking or is part of another change.[10] However, long *ē* never undergoes breaking in West Saxon and long *ǣ* is only regular before [x] as in *nēah* 'near' (< **næh*) (cf. Campbell, 1959, p. 58).

Indeed, one fundamental question is the pronunciation of the diphthongs produced by breaking. The cited textbook (Mitchell & Robinson, 2012) assumes <ea> to be realized [æa].[11] This seems to be important to understand the general "mechanism" of this change better. What seems to happen is an assimilatory process between the front vowel and the consonant(s) following it. The consonants that trigger breaking are all articulated in the back of the throat: <l> was presumably dark [ɬ], <h> was realized either [x] or [ç] word-internally and word-finally,[12] and <r> either velar, retroflex or uvular (cf. Lass, 1994, p. 49; Smith, 2007, 98ff.). The fact that they are all 'back' environments "would naturally prompt insertion of a 'transition' vowel of back quality as an assimilatory response to the front-to-back movement" (Lass, 1994, p. 49). Lass identifies this vowel as being originally [u]. After [u] has been inserted between the front vowel and the consonant(s), we get for <æ> in i), for example, a cluster like [-æuCC], for <e> [euC] respectively, etc. It is evident that this is only one step in the process of breaking, whereby the articulatory distance is abridged by the insertion of a back vowel.

The second step involves what Lass (1994, 50f.) dubbed Diphthong Height Harmony (DHH). The inserted vowel [u] takes on the height of the front vowel:

> DHH then is a condition on complex nuclei that both elements must be of the same height, and that the second assimilates to the first. The condition of course holds by default of long vowels, but changes diphthongs in /-u/ with nonhigh first elements. (Lass, 1994, p. 51)

[10] Campbell (1959, p. 90) lists *eowu* in the context of Back Mutation, noting that "[a]ll dialects provide instances of the back umlaut of an *e* produced by *i*-umlaut. After the latter change took place, a back vowel might be placed in the syllable after the *e* by suffix transference and cause back umlaut." Similarly, Smith (2007, p. 93) sees [w]-diphthongization as an instance of *i*-mutation. We adopt this view here and do not consider diphthongization before [w] to be part of breaking.

[11] For an exhaustive discussion of OE diphthongs and their long and short variants, see Lass (1994, 45ff.), also Lass and Anderson (1975, 75ff.). It is discussed whether short diphthongs were in fact monophthongs. For a comprehensive reference list on the issue, see also Smith (2007, p. 94).

[12] Word-internally, the grapheme <h> has a palatal and a velar variant in Old English. Which allophone is relevant in a word depends on the front or back quality of the neighboring vowel (cf. Mitchell and Robinson, 2012, p. 15). Word-initially, <h> is always [h].

Our consonant cluster for <æ> above, according to the DHH, develops to [-æaCC]. The inserted vowel [u] changes its height according to the preceding vowel *æ* to *a*. The development of *eald* 'old' can illustrate this succession: */ald/ [ałd] > [æld] (Anglo-Frisian Brightening) > [æułd] (Breaking) > [æałd] (DHH) (cf. Lass, 1994, p. 51).

This example, beside modelling breaking in two subsequent steps, shows us that Anglo-Frisian Brightening (AFB) produces the low front vowels that are subject to breaking. This is held as evidence for the fact that breaking must have occurred after AFB because it is fed by the latter's output.

Campbell's classical grammar of Old English (Campbell, 1959, p. 54) presents breaking together with retraction. Here it is also assumed that a vocalic glide – but not necessarily [u] – developed in the movement from the front vowel to the back consonant. Campbell assumes this glide to have originally been a rounded sound.[13] Textual evidence seems to support this since <eu>, <iu> are found for *ĕ̆*, *ĭ̆* respectively, later they develop to <eo>, <io>. There are some logical arguments that speak in favor of considering breaking and retraction as being part of one change, as Campbell does. Firstly, both glide insertion and retraction are instances of assimilation processes that abridge the articulatory distance between back consonants and front vowels. Another evidence supporting the closeness of breaking and retraction comes from West-Saxon where *e* breaks before [w], e.g. *cnēowes* 'knee' (gen.sg.), but *æ* retracts to *a* as in *awel* 'hook', *gesawen* 'seen' etc. (cf. Lass, 1994, p. 50). In pairing retraction and breaking, forms that are not affected by breaking (e.g. those in Anglian dialects) are accounted for by retraction.[14]

While it was said that forms that do not show breaking in the environments where we would expect it can be ascribed to retraction, many irregularities still remain. Breaking is a complex and by no means always 'regular' change (cf. Lass, 1994, p. 48). Sometimes palatal **i, *j* in the following syllable prevented breaking. For instance, breaking of *i* failed in the [-*iwi*] group (*spiwe* 'vomiting', *niwel* 'prostrate') (cf. Campbell, 1959, p. 59).

Moreover, while geminates also trigger breaking, *ll* that stems from West-Germanic gemination does not have the same effect as *l*C in ii) above (e.g. *tellan* 'tell', *sellan* 'sell' <

[13] An exception is *æ̆* from PGmc *au. After *æ̆* the glide was generally unrounded and hence produced *æa*. Hogg (2011, p. 82) describes the glide as a non-low, non-syllabic back vowel, so either *o* or *u*.

[14] More recent grammars of Old English do acknowledge the possibility of retraction and breaking as being part of one historical change, but opt for an account that separates them: "Thus it is possible and reasonably plausible that those two sound changes were really part of a single historical event. It might seem more economical to suggest that retraction of *æ before *lC was part of the more general retraction of *æ when a single consonant or geminate and a back vowel followed […]. But retraction before *lC occurred regardless of the following vowel, and even in monosyllables […], and since the conditioning of the two changes was quite different, it is almost certain that they were separate historical events." (Ringe and Taylor, 2014, p. 186)

**saljan*, *hell* ‘hell’ < **halj-* vs. *feallan* ‘fall’, *eall* ‘all’) (cf. Campbell, 1959, p. 54). This shows that the origin of the consonant cluster is relevant. It is unclear, however, why geminate *ll* that stems from West-Germanic gemination behaves differently than the remaining geminates. Hogg (2011, p. 83) gives evidence that geminated *l* from West-Germanic gemination failed to trigger breaking because “the palatalizing effect of following /j/ gave [ll] rather than [ɬɬ].” Thus, in this case geminated *l* was not a ‘back’ consonant. This would again speak for an assimilation process that drives breaking.

Beside these observations of ‘structural irregularity’ there are also forms that match the breaking environments but simply do not undergo the change, e.g. *ærn* ‘house’, *bærn* ‘burn!’ (cf. Hogg, 2011, p. 92). Those cases simply cannot be accounted for.

There are several reflexes of breaking in the morphological system of Old English. As is well known, sound changes can lead to “long chains of ‘cooperating’ mutations that can distort the original structure of paradigms” (Lass, 1994, p. 52). In particular, this manifests itself in the fact that breaking has obscured the original ablaut pattern of the strong verbs of class III that originally had *e* in the present and *æ* in the preterite singular. Since the original root contained a nasal or liquid, the environment for AFB, which produced *æ*, was given. Subsequently, the roots were subject to breaking as in *weorpan* ‘throw’, pret. sg. *wearp*.

Another consequence of breaking affects the weak verbs of class 1 with root-final *l* and a syncopated preterite. Verbs like *syllan* ‘give’ show breaking in the preterite (*sealde*). Similarly, the *wa-* and *wō-* stems show breaking in the nom.acc.sg. because of the /-rw/ cluster: *bearu* ‘grove’, *searu* ‘device’ (cf. Hogg, 2011, p. 92).

It is worth to discuss the place of breaking in the chronology of changes. We have seen above that AFB produces the low front vowels that undergo breaking in certain environments. Consequently, AFB feeds breaking and must have occurred before. Equally uncontroversial is the assumption that *i*-Mutation must have occurred after breaking because it acts on its products: **heardjan* > EWS[15] *hierdan* ‘make hard’ (cf. Campbell, 1959, 107f.; cf. Hogg, 2011, p. 92). A later change which reverses the outcome of breaking by monophthongization, called *Anglian smoothing*, is particularly interesting. Before the back consonants /k, ɣ, x/ the vowels <ea, eo, io>, both the long and short ones, became <æ, e, i> respectively (cf. Campbell, 1959, p. 93), thereby reversing the process of breaking. This also confirms the assumption that breaking was a temporally framed event rather than an ongoing process. In borrowed words, for instance,

[15] EWS stands for Early West-Saxon

breaking no longer occurred by the late West-Saxon period (cf. *pæll* 'pallium') (cf. Smith, 2007, p. 96).

Summarizing the points, we have seen that breaking diphthongized the front vowels *æ*, *i*, *e* to *ea*, *io*, *eo* respectively. The long and short vowels were affected equally except for *ē* that never breaks. Breaking is triggered by the consonant clusters *r*C, *h*C and, although more restricted, *l*C. Breaking is assumed to have proceeded in two subsequent steps. The first step was the epenthesis of a vocalic glide between the front vowel and the back consonants [r, ɬ, x]. The second step involved assimilation of the glide to the height of the front vowel.

It is disputed whether breaking and retraction are part of one change. Adopting this view allows to account for several cases, especially in the Anglian dialect, where breaking failed to act in the expected environments. Chronologically, AFB must have occurred before breaking and *i*-umlaut followed it. A change in late Old English called smoothing reversed the process of breaking by monophthongization.

Before we can endeavor to explain this complex sound change called breaking with the different theories, we need to be clear about what an *explanation* actually is in the context of language change theories.

4. Epistemological Problems of Change and Explanations

First, we need to consider what assumptions are made by a "language change theory". Trivially, the term refers to a specific theory that tries to *explain* language change. Before we discuss what *to explain* means when we deal with language change, we need to think about another assumption made by any language change theory, which is the fact that languages *change*.

As was briefly noted in the introduction, our evidence from everyday life to justify this claim is very scarce. However, there is little doubt among linguists that languages change. If we take into account the ongoing changes from a synchronic point of view, this does not count as evidence for language change. Rather, these can be seen as synchronic *variation*. How do we know that the variation of each generation does not just die as the old speaker generation is substituted by the new one, leaving the language unchanged?

It is necessary, therefore, to rely on documents of the past – *witnesses*, as Lass (1997, p. 21) calls them. Subsequently, these witnesses are interpreted and compared with another language state, thereby trying to track changes in the language. In the first place, the task of the linguist needs to be the exegesis of historical texts. For Lass (1997, p. 18) it follows that all historical linguistics is historiography. A given object of the past is only a potential witness and needs to

be interpreted as a historical document. We call these types of historical knowledge *witnesses*[16] (*ibid*., p. 42).

Unlike witnesses, which are generated by interpretations, there is also an indirect way of having access to the past. This knowledge can derive either from theory of the present world or from metaphors. The former type makes several assumptions that tend to be taken for granted but should not. Firstly, it has to be noted that "historical linguistics is a branch of linguistics, constrained by non-historical linguistic knowledge and theory" (Lass, 1997, p. 27). In trying to apply knowledge of the general discipline of linguistics onto the historical domain of it, we assume two facts about our world in general. These two *Uniformity Principles* are presented in their linguistic rephrasing.

> General Uniformity Principle
>
> No linguistic state of affairs (structure, inventory, process, etc.) can have been the case only in the past.
>
> Uniform Probabilities Principle
>
> The (global, cross-linguistic) likelihood of any linguistic state of affairs (structure, inventory, process, etc.) has always been roughly the same as it is now. (Lass, 1997, 28f.)

Accepting these two principles is inevitable for any diachronic enquiry. There is no other way of interpreting the past than to assume that the same laws that apply in the present also applied in past situations. To give a linguistic example, a sound sequence [mb] is easier to pronounce than a sequence [nb]. This must also have been the case in the past (see General Uniformity Principle). The probability that speakers in the past pronounced a sequence [nb] as [mb] must have been "roughly the same as it is now" (see Uniform Probabilities Principle). Although these principles are barely questioned, it is important to make them explicit.

Besides projecting the insights into language gained by synchronic research onto the problem of language change, the *uniformitarian hypothesis* also maintains that variation has always been similarly structured as it is today. Sociolinguistically speaking, variation is expected to occur in a similar fashion in all levels of language in, say, Old English, as well as in Present-Day English. One popular reflex of this hypothesis in diachronic linguistics is the assumption that synchronic cross-linguistic variation is similarly structured as different historical language states within the same language. To put it differently, if we abstract away from the lexicon, Old English is to Present-Day English as English is to German.

[16] Lass (1997, p. 61) notes that written records often only give hints to what the spelling of a language in the past might have been. Whether these are merely lapses or meaningful evidence for changes is subject to careful research. This involves many of the interpretative and reconstructive methods of historical linguistics.

Still it remains unclear how we should imagine the process of a historical change. Translative conceptions of change would maintain that one form or structure simply *becomes* or *turns into* another (cf. Lass, 1997, p. 278). Conversely, the "structuralist-replacive" notion of change sees language change as a substitution of a former state. Accordingly, the first step is that the slot that is affected in the system is vacated due to an external factor.[17] Subsequently, the empty slot is filled by the new form (cf. the notion of the *Great-Vowel Shift*).

If we now assume that languages in fact *do* change, we arrive at the second, far more controversial assumption of a language change theory, namely that language change is *explainable*. Several questions arise when we try to define what "explain" actually means. In an earlier monograph, Lass (1980) discusses the epistemological problem of *explaining* language change, which lies at the heart of language change theories. Questions of *why* something happened "involve general principles, matters of theoretical interest, etc., and answering them represents a higher mode of achievement […]" (Lass, 1980, p. 1). With those abstract theories on the subject we are able to understand the phenomenon and can explain it (cf. *ibid.*, p. 7).

In principle there are "historical explanations" which Lass dubs the *positivist view* and there is the notion of the historian as a *myth maker* (cf. Lass, 1980, p. 2; 1997, p. 4). A myth is "in the widest sense […] a story or image that structures some epistemic field (knowledge, thought, belief) in a particular culture" (Lass, 1997, p. 4). The problem with myths in linguistic explanations is that they are notoriously independent of their truth value and hence cannot be taken to *explain* a complex phenomenon such as language change (cf. *ibid*., p. 5). Rather, we need explanations of the logical-deductive kind that use conditions and laws in their *explanans* to explain the *explanandum*.

E= 'John died after being decapitated'

C1 John's head was cut off.

L1 The heart will not beat if it is disconnected from the brain.

L2 Persons whose hearts don't beat die.

E John died. (Lass, 1980, p. 10)

These deductive explanations are the only true explanations but are unattainable in linguistics. Most importantly, in this explanation type the explanandum follows *necessarily*

[17] It is not always entirely clear what the initial cause of the process is. While the rest of the succession is completely internally motivated, the first change of the vacated slot is often accounted for by an external factor (cf. McMahon, 1994, p. 84)

from the conditions in the explanans (cf. Lass, 1980, p. 10). Linguistics lacks such universal "laws" and has to work with what can be called *probabilistic explanations*. The explanandum will then not follow logically from the explanans, "but rather with 'high likelihood'" (*ibid*., p. 12). An important consequence of these probabilistic types of explanations is that they cannot predict the explanandum and therefore are always *post hoc*. Deductive explanations, on the other hand, can predict the explanandum.

Instead of dismissing the undertaking to explain language change altogether, we should "accept a lower-key definition of explanation at a less elevated […] level" (McMahon, 1994, p. 45). A convincing but modest notion of explanation, then, would be that it constitutes "relief from puzzlement about some phenomenon" (*ibid.*, p. 45). However, we need to be conscious about what kind of explanation a language change theory proposes, because this has several consequences for the generalizability of the explanative model.

Finally, we need to be aware of what a language change theory in fact *does*. McMahon (1994, p. 44) maintains that, for example, the generativist accounts of sound change are "all more successful at describing *what* happened than *why* it happened, although they all claim, with varying degrees of conviction, that they are explaining language change" (emphasis original).[18] Similarly, the notions of lexical diffusion[19] in the field of sound change and grammaticalization in morphosyntax are in fact only describing how the change proceeds. Lexical diffusion, if anything, may describe the way a sound change spreads, hence contributes to the transmission problem (cf. McMahon, 1994, p. 68). Likewise, grammaticalization describes pathways and "channels" that structures seem to follow.[20] However, little is said in these theories on the motivation of a novel form in the first place. Another important distinction, therefore, seems to be the description of the change on the one hand and the motivation of the change on the other hand.

5. Language Change Theories

In the following, the three theories are outlined and it is discussed how these theories deal with the problem of the motivation of a sound change, i.e. why speakers innovate their language. Referring to our example of breaking in pre-Old English, we are specifically interested in the reasons that can be generated in these frameworks for diphthongizing the vowels <æ, e, i> to

[18] This is not to be misunderstood as a criticism of generativist explanations. Already early works of Chomsky (e.g., 1957) emphasize the difference between descriptions and explanations.

[19] Lexical diffusion argues that sound change does not affect all the respective phonemes at the same time but spreads gradually through the lexicon. This hypothesis stems from empirical observations according to which the most frequent words show a sound change first. See e.g. Phillips (2002).

[20] For an overview see Hopper and Traugott (2012).

<ea, eo, io> before consonant clusters involving <l, r, h>. With some of the problems of explaining sound change in mind, we can move on to present a structuralist theory that makes use of the notion of *markedness*.

5.1 Structuralist Approaches: *Grammatisch Initiierter Wandel*

Since the 1980s and 1990s, several researchers have worked on what can be called a "natural theory of linguistic change".[21] We can contextualize this approach in a larger debate in the course of the 20th century that started focusing on the language-internal potentials of explaining language change. Rather than scrutinizing the speakers and their environment, this so called "naturalistic theory" (*Natürlichkeitstheorie*) searches for properties in the language system that are held as the initial cause of language change, hence the notion of *Grammatisch initiierter Wandel* proposed by Wolfgang Ullrich Wurzel (1994). Accordingly, in order to justify that the language system is the locus of language change, it is inevitable to assume a structuralist theory for this approach.

Above all, structuralist notions of language assume that a language is a *system* whose signs are not distributed randomly but are structured in such a way that some signs have a close relation to others. Each element is constitutive for the whole, and it receives its function only through the system. Consider the model below as part of the consonant system of any language.

p	t	k
b	d	g
z	m	x

Figure 1: An exemplary phoneme inventory in the structuralist tradition.

The relations between the phonemes /p t k/ in the first horizontal row is closer to each other than the phonemes /p b z/ in the first vertical row since /p t k/ share the same manner of articulation (plosive). Similarly, the vertical row /k g x/ shares the same place of articulation (velar) and is therefore more related to one another than, say, the row /t d m/. The fact that particular phonemes share a different degree of relatedness to other phonemes in a phonological system leads to a specific structure of the system.

If a change in the system occurs and alters one group of phonemes, usually caused by some external factor, structuralist theory would predict subsequent changes in other parts of the

[21] Among the proponents of this theory are Stampe (1997), Ronneberg-Sibold (1988), Charles-James Bailey and Willi Mayerthaler.

system. For instance, when a change affects the voiceless plosives /p t k/ that bear a close relation and produces the fricatives /f θ x/,[22] the phonological system is out of balance because the new fricatives merge with the old ones. While all subsequent changes to the first can be deduced logically as a reconfiguration of the system, the first, initial change is hard to motivate in a structuralist framework. This first change is often accounted for by an external factor (cf. McMahon, 1994, p. 31). Although Wurzel's theory (1994) relies by and large on the classical structuralist linguistic theory, it is maintained that the initial impulse stems from the system as well, hence the term *grammatisch initiierter Wandel*. In order to make this plausible a further parameter is necessary, the parameter of markedness.

5.1.1 Language Change as Reduction of Markedness

Wurzel (1994, p. 27) regards the markedness principles (*Markiertheitsprinzipien*) as one of the fundamental concepts of his theory in that they

> legen fest, ‚was Markiertheit ist', genauer gesagt, welche grammatischen Erscheinungen hinsichtlich welchen Parameters in welchem Grade markiert sind. Dabei sind phonologische, morphologische und syntaktische Markiertheitsprinzipien zu unterscheiden, die für die jeweiligen grammatischen Bereiche gelten.

It follows that in this theory another layer is added on top of the language system, namely an evaluative layer of markedness. Forms can be marked in regard to one (phonological, morphological etc.) parameter. Language change, consequently, is defined as the reduction of markedness: "grammatisch initiierter Wandel [führt] immer von stärker markierten grammatischen Einheiten zu schwächer markierten grammatischen Einheiten […]. Das Wesen eines solchen Wandels besteht damit im Abbau von grammatischer Markiertheit" (Wurzel, 1994, p. 27).

At the same time, it has to be stressed that there is not a purely marked form. Rather, one form is marked regarding one specific parameter on a linguistic level. If language change is understood as reducing markedness, this is not to say that all marked forms in a system are necessarily eliminated (cf. Wurzel, 1994, p. 29). It is true, however, that language change is a directed process because the leading parameter is markedness; changes always lead to the reduction of markedness.

Furthermore, one important property of markedness that results from the outline above is that it is gradable. Consider the examples in (2) for an illustration of unmarked and more marked forms in the formation of the plural in German.

[22] This example is part of the change called "Grimm's Law".

(2) a) Frau – Frauen

b) Vater – Väter

c) Fenster – Fenster

d) Elternteil – Eltern (adapted from Wurzel, 1994, p. 60f.)

According to the second morphological parameter called "konstruktioneller Ikonismus", which holds that semantically more complex concepts should be symbolized with more phonological material (cf. *ibid*., p. 60), a) is unmarked because the plural symbolizes its semantics by adding the suffix *-en*. The form in b) is more marked regarding this parameter because it shows umlaut rather than adding phonological material to the stem. The plurals of class c) that have zero affixation are marked because the category 'number' is not expressed anywhere and eventually, forms like d) are highly marked in that they are even counter-iconic because the singular is phonologically richer than the plural.

Accordingly, this theory would assume that forms like d) that are most marked regarding this principle are most likely to be affected by a change. However, it is crucial that language change, that is, the reduction of markedness, acts only *locally*. Markedness cannot be eliminated; only markedness regarding one specific parameter can be reduced because "jeder einzelne natürliche grammatische Wandel hinsichtlich eines Parameters geschieht ohne Rücksicht auf die jeweils anderen Parameter" (*ibid*., p. 31). The reduction of phonological markedness of a form can lead to greater markedness regarding a morphological principle. If in a language, for example, unstressed vowels are reduced, leading to phonologically more unmarked forms, this can build markedness regarding the principle of morpho-semantic transparency. Since unstressed vowels are often inflectional affixes, the reduction of these makes the word morpho-semantically opaque. This example shows that language change proceeds with reference to one parameter only. The outcome can build markedness on another level and can thus conflict with another parameter. It is therefore impossible that there is an end point that language change is moving towards, although language change is directed.

The question arises, however, why language change should follow these markedness principles. The logic behind this construct is that unmarked forms are preferred over the marked ones because they are more easily processed.

> Eine Erklärung des Phänomens der Markiertheit muß in der menschlichen Sprachkapazität selbst gesucht werden. Alle einschlägigen Fakten sprechen dafür, daß der Begriff der Markiertheit grammatische Komplexität reflektiert, die die Sprachkapazität belastet: Stärker markierte grammatische Erscheinungen belasten die Sprachkapazität mehr als ihre schwächer markierten Gegenstücke. Die schwächer markierten Erscheinungen sind für die Sprecher entsprechend leichter zu erwerben und zu handhaben und werden demzufolge von ihnen […]

> präferiert. Der Grad der Markiertheit einer grammatischen Erscheinung ist also das relative Maß für die Belastung der menschlichen Sprachkapazität hinsichtlich eines bestimmten Parameters, das diese grammatische Erscheinung mit sich bringt. (Wurzel, 1994, p. 35)

It is worth citing this passage at length because it is at the heart of the markedness construct. Marked forms are a burden on the human speech faculty and are therefore avoided. This means, then, that we are in fact dealing with an economy argument. The evidence for the markedness principles stem from several sources, including language typology, language acquisition, aphasia, error analysis and, unsurprisingly, language change. These principles are crucial for any attempt to explain language change with the theory of *grammatisch initiierter Wandel*.

5.1.2 Sound Change and Phonological Principles

We will now try to address the problem of sound change in the theory by Wurzel (1994). It was said above that we are confronted with a layer of markedness that assumes that marked forms are uneconomical because they are not as easily processed as unmarked forms. This applies also to phonology in that the human speech organs constrain the articulation and perception of language.

> Markiert sind diejenigen Laute, Lautkombinationen, Silben und Wörter, die verglichen mit anderen relativ schwer vom Sprecher zu artikulieren und / oder vom Hörer zu perzipieren sind. Phonologische Markiertheitsprinzipien sind also phonetisch begründet. Auf der Basis artikulatorischer und perzeptiver Komplexität […] besagen sie, was phonetisch gut bzw. leicht zu meistern ist. (Wurzel, 1994, p. 44)

Wurzel hypothesizes that there are probably many phonological markedness principles (PMP) since there is a variety of possible cross-linguistic sound combinations, many of which have not been discovered yet (cf. Wurzel, 1994, 44f.). We may illustrate the nature of these PMPs by contrasting two of them which are interrelated.

The first markedness principle (PMP1) Wurzel presents refers to the nasalization of vowels: "Ein Vokal ist hinsichtlich der Nasalität unmarkiert, wenn er nichtnasal ist und markiert, wenn er nasal ist" (*ibid*., p. 45). This principle is supported by several facts. Firstly, nasalized vowels are harder to articulate than non-nasalized vowels.[23] Secondly, nasalized vowels are harder to distinguish in spoken speech. Moreover, all languages have non-nasalized vowels while not all languages have nasalized ones. A typological generalization is that nasalized vowels imply non-nasalized ones but not vice versa (cf. *ibid*., 45f.). PMP1, then, would predict denasalization of vowels, for which there is indeed evidence in dialects.[24]

[23]Nasalization requires the opening of the nasal cavity in addition, resulting in more articulatory energy.
[24] For instance, *schẽẽ* > *schee/schie* 'schön' in Frankish (and other dialects in Germany).

A second markedness principle (PMP2) shall be considered here. Here, it is held that "[e]in Vokal vor einem Nasalkonsonanten ist hinsichtlich der Nasalität unmarkiert, wenn er nasal ist und markiert, wenn er nichtnasal ist" (*ibid*., p. 47). Although this principle might seem to contradict PMP1, because in PMP2 nasalization is unmarked, this is a common assimilatory phenomenon. On the one hand, PMP2 refers to the realization of the vowel in a specific context, namely when a nasal consonant follows. PMP1, on the other hand, refers to context-free vowels. PMP2 is assumed because nasalized vowels are easier to articulate in front of a nasal consonant than non-nasalized vowels. There is evidence from Swabian where every vowel in front of a nasal is nasalized, for example /bẽ:n/ 'bin', /sõ:n/ 'Sohn' (cf. *ibid*., p. 47).

We can now turn to our sample sound change presented in chapter 3 and try to apply the notion of *grammatisch initiierter Wandel* outlined thus far.

5.1.3 Breaking in the Markedness Framework

The two principles PMP1 and 2 above have shown that there are context-free principles and contextualized ones for the same item (i.e. nasalized vowels). If we want to apply Wurzel's theory to our sound change, the first step is to find out which kind of markedness is eliminated.

> Wenn in einem gegebenen Fall überprüft werden soll, ob ein dokumentierter Wandel aufgrund des Prinzips des natürlichen grammatischen Wandels erklärt werden kann, so muß ermittelt werden, worin der Markiertheitsabbau in diesem Fall besteht. (Wurzel, 1994, p. 32)

There are several possible ways to go from here. One approach, which is adopted here, starts by surveying the relevant markedness principles. One specifically interesting principle is PMP5:

> Einheitlichkeit des Silbenkerns
>
> Eine Silbe ist hinsichtlich ihres Silbenkerns um so weniger markiert, je einheitlicher dieser ist (um so weniger verschiedene Segmente diesen bilden). (Wurzel, 1994, p. 52)

Put differently, a syllable nucleus is unmarked the fewer vowels it contains. Marked are nuclei with a triphthong and unmarked those with a monophthong. Wurzel gives cross-linguistic evidence that all languages have monophthongs, while only some languages have diphthongs and few have triphthongs. Consequently, PMP5 would predict, for example, changes from diphthongs to monophthongs. However, the reverse, that is, changing monophthongs into diphthongs, should not happen. As we have seen in chapter 3, exactly this seemed to have happened in Old English breaking. Wurzel also acknowledges that there are cases of diphthongizations such as the New High German diphthongization which he views as

influenced by other, suprasegmental factors (cf. *ibid*., p. 53, footnote 15). In short, PMP5 contradicts the outcome of breaking because diphthongization is not a "natural" process.[25]

We are therefore forced to assume a different parameter for breaking. Similar to the principle PMP1 above, PMP5 is context-free because it generalizes the trend in syllable nuclei in whatever linguistic environment. It is reasonable to assume parallel to the contextual principle PMP2 as well a contextual principle for the nucleus principle PMP5. Monophthongs might be preferred in the nucleus generally, but in certain environments the opposite, i.e. diphthongs are preferred. We might state this phonological markedness principle for breaking (PMPB) as follows.

> PMPB: A vowel followed by a 'back' consonant is unmarked regarding the position of the tongue if it is a back vowel and marked if it is a front vowel.

Similar to the principle PMP2, PMPB states markedness for vowels in the context of a following 'back'-articulated consonant, which the relevant consonants for breaking ([ɬ], [r] and [x]) are instances of. However, it has not been proven yet whether a dissimilated vowel-consonant combination of this type is in fact rare in the world's languages, neither do we have evidence for corresponding speech errors.[26]

If we accept for a moment the authenticity of PMPB, there is still no reason why the front vowel should become a diphthong. A front vowel that is marked in the specific environment (i.e. preceding a 'back' consonant) could as well be retracted to assimilate to the consonant. We face another problem of this theory here, namely that the markedness principles do not predict *how* markedness is reduced. It remains elusive, in our case, whether regressive or progressive assimilation occurs,[27] and which measures are employed to reduce markedness. It would be possible, as was said, that the vowel in, for example, /æld/ simply retracts to /ald/. The strategy of breaking to insert a back vowel is not predictable from this perspective.

To sum up, we have examined the theory of *grammatisch initiierter Wandel* which supposes that the initial cause of language change comes from the system itself. While relying largely on the structuralist linguistic theory, this approach adds a further layer to the system,

[25] A process is "natural" if it is (cross-linguistically) very common, hence unmarked. Cf. the terms *Natürlichkeitstheorie*, *natürlicher grammatischer Wandel* etc.

[26] Further studies could give evidence for the PMPB from different branches of linguistics, such as language typology. It is beyond the scope of this study to supply exhaustive evidence for the principle, since the main focus is on the theories themselves.

[27] The principle PMPB in the form above would yield progressive assimilation. However, there is no reason to rule out regressive assimilation of the consonant. This version of the PMPB would state: A consonant that is preceded by a front vowel is unmarked if it is a "front" consonant (i.e. labial, alveolar, palatal) and marked if it is a "back" consonant (velar, uvular etc.). Consequently, another strategy could have been the assimilation of the consonant instead of the vowel.

thereby making use of the notion of *markedness*. This theory views language change as the reduction of markedness of a form. However, a form can be marked only in reference to a specific *parameter*. A change is therefore only a local improvement, i.e. reduction of markedness, which can result in increasing markedness regarding another markedness principle. Language change is thus directed, namely towards the reduction of markedness, but has no final end point.

Assuming that unmarked forms are more economical for the speakers, the parameters are mainly grounded in cross-linguistic evidence. In trying to apply the theory to our example of breaking, we saw that parameters can be contradictory depending on their status as being contextual or context-free. It was necessary to formulate a contextual parameter in order to model breaking as reducing markedness. However, the parameters (and the theory) do not specify which strategies are adopted to overcome markedness.

While it is characteristic of structuralist theories that they focus exclusively on the system as such, proponents of speaker-oriented approaches turn away from the system and consider the motivations of the language users, which will be our next focal point.

5.2 The Pragmatic Approach to Language Change: *Invisible-Hand Theory*

In the context of the pragmatic turn in the 1960s and 1970s, the previously ignored perspective of the language speaker was focused.[28] The novel approach to interpret utterances as *speech acts* was an integral part of this pragmatic theory. Authors such as Austin and Searle proposed a speech act theory that emphasizes the action carried out by an utterance. This theory has a long tradition – some scholars even view Wilhelm von Humboldt as the precursor of the modern pragmatic language theory[29] (cf. e.g. Bülow, 2017, p. 47) – building mainly on the philosophical work of Ludwig Wittgenstein. In diachronic linguistics, the central assumption is that "change is […] driven by social factors and language users who are active participants in negotiation of linguistic patterning" (Traugott, 2012, p. 549).

The perhaps most important contribution to pragmatic theory stems from Herbert Paul Grice who formulated maxims that language users follow. In the center of these maxims stands

[28] Other famous linguists, especially from sociolinguistic research, similarly emphasize the role of the speaker in explaining language change, adopting a pragmatic perspective, see cf. James Milroy (1997, 2003).

[29] It is not convincing to present Humboldt as a proponent of a speaker-oriented approach to language as Bülow (2017, p. 47) does. It is, however, true that Humboldt saw speech as the primary instance whose cumulation subsequently leads to a language instead of seeing the language as something given. Consequently, language is a dynamic and procedural entity that is mutually conditioned by its speakers (cf. Bülow, 2017, p. 48). On the other hand, saying that speech constitutes language is not the same as saying that speakers are using language to accomplish social goals, which is the premise of a pragmatic theory (of language change). Rather, it appears that Humboldt, as his primary argument, defined a language in terms of its expression of a nation's *Geist*, cf. e.g. "über den Nationalcharakter der Sprachen" (Humboldt, 1996, p. 244).

the rational speaker that acts intentionally. Grice formulated in total eleven maxims that belong to one of the four categories of *quantity*, *quality*, *relation* and *manner* (cf. Bülow, 2017, p. 64f.). It has to be stressed that these maxims are not to be misunderstood as normative "rules". The maxim of quantity "make your contributions as informative as required", for example, is not an imperative for language users – although grammatically speaking, it is – but a description of "sensible" communicative behavior (cf. *ibid*., p. 65). These maxims are principles of "cooperative speaking", which stresses the mutual interest of the interlocutors in pursuing these maxims.

Pragmatic explanations are common in grammaticalization theory (e.g. Hopper & Traugott, 2012; Traugott, 2002), stressing the desire of speakers to be articulatory economical and expressive. A specifically often cited and discussed theory in the pragmatic framework is the *invisible-hand theory*[30] by Rudi Keller (1994) which we shall examine in what follows.

5.2.1 Language Change as an Epiphenomenon

The first important hypothesis of modelling language change as an invisible-hand process is that language change is an epiphenomenon (in Keller's terms "a phenomenon of the third kind"). It is neither a natural phenomenon that happens without human intervention, nor an artificial object that is purely product of human design. Rather, phenomena of the third kind are

> collective phenomena. They come into existence through actions of many, and this because the actions generating the phenomenon are characterized by certain similarities, which may be irrelevant as such, but which together can have certain consequences. (Keller, 1994, p. 61)

The three fundamental characteristics of such a phenomenon are that they a) are procedural, b) consist of a micro- and a macrolevel and c) are both an artefact and a natural phenomenon (cf. *ibid*., p. 99). They are procedural because they arise as the consequence of many individual human actions. The respective motives and intentions of these actions are located on a microlevel, while the unintended result is located on a macrolevel.

Keller compares language change with other phenomena of the third kind, such as a desire path. Humans tend to take the shortest way because one of the leading maxims is to be economical (cf. *ibid*., p. 100). Hence, the best strategy to accomplish this maxim in this case is to go the way that takes less time. This is the microlevel of the individual intentions. Since many individuals will choose the more economical alternative, the gras will be stepped down at this area, hence it is a *procedural* event. The ultimate result is a macrolevel structure, the

[30] Keller adopts this term from Scottish moral-philosophers of the 18th century, including Adam Smith and Adam Ferguson (cf. Bülow, 2017, p. 70).

desire path, that is initially not intended by the individuals, but is the inevitable result of the accumulation of the intentions on the microlevel.

Keller presents the mechanism of an invisible-hand process as follows:

> An invisible-hand explanation explains its explanandum, a phenomenon of the third kind, as the causal consequence of individual intentional actions which are based on at least partially similar intentions. (Keller, 1994, p. 68)

In the example of the desire path the intentions of the individuals were clear, i.e. take the shortest way. However, in the realm of language, there are a number of maxims that describe the communicative behavior. To act means for Keller to try to transform a "relatively less desirable state into a relatively more desirable one" (*ibid*., p. 101). This is reflected in his hyper-maxim of communication: "Talk in such a way that you are socially successful, at the lowest possible cost" (cf. *ibid*., p. 102). There are submaxims that are either static, i.e. those that do not cause language change, or dynamic maxims, hence lead to a change. Static maxims, on the one hand, maintain intelligibility: "Talk in such a way that the other understands you" (*ibid*., p. 94). Dynamic maxims, on the other hand, can be focused on the (social) effect: "Talk in such a way that you are noticed" and "Talk in such a way that you are not recognizable as a member of the group". The latter maxim is also an expression of identity by excluding the group that the speaker wishes *not* to identify with. In other words, this maxim is identification *ex negativo*. Moreover, dynamic maxims can also be based on the economy principle: "Talk in such a way that you do not expend superfluous energy. " (*ibid*., p. 97f.)

It is evident that these two kinds of maxims are often in conflict. If, for example, a speaker wants to be noticed, he can hardly save resources. Attracting attention is ultimately connected with innovative language use which will result in more cognitive or articulatory expenditure. Keller similarly notes:

> In a 'diachronic conflict' of a special kind, the maxim according to which we save articulatory energy clashes with the maxim according to which we talk in such a way as to be understood. (*ibid*., p. 103)

5.2.2 Adopting Lüdtke's Cycle of Language Change

In trying to account for this conflict between striving to economize speech on the one hand and expressiveness on the other hand, Keller makes use of a diachronic model[31] proposed by Helmut

[31] Similar models that describe diachronic developments were also proposed before Lüdtke. For instance, Otto Jespersen explained the shortening and extension of French negation in a cycle similar to Lüdtke's cycle. However, Lüdtke can account for this cycle by adding his notion of redundancy.

Lüdtke (1980, cited in Keller, 1994, p. 106). This model holds that language change is a cycle that consists of the three following components.

> … > Lexikalische Anreicherung > Verschmelzung > lautliche Schrumpfung > … (after Keller, 1994, p. 106)

Speakers use redundancy in their expressions in order to make sure that they are understood. However, only a certain degree of redundancy is functional; if speech is more redundant than necessary the hearer will deem it boring. On the one hand, monitoring how much redundancy is functional in accomplishing maxims such as "be perspicuous"[32] and at the same time making oneself noticed constitutes how much (phonetic, lexical) material is added. On the other hand, an economy maxim causes the speaker to erode phonetic material, since too much redundancy is counterproductive (cf. Keller, 1994, p. 105f.). This general principle of linguistic change is a directed process and therefore an irreversible "drift". Keller sees the potential of this model to explain changes in his theory of the *invisible hand*.

> To my mind, Lüdtke has shown how three invisible-hand phenomena can follow each other cyclically so that the output of each preceding process (no matter where the starting-point is placed) provides the decisive ecological input conditions for each following process and sets it in motion. (Keller, 1994, p. 107)

The necessary condition for the initiation of the next step in this cycle is that the speakers act according to the maxims that Keller also assumes. However, Keller's hyper-maxim was defined as being both an economy and an expressiveness maxim (cf. above), assuming that different maxims can be relevant in one single utterance. It is therefore not logical why Lüdtke's cycle should model a diachronic succession if the maxims are not understood as subsequent stages but as different factors that can combine at the level of speech production.

At the same time, it is not surprising that Keller adopts this model for his theory. The *invisible-hand* process might be a convincing framework that makes language change plausible, but it is hard to imagine an actual change explained within this theory. This becomes apparent, and is among the standard criticism of this theory (cf. Croft, 2000, p. 61), that only two examples are discussed, both instances of semantic change. One example refers to the pejoration of the German word *Frau* and its replacement by *Dame*; the other deals with the former homonymy of *englisch* that was disambiguated by the emergence of *engelhaft*. In both instances, speakers are assumed to choose another word in the respective contexts, resulting in narrowing the use of *Frau* and *englisch* (cf. Keller, 1994, p. 90f.). On the one hand, it seems rather hard to explain sound change with this theory, since particular phonemes do not carry a

[32] One of Keller's and Grice's maxims (cf. Bülow, 2017, p. 65).

meaning themselves.[33] Lüdtke's model, on the other hand, has the advantage to be linguistically more applicable. We will now attempt to apply Keller's framework to *breaking* again and thereby elucidate major problems of this theory.

5.2.3 Breaking as an *Invisible-Hand* Process

Since an *invisible-hand* process is a threefold process, we need to go step by step to explain a change with this theory. The first step is the presentation of the intentions, motives, goals etc. that cause the individuals to act. The subsequent step needs to show how the final structure emerges through the accumulation of the individual acts, and the third step presents this ultimate structure, i.e. the explanandum (cf. Keller, 2003, p. 67).

The first step includes the formulation of the premises; the initial conditions that Keller (a bit unfortunate) calls ecological factors (*ibid*., p. 90). These can be of linguistic or non-linguistic nature. Keller, for example, assumes as an extra-linguistic ecological factor in the elimination of the *englisch* -homonymy the increasing importance of England in the context of the industrialization in the beginning of the 19th century (*ibid*., p. 90).

Linguistic ecological factors, i.e. the initial conditions, on the other hand, refer to the individual competence of the speakers.[34] It is in the area of linguistic factors that we must search for the initial conditions that led to breaking in the Old English period.

Mitchell and Robinson (2012, p. 38) interestingly illustrate the process of breaking thus:

> You can see the result of this process in an exaggerated form if you imagine that you have fallen overboard from a ship and are calling out 'Help'. If you call out loudly and long […], you will find that the vowel of the word 'Help' is 'broken' as you glide from the front position of *e* to the back position of *lp*. If you spell it as you are pronouncing it, you will write something like 'Heulp'. (emphasis original)

This vivid explanation might be of some help for us to state the initial conditions for breaking. If the vowel insertion is a phenomenon that occurs in loud and long articulation of the vowel-consonant combinations, we have a convincing initial condition. We must, however, state that this is due to an assimilatory process, as was pointed out earlier. In order to abridge the distance between the back consonant and the front vowel, a glide develops between those two sounds. Hence, the initial conditions on a linguistic basis can be described as the phenomenon of assimilation.

[33] Phonemes distinguish particular words, hence the notion of minimal pairs. However, unlike lexemes, they do not refer to any kind of non-linguistic referent.

[34] Keller does not include the hearer in this constellation since "[t]he hearer's real competence is not one of the factors influencing the speaker's actions, as he or she has no access to it." (Keller, 1994, p. 89)

The second step involves the formulation of the maxims that the speakers strive after. We can quite plausibly assume that breaking is a process that a) eases articulation and b) adds phonological material to the stem, i.e. producing a diphthong. Consequently, we can assume an economy maxim "Speak in such a way that you do not expend superfluous energy" (*ibid*., p. 97), which accounts for the fact that speakers would insert a back vowel. However, similarly plausible would be the retraction of the respective front vowel or the 'fronting', i.e. palatalization of the 'back' consonant.

Another kind of maxim that can be made plausible here rules out these two mentioned alternative solutions to the strive for speech economy. This is a maxim that in Lüdtke's cycle corresponds to phonological/lexical enlargement. It is any dynamic maxim that would justify adding phonological material; hence a maxim such as "Talk in such a way that the other understands you". This maxim was pointed out above and refers to what Lüdtke calls functional redundancy. We can equally see breaking as the development of a redundancy. Speakers might felt that the stem-vowel in *feh*[35] is not as audible as in *feoh* 'cattle', hence could threaten the understanding of the message.

In trying to elaborate those vowels, speakers would take an option that even accomplishes another maxim, an economy maxim. The new diphthongs are more expressive and are a better choice to convey the message. At the same time, they ease articulation because only vowels before a 'back' consonant are affected. We can quite plausibly assume the operation of Keller's hyper-maxim "Talk in such a way that you are socially successful, at the lowest possible cost" (cf. above), which is both an economy and a social maxim.

We have seen that we can only speculate on the initial conditions of breaking and the relevant maxims that could have brought about such a change. An *invisible-hand* explanation tries to reveal the intentions and goals of the individuals, i.e. the microlevel, whose accumulation leads to a structure at the macrolevel. Language change is such a structure. It is not intended but is the consequence of a great number of similar individual actions: a phenomenon of the third kind.

While this theory makes language change plausible, it is rather hard to explain changes other than changes in the lexicon with it. It needs a linguistic element that carries some kind of meaning by itself in order to link it logically to the individual's actions. Phonemes, however, do not carry meanings by themselves, hence sound changes need to be explained with either the ease of articulation or as the result of a redundancy monitoring process as Lüdtke described

[35] The grapheme <h> has different allophones in Old English. In this case it is assumed to be a velar fricative [x].

it, leading to the reduction or addition of linguistic material. These two motivations of sound change manifest themselves in two competing kinds of dynamic maxims. One states that speech should be as economical as possible, the other leads to more expressive utterances by adding phonetic material.

Breaking can be interpreted as being both an instance of economizing speech and being expressive by adding phonetic material. The invisible-hand process as such, however, is not convincingly applicable to sound change, and does not contribute much to our understanding of breaking. An invisible-hand theory is better at explaining the spread of a novel form rather than the emergence of it. Hence, it describes the development of a direction where changes are leading towards, which means, according to Croft (2000, p. 60), that "the invisible hand process is an example of evolutionary drift". Accordingly, our next focal point is a rather recent theory that tries to make use of Charles Darwin's evolutionary theory.

5.3 The Evolutionary Framework

It has become apparent that the two theories presented until here are very different in their ways of explaining language change. While Wurzel's theory excludes the speaker completely and seeks for impulses of change in the system itself, Keller's notion of the invisible hand relies on the intentions of the individuals, the side-effect being language change. The attempt to unite those approaches is witnessed by Wurzel's contribution (1997) with the telling title "Natürlicher Grammatischer Wandel, 'unsichtbare Hand' und Sprachökonomie – Wollen wir wirklich so Grundverschiedenes?". Keller's (1994, p. 110ff.) response is a harsh criticism of naturalness theory resulting in the rejection of the proposal because the differences are too vast.

The 1990s were marked by the quest for an ontological framework that incorporates several language change theories and eventually saw the borrowing of the neo-Darwinian evolutionary theory. Cultural Darwinism, for example, assumes that cultural products can be described as an evolutionary process.[36] However, seeing language change as an instance of evolution was only promoted hesitantly. Bülow (2017, p. 153) explains this fact by the dominance of generative linguistic theory, which assumes a certain amount of linguistic structures to be innate and hence not culturally transmitted.

By regarding language as a cultural product, language change was modelled in analogy to the evolution of species. Several arguments justify this model, for example, the fact that both species and languages exist through time. Moreover, speakers, as well as organisms, build

[36] Neo-Darwinians also see the development of science as an evolutionary process. Certain paradigms in a discipline are better adapted to the field and survive, i.e. are selected, while less well adapted ones lose their influence (cf. Croft, 2000, p. 24).

populations with a certain degree of variation. Isolating parts of a population can similarly lead to divergence. Dialect continua can thus show the linguistic consequences of geographical separation of speakers. However, while it is true that the parent generation passes on the structures of the language to the child generation, language is not coded in the genes but is *acquired*. It follows that new variants in a language are not only produced by the succession of generations but also during a single generation (cf. McMahon, 1994, p. 336).[37]

Another difference lies in the fact that mutation in biology is defined as a random process, whereas language change can indeed be the consequence of intentionality. Bülow (2017), assuming Keller's theory of the invisible hand, argues: "Weiterhin kann Sprachwandel insbesondere auf der Mikroebene […] intentional induziert sein. Dafür spricht, dass wir unser Sprachverhalten auch an dynamischen Maximen ausrichten" (p. 159). This is certainly a crucial difference between language change and evolution, which ultimately has to do with the consciousness of human actions in contrast to other organisms.

Keller, recognizing the potential of the evolutionary model, added a chapter on "Language change as an evolutionary process" to his second edition of 1994. He argues that "there is only a small step from the theory of the invisible hand to the concept of evolution, historically as well as systematically." (Keller, 1994, p. 139) The salient features of an evolutionary process are that a) it is not teleological, i.e. going in a pre-determined direction; b) it is a cumulative process brought about by a population, and, above all, c) it rests on the interaction of variation and selection (*ibid*., p. 139f.). It is uncontroversial that language change builds on synchronic variation, which is particularly emphasized by empirical studies on phonetics (e.g. Ohala, 1989). Evolutionary theory, unlike any other theory, crucially highlights this component as the basis for language change; it is a *conditio sine qua non*. This allows to incorporate the findings of sociolinguistic theory since this paradigm investigates all sort of linguistic variation in a speech community.

The second salient mechanism is selection, which is strictly separated from variation. Variation is 'blind' for its potential advantage it has on the organism. It is only by a subsequent mechanism that the best adapted instances are selected and given a reproductive advantage,

[37] This problem was also recognized by neo-Darwinians like Dawkins and Blackmore, and a Lamarckian theory was proposed instead. Lamarckism, in contrast to Darwinism, argues that the phenotype of an organism can have effects on the genotype. For instance, Lamarck thought that a giraffe stretched its neck in order to reach the higher leaves, making the neck grow longer. Similarly, linguistic forms are not coded in genes, and changes in utterances can therefore occur within one speaker's lifetime.

> As organisms, idiolects are indeed more Lamarckian than Darwinian, since they frequently change their genetics makeups while they adapt to their different hosts, on whose life-style their vitality depends. (Mufwene, 2010, p. 313, cited after Bülow, 2017, p. 158)

allowing the organism to spread its mutated gene in the gene pool of the population. Keller (1994, p. 143) proposes two kinds of selection mechanisms in language change, one is internal, that is, linguistic selection, the other social. Bülow (2017, p. 170) assumes only a social selection mechanism, but sees language as a "complex adaptive system".[38]

McMahon (1994) acknowledges the benefit of an evolutionary approach to rule out the notion of teleology as an explanation for directionality in language change. Although organisms, as well as languages, have undergone changes that seem to go in certain directions, this is only due to the operation of random mutation and selection.

> This axiom [of evolutionary methodology, R.M.] would help us solve our problem of perceived directionality, for which teleological explanations have previously been proposed. Perceived directionality is accepted in current evolutionary theory as resulting from random variation and natural selection, which combine to produce order with no necessary external direction. (McMahon, 1994, p. 337)

The perhaps most elaborated evolutionary approach to explain language change was proposed by William Croft (2000), whose theoretical concepts that can help us to explain sound change are presented in the following.

5.3.1 Variation and Selection – Croft's Evolutionary Approach

Croft presents a theory of utterance selection which is deeply connected to his understanding of language. Any kind of monocausal theory is suspicious, hence it is necessary to propose a theory that allows for different factors in explaining language change. Croft begins by criticizing the structuralist notion of language as an abstract system, thereby refusing structuralist theory altogether:

> The position taken in this book is that the study of language is about empirically real entities, not idealized abstract systems. The real entities of language are utterances and speaker's grammars. Language change occurs via replication of these entities, not through inherent change of an abstract system. (Croft, 2000, p. 4)

The starting point is again neo-Darwinian theory, which was briefly mentioned above. Croft mainly refers to David Hull (1988) who models the development of scientific paradigms and theories as an evolutionary process. Hull (1988) identifies replicators, i.e. the genes, and interactors, i.e. the organism that interacts with its environment. A replicator is "an entity that passes on its structure largely intact in successive replications" (*ibid*., p. 408), whereas the interactor "causes replication to be differential" (*ibid*., p. 409). The product of replication can

[38] It is beyond the scope of this chapter to outline the arguments for language as a complex adaptive system ("chaos theory") in the evolutionary framework. For an exhaustive discussion see Bülow (2017), Lass (1997).

be either an identical copy, hence normal replication, or a different structure, i.e. altered replication (cf. Croft, 2000, p. 23). The latter type, altered replication, is the source for variation in a population.

It is assumed that the interactor and the mechanism of selection give rise to what is called differential replication. Since selection causes some interactors to have an advantage over others, these variants will exert a greater influence in the population.

> The paradigm example of differential replication is the increase in frequencies of certain genes due to the favored survival and reproduction of the individual organisms possessing those genes in their ecological environment. (Croft, 2000, p. 23).

Language change relies to a great extent on the working of the language itself. In other words, it is impossible to understand language change if we do not understand how speakers use their language. Croft defines language as "the population of utterances in a speech community" (*ibid*., p. 26). An utterance is defined as

> a particular, actual occurrence of the product of human behavior in communicative interaction (i.e. a string of sounds), as it is pronounced, grammatically structured, and semantically and pragmatically interpreted in its context. (Croft, 2000, p. 26)

This has several consequences. Firstly, a language is nothing more than the sum of all its generated utterances. Secondly, it follows that utterances that were never in fact physically produced are not part of the language. This obviously conflicts with the generativist assumption of a speaker's grammar in terms of its ability to produce an infinite number of sentences. Any token[39] that has never been pronounced before but could be uttered is in Croft's definition not part of the language. Similarly, a token that has never been produced but could be understood by the hearer is theoretically not "language". Once it is produced for the first time, it becomes language and in this moment is intelligible. Croft argues that this aspect is important for the theory of selection since selection only operates on actual individuals in biology. A population, and therefore a language in this model, "is a spatiotemporally bounded set of actual individuals, not a set of 'possible' individuals – whatever that would mean" (*ibid*., p. 26). In biology this might be hard to imagine, but generativist theory has emphasized that sentences like "Colorless green ideas sleep furiously" (Chomsky, 1957/2002, p. 142)[40] that were never heard before can be understood.

[39] I choose the term "token" here because, according to Croft's definition of an utterance, it must have been pronounced before. Token here means any kind of human speech production.

[40] This famous sentence stems from Noam Chomsky's book *Syntactic Structures* (1957/2002).

In a similar vein, Croft's notion of the speaker's grammar is not a generative one but simply defines it as the structure that is used in producing utterances.

> A grammar is the cognitive structure in a speaker's mind that contains her knowledge about her language, and is the structure that is used in producing and comprehending utterances […]. The grammar of each speaker is acquired on the basis of the subpopulation that she is exposed to.[41] (Croft, 2000, p. 26)

Consequently, since every individual has a different linguistic input in the acquisition process, every speaker has a slightly different grammar. The speaker and its grammar subsequently correspond to the interactor in Hull's terms, which interacts communicatively with the speech community, i.e. the environment. The latter also includes "the social context of the speech event, and the goals of the speech event itself" (*ibid*., p. 27).

The next necessary element of evolutionary biology is that of the genes. Croft proposes the "lingueme" as the replicator in language that corresponds to the gene. Similar to the DNA that consists of genes, an utterance consists of linguemes that have a linguistic structure. Linguemes can be "anything from a phoneme to a morpheme to a word to a syntactic construction, and also their conventional semantic/discourse-functional values" (*ibid*., p. 28). Croft goes on to equate alleles in biology, i.e. alternative forms of a gene, with variants of a lingueme. This includes synonymy, allophony and any other alternative form to express the same idea (cf. *ibid*., p. 28). The set of all linguemes form the lingueme pool in analogy to the gene pool. Hence every utterance consists of linguemes that are replicated in speech production.

It is crucial to understand how the speaker produces an utterance in this conception, leading to the "utterance selection model", which is the theoretical core of Croft's approach.

5.3.2 The Utterance Selection Model

Replicating linguemes in certain social contexts is governed by convention in the speech community. Accordingly, choosing the appropriate lingueme for an utterance is determined by the linguistic convention. It follows that the parameter of convention in utterance selection is the salient factor that separates normal replication from altered replication.

> Normal replication is simply conformity to linguistic convention. Altered replication is the result of not conforming to linguistic convention. However, a wide range of mechanisms may lead to a speaker not conforming to linguistic convention in an utterance. (Croft, 2000, p. 31)

These mechanisms as Croft calls them are certainly crucial for motivating language change and rely on many theories proposed in the literature. Before we look at the specific mechanisms that

[41] Croft uses the female pronoun to refer to the speaker and the male pronoun for the hearer.

can motivate sound change in this model, we can now put all the elements together and describe the selection process.

Croft argues that selection in language change is a social phenomenon, not a functional. The variants that developed through altered replication are alternative forms. However, they do not remain mere doublets without any difference. It seems to be the nature of the human language faculty, from the speaker's perspective, to use a different form with a different function, and from the hearer's perspective, to assume that a different form fulfills a different function. We are aware of the fact that two variants tend to acquire a distinctive feature since there is almost no case of exact synonymy.[42] With the insights of sociolinguistic theory, Croft argues that social parameters essentially govern the selection of one variant over the other.

> The variants in a linguistic variable have social values associated with them. Speakers select variants to use […] in particular utterances on the basis of their social values: overt or covert prestige, the social relation of the speakers to the interlocutor, etc. (Croft, 2000, p. 32)

The lingueme that the speaker chooses over another lingueme has a specific social value. Deciding for a lingueme results in either conforming or not conforming to convention, which is ultimately conditioned by the communicative situation and the intentions of the speaker. An utterance necessarily replicates one or more linguemes; the selected linguemes display whether normal or altered replication has occurred. We might summarize the utterance selection model thus:

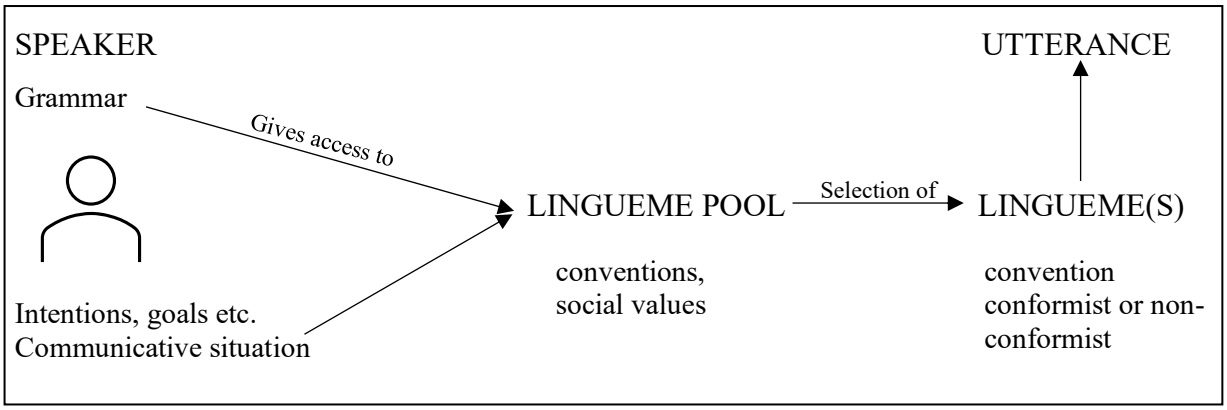

Figure 2: Summary of the utterance selection model proposed by Croft (2000, p. 6ff.).

Firstly, the utterance selection model holds that utterance selection is the primary – though not the only – locus of language change (Croft, 2000, p. 30). Moreover, it puts linguistic convention in the center because for every communicative situation there is a conventional

[42] Synonymy in its purest form is almost unattainable in language. One form might acquire a slightly distinct social value by being used in different contexts. Often the distinction is a mere matter of style and displays subtle shadings.

lingueme and there are unconventional ones. The conventionality of a structure is crucial because it separates normal replication from altered replication, which leads to new variation. The cumulation of this social selection process by many speakers leads to the differential replication of linguemes, causing some of them to eventually die out and others to proliferate. Croft assumes specific linguistic maxims to be responsible for the selection of one form over another. Above all, those maxims that define talking as an act of identity are relevant, including maxims such as "Talk like the others talk", whereby the "others" are the social group that the speaker wishes to identify with (cf. *ibid*., p. 73).

Secondly, the utterance selection model and the whole evolutionary approach understands language change as two separated processes: replication that leads to variation in some cases and selection which is understood as differential replication. These two processes correspond to innovation, i.e. the genesis of novel forms, and propagation of changes. A specific variant that was innovated in a speech community is not an instance of language change until more speakers adopt this form. Croft (2000, p. 64) presents several mechanisms for normal replication, thus leading to stasis, and for innovative language use respectively. We now turn to the relevant mechanisms for innovation in phonology since we are interested in the ways this theory can explain sound changes.

5.3.3 The Rise of Phonological Innovations

Once we define innovation as not conforming to linguistic convention, the question arises why speakers should break with conventions. Croft (2000) is right in saying that "[s]peakers have many goals when they use language, but changing the linguistic system is not one of them" (p. 70). Teleological mechanisms in the sense of intentionally changing the language are therefore futile, especially in Croft's conception of language. Why should speakers strive to make the phonological system symmetrical – e.g. providing both a voiced and unvoiced phoneme – when the language does not exist as an abstract system? If language is the set of actually produced utterances, there is no symmetry of phonemes, nor do speakers have access to those abstractions.

Rather, far more compatible with Croft's utterance selection model is the notion of individual intentional behavior that has innovative language use as its consequence. This concept was already mentioned in Keller's theory of the invisible hand and can be referred to as functional explanations.[43] Accordingly, we can incorporate dynamic maxims that account for innovative language use. Those refer either to expressiveness (e.g. "Talk in such a way that

[43] Functional are explanations of the type "X became Y to fulfil function Z"/"The new Y can now do Z".

you are noticed", and variations thereof) or invoke the economy principle ("Talk in such a way that you do not expend superfluous energy" (Keller, 1994, p. 97)). One fundamental problem with the economy principle in Croft's framework is that it is not based on social interaction. Croft, similar to Keller, assumes that utterance selection is a social phenomenon that is conditioned by interaction. This problem can be fixed by incorporating the economy argument into the intentions of the speaker: "Economy may serve the interlocutor's goal of using as little time as possible in achieving their other interactional goals" (Croft, 2000, p. 75).[44]

The third functional explanation for innovation is the strive to avoid misunderstanding.[45]

> Speaking in order not to be misunderstood cannot be reduced to conformity with linguistic convention. One can speak cryptically or confusingly and still be conforming to linguistic convention. Conversely, one might use a paraphrase or circumlocution that is not the conventional expression for an idea, in order not to be misunderstood. (Croft, 2000, p. 75)

Unsurprisingly, Croft's argumentation witnesses that functional explanations always rely on the specific pragmatic context. Linguistic convention and the speaker's intentions can conflict, which leads to innovative language use, e.g., using a more expressive, hence unconventional form in order to be understood. Conversely, there are contexts in which the opposite of the economy principle is desired, for example, keeping a conversation going instead of 'awkward silence'. This strategy to make speech more redundant can be a convention in a speech community but runs counter to the economy maxim.

Beside those functional explanations, we must also consider non-intentional explanations. Croft calls them mechanical processes, whereby the speakers do not even strive to accomplish any goal. They rely only on the physiology of speech and audition. Examples of mechanical innovations are speech errors, although they are of little importance in sound change according to Croft (2000, p. 76).[46] Among the non-intentional mechanisms that Croft deems more important for language change are target-missing mechanisms.

[44] A specifically interesting aspect concerns the interaction of the principles that Croft suggests: Economy is presented as a meta-principle that becomes relevant once the other principles are satisfied. The question remains, however, whether this interpretation of economy is conciliable with the immense power that economic tendencies seem to have in processes of linguistic change. Particularly, it may be argued that certain levels of grammar are prone to be economized (phonology), while others do not (morphology). Such a discussion is worth addressing in future investigations.

[45] This maxim is similar to Humboldt's maxim that maintains intelligibility (cf. e.g., Croft, 2000, p. 75), but is not identical with it.

[46] Croft argues that the mechanism of speech errors is "empirically untenable, because the sorts of novel forms created by speech errors are not the sort of language changes that are empirically attested" (p. 76). It has to be noted, however, that speech errors contribute considerably to the variation of speech, which was already emphasized by Hermann Paul (1995).

> Articulatory mechanisms for altered replication of phonemes can be described as target-missing mechanisms: the speaker aims to produce a particular sound, but overshoots or undershoots the target, for essentially physiological reasons. (Croft, 2000, p. 76)

From the hearer perspective, reanalysis plays a major role. With Ohala (1989) phonetic reanalysis consists of two types, hypo-correction and hyper-correction. We will now consider Old English breaking again and try to see it as an instance of reanalysis in the evolutionary framework.

5.3.4 Breaking as an Evolutionary Process

Any attempt to explain a change in the evolutionary framework needs to explain a) how the variation came about, and b) which selective forces supported this specific form. In Croft's model the two processes correspond to innovation and propagation, which he understands as two strictly separated processes leading to a change. We will begin first by having a closer look at the possible origins of the diphthongs that breaking produced. The subsequent step of selection can only be discussed briefly and less practically for reasons to be outlined below.

Variation is pervasive in language and is primarily caused by the physiology of speech. Ohala (2012, p. 27) argues that "variation is potentially infinite and is mechanically caused". Pronunciation is limited by the vocal tract and therefore is a unique event. No phonetic realization in speech is identical with another:

> Whatever the intention of the speaker may be, the speech that emerges from the vocal tract is the product of that intention plus the effect of physical constraints. Though the speaker's intention may be the same from one utterance to another, the speech signal will vary if the effect of the physical constraints vary – as they will with rate and loudness of speech, etc. (Ohala, 1989, p. 176)

Here, "Intentions" of the speakers is used very differently from the pragmatic-functionalist understanding of the term. For Ohala, intention in speech production refers to the mechanism of having a mental representation, i.e. a phoneme, which the speaker wishes to articulate. The fact that phonetic realization is highly variable was proven in experimental paradigms by Ohala (e.g. 1989). One of the important results of those experiments is that phonetic variation is contextually caused (Ohala, 2012, p. 27).

It is assumed that the listener is capable of identifying the variant as being distorted and consequently reconstructs the correct representation, i.e. phoneme. The hearer, "by identifying the source of the vowel distortion, […] is able to recover the identity of the intended syllable" (Ohala, 2012, p. 27). This is the process of normal replication of phonemes that accounts for stasis. Usually the discourse context and the communicative situation hint towards the corrective rule to be applied by the listener, as well as his experience with speech. The listener

knows, for example, “that a slightly affricated release to a stop before a high front vowel or glide is to be expected and that it is not part of the speaker’s intention” (Ohala, 1989, p. 185). This mechanism, which Ohala calls correction, is salient for understanding and keeps communication intact.

One source of altered replication of phonemes, leading to innovation, is hypo-correction. Here, the speaker’s phonetic realization is distorted but the listener fails to correct it. Consequently, the listener has a different representation of the phoneme than the speaker intended (Ohala, 2012, p. 28). Hyper-correction, on the other hand, happens when the speaker’s realization is not distorted, but the listener applies a corrective rule which leads him to a different representation. Ohala (2012, p. 28) argues that hypo-correction can account for assimilations, while hyper-correction accounts for dissimilations.

We may assume that breaking is an instance of hypo-correction where the listener failed to correct the phoneme he heard. To make this plausible, we have to assume that speakers realized the vowels *æ*, *e* and *i* before a ‘back’ consonant slightly different for physiological reasons. It was pointed out earlier that the insertion of a glide between the front vowel and the consonant is a ‘natural’ process for articulatory reasons. The subsequent inability of (some) speakers to factor out the glide as being due to physiology led to a different representation of those vowels. Listeners would increasingly recognize *æ*, *e*, *i* as being intended as diphthongs. Their altered mental representation then causes them to produce the diphthong themselves. Figure 3 may illustrate this process with the case of *æ* that breaks into *ea* / [æu].

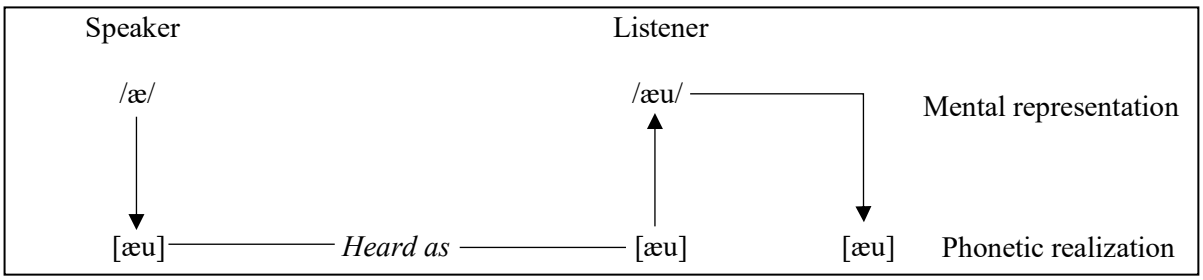

Figure 3: Hypo-correction in the case of breaking, after Ohala (2012, p. 28).

In sum, this view holds that altered replication occurred by hypo-correction. The respective vowels were frequently distorted phonetically for physiological reasons. In some cases, the inserted vowel was corrected and thus did not affect the mental representations, while in other cases speakers were not able to apply the corrective rule. The result was an altered mental representation, namely a diphthong instead of the from the speaker intended monophthong. This altered lingueme was then replicated again by those speakers. It follows that variation in the

speaker population came about that affected the realization of these vowels in the specific environments for breaking.

Once we have a plausible hypothesis about how the variant developed, the next step is the identification of the selective forces that governed the propagation of the new lingueme. Croft (2000, p. 166) argues that selection is only socially conditioned: "the mechanisms for propagation of innovations in language change are social, that is, they involve the relationship between the speaker – the interactor – and the society to which she belongs". But if we understand selection as the differential replication of some linguemes at the expense of others, we need to apply the utterance selection model in order to explain why speakers choose a conventional or non-conventional lingueme. Croft's utterance selection model discussed above does however hold that not only social but also functional factors (the speaker's goals, the communicative situation etc.) influence the speaker's linguistic choice.

Croft's exclusively social definition of the selection process in terms of prestige and group identification does not logically combine with his utterance selection model. Hence it is unsurprising that one fundamental criticism in the literature is his one-sided notion of selection that neglects functional factors (cf. e.g. Rosenbach, 2008; Seiler, 2006). We will return to this issue in the following discussion. The main emphasis of the discussion will be laid on certain aspects that have shown to be controversial in each of the theories presented here, and in the literature. By doing so, we will arrive at some comparative remarks on the explanations that these theories offer. We will close by problematizing the relevance of an evolutionary approach and the question of a pertinent linguistic theory.

6. Critical Discussion

The first theory we examined was a structuralist theory by Wolfgang Ulrich Wurzel. Firstly, in order to explain sound changes with this theory it is necessary to find out which kind of markedness this particular change reduced. This was the first problem that we encountered, because a change can be caused by a variety of principles, not only phonological principles. Semantic or morphological principles can as well have a phonological change as its consequence.

Secondly, the reconstruction of the corresponding markedness principle is questionable. The principle proposed by Wurzel himself which holds that diphthongs are marked in syllable nuclei even rules out changes of diphthongizations, such as breaking. If we rather assume a contextual principle that defines a linguistic environment where diphthongs might be preferred, we can hardly prove the existence of such a principle. Are there infinite markedness principles?

It appears to be the case that for every change we can come up with a fitting principle. Although Wurzel claims that these principles are founded in language typology and other research fields, the fact that known changes are one source of his principles makes their authenticity dubious. Taking language changes as a source for the markedness principles, which are then taken to explain language change, represents a major problem of circularity.

Furthermore, what is striking is the logic of equating commonness of structures with simplicity. Only because monophthongs are more common than diphthongs in nuclei, we cannot infer that monophthongs are more easily processed. The fundamental problem with speech economy arguments in general is their "failure […] to apply in a particular instance" (Lass, 1980, p. 19). They can neither predict changes nor counter-predict the opposite. If a marked form is not changed in a language, proponents of this theory would argue, it must be simply due to another markedness principle that blocks it. Such conflicting principles seem plausible in some cases, such as morphosemantic transparency versus erosion of unstressed syllables. In general, however, incorporating blocking-mechanisms is a strategy to avoid explaining specific instances, since the markedness theory describes at best a general trend of language change. From this perspective, it can be confirmed that indeed "'naturalness' does not explain anything" (Lass, 1980, p. 15).

In contrast to Wurzel's highly formalized theory, Keller's notion of the invisible hand in language change offers a functional explanation of language change. Keller does not locate the cause of language change in the system as Wurzel does but assumes that speakers strive for similar individual goals. The cumulation of these actions brings about language change. The question remains which maxims that reflect the speaker's goals are relevant for a specific change. Keller argues that the ecological conditions lead the speakers to follow a specific maxim. But this factor is not sufficiently defined in the theory; what makes an ecological condition a necessary feature for a maxim? The (few) examples that Keller offers are only semantic changes. In the case of the former homonymy of *englisch*, the rise of industrialization caused the two meanings of the word to become virulent because it threatened the communicative success. Hence the maxim "speak in such a way that you are understood" triggered a different derivational suffix for one of the meanings. It seems, however, that these "stories" are rather arbitrary in nature. Keller does not pay much attention to them, although they are an integral part of his theory. In explaining sound change we face major problems because which "story", i.e. ecological condition, can we reconstruct for a phoneme? Even if we had all details of the society where the change took place, how can we identify the relevant condition that triggered the specific maxim at work?

The problems outlined thus far ultimately depend on the fact that the invisible hand is a theory of the propagation of changes, not innovation. Likewise, Croft (2000, p. 62) sees the invisible hand as a "relatively minor propagation mechanism". In terms of innovative language use, Keller's theory relies on linguistic maxims only. Those are more general in nature, and therefore cannot be taken to explain specific instances of changes. Rather, it seems that Keller's approach refers to the 'big picture' in language change that elucidates the logic behind propagation. Whether changes really propagate according to the invisible hand is still another question. It might account for few semantic changes of pejoration.

We can discern in those two theories discussed until here that they both employ strategies to avoid teleology. In Wurzel's account, a plain markedness theory would be directed towards unmarked forms, which is the final end point. Since it is uncontroversial that change cannot improve or deteriorate language, there must be elements that conflict with one another. A form is not generally marked for Wurzel but is marked to a certain degree regarding one specific parameter. The same form can be unmarked regarding a different parameter. Moreover, markedness is gradable and therefore is not always entirely eliminated; only the most marked forms are changed.

In a similar vein, Keller's maxims also conflict with one another. Economy maxims cannot be the only ones because this would mean that language becomes always more economical. Expressiveness maxims are opposed to economy and try to explain why language does not always become more economical and shorter. It is due to the communicative situation which of the two dynamic maxims is dominant in an innovative utterance. Keller's hyper-maxim combines the economy principle with expressiveness. This rules out the possibility that language becomes either more economical or expressive. One problem with this is that in most cases these two dynamic maxims would theoretically block each other. Unlike Wurzel's conflicting markedness principles, it is not logical why one maxim should dominate if both are relevant for an utterance. Maxims that neutralize each other in an utterance might be taken to account for the pervasiveness of stasis, i.e. no changes in languages.

Croft (2000) offers a more sophisticated theory of innovation in language change. On the one hand, there are intentional mechanisms that basically acknowledge the existence of linguistic maxims. On the other hand, there are non-intentional mechanisms that produce variation. Croft (2000, p. 117ff.) argues that these are to be explained functionally in terms of form-function reanalysis. By viewing the lingueme as the replicator in his model, innovation is defined as altered replication. Form-function reanalysis is motivated by the uniqueness of the speech event. No utterance is like any other, which gives rise to infinite variation. On the level

of phonology, variation is in part due to the physiology of speech production and the errors in the listener's correction-processes. But the dividing line between normal replication and what is considered altered replication is not immediately clear in language. Rosenbach (2008, p. 37) similarly asks: "[T]o what extent is a replicated variant still 'the same' as its source, and how big a step does it take for variants to be 'different'?". As we have seen in the preceding chapter, altered replication in our example was caused by the inability of the listener to correct the phonetic realization of the speaker. This led to an altered mental representation of the phoneme.

Above all, the notion of contingency in evolutionary biology promises to give important impulses for the rise of innovations. Blevins (2004, p. 314) notes that innovation can indeed be random but at the same time be phonetically motivated. Similar to biological replication where "certain DNA replicators are just more likely to occur than others" (Rosenbach, 2008, p. 39), linguistic variation is also in a sense random. It is important to define what we mean by random. Crucially, certain forms are "random in the sense that their probability is causally unconnected to the effect they have on subsequent fitness" (*ibid*., p. 40). This is compatible with Croft's postulate that innovation and propagation are strictly separated processes. New innovations are 'blind' for their possible advantages of being selected. Selection has to be causally independent of the mechanisms that produces variation. This seems to be the logic behind assuming innovation to be functional and propagation to be social, which has been subject to criticism (e.g. Seiler, 2006).

For Croft, selection happens at the level of the interactor and is therefore exclusively socially determined. A speaker chooses one form over the other because he or she wants to identify with a social group. This idea is largely motivated by the findings of sociolinguists such as Labov (1994). At the same time, the locus of selection is utterance selection, which assumes a multifactorial situation. According to the utterance selection model, not only social factors play a role, but also the communicative situation, the goals of the speaker etc. In addition, Seiler (2006, p. 181) notes that the solely social definition of selection is inconsistent given Croft's holistic notion of the interactor.

> The definition of the interactor […] is remarkably multi-dimensional. If a speaker has the choice between options, it is not surprising that at the moment of the concrete selection of an option she is exposed to a multiplicity of influences and preferences, only a subset of which are social factors. (Seiler, 2006, p. 181)

The selection mechanism is similar to an invisible-hand process. Speakers select a variant in order to pursue their individual goals; the cumulation of the individual actions leads to an unintended result, a language change.

> A particular variant may be selected increasingly often such that other competing variants possibly die out. Change therefore is an unintended by-product of many individual choices among available variants (speakers don't select variants 'in order to' change their language, but because they want to communicate successfully, here and now). (Seiler, 2006, p. 164)

Seeing language change as an invisible-hand process has the advantage of avoiding the question of selection, because the change spreads through similar goals of the individuals. It is very unlikely, however, that selection is only functionally conditioned. Social factors must be part of a theory of selection; whether functional factors do really play a role needs to be investigated.

Above all, the evolutionary approach by Croft is a convincing model because it is able to combine the theories proposed in the literature. The subsequent question of whether the evolutionary approach actually changes the way we investigate language change was addressed in Croft (2006). Firstly, the evolutionary model argues for a two-step process that has several empirical implications, for example, the fact that experimental paradigms can be taken to elucidate the mechanisms for innovation (cf. Ohala, 1989; 2012). Rosenbach (2008, p. 56) similarly argues for the implementation of psycholinguistic concepts such as priming in an evolutionary framework.

Secondly, Croft's model can eliminate the notion of teleology in questions of language change. By stressing contingency, it integrates functional and social explanations in an abstract framework. This then also rules out the possibility of predicting language change, which no theory to my knowledge has ever achieved.

> Furthermore, it is impossible to predict the occurrence of change in linguistics or biology, since change results from random, chance mutations. In this matter, however, biology is far ahead of linguistics since biologists have been interested in variation for much longer. (McMahon, 1994, p. 336f.)

The biological metaphor can then also be taken to give interesting impulses for linguistics, as happens with the notion of *exaption* (cf. Lass, 1997; van de Velde & Norde, 2016).

Thirdly, the evolutionary approach can elucidate the quest for a linguistic theory that incorporates the contrasting views of the different theories. Hence "[t]he study of language change can easily be transmuted into the study of language itself, because language is fundamentally a variable, dynamic phenomenon." (Croft, 2000, p. 229) It follows that change and transformation must be part of the definition of a language. For instance, Croft's definition of language as the set of actual utterances is based on a speaker-oriented approach. It basically assumes a functional-pragmatic linguistic theory similar to Keller's approach. By viewing language as a communicative instrument, language is "made and remade, created and recreated, formed and re-formed, by its users, adapting it to the ever changing circumstances of language

use" (Thomsen, 2006, p. 308). Language in this understanding is processual (*energeia*) rather than a static product (*ergon*). This dynamic understanding then also sees language as a unique historical entity, a token. Croft (2000, p. 2) argues that

> [i]n the study of linguistics, the real, existing entities are utterances as they are produced in context, and speakers and their knowledge about their language as it is actually found in their minds.

Different linguistic theories, such as structuralist theory in the case of Wurzel, have a different understanding of what a language is. Structuralism abstracts away from the speaker to describe the structure of the system. This view has been argued to be part of the discourse of historical linguistics.

> Much more generally, however, the idea of endogenous or internally triggered change is so deeply embedded in our subject that it feeds into what can be called the *discourse* of historical linguistics. In this discourse, individual languages are typically presented as changing within themselves rather than being changed through the agency of speaker/listeners. (James Milroy, 2003, p. 357, emphasis original)

It is precisely this discourse that Wurzel's theory is part of. The system itself is claimed to have the potential to cause changes. Abstractions, however, are sometimes necessary and helpful as long as we keep in mind that they are in fact only abstractions and are not mistaken for the complex reality of language. Roger Lass explains his structuralist approach thus:

> The view of language in time that I have been advocating in this chapter […] is 'structuralist' in the specific sense that its basis is neither 'cognitive' nor 'social'; communication and meaning, however central they are to the use of language, are not at the centre of change, or at least of major structural change. It puts a premium on system-internal transformation, and devalues, or at least marginalizes, the human actor. In this way it stands in sharp opposition to the notions of all-pervasive semiosis, 'striving for communicative efficiency', 'teleological dynamism', etc. that one gets in the models of change proposed by writers like Anttila or Shapiro […]. For these semiotically inclined scholars, the evolution of language is a constant 'striving for meaning', as for the sociolinguistically centred […] it is a matter of 'social negotiation'. I am not very sympathetic to such views, which are a bit like vulgar adaptionism in biology (all monocausal theories are suspicious). As eclipsing as this sounds, it is not an attempt to say that the other approaches are 'wrong'; rather that they are complementary, because different ways of looking at language involve looking at different things. (Lass, 1997, p. 324)

Crucially, it shall be emphasized that different theories are not wrong or right, as Lass notices, but simply adopt a different perspective. Those perspectives are all part of the truth, and together can give a comprehensive account of language and therefore also of language change.

> So setzt sich das heutige Bild des sprachlichen Wandels kaleidoskopartig aus den Resultaten verschiedener Schulen zusammen, die jedoch durch den Bezug zu nicht-linguistischen Disziplinen einerseits und das Wissen aus Indogermanistik und synchroner

> Sprachwissenschaft andrerseits über breite Ausgangsdaten, grundlegende methodische Verfahren und vielfältige theoretische Annahmen verfügen. (Zeige, 2011, p. XIII)

Similarly, this study has shown that the theoretical approaches discussed here differ in major questions of what defines a language. At the same time, however, each theory focusses on a different aspect of the problem, thereby contributing to the understanding of language change as a whole. It is the task of future work to stress the aspects that these approaches have in common, rather than complaining about their irreconcilability. This way we might be able to construct a refined ontological frame which combines the proposed perspectives logically. Models of non-linguistic descent are particularly promising, as Zeige (2011)[47] notes. In this sense, evolutionary theory was shown to provide a fruitful metaphor for historical linguistics.

7. Conclusion

In conclusion, this study compared three language change theories with very different approaches. The structuralist theory by Wurzel tries to explain language change based on the structure of the system. The layer of markedness is added and language change is subsequently defined as reduction of markedness regarding one parameter. Wurzel's theory is highly formalized, which ultimately has to do with the notion of language as a system that abstracts away from the speakers.

In contrast, Keller's theory of the invisible hand is a speaker-oriented approach to language change. In line with the pragmatic view of language, speaking is a way of negotiation. Language change is defined as a phenomenon of the third kind: It is the unintended result of intentional behavior of the individuals. Specific ecological conditions cause speakers to have similar intentions on the microlevel, leading to a change on the macrolevel.

Unlike any of these, the evolutionary approach by Croft (2000) models language change as a case of cultural evolution. It is assumed that language change comes about through the two separated mechanisms of variation and selection. Innovations that produce variation are due to altered replication. Certain variants are subsequently selected by speakers because they strive to identify with a social group. Selection corresponds to the propagation of a change and is socially determined; variation is functionally motivated.

[47] Zeige's (2011) attempt to apply Niklas Luhmann's theory of social systems to language change is particularly noteworthy, although it has not received enough attention yet. The theory of complex adaptive systems ("chaos theory") is discussed more lively both by German scholars, e.g. Bülow (2017), Rosenbach (2008), and elsewhere. Lass (1997), for example, combines a theory of complex adaptive systems with an evolutionary approach.

It was shown that any theory of language change relies largely on the definition of language. If language is a communicative tool, language change is located in language usage. Keller's theory represents such a functional account of language. The structuralist approach, on the other hand, views language as a system that triggers changes by itself. It was argued that these approaches provide a different perspective of the problem each, which must be fused in order to generate a comprehensive framework. The evolutionary metaphor may represent such a framework that stresses the similarities, not the differences between the theories.

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