EXPLORING MIDDLE ENGLISH (MOR-) PHONOTACTICS: THE CASE OF WORD FINAL /nd/

Abstract

The article investigates the diachronic interaction between phonology and morphology in the domain of morphonotactics, one of whose basic assumptions is that the relationship between the phoneme sequences which a language allows lexically and the ones which it produces through morphological operations is systematic, functional, and governed by domain specific dynamics. The historical development of consonant clusters such as /nd/ represents a good testing ground for this assumption: taking Middle English as a whole, it is possible to say that /nd/ could occur both at the end of morphologically simple word forms and in the past tense and past participle forms of verbs whose stems ended in /n/. Word internal final /nd/ clusters had already existed in Old English but the possibility of creating them through past tense formation represented a Middle English innovation brought about through schwa loss—whereby word final phoneme sequences (exclusively lexical originally) came to be joined by numerous (morphologically-produced) new homophones. Such a change can be expected to have produced observable effects either in the domain of lexical phonotactics or in morphology, or in both. After outlining the basics of morphonotactic theory and some of its more specific predictions (e.g. a preference for purely lexical phonotactic configurations and morphologically produced ones to be non-homophonous), I will then discuss what effects changes in the morphonotactic system of a language can be expected to have, and will finally propose that the peculiar way in which EME vowel lengthening before /nd/ clusters seems to have been implemented might indeed represent such an effect. **Keywords:** Phonology, Morphology, (Mor-)phonotactics, consonant clusters, Middle English, homophones, vowel lengthening.

Resumen

El artículo investiga la interacción diacrónica entre fonología y morphología en el terreno de la morfonotáctica, uno de cuyos presupuestos fundamentales es que la relación entre las secuencias de fonemas permitidas en el léxico de una lengua y las producidas mediante mecanismos morfológicos es sistemática, funcional y regida por la una dinámica específica. El desarrollo histórico de grupos consonánticos como /nd/ supone un terreno experimental adecuado para este presupuesto: tomando en consideración todo el Inglés Medio, podría afirmarse que /nd/ podía ocurrir tanto al final de palabras morfológicamente simples como en el pasado simple y el participio pasado de verbos cuya raíz terminaba en /n/. El Inglés Antiguo tenía palabras que terminaban en /nd/, pero la posibilidad de crearlas mediante la formación de tiempos verbales es una novedad del Inglés Medio, causada por la pérdida de la schwa, y por la cual, a secuencias de final de palabra originalmente léxicas se les unieron numerosos homófonos nuevos, creados por procedimientos morfológicos. Tal cambio debería haber producido efectos observables en el campo de la phonotáctica léxica, en el de la morfología o en ambos. Tras exponer los elementos fundamentales de la teoría morfonotáctica y algunas de sus predicciones más específicas (p.ej. la tendencia a evitar que las configuraciones fonotácticas puramente léxicas y las de origen morfológicas no fueran homófonas), se discuten los cambios esperables en el

sistema morfonotáctico de una lengua, para finalmente sugerir que el modo en que sucedieron los alargamientos vocálicos antes de /nd/ en Inglés Medio Temprano serían un ejemplo de tal tendencia. **Palabras clave**: fonología, morfología, (mor)fonotáctica, grupos consonánticos, Inglés Medio, homófonos, alargamiento vocálico.

1 INTRODUCTION

L ooking at Middle English /nd/ clusters, this paper investigates the diachronic interaction between phonology and morphology in the domain of morphonotactics. Going back, originally, to ideas of Nikolaj Trubetzkoy, morphonotactics has recently been proposed as a potentially promising new field of research by Dressler and Dziubalska (e.g. 2006, or 2010). One of the basic assumptions on which morphonotactic theory rests is that the relationship between the phoneme sequences which a language allows lexically (i.e. morpheme internally) and the ones which it produces through morphological operations such as concatenation is systematic and functional, and governed by domain specific dynamics. The historical development of consonant clusters such as /nd/ represents a good testing ground for this assumption: if one considers the Middle English period as a whole, it is possible to say that /nd/ clusters could occur both at the end of morphologically simple word forms (e.g. *feond* 'fiend', *hond* 'hand', *land*, *round*, etc.) and in the past tense and past participle forms of verbs whose stems ended in /n/ (e.g. *iturn+d* 'turned', *join+ed* 'joined', *ordain+d* 'ordained', *ston+ed*, etc.). While word internal final /nd/ clusters had already existed in Old English, however, the possibility of creating them through past tense formation represented a Middle English innovation. It was brought about through schwa loss, which produced wordforms with the structure /Xnd/ from earlier /Xnəd/ (as in LME /dʒoind/ < EME /ʤoinəd/ 'joined'). Thereby, word final phoneme sequences which had originally been exclusively lexical came to be joined by a large number of morphologically produced homophones that had not existed earlier. If the basic assumption outlined above is correct, such a change can be expected to have produced observable effects either in the domain of lexical phonotactics or in morphology, or in both. In order to test that very general prediction, this paper will first outline the basics of morphonotactic theory and some of the more specific predictions that can be derived from it—one of them being a preference for purely lexical phonotactic configurations and morphologically produced ones to

be non-homophonous. It will then discuss what effects changes in the morphonotactic system of a language can be be expected to have, and will finally propose that the peculiar way in which EME vowel lengthening before /nd/ clusters (/biːnd/ < /bind/ 'bind', but not */haːnd/ < /hand/ 'hand') seems to have been implemented might indeed represent such an effect.

2 Consonant clusters in morphonotactic theory

In a number of recent papers, Dressler, Dziubalska-Kołaczyk (2006) and others (Dressler, Dziubalska-Kołaczyk & Pestal 2010, Zydorowicz 2007, 2009) suggested that morphonotactics, which was originally conceived of by Trubetzkoy (1931) as the study of the internal phonological structure of morphemes (cf. 1931: 161 ff.), might be fruitfully expanded to investigate also the "shapes of morpheme combinations, particularly when they differ from the phonotactics of lexical roots and thus signal morpheme boundaries" (Dressler & Dziubalska-Kołaczyk 2006: 72). That such differences do exist is obvious, and has long been recognized. In fact, at least since SPE (Chomsky & Halle 1968) much phonological research has been carried out to account for differences between the prosodic structures and, particularly, the stress patterns of morphologically simple items and those of complex ones in terms of stratified derivational theories such as lexical phonology (e.g. Kiparsky 2000, MacMahon 2000, Giegerich 1999) or more recently (stratal) Optimality Theory (e.g. Bermúdez-Otero forthcoming). This paper focuses on a different aspect of phonotactics, namely on the word final consonant cluster /nd/. In order to set the frame for this discussion, and in order to show how morphonotactic theory can contribute, let us look first at the distribution of word final consonant clusters in Modern English. Restricting our view to clusters with two constituents only, we can observe that some of them occur exclusively in lexical roots (such as /ŋk/ in *ink*, or /mp/ in *lamp*), others occur exclusively across morpheme boundaries (such as /md/ in *seem+ed*, /fs/ in *wife+'s*, or /gz/ in *egg+s*), and still others occur both in lexical roots and in across boundaries (such as /ts/ in *cats* or *waltz,* /ks/ as in *lock+s* or *sex*, or /nd/ in *hand* or *gained*). In Dressler and Dziubalska-Kołaczyk's terms, the first type would be referred to as 'exclusively phonotactic clusters', and the second type as 'exclusively morphonotactic clusters'. Clusters of the

third type, i.e. clusters that occur both within roots and across morpheme boundaries can be ordered on a scale according to the relative frequency of their phonotactic and morphonotactic occurrences. Among them, there can be clusters that are morphonotactic by strong default (such as /ts/ which occurs only in very few mono-morphemic roots), clusters that are morphonotactic by weak default (such as /ks/ which occurs in many roots of Romance origin), clusters which are frequent both morpheme internally and across boundaries (e.g. /nd/), and so on, as shown in Figure 1 below.
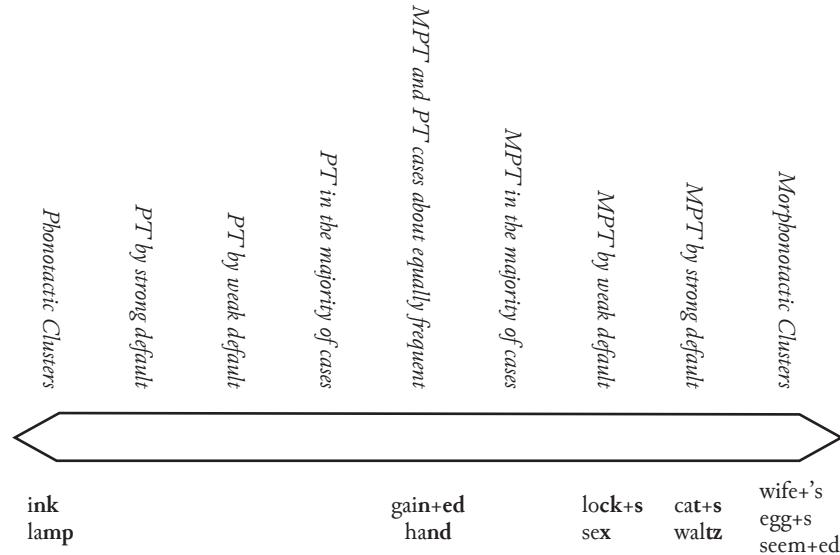
Phonotactic Clusters *PT by strong default* *PT by weak default* *PT in the majority of cases* *MPT and PT cases about equally frequent* *MPT in the majority of cases* *MPT by weak default* *MPT by strong default* *Morphonotactic Clusters*

ink				gain+**ed**		lo**ck**+**s**	cat+**s**	wife+'s
la**mp**				ha**nd**		se**x**	wal**tz**	egg+s
								seem+ed

Figure 1

Now, at first sight this taxonomic exercise might seem superficial and somewhat trivial. In languages where consonant clusters occur, it is rather non-surprising that some of them occur in morphologically simple items, and that others may be produced by such processes as the concatenation of morphemes. It also seems obvious that there will be a certain overlap between the two classes. It can be shown, however, that (a) interesting *a priori* predictions can be made about the distribution of clusters among

the categories suggested in Figure 1, and that (b) interesting further predictions can be derived from it.

2.1 Predictions about the distribution of consonant clusters with morphemes and across boundaries

Consider first some predictions that can be made *a priori* about the consonant cluster types to be expected in natural languages at all, and about the probability that they should occur in phonotactic and/or morphonotactic contexts. Recall, first of all, that consonant clusters are generally rare in the languages of the world (see e.g. Dziubalska-Kołaczyk 2002). It is widely acknowledged that this reflects the fact that they are suboptimal, primarily, in terms of perception, because the contrast between two consonants is usually smaller than the contrast between a consonant and a vowel. For obvious semiotic reasons, segments are more easily identified, learnt and therefore transmitted when they occur in contexts against which they stand out. Therefore, it is no surprise that the most stably transmittable and most frequent syllable type is CV, and in languages where only CV syllables are allowed, consonant clusters can obviously not arise. The perceptually grounded preference for possibly high contrasts among neighboring segments does not only predict that consonant clusters should be generally rare, however. It also predicts, for example, that in languages which do admit consonant clusters, clusters should be more stable and frequent intervocalically than at the beginning or the end of words. This is quite evident because in medial position clusters have vowels on each other sides, with which their constituents will contrast well enough. Another prediction is that clusters with two constituents will be more stable and frequent than clusters with three or more constituents, and clusters with relatively strong perceptual contrasts among their constituents more stable and frequent than clusters in which that contrast is weak. At least statistically speaking, these predictions also seem to be borne out in the world's languages. The general point is that physiological constraints on articulation and perception specify quasi-universal preferences for phonemic inventories and phoneme combinations, and that consonant clusters can of course not be expected to be immune to the impact of such preferences.

More importantly for the present argument is another prediction, however. It can be argued that universal physiologically grounded preferences like the ones just mentioned should affect phonotactic configurations more strongly than morphonotactic ones. To see why this is so, compare the cluster /nd/ in a simple lexical morpheme such as *land* to its homophone in the past tense form *gained*. Look at *land* first. Whenever the word gets produced, the final /d/ in it is always preceded by the homorganic nasal /n/. Since the contrast between /n/ and /d/ is small —both in terms of sonority and in terms of place-of-articulation—each of the two segments makes the perception of the other one relatively difficult, so that neither can contribute a lot to the successful identification of the word *hand*. When even the careful articulation of the sound sequence is communicatively relatively ineffective, however, this may easily motivate speakers to save effort in producing it, so that they may fail to release the final /d/, for example, or fail to pronounce the sound altogether. The less often the final /d/ gets articulated faithfully, however, the less likely it is to be recognized and acquired. Therefore, the phonotactic cluster /nd/ in words like *hand* can be predicted to be relatively instable and variationist studies show that this is indeed the case (e.g Labov 1972). In cases like that of past tense *gained*, on the other hand, the situation is slightly different: here, the /n/ and the /d/ that make up the final /nd/ cluster do not occur exclusively in each other's company. Instead, present tense uses of *gain* will see the final /n/ in a variety of different contexts, and many of them will be more favorable to its successful perception, such as the vowel which follows it in *Women gain a voice*, for example. Likewise, the /d/ in the past tense morph will often occur after segments with which it contrasts much better than with the /n/ of *gain*. Therefore, the negative effect which the two consonants may have on each other's perception in *gained* will not affect their successful recognition and acquisition as much as it does when the two sounds co-occur in mono-morphemic words. Instead, each of them will often get produced, recognized and acquired independently of the other. Thus, the /n/ will come to be stably represented in the base form *gain*, and the /d/ in the past tense morpheme *-ed*, and these independent representations will facilitate the recognition of the sounds even when they occur in the perceptually sub-optimal sequence *gained*. To the extent that speakers can trust the constituents

of morphonotactic clusters like /n+d/ in gained to be recognized and to unfold their intended communicative effect, they will be motivated to invest in their articulation and to suppress reduction processes. Once again, evidence from variationist studies shows that this is indeed the case (see Labov 1972). Thus, the fact that the constituents of morphonotactic clusters are also transmitted independently of each other, while those in phonotactic clusters are not, explains why the former should be more immune to the pressures from universal phonotactic constraints such as the preference for cluster constituents to contrast well with each other. Therefore, morphonotactic clusters can be expected to be more marked or less preferred, on average, than phonotactic ones, and from this follows in turn that languages which admit clusters at all are likely to include at least some that are exclusively morphonotactic. For English, German and Polish, Dressler and Dziubalska-Kołaczyk (2006) have demonstrated that this is indeed the case.

It needs to be added, however, that even morphologically produced sound sequences cannot be fully immune to physiologically grounded constraints on their phonotactic viability. Thus, in spite of the fact that their constituents may be independently transmitted in phonotactically preferred environments, morphonotactic clusters that are extremely difficult to pronounce or to perceive will clearly not be stable either. So the prediction is not that they will be extremely dispreferred in terms of phonotactic naturalness, but only that they can afford to be less preferred than phonotactic clusters.

Finally, there is a third prediction that can be made a priori, at least for languages where the inventory of sounds that can occur in inflectional and derivational affixes is highly restricted (cf. Jakobson 1962): in such languages, the variety among cluster types can be expected to be higher among phonotactic clusters than among morphonotactic ones. In English, for example, this clearly applies: the inventory of purely consonantal inflectional and derivational suffixes includes only /s/ and /z/, which occur in 3rd person present tense forms and in noun plurals, /d/ and /t/, which occur in past tense and past participle endings, and /θ/ which occurs in ordinals and de-adjectival nouns like strength, or width. Thus, there are no word final morphonotactic clusters that end in /p/ /b/, /m/, /k/, /g/, /ŋ/, /ʧ/, /ʤ/, etc., while such clusters occur quite frequently at the

end simple morphemes, as in *limp*, *bulb*, *elm*, *sink*, *ring*, *finch*, or *singe*, for example. Generalizing from this observation, it can be expected that languages which admit clusters are likely to include at least some that are exclusively phonotactic.

We can now draw a first summarizing conclusion. The fact that morphonotactic clusters are more likely to be immune to the pressures of universal physiologically grounded preferences than phonotactic ones predicts the existence of exclusively morphonotactic clusters, while the fact that the segment inventory of inflectional and derivational affixes is often limited predicts the existence of exclusively phonotactic clusters. This implies that on the category scale in Figure 1 a relatively high number of cluster types will be found near its edges than in its centre, i.e. the number of clusters that occur both within morphemes and across boundaries will be smaller than if their distribution were random. Putting it more simply still, there will be a tendency for consonant clusters to distribute complementarily between typically phonotactic and typically morphonotactic categories.

2.2 The semiotic potential of distributional differences between phonotactic and morphonotactic clusters

Now, as indicated above, it is possible to derive some further predictions from this. Dressler and Dziubalska-Kołaczyk do so by taking semiotic functionality into consideration, and point out that the predictable tendency of phonotactic and morphonotactic clusters to distribute complementarily lends itself naturally to being utilised for such semiotic purposes. According to them, "prototypical morphonotactic clusters [...] have the function of co-signaling the existence of a morphological rule" (2006: 83). If an English listener perceives clusters such as /fs/, /gz/ or /md/, for instance, s/he will be able to infer that the word form ending in it must be morphologically complex, i.e. a plural, a genitive or a 3rd person present in *proof+s*, *egg+s*, *wife+'s*, *rogue+'s*, *(s/he) cough+s*, or *(s/he) dig+s*, or a past tense or participle in *seem+ed* or *roam+ed*. Recognising this potential, Dressler and Dziubalska-Kołaczyk hypothesise that their ability to signal morphological complexity may be an additional motivation for the stability of exclusively morphonotactic clusters both in production and in diachrony. By the same rationale, on the other hand, they point

out that such morphologically created clusters that are homophonous with well established phonotactic counterparts can obviously not fulfil this function well. Their overall implication is then that the inherent tendency of phonotactic and morphonotactic clusters to distribute complementarily and to cluster on the edges of the scale in Figure 1 can be expected to be further enhanced through the signalling function it can be made to serve. Thus, morphonotactic clusters will tend to be more marked than phonotactic ones not only because they are more immune to pressures from physiologically grounded constraints on their articulatory and perceptual viability, as argued above, but also because they will be positively selected for their markedness and the signalling function it serves.

Another prediction that Dressler and Dziubalska-Kołaczyk derive from their arguments is that morphologically complex word forms which have the boundary in a cluster that occurs frequently in simple word forms as well ought to be particularly prone to lexicalisation, to losing their morphological transparency, and to becoming irregular. "Expanding on arguments used by Hay & Baayen (2002, 2005)" (Dressler & Dziubalska-Kołaczyk 2006: 72), they argue that morphonotactic clusters with frequent phonotactic homophones

> are hardly apt to co-signal the application of morphological rules (MRs) and thus do not stimulate morphological decomposition and therefore [...] may be liable to lose their internal morpheme boundaries in diachronic development. (ibid.)

Thereby, originally morphonotactic clusters become normal phonotactic ones, and the tendency to avoid overlaps, or homophonies, between phonotactic and morphonotactic clusters is further strengthened.

2.3 Summary

To sum up, morphonotactic theory, as developed by Dressler and Dziubalska-Kołaczyk, makes the following predictions: because morphonotactic configurations are less strongly constrained by universal preferences than phonotactic ones they can be expected to be more marked than the latter. Therefore, languages can be expected to have some clusters that occur only across morpheme boundaries but not within morphemes. Similarly, the fact that the inventory of segments that can

appear in inflectional and derivational morphemes will often be smaller than the inventory of segments lexical morphemes predicts that languages will often include some clusters that that can appear in within lexical morphemes but never across boundaries. While these two predictions are almost self evident, however, morphonotactic theory—as conceived of by Dressler and Dziubalska-Kołaczyk—goes further than that: since the signaling function which morphonotactic configurations clusters may assume by being more marked than morpheme internal phonotactic ones is served better if the number of homophonous morphonotactic and phonotactic configurations is small, it is predicted that languages will tend to keep homophonies of this kind minimal. That is to say, the inherent tendency of phonotactic and morphonotactic configurations to distribute complementarily is expected to be additionally enhanced, because speakers realize and exploit its semiotic potential. Therefore, diachronic changes in both the phonological and the morphological domains which diminish homophonies between morphonotactic and phonotactic configurations ought to be more expected than changes with the opposite effect. This is clearly a relatively strong prediction, which deserves to be put to the test.

3 Final /nd/ clusters in Middle English

In order to do so, the second part of this paper discusses the word final cluster /nd/ in Middle English. As I shall show, it provides a very good test case for morphonotactic theory, because historical developments in English phonology brought about homophonies of the very type that the theory predicts to be semiotically undesirable and that ought to trigger therapeutic effects. I begin by sketching a brief overview.

3.1 (Old and) Early Middle English

In Old English, word final /nd/ clusters were exclusively phonotactic. They occurred in nouns such as *lond* 'land', *feond* 'enemy', *freond* 'friend', or *pund* 'pound' in adjectives like *blind*, in the highly frequent conjunction *ond* 'and', and in the present participle suffix *-end* '-ing'. Since in Old English inflectional endings were generally syllabic, and usually began with vowels (in later periods most probably schwa, cf. Lass 1994: 123

ff.), word final morphotactic consonant clusters did practically not exist. Since this applies of course also to past tense and past participle endings, morphonotactic final /n+d/ clusters did not occur, except, possibly, in highly causal or fast speech.

The situation is likely to have persisted in Early Middle English. Phonotactic final /nd/s will have been about as frequent as they had in Old English, and morphonotactic ones still improbable, even though occasional spellings like *iturnd* 'turned' (Katherine Group [*Juliane*]: 95), *itund* 'closed' (*Ancrene Wisse*: 215), or *ibearnd* 'burnt' (*Ancrene Wisse*: 165) can be found, which suggest that fast or casual speech variants in which the schwa of the *-ed* suffix was deleted may have become more common.

In terms of morphonotactic theory, and its inherent predictions, the situation in Old and Early Middle English does not seem to be particularly interesting. A few observations nevertheless deserve to be made. First of all, the fact that no morphonotactic but many phonotactic final clusters occurred word finally appears to be somewhat puzzling. It seems to contradict the assumption that purely phonotactic sequences ought to be more strongly constrained by universal physiologically grounded preferences than morphonotactic ones. Since word final clusters are generally dispreferred, then it would seem that they ought to occur more easily in morphonotactic contexts than in phonotactic ones. However, the fact that most Old English inflectional endings began with vowels can help to understand this apparent oddity, because inflection would often render clusters that were final in some forms intervocalic in others; and —as observed above (see p. 3) already—word medial, intervocalic clusters are generally held to be much less marked than final ones. (Dziubalska-Kołaczyk 2002). Thus, for instance, OE *freond* 'friend' would actually have occurred with a final /nd/ cluster only in some of its forms, such as the nominative and the accusative singular. In genitives, plurals, and datives, on the other hand, it would often show up as *freond+es*, or *freond+e*,[1] and in such contexts both the /n/ and the /d/ would be neighbored by vowels, with which they contrasted well enough. Being relatively easy to perceive and to acquire in such contexts, the /nd/ clusters would be indirectly stabilized also in case forms in which they were word final, because they did not depend on them exclusively for being successfully transmitted.

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[1] Although athematic datives (i.e. *freond*-Ø) are also attested. (cf Lass 1994:137).

The other thing to be said about the status of final /nd/ clusters on Old and Early English is that it does—obviously but also somewhat trivially—conform to the other assumption of morphonotactic theory, namely that languages will generally avoid homophonies between phonotactic and morphonotactic configurations. Nevertheless, it can be claimed that word final /nd/ clusters served to indicate the morphological simplicity of the word forms in which they occurred, because they were never created through morphological processes.

3.2 Late Middle English

So much for the Old and Early Middle English situation: as the Middle English period progressed, the situation was changed dramatically, because unstressed syllables were increasingly affected by reduction processes, and these processes caused schwa vowels to gradually disappear from practically all inflectional suffixes. Middle English schwa loss is discussed in considerable depth in Lass (1992), and Minkova (1991) represents a book length study to the history of final schwas, so only the basic facts need to be rehearsed here. Most probably, schwa loss started as a post-lexical process, which was first restricted to word final schwas in hiatus,

(1) $\mathrm{\partial} \rightarrow \varnothing \ / \ \sigma_{s}(\sigma) \ X\_\#V$

where it removed them in contexts like *Himm sholld(e) onn eorþe shæwenn* (Ormulum: H 876). Next, it seems to have been gradually extended to word final schwas in general,

(2) $\mathrm{\partial} \rightarrow \varnothing \ / \ \sigma_{s}(\sigma) \ X\_\#$

removing them in contexts like *Vor wan(e) þu sittest on þin(e) rise* (Owl and Nightingale, 894). Eventually, also schwas in closed final syllables were lost, except where the deletion would have yielded such extremely dispreferred clusters as /t+d/, /d+d/, /s+s/, /ʃ+s/ or /ʒ+z/.

(3) $\mathrm{\partial} \rightarrow \varnothing \ / \ \sigma_{s}(\sigma) \ X\_Y\#$, where XY is phonotactically well formed.

After that change, schwas did not surface anymore in contexts like *For, lording(e)s, sith I twelf yeer was of age, thonk(e)d be God, that is etern(e) on lyve* (Wife of Bath's Prologue, *CT*: 4 f.)

Of course, much socio-stylistic variability will have been involved in what looks like a clean sequence in the representation above. Also, schwa deletion in closed syllables is likely to have remained a post-lexical process through much of the Middle English period. It is nevertheless clear, however, that it created a large variety of new word final consonant clusters, both word internally and across morpheme boundaries, and this is what matters in the context of the present discussion.

As far as the final cluster /nd/ is concerned, schwa deletion must first have increased the number of phonotactic, word-internal occurrences by removing the sound from inflectional endings of more or less all word classes (cf. Minkova 1991: 125–151). A rough quantitative estimate of the increase in phonotactic X*nd* forms through schwa deletion can be gained, if one searches a representative sample of Early Middle English texts for <*nd> forms on the one hand, and <*nde> forms on the other. Excluding the highly frequent conjunction *and*, the HM1 section of the Helsinki Corpus (1150–1250), for example, contains 101 types and 397 tokens of word forms ending in <nd>, and 315 types and 855 tokens of word forms ending in <nde>. If one assumes that forms ending in <nde> contained schwas that were eventually lost, final schwa deletion can thus be estimated to have increased the frequency of X*nd* types by about 200%, and that of Xnd tokens by about 115%.

While the number of word final /nd/ clusters rose during the first phase of schwa deletion, the fact that schwas were still stable in closed syllables for some time helped to support their stability because they would still occur as medial clusters in plural and genitive forms of nouns (*hound* NOM/ACC/DAT – *hound+es* GEN SG/PL) and in various forms of verbs (*bind* – *bind+en* INF, *bind+eð* 3RD SG PRES, *bind+end* PRES PART, etc.). At the same time, the absence of morphologically produced homophones allowed final /nd/ to continue to serve as indicators of morphological simplicity. Thus, all in all at this stage, the situation still conforms to the assumptions and predictions of morphonotactic theory as proposed by Dressler and Dziubalska-Kołaczyk, and as described above (see p. 4 f.).

As schwas came to be lost in closed syllables as well, however, two situations arose that seem to be difficult to reconcile with it. On the one hand, phonotactic final /nd/ clusters lost at least some the indirect support they received from occurring before schwas in inflected forms,

because those schwas were deleted. Thus, instead of phonotactically quite natural /huːndəs/, plural and genitive formation would no produce the highly marked triple final cluster /ndz/ from the sg /huːnd/ 'hound'. On the other hand, schwa deletion resulted in the creation of frequent morphonotactic /nd/s, which arose when past tense or participle forms were created from verbs that ended in /n/, such as *sinnen* 'to sin', *runnen* 'to run', *monen* 'to moan', etc.

Clearly, in terms of morphonotactic theory this development seems to be unexpected. The less problematic aspect is the creation of triple clusters like /ndz/ in plurals like *hounds*. While they may not have helped to make the /d/ more easily perceivable than in absolutely word final positions, these newly created clusters were themselves highly marked, of course, and since they did not occur phonotactically, they were prototypical morphonotactic clusters and capable of indicating the morphological complexity of the forms in which they occured. That they should be stable is actually what Dressler and Dziubalska-Kołaczyk would predict. On the other hand, however, the fact that final /nd/ clusters could now both occur within simple morphemes and be morphologically created through past tense and participle formation would clearly have been suboptimal, because the cluster did not seem to indicate anymore whether the word forms in which it occurred were morphologically simple or complex. Therefore, the arguments developed by Dressler and Dziubalska-Kołaczyk would seem to predict that this situation should either be diachronically unstable or else cause therapeutic changes of some kind.

However, the former prediction does obviously not hold: homophonies between phonotactic and morphonotactic final /nd/ clusters seem to have remained stably established in English until the present day. Clearly, there are still many simple words that end in /nd/ (such as *and*, *bend*, *end*, *hand*, *hound*, *kind*, *land*, *lend*, *mind*, *send*, *wind*, to name just a few), and at the same time, regular past tense formation still applies productively to verbs that end in /n/, and thereby produces forms such as *burned*, *loaned*, *moaned*, *sinned*, *tanned*, and so on. This leaves the other possibility, namely that the English language developed some strategies in order to neutralize the semiotically unwelcome effect which schwa deletion had created in its morphonotactic system. If no such strategies can be found, it

will have to be concluded that the ability of phonotactic configurations to signal morphological structure may be nothing more than an accidental or epiphenomenal side effect of tendencies that are expected for independent reasons: languages may happen to be able to exploit that possibility more frequently at some times and less frequently at others, but nothing about their development can be derived from the fact that the possibility exists.

4 Morphonotactic theory and /nd/ after schwa deletion

Let us recapitulate. The creation of morphonotactic final /nd/ clusters through the deletion of schwas in past tense and participle endings seems to have created a semiotically suboptimal situation, because when listeners perceived a word form that ended in /nd/, the cluster did not tell them much about the morphological structure of the word. Of course, statistically speaking, phonotactic /nd/s were considerably more frequent than morphonotactic ones. If one searches section HM4 of the Helsinki corpus (1420–1500), one finds that about 87% (2208 tokens) of word forms ending in /nd/ are lexically simple, and only 13% (330 tokens) complex.[2] Thus, the cluster by itself was certainly no useful indicator of morphological complexity—on the contrary, if it signaled anything at all then it would have been that the word forms in which it occurred were morphologically simple, and that guess would have been wrong in 13% of all cases.

However, the picture which these numbers suggest is too simple, and somewhat unrealistic: it rests on the implicit and unwarranted assumption that the morphological structure of any word form ending in /nd/ would be signalled—or fail to be signalled—by the mere fact that it contained the specific final cluster. This is misleading because final clusters occur by definition at the end of something, i.e. at the end of word forms which may vary considerably as far as their overall phonotactic Gestalt, of which final /nd/ is just one aspect, is concerned. Thus, EME final /nd/s occurred in forms where they were preceded by nothing but a single short vowel as in and, or end(e), in more complex monosyllabic forms *hound*, *lerned* 'learned', *fownde* 'found', as well as in polysyllabic forms such as *doand(e)*, 'doing', *erande* 'errand', *euerlastande* 'everlasting', *recomende* 'recommend',

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[2] The highly frequent copula *and* was once again not considered in this calculation.

and so on. Clearly, the overall phonotactic shape of the word forms in which /nd/ was the final cluster may have contributed to any inference concerning their morphological structure. Therefore, they need to be taken into consideration as well, if one wants to assess how easy it may have been for speakers of Middle English to derive the morphological structure of word forms from the fact that they ended in /nd/.

4.1 Final /nd/ clusters and the role of their phonotactic environment in supporting their signalling function

Of course, a crucial question is how much detail should be taken into account. Obviously, the exercise only makes sense if one classifies word forms into fairly general categories, because otherwise, and radically speaking, one might just as well regard every single word form with final /nd/ as a particular phonotactic structure, and—absolute homophones apart—it is trivially true that listeners will know what morphological structure a word form has once they have fully recognised it. For instance, saying that the final /nd/ signals the morphological complexity of a word form if it occurs after /ler/ as in ME *lerned*, amounts merely to saying that speakers will recognise the form /lernd/ as the past tense of *lernen*. In such a case, the contribution which the final cluster makes does not go beyond the contribution of any other segment in the word form. Its special status as a relatively marked morphonotactic cluster plays no special role at all. Of course, by the same rationale, the contribution that /nd/ can be said to make to a successful identification of the morphological structure of a word form is of course greatest, if it disambiguates it in word forms of all possible shapes. In that case it would be a prototypical, exclusively morphonotactic cluster—but we have seen that this is not the case. Therefore, in order for it to play a meaningful role in facilitating the recognition of morphological structure, the categories of phonotactic configurations in which it can be shown to do so, must at least be broad and include as many individual word forms as possible.

4.2 The role of the metrical weight of word forms

Now, there seems indeed to be a simple and rather natural way of dividing ME word forms in just two classes, so that in each of the two classes

the predictiveness of final /nd/ with regard to morphological structure is significantly higher than among all /nd/ forms taken together. The criterion is based on metrical weight: if one considers the foot which the final /nd/ belongs to, and takes the cluster away, the remaining constituents may either amount to a light syllable—i.e CV—as in *a(nd)*, *ha(nd)*, *te(nd)*, *se(nd)*, or *e(nd)*, or to more than that, as in *lear(nd)*, *turnd* (CVC), *bind*, *hound* (CVV), or *itake(nd)*, 'indicated', *faste(nd)*, *erra(nd)*, *doa(nd)* (σσ). For the sake of simplicity let us call the former class of word forms light, and the latter one heavy.

On the basis of this classification, it turns out that after schwa deletion the vast majority of morphonotactic final /nd/s occurred in heavy forms (*taken+d* 'signified', *christen+d* 'christened', *mon+ed* 'moaned'. A search of the HM4 section of the Helsinki corpus yields a proportion of slightly over 96% of all tokens. (Occurrences of *banned* and *sinned* are notable exceptions, and although the latter is frequent in terms of tokens, it is probably over-represented in the corpus, which includes a substantial number of religious texts).

Among phonotactic final /nd/s, on the other hand, the situation is different. First of all, there are a large number of present participles that end in *-end* (e.g. *seand* 'seeing', *goand* 'going', etc.). Being at least disyllabic, they are all heavy in terms of our definition, and the /nd/ clusters in them are phonotactic because they do not span a morpheme boundary. Present participles represent roughly a quarter of all disyllabic word forms in /nd/. In the context of the present discussion, they constitute a special case, however. One reason is that all present participles represent really one and the same /nd/-final morpheme, namely *-end*, although the type has many tokens. Also, even though the /nd/ clusters in participles are phonotactic on our definition, the word forms in which they occur are always morphologically complex, although the boundary is not between the /n/ and the /d/. Therefore, it is not fully adequate to say that their overall phonotactic structure, including the final /nd/ cluster, identifies them as morphologically simple. For those reasons, the present participle morpheme *-end*, will be left out of the discussion for the time being.

If we look at lexical morphemes only, then, it appears that only 16% of them occurred in heavy word forms (such as *husband* 'husband', *errand* 'errand', *bind*, or *hund* 'hound') all the others in light ones. Thus, there

seems to be correlation between the likelihood of a final /nd/ cluster to be morphonotactic and the overall metrical weight of the word forms in which it occurred. This is actually not very surprising, if one takes into account that there is a plausible, ultimately physiologically grounded preference for simple morphemes not to be longer than necessary for effective communication. This preference obviously implies that morphologically simple morphs will tend to be shorter than word forms resulting from concatenation, and this in turn implies that there will tend to be more segments before morphonotactic /n+d/ clusters than before phonotactic /nd/ clusters.

The crucial question to be asked then, is how well the morphonotactic status of a final /nd/ cluster can actually be predicted, if the heaviness of the preceding material is taken into account as well. In order to check this, I have once again looked at tokens of word forms with final /nd/ in the HM4 section of he Helsinki corpus. The results for /nd/ clusters are shown in Figure 2.
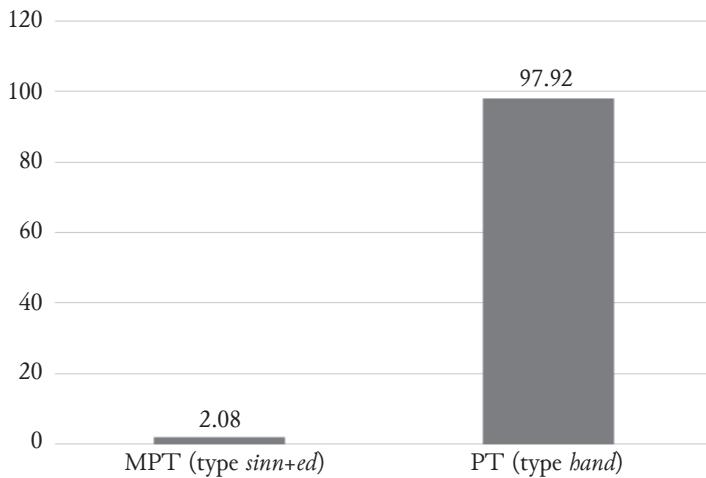

Figure 2. Morphonotactic and phonotactic final /nd/s in metrically light word forms

Figure 2 clearly shows that practically all light words forms in /nd/ were morphologically simple. Speakers would therefore have been well able to infer their morphological structure from their phonotactic shape.

For heavy forms, however, the situation appears not to be quite so straightforward. The results of the corpus search are charted in Figure 3.
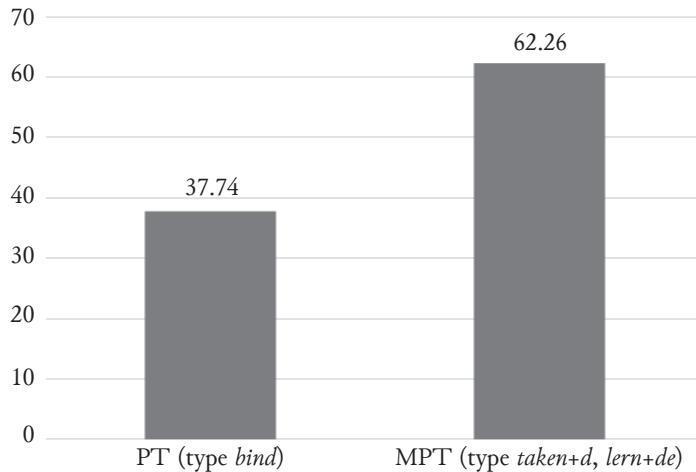

Figure 3. Morphonotactic and phonotactic final /nd/s in metrically heavy word forms

That 62 percent of heavy /nd/-final word forms are morphologically complex while 38 percent are not, does certainly not represent a good basis for statistical inferences. In such forms, the presence of an final /nd/ does not seem to be semiotically significant, and a situation seems to obtain, which is clearly suboptimal from the perspective of morphonotactic theory, and throws doubt on its central hypothesis that languages should avoid phonotactic configurations that are ambivalent in terms of their morphological structure.

However, the class of heavy /nd/-final forms can be further divided in ways that increase the morphological predictiveness of their phonotactic shapes. Thus, it seems to be the case that practically all forms among them that are morphologically simple are monosyllabic words of the type *hound* or *bind*. Monosyllabic words of the type *lernde* 'learned', as well as disyllabic ones, such as *takend* 'signified', *awakend* 'awakened', or *Christend* 'christened', were more or less always complex. This means that the only really ambiguous phonotactic configurations are word forms with rhymes of the type /XVVnd/.

4.3 Vowel quality and the implementation of Homorganic lengthening before final /nd/

Now, apart from *freond* 'friend', and *feond* 'enemy', practically all simple words of the /XVVnd/ type were produced through a sound change known as Homorganic Lengthening. This sound change is supposed to have lengthened vowels before homorganic clusters of sonorants and voiced obstruents such as /ld/, /rd/, /rz/ and /rð/ /mb/, /ŋg/, and /nd/. The status of this change has always been considered as questionable ever since it was proposed by Karl Luick, because it certainly does not seem to represent anything like a good Neo-grammarian sound change, and because it is odd in a number of additional respects too. For instance, lengthenings before the cluster /ŋg/ are supposed to have been 'reversed' soon after having been implemented so that none of them have survived into Modern English. In the case of /rd/, /rz/ and /rð/, on the other hand, any unambiguous long terms effects of the change have been obscured by later effects, which /rC/ custers had on the quality and the quantity of the preceding vowels, and something similar holds for /ld/ clusters. Thus, Stockwell and Minkova (1992) have suggested that Homorganic Lengthening does not really deserve to be considered as a single coherent sound change at all. Instead, we seem to be confronted with a heterogeneous set of individual lengthenings, of which some happen to have affected just enough words to avoid being classified as sporadic. It is true that the clusters before which the lengthenings occurred were all homorganic and voiced, but the large number of exceptions to, or apparent reversals of the change, make it doubtful that it was ever systematically implemented in that environment.

Looking at the cluster /nd/ in particular, its role in Homorganic Lengthening is odd in another respect as well. While it does seems to have caused lengthening in more than a handful of words, it seems to have stably affected only high vowels, while words such as *bend*, *bond*, *land*, *hand*, *tend*, *sand*, *band*, etc. all kept their short vowels. This is strange because normally mid and low vowels are much more likely to undergo lengthening than high ones. This may hang together with the fact that low vowels are more sonorous than high ones, perceived as more prominent than the latter, and therefore more easily interpreted as long. Another physiologically based explanation may be that the more

pronounced jaw movement required for the production of low vowels causes their articulation to take more time. Whatever the ultimate reason, however, it is empirically well established that high vowels are less prone to lengthening than mid and low ones. Therefore, the fact that only high vowels seem to have lengthened before /nd/ is highly exceptional.

On the distribution of phonotactic and morphonotactic /nd/ clusters among monosyllabic word forms of the type /XVVnd/, however, the strange way in which Homorganic Lengthening was implemented seems to have had a surprising effect. There appear to have been very few ME weak verbs that ended in /iːn/ or /uːn/, and those that did exist, like *minen* 'to mine', *pinen* 'to pine', or *brunen* 'to become brown' were very rarely used. Since the same must have applied to their past tense and participle forms, this means that the number of morphonotactic word forms ending in /iːnd/ or /uːnd/ would have been extremely small. On the other hand, there were quite a number of weak verbs, and some of the relatively frequent, which ended in /eːn/, /ɛːn/, /oːn/, /ɔːn/ or /aːn/. Among them were *clean, glean, hean, mean, lean, wean, yean, green, screen, gleen, keen, preen, sheen, spleen, steen, ween, croon, swoon, groan, loan, moan, bane, cane, crane, gane, pane, plane, wane.* Now, since there were only very few past tense or participle forms ending in /iːnd/ or /uːnd/, vowel lengthening in words ending in /ind/ or /und/ would have created hardly any ambiguities with regard to morphological structure. On the other hand, the lengthening of OE /land/ or /band/ to /laːnd/ and /baːnd/ would have resulted in ME /lɔːnd/ and /bɔːnd/, and would thereby have made it impossible to recognise the morphological complexity of /mɔːnd/ 'moaned' and /grɔːnd/ 'groaned' from the structure of their rhymes. The same would have been true for other non-high vowels as well, of course: lengthened /e/ in *bend* or *lend* would have made the recognition of past tense *mende* 'meant', or *cleaned* more difficult for the same reasons. In short, it seems as if the idiosyncratic implementation of lengthening before /nd/ clusters helped to establish a situation in which the morphological complexity of word forms ending in /nd/ was inferable from their phonotactic shapes, even though the cluster itself occurred both in phonotactic and in morphonotactic configurations. The necessary steps in this inference process are charted in Figure 4 below.
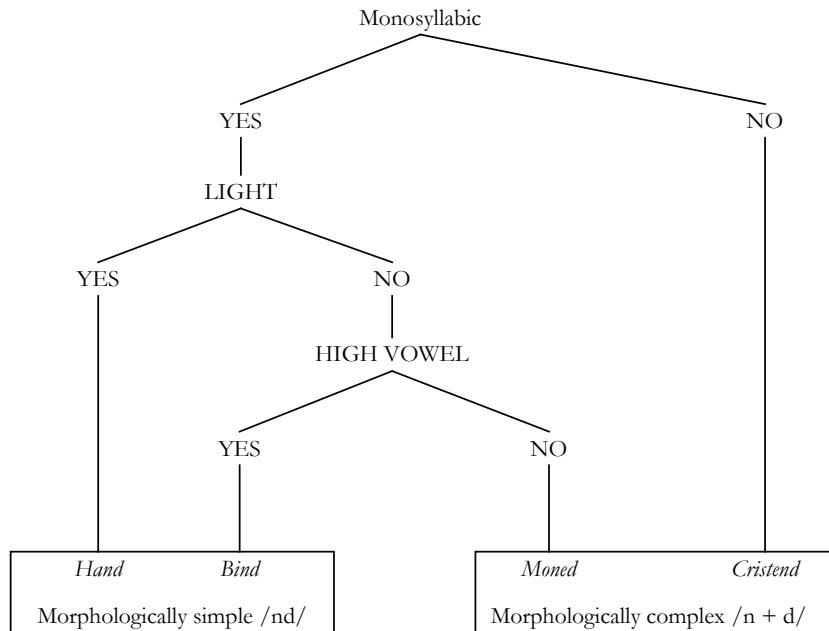
Figure 4

Now, since there does not seem to be any other plausible reason why non-high vowels should have failed to be lengthened before /nd/ clusters, the possibility that their lengthening was avoided, so that the morphological signalling function of rhymes like /eːnd/, /ɛːnd/, /oːnd/, /ɔːnd/ and /aːnd/ could be maintained clearly deserves to be taken seriously. If that was indeed the relevant reason, the way in which Homorganic Lengthening was implemented in /nd/ forms would represent a development of the very type that Dressler and Dziubalska-Kołaczyk seem to predict, when they assume that languages prefer morphonotactic clusters which serve as indicators of morphological complexity.

Of course, the proposal has something teleological about it. It seems at first sight difficult to imagine how speakers should know that a sound change would create a problem before it had occurred and suppress it prophylactically, or that they should be able to reverse it, once it had occurred. That explanations like this are problematic has been

pointed out repeatedly, for example by Roger Lass (e.g. 1996). From a variationist perspective, however, they can easily be given non-teleological interpretations. In our case, it is perfectly conceivable, for instance, that lengthened variants of land, i.e. /lɔːnd/ might have struck speakers as odd because they associated its rhyme structure with morphologically complex word forms, and this may have caused them to suppress the lengthening process, so that the un-lengthened variant remained stably established in the community.

5 Conclusion

Now, what does the distribution of ME word forms that end in /nd/ which has been just described and discussed imply for the hypotheses of morphonotactic theory as developed by Dressler and Dziubalska-Kołaczyk? First of all, it shows that the morphonotactic /nd/ clusters created through schwa deletion, and the fact that they have remained stable, even though there exist numerous phonotactic homophones, is not really as problematic as it first appears. Instead, token frequencies in Middle English texts suggest that the morphological structure of most word forms that ended in /nd/ could still be relatively easily inferred from their phonotactic shapes, and that the cluster signalled morphological complexity quite reliably if it occurred in disyllabic forms or in heavy monosyllables as long as they didn't contain a high vowel. In other words, the prediction that languages will tend to distribute morphotactic and morphonotactic clusters in complementary ways, so that they help to signal the morphological structure of word forms, seems to be fulfilled. Secondly, the possibility to interpret the failure of Homorganic Lengthening to affect non-high vowels suggests that the functionality which arises when morphotactic and phonotactic clusters are distributed complementarily might be more than an accidental by-product of independent factors, and might indeed represent an active force in directing linguistic changes. Thereby, the discussion has suggested that the implementation of phonological changes may depend on morphological factors in ways that have so far received little attention.

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REFERENCES

Bermúdez-Otero, Ricardo forthcoming: *Stratal optimality theory*. Oxford, Oxford University Press.

Chomsky, Noam & Morris Halle 1968: *The sound pattern of English*. New York, Harper & Row.

Dziubalska-Kołaczyk, Katarzyna 2002: *Beats-and-binding phonology*. Frankfurt, Lang.

Labov William 1972: *Sociolinguistic patterns*. Philadelphia, University of Pennsylvania Press.

Dressler, Wolfgang U. & Katarzyna Dziubalska-Kołaczyk 2006: Proposing morphonotactics. *Wiener Linguistische Gazette* 73: 69–87.

Dressler, Wolfgang U., Katarzyna Dziubalska-Kołaczyk & Lina Pestal 2010: Change and variation in morphonotactics. *Folia Linguistica Historica* 31: 51–66.

Giegerich, Heinz 1999: *Lexical strata in English: morphological causes, phonological effects*. Cambridge, Cambridge University Press.

Gussmann, Edmund 2002: *Phonology: analysis and theory*. Cambridge, Cambridge University Press.

Hay, Jennifer & R. Harald Baayen 2002: Parsing and productivity. In Geert Booij & Jaap van Marle eds. *Yearbook of Morphology 2001*. Dordrecht, Kluwer: 203–235.

Hay, Jennifer & R. Harald Baayen 2005: Probabilistic phonotactics and morphological productivity. http://www.ling.canterbury.ac.nz/jen/ documents/haybaayenh_esse.htm.

Hubmayer, Karl 1986: *Natürliche Diachronie. Untersuchungen zur phonetischen Motivation historischer phonologischer Prozesse im Englischen*. Salzburg: Universitätsverlag.

Jakobson, Roman 1962: *Selected Writings I*. The Hague, Mouton.

Kiparsky, Paul 2000: Opacity and cyclicity. *The Linguistic Review* 17: 351–366.

Lass, Roger 1992: Phonology and morphology. In Norman Blake ed. *The Cambridge history of the English language. Volume II: 1066–1476*. Cambridge, Cambridge University Press: 23–155.

Lass, Roger 1994: *Old English. A historical linguistic companion*. Cambridge, Cambridge University Press.

Lass, Roger 1986: On sh*tting the door in modern English: A reply to Professor Samuels. In Willem F. Koopman, Frederike van der Leek, Olga Fischer & Roger Eaton eds. *Explanation and Linguistic Change*. Amsterdam, John Benjamins: 251–256.

Lass, Roger 1997: *Historical Linguistics and language change*. Cambridge, Cambridge University Press.

Lüdtke, Helmut 1980: Sprachwandel als universales Phänomen. In Helmut Lüdtke ed. *Kommunikationstheoretische Grundlagen des Sprachwandels*. Berlin, Springer.

McMahon, April 2000: *Lexical phonology and the history of English*. Cambridge, Cambridge University Press.

Minkova, Donka 1991: *The history of final vowels in English*. Berlin, Mouton.

Pinkser, Hans Ernst 1974: *Historische englische Grammatik*. München, Niemeyer.

Plag, Ingo 2002: The role of selectional restrictions, phonotactics and parsing in constraining suffix ordering in English. In Geert Booij & Jaap van Marle eds. *Yearbook of Morphology 2001*. Dordrecht, Kluwer: 285–314.

Ritt, Nikolaus 1994: *Quantity adjustment. Vowel lengthening and shortening in Early Middle English*. Cambridge, Cambridge University Press.

Stockwell, Robert P. & Donka Minkova 1992: Homorganic clusters as moric busters. In Matti Rissanen *et al.* eds. *History of Englishes*. Berlin, Mouton.

Trubetzkoy, Nikolaj S. 1931: Gedanken über Morphonologie. *Travaux du cercle linguistique de Prague* 4: 160–163.

Zydorowicz, Paulina 2007: The acquisition of Polish morphonotactics. *Wiener Linguistische Gazette Online* 74: 24–44.

Zydorowicz, Paulina 2009: *English and Polish morphonotactics in first language acquisition*. [Ph.D. Dissertation]. Poznań, Adam Mickiewicz University.

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