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Exaptation and phonological change

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Abstract: Looking at the fate of the concept of exaptation in historical linguistics, this article attempts an extension of exaptation from morphosyntactic change to phonological change. It argues that explicit recognition of the links between language change and other manifestations of Darwinian evolution can provide a context in which the use of this concept might be justified. First, an overview of the applications of exaptation in linguistics is provided (Section 2). Next, the historical data, that is the raisings of the close–mid long vowels as part of the Great Vowel Shift, as well as the lowerings of the short vowels as part of the Short Vowel Shift, adduced in this paper to verify the usefulness of exaptation in studying sound change are presented (Section 3). Consequently, two ways in which exaptation can be applied in the analysis of these data are presented: first (Section 4.1), a superficially evolutionary approach, which treats exaptation as a biologically inspired metaphorical label, and second (Section 4.2), a strictly evolutionary approach, which goes beyond metaphorical extensions of biological terms to linguistics, and which instead treats languages as truly evolutionary systems.

Keywords: exaptation, phonological change, historical linguistics, evolutionary linguistics

1 Introduction

Exaptation is a concept of biological provenance, which has gained some currency in linguistics, including in the area of studying language change.¹ Though not a part of mainstream historical linguistics just yet,² it has made

¹ This article deals with exaptation applied to historical language change, i.e. to instances of change in culturally evolving languages in historical times. It does not deal with applications of exaptation to issues pertaining to the emergence of language, such as the emergence of the language faculty at large (Hauser et al. 2002; Boeckx and Piatelli-Palmarini 2005) or of its individual components (MacNeilage 1998; Carstairs-McCarthy 1999; Samuels 2011). It does not discuss the metaphor-as-exaptation approaches (Casasanto 2010).

² Note, e.g. its absence from Campbell and Mixco's (2007) *Glossary of historical linguistics*.

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its way into numerous recent publications.³ The interest that this concept has enjoyed could be seen in the wider context of a more general revival of interest in the links between language change and biological evolution. After initial recognition of links between evolutionary biology and historical linguistics, which goes back as far as the study of evolution itself (Schleicher 1863 [1873]), the interest in exploiting those links later waned. In the second half of the twentieth century, however, there has been a resurgence of interest in the relationship between biological evolution and culture. Starting with the pioneering research of Cavalli-Sforza and Feldman (1973), cultural evolutionists showed that social learning or transmission of knowledge among members of a population through non-genetic means (so-called horizontal transmission) can influence the evolution of that population. Indeed, that cultural inheritance has been essential in shaping our own species is beyond doubt (Lewens 2008). Taking that idea further, Dawkins (1983) and also Hull (1988) argued that culture is another domain where Darwinian evolution takes place. To go back to language, the parallels between language change (or “glossogeny”, [Hurford 1990]), seen as part of cultural evolution, and biological evolution could now be placed on a firm conceptual footing and treated not as merely interesting similarities, but as stemming from these systems being subject to the same mechanisms. Accordingly, a number of researchers (Lass 1997; Croft 2000; Mufwene 2001; Ritt 2004) have seriously taken up the idea that historical language change is one of the domains subject to Darwinian evolution. Most extant discussions of exaptation in linguistics, however, do not go down that path.

The term exaptation was coined by Gould and Vrba (1982), to refer to “features of organisms [which are] non-adapted, but available for useful cooptation in descendants.” Gould and Vrba meant for the concept to revolutionize⁴ evolutionary biology by pointing to a new kind of evolutionary change. Its characteristics can be illustrated with two examples, to point to two types of exaptation identified in that paper. The two possible sources of exaptation given by Gould and Vrba (1982: 12) are “adaptations for another function” and “non-active structures,” i.e. structures without function. As for the former, the most

³ Testament to the interest in the concept, and to its popularity in studying morphosyntactic change is also the “Exaptation” workshop at the 20th International Conference on Historical Linguistics (ICHL20) in Osaka, as well as its follow-up, the “Exaptation in Language Change – Constraining the Concept” workshop during the 2012 45th Societas Linguistica Europaea (SLE 2012) conference in Stockholm.

⁴ The disconnect between the current utility and the genesis of certain traits was observed already by Darwin. His term for such cases was “pre-adaptation,” a rather unfortunate term, since it suggests teleology.

widely circulating example is that of feathers in birds. Since the discovery that *Archaeopteryx*, a bird that had feathers, but was probably capable of only rudimentary flight, it has been clear that feathers are not adaptations for flight, rather they have been adapted to insulation (Gould and Vrba 1982: 7). The utility of feathers in flight, then, is an effect of exaptation. Another source of exaptations is structures that have no function at all and which can be co-opted to have one. One example given by Gould and Vrba is that of sexual mimicry in hyenas. Overgrown female genitalia in these animals play an important role in their greeting rituals. However, as Gould and Vrba (1982: 9–10) argue, these features are not adaptations for that function, but rather a by-product of high testosterone levels in female hyenas. Non-active or functionless features that are necessary by-products of other adaptive features are the famous “spandrels” (Gould and Lewontin 1979), proposed even before exaptation was postulated.

Even though the interest in exaptation coincides temporally with the revival of interest for evolutionary thinking among linguists, most applications of exaptation in linguistics are not explicit about the nature of the relationship between biological evolution and language change. The discussion of the usefulness of exaptation for studying historical language change has focused on the question of its relationship to grammaticalization. In this article, I apply exaptation to phonological change.

In the first stages of the developments widely known as the Great Vowel Shift, the close–mid long vowels were raised. Middle English (ME) /o:/ raised to /u:/; earliest spellings include *pe touper* ‘the other’, *doun* ‘to do’ (Robert of Brunne, Lincolnshire, 1303), *roude* ‘rood’, *bloude* ‘blood’, *touke* ‘took’ (William of Shoreham, Kent, 1320). ME /e:/ raised to /i:/; cf. <y> spellings from the Siege of Rouen (c. 1420) *hyre* ‘hear’, *hyrde* ‘heard’, or the slightly later Paston Letters examples: *shype* ‘sheep’ (1465), *kype* ‘keep’ (1454), *appyre* ‘appear’ (1465). Such spellings become prevalent throughout the fifteenth century, and by the early sixteenth century /e/, o:/ have been “stably shifted” (Lass 1999: 80).

At around the same time, the close–mid short vowels were lowered. These lowerings do not find a reflection in the spelling, so other kinds of evidence have to be sought. As ME /ɛ:/ was often equated with French /ɛ:/, and ME /e/ with its short counterpart, the lowering may have taken place by the mid-sixteenth century (Lass 1999: 87). As for ME /o/, the descriptions of orthoepists dating to the mid-seventeenth century point to a lowering even further than [ɔ], as Cooper (1687: 8, cited in Lass 1999: 87) calls it a “guttural” and “the most open ... sound of all,” suggesting [ɒ].

Since typological data suggests that durationally distinguished vowel pairs display some qualitative differences as well, the idea that these “non-active” qualitative differences between the long and short members of these phonemic

oppositions have been “exapted” suggests itself as a possible interpretation of these raisings and lowerings.

In the following, it is argued that if the idea that language change, being one instantiation of cultural evolution, is strongly analogous to biological evolution is taken seriously, then the concept of exaptation might be of some use. If, on the other hand, evolution is to be a mere metaphor for aspects of language change, then the term does not constitute an important addition to the conceptual toolbox of historical linguistics.

2 Exaptation and language change

Arguing that there is a similarity between the co-optation of forms without function in biology and certain changes observed in diachronic developments in languages, Lass (1990) introduced the term “exaptation” into historical linguistics. One of the examples he gives to illustrate its utility is the fate of the adjectival *-e* in Afrikaans. The *-e/-Ø* contrast on attributive adjectives, once conditioned morphosyntactically by the gender, definiteness and number of the noun, collapsed after the leveling of the gender system. Rather than to disappear completely, however, the morphemic contrast was redeployed. Now, the *-e/-Ø* contrast is contingent solely on the properties of the adjective itself, such as its morphological structure and its inflectional paradigm. This is a development, then, where a non-aptive, or functionless feature (the “junk” from the article’s title, “How to do things with junk”) acquires a function. Just as the non-aptive, large size of genitalia in female hyenas acquires a function in greeting rituals, the defunct adjectival *-e* in Afrikaans acquires a function of marking the morphological properties of the adjective. In fact, in line with his article’s title, all the examples Lass gives are of exaptations with a source in functionless features, and he leaves the cases of features adapted to another function (which would mirror *Archaeopteryx*’s feathers adapted for insulation and exapted for flight) out of his definition of exaptation.

Sticking to the letter of Lass (1990), one could argue that exaptation cannot be applied to linguistics, as languages do not contain fully functionless material (as Henning Andersen, cited in Vincent [1995] does). Vincent’s (1992, cited in Vincent [1995]) defense of exaptation in this regard is the demonstration that the structures undergoing exaptive change, though not completely functionless, are nevertheless marginalized. Andersen’s criticism, however, might be seen as levied not against the usefulness of exaptation in linguistics per se, but against the “junk” view of exaptation, whereas the less restrictive take, one closer to

Gould and Vrba's (1982) original formulation, one including co-optations of structures adapted to a different function, would still hold. Just as feathers have not lost their thermoregulating function and become "junk" before being adapted for flight, the distribution of Afrikaans adjectival *-e* need not be completely random to qualify for exaptation. As a matter of fact, not even "marginalization" is required (in biology), as the loss of the insulation function of feathers is not a pre-requisite for their adaptation for flight (De Cuyper 2005).

Vincent's (1995) concession, i.e. the recognition that exaptation does not have to operate on completely functionless structures, has been absorbed into linguistics. Lass' later treatment of the issue admits "the exaptation of 'useful' (or at least not marginal, decaying) features" (Lass 1997: 318). This is, by the way, a correction in which findings within linguistics converge with the original conception within evolutionary biology, even though the arguments of Vincent do not reference biological exaptation, but are rather purely linguistic.

Be that as it may, exaptation took on a life of its own within linguistics. Here, in the context of language change, it has been discussed mostly from the point of view of its relationship with grammaticalization. First, for Lass (1997) it is a mechanism different from grammaticalization; he maintains that exaptation can result in "grammaticization," i.e. "becom[ing] grammatically obligatory," which he distinguishes from grammaticalization, which he takes to mean "[getting] routinized, bleached, downgraded from lexical to grammatical status" (Lass 1997: 256). Second, its possible utility for linguistics has been judged by whether or not it constitutes a hitherto unrecognized form of grammaticalization, adding to the two types of grammaticalization distinguished by Meillet (1921). Their results (Giacalone Ramat 1998: 108) can be either (a) "to create new forms that replace old forms in existing grammatical structures, which remain essentially the same from the point of view of function" (e.g. the development of new forms of negation in the history of Romance) or (b) "to introduce into grammar new categories, i.e. new units of form/function" (e.g. the rise of auxiliaries in Romance languages). Exaptation, in Lass's (1990) understanding, could be seen as representing a third kind of grammaticalization, one in which a new function is acquired by an old form (cf. Giacalone Ramat 1998; Vincent 1995). Third, it could be seen as a mechanism complementary to grammaticalization, picking up where grammaticalization leaves off, that is re-deploying forms that have reached the end of the grammaticalization cline (Traugott 2004).

Thus, the evaluation of the merits of its application in linguistics has continued in isolation from its fate in biology. Most of the argument has centered around the question of whether exaptation represents a new kind of language change or not.

Now, an important argument within evolutionary biology with regard to exaptation was the ostensibly non-adaptationist character of exaptive change. Gould and Vrba (1982) saw the recognition of exaptation as a step toward undermining the purely adaptive view of evolution, as they claimed to have identified a mechanism of evolution which provides an alternative to the hegemony of adaptation as its only driving force.⁵ Since, they argue, features that were not honed by natural selection can contribute to the fitness of an individual, adaptation can no longer be seen as the only way to explain change in species. This non-adaptationist view, however, has been refuted (Dennett 1995). The addition of exaptation to the conceptual inventory of evolutionary biology might be seen as nothing more than an introduction of a useful term into the purely adaptive view of evolution, as Dennett argues, since “every adaptation is one sort of exaptation or other” because “every adaptation has developed out of predecessor structures each of which either had some other use or no use at all” (Dennett 1995: 281). In other words, since no function lasts forever, changes in function are inevitable, and this results in structures being exposed to different selective forces than originally, and corresponds to exaptations having their source in structures evolved for another function. The only other logical possibility for an adaptation to arise is for selective forces to start selecting for a feature that previously had no function at all, and this corresponds to the second type of exaptations, namely to those originating from “non-aptive” structures. Hence, each adaptation must start as an exaptation, and exaptation is nothing more than a useful term to refer to the initial stage in the lifetime of adaptations.

One contribution taking into account the more modest take on exaptation is De Cuyper (2005), who points to the discrepancy between the view of exaptation in evolutionary biology and in linguistics. De Cuyper notices that the fate of exaptation in historical linguistics is marked by a series of ‘arbitrary restrictions’. The first one is the already discussed junk view of exaptation, which has been abandoned within linguistics. However, the notion that exaptation has to result in changes marked by novelty, which has taken root within linguistics, and underscores the discussion in Giacalone Ramat (1998) and Vincent (1995), which is another instance of an arbitrary (from a biological standpoint) restriction, is still around. De Cuyper’s conclusion is that a view of exaptation that is closer to its meaning in evolutionary biology would make it too broad to be

⁵ Exaptation’s role in Gould’s anti-adaptationist agenda is manifest in the title of a paper he co-authored with Lewontin (Gould and Lewontin 1979), sub-titled: “a critique of the adaptationist programme,” which introduces the term spandrel, denoting one possible source of exaptations in light of Gould and Vrba (1982).

useful. Perhaps one could argue that it should not matter what exaptation “really is” in evolutionary biology. As long as, so the argument could go, exaptation helps identify a hitherto unrecognized type of language change, say, one marked by novelty, then the fact that novelty is not a necessary component of exaptation in biological evolution is irrelevant. If linguistic exaptation is fundamentally different from biological exaptation, however, then there is little rationale to call it that.

Another possible approach, however, would be to see whether the concept is of any use when it is seen not as similar in linguistics and in biology, but as strongly analogous, i.e. to take a strictly evolutionary view of language. In a way, by the very fact that one argues the merits of a concept in linguistics based on its faithfulness to the source domain, one operates on the assumption that the two domains – language change and biological evolution – are subject to the same principles. The idea that this hypothesis could be fruitfully entertained has been put forward by, for example, Lass (1997), Croft (2000), Mufwene (2001) and Ritt (2004).

Two general conclusions that stem from a strictly Darwinian view of language change and therefore a truly evolutionary take on exaptation are that (1) no arbitrary restrictions on the scope of exaptation can be imposed, among them the spandrel-only or the junk-only view of exaptation is unwarranted and exaptation does not have to result in novelty and (2) since exaptation is nothing more than a stage in adaptive change, it is a good term for indicating a development where a form becomes subject to selection (for previously functionless forms) or to different/additional selection forces than before (for functional forms). Importantly, as for any explanation in terms of adaptation, the advantage of the new form/function pairing has to be argued for. After the relevant data have been presented, a superficially evolutionary and a strictly Darwinian application of exaptation to an instance of phonological change are considered.

3 The data – qualitative differences replace quantitative differences in English

Below, systems of pure vowels of three historical stages of English are presented, Old English, Middle English and Present-Day English. The variety of Old English presented below (Figure 1) is that of the so-called classical Old English or West Saxon c. 1000 (Hogg 1992: 83).

earlier historical stages, no single vowel pair is currently distinguished by length alone, and that while (some) vowel pairs can be identified, these are qualitatively different.

The differences that can be observed between the ME system and the RP system are a result of a whole host of vocalic changes that have taken place from the early Modern English period onward (with the changes in the long vowels forming what is known as the Great Vowel Shift). The first important changes of this series of events affected the close–mid vowels, both long and short, which are presented in Table 1.

Table 1: Changes to the close–mid vowels in EModE (long vowels after Lass (1999: 72) and short vowels after Lass (1999: 91).

	Fifteenth century	Sixteenth century
meet	e:	i:
met	e	ɛ
boot	o:	u:
pot	o	ɔ

Clearly, vowels occupying the close–mid region in the fifteenth century were in for some dramatic changes. None of the four vowels remained unchanged, and so the long vowels raised (as part of the Great Vowel Shift) and the short vowels lowered (perhaps, as part of the Short Vowel Shift) (Schendl and Ritt 2002). Notably, the long/short pairs did not move as units, so in place of a two-way qualitative difference further differentiated by a length contrast in the fifteenth century, these four lexical sets now (in the sixteenth century) possess four distinct qualities.

4 The analyses

In the following, two different analyses are conducted: a superficially biological analysis, which simply borrows exaptation as a term, and a strictly evolutionary one, which uses the concept of exaptation within an adaptive evolutionary framework.

4.1 A superficially evolutionary analysis

An analysis that sees exaptation as a biologically inspired metaphor with later linguistics-internal corrections might look like the following.

In languages with vowel oppositions based on length vowel pairs primarily distinguished by duration tend to slightly differ in quality as well. This is especially true of close and mid vowels.⁶ Phonetic studies show this for instance for Czech (Dankovičová 1999), Hungarian (Szende 1999), Slovak (Hanulíková and Hamann 2010), Swedish (Engstrand 1999) and Zurich German (Schmid 2004). An analogous situation has been postulated for historical stages of numerous languages, since when quantity-based contrasts become re-interpreted as quality-based contrasts, short vowels acquire a lower and/or more central quality than their long counterparts. This has been argued, for instance, for the developments from Old Icelandic to Modern Icelandic (Þráinsson 1994), from Sanskrit to Hindi (Bloch 1965: 35; Masica 1993: 35), from early Proto-Slavic to late Proto-Slavic (Schenker 1993: 79; Sussex and Cubberley 2006: 33) and from Latin to Common Romance (Loporcaro 2011: 110–115).⁷ It is plausible, then, to suspect that the same was true of Old English and Middle English vowel pairs. The oppositions between phonologically long and short vowels, expressed phonetically primarily by means of duration, are likely to have been accompanied by qualitative differences as well, with the short members of the pairs being more open than the long ones.

The long members of the pairs had slightly more peripheral qualities, which means, in the case of the open–mid front vowel closer and more front and in the case of the close–mid back vowel closer. Their short counterparts had less peripheral, that is lower, and, in the case of the front vowel, more central qualities (stage 1 in Table 2). The inherent qualitative differences become co-opted for the maintenance of the oppositions. They are then exaggerated and attain their post-Great-Vowel-Shift values (stage 2 in Table 2).

Table 2: Close–mid vowels before and after exaptation of qualitative differences, version 1.

	Stage 1	Stage 2
meet	[e:]	[i:]
met	[ɛ]	[ɛ]
boot	[ɔ:]	[u:]
pot	[ɒ]	[ɔ]

⁶ The qualification of this statement which excludes open vowels is in agreement with Donegan’s (1978: 64) observation that open vowels do not undergo tensing.

⁷ The exact phonetic mechanism behind phonologically short vowels becoming more open and phonologically long vowels becoming closer is not entirely clear. One could even expect the opposite to be the case, since it has been noted repeatedly that, other things being equal, open

Thus, there was a feature (possibly a kind of non-functional by-product of quality-based oppositions) which later acquired a function (maintaining vowel oppositions). As phonemic vowel oppositions between words such as *meet* and *met* were maintained phonologically by length, the phonetic manifestation of such contrasts was first and foremost duration. The accompanying qualitative differences can be seen as secondary, that is as a kind of by-product of the primarily quantitative opposition. If qualitative differences are thought to necessarily follow from quantitative differences in vowels, they could be seen as “spandrels,” although this is strictly speaking irrelevant to the questions of whether a development is a case of exaptation, as it suffices for exaptation for a character to acquire a function regardless of the provenance of the character (Cuypere 2005). Furthermore, it does not even matter that the character in question is non-functional, since a character that is not completely functionless can still be exapted (Vincent 1995; Lass 1997). The fact that the function fulfilled by the new qualitative oppositions, i.e. maintaining lexical sets distinct, is not a novel one does not undermine the exaptive character of the change either, as novelty is also one of the arbitrary restrictions (Cuypere 2005). Alternatively, if one sees novelty as decisive for (linguistic) exaptation, then the change is not a case of exaptation to begin with. Under the broader interpretation, however, the raisings of long vowels and lowerings of short vowels do remain a good candidate for the status of an exaptation, even if no gain from applying this broadly construed concept is apparent.

When judging whether it is of any use, it is worthwhile to consider that this analysis, in fact, does not go beyond what has been known under the name of phonologization, which is a development where “an intrinsic byproduct of something else, predicted by universal phonetic principles, ends up as unpredictable and hence, extrinsic” (Hyman 1976: 33). In the present case, qualitative differences accompanying quantitative differences could be argued to be the “intrinsic byproduct” which becomes “extrinsic.” Whatever the precise mechanism behind the relationship between durational and qualitative variation turns out to be, it seems defensible that it is a universal phonetic tendency for long vowels to have a more peripheral quality than short vowels.

If one subscribed to the notion that the usefulness of exaptation should be adjudged with regard to its relationship to grammaticalization, then for phonology this could mean evaluating the relationship between exaptation and phonologization. If one agrees with Hyman (2008) that grammaticalization is

vowels are longer than close vowels (House and Fairbanks 1953; Peterson and Lehiste 1960; House 1961). This well-known generalization, however, holds only within phonological classes of long and short vowels, not across them.

“movement toward structure,”⁸ then phonologization is one instantiation thereof, and the fate of exaptation should be similar in both syntax and phonology. Arguably, the qualitative differences became stably established within the language-specific phonetics of English before they entered its phonology. If one wants to see phonologization as grammaticalization, this particular instance would mirror Meillet’s first type, where an existing function (keeping the same lexical sets apart) is fulfilled by a new structure (qualitative oppositions), so exaptation would not even identify a new kind of grammaticalization, as it might be the case in morphosyntactic change. In other words, labeling the development as a case of exaptation, on the tacit assumption that the links between exaptation in evolutionary biology and language change are metaphorical, does not add anything to an existing phonological approach. In fact, it can be even seen as a step back. Explanations in terms of phonologization have to be explicit about the phonetics of the origins of a change. As for exaptive change, the source of the exapted feature is essentially irrelevant, and the precise phonetics behind the diachronic tendency of long vowels to raise and short vowels to fall can remain unaddressed.

With regard to morphosyntactic change, it remains to be seen whether the biologically inspired label of exaptation will turn out to be of any use. If it does, it will be useful as a metaphorical label by pointing to a new type of grammaticalization or another complementary kind of language change. With phonological change, if one wanted, like Hyman (2008), to bring phonologization and grammaticalization together, exaptive phonologization-as-grammaticalization would probably not be a new kind of grammaticalization, and therefore little use for the concept can be discerned. It does not offer any new insights regarding the change at hand. If the criterion of novelty is upheld, the raisings and lowerings would not be exaptive, so the point is moot, and when this arbitrary restriction is lifted, the change can be called exaptive, but nothing is gained from this labeling. While the superficially evolutionary analysis has no advantage over a strictly linguistic phonologization account, it might be worthwhile to see what a strictly evolutionary account might look like.

8 As opposed to what the term is generally understood to mean, that is the “historical development of grammatical morphemes” (Hyman 2008: 41). Importantly, seeing phonologization as grammaticalization is different from two other ways in which phonology is usually invoked in the context of grammaticalization, that is from phonogenesis (Hopper 1994, cited in Giacalone Ramat 1998), which refers to the last stage of functional loss, where morphemes turn into phonological segments, and from erosion (Heine and Reh 1984, cited in Hopper and Traugott 1993 [2003]), i.e. the deletion of segments which may accompany morphemes on the grammaticalization cline from a lexical item to a morpheme.

4.2 A strictly evolutionary analysis

The analysis above operates on the assumption of the impossibility of a technical application of evolutionary thinking to language. This assumption is common even in ostensibly evolutionary approaches to phonological change, such as Blevins (2006), as well as her commentators, be it critical or approving, e.g. Hamann (2006), Kiparsky (2006), and Smith (2007).⁹ Consequently, this analysis misses out on the benefits of seeing linguistic evolution as a strictly evolutionary process. Specifically, it might impose an unwarranted restriction that exaptation must result in the creation of new functions, and it fails to impose the restriction that change is adaptive.

Instead, the analysis presented below assumes, following Ritt (2004), that languages are populations of replicating competence constituents, which are encoded in the brains of their speakers as neural associative networks. Specifically, phonemes, as well as rhythmic feet, are treated as such competence constituents, which are, in evolutionary terms, replicators. This means that they owe their characteristics to their evolutionary histories, as they owe their current existence to the fact that their ancestors have successfully placed copies of themselves in speakers.

The development in question is one where exaptation, that is a change in the selection pressures to which a given structure is sensitive, is a clearly identifiable stage in the development of the English vowel system. Novelty, crucial to many discussions of exaptation within grammaticalization, can be dispensed with as one of the arbitrary restrictions. And it can be dispensed with for a principled reason, as language change is seen as being subject to the same mechanisms as biological evolution, and so there is no room for tailoring the concept to one's (here: phonological) needs. A change that starts off as exaptation, on the other hand, does have to be adaptive.

⁹ Within a strictly evolutionary perspective on historical language change, Croft (2002) includes a brief discussion of the relevance of exaptation. However, Croft (2002) assumes a view of generalized Darwinism where random mutation and adaptation are not seen as its essential components (also in language change). Consequently, in the end it is unclear what role he assigns to exaptation. Since he claims on the one hand that “there is no logical inference from the generalized theory of selection that requires language to display [...] exaptation” and on the other hand that “[exaptation] ha[s] [a] clear analog[us] in language, albeit with different causal explanations particular to the domain of language” (2002: 86), it is difficult to say what criteria should be applied to decide whether one is dealing with exaptation or not. At any rate, since exaptation has its *raison d'être* only within adaptive changes, Croft's arguments are tangential to the present discussion.

To begin with, then, the new structure (quality-based oppositions) must have had a replicative advantage over the old structure (quantity-based opposition) in order to be exapted. There are reasons to believe that in ME short vowels could be lengthened and long vowels could be shortened as a result of post-lexical rhythmic adjustments to better conform to trochaic feet (Ritt 2012: 404). As sequences of syllables of the same prominence are dispreferred (Dziubalska-Kończak 2002), in sequences of three subsequent weak syllables, as for example in *michelnesse* ‘greatness’ in (1) below, the middle weak syllable would acquire secondary prominence, resulting in the lengthening of the vowel.

- (1) pɛ | 'childes | 'michel | ,nesse | 'sheude pɛ | 'engel on
 the child's greatness.ACC showed the angel.NOM by
 | 'fuwer | 'pingen
 four things
 c.1225 *Trinity Homilies*, XXIII: 135, cited by Ritt (2012: 404)

A lexically prominent syllable could also lose its primary prominence thus eliminating sequences of consecutive strong syllables, as in (2) below.

- (2) For, | 'quyk or | 'deed, right | 'there ye | 'shal me | 'fynde
 for alive or dead right there you shall me find
 c.1390 Chaucer, “Franklin’s Tale,” *CT* F628, cited by Ritt (2012: 404)

The preference for the trochaic foot, both within words, and on the utterance level, spanning several lexical items, seems to have resulted in such rhythmically motivated adjustments with consequences for phonetic vowel duration. Given that feet are good candidates for replicators, it can be postulated that the trochaic foot was a successful replicator in ME. Since replicators constitute an important part of the environment for other replicators, and since rhythm is acquired early on in first language acquisition, the trochaic foot can be thought to have exerted considerable pressure on other replicators, including vowel phonemes.

The coexistence of phonemically long and short vowels, together with the preference for the trochaic foot, resulting in post-lexical adjustments, could have led, phenotypically, to the formation of very similar forms, as presented at Stage 1.5 in Table 3.

With such pronunciations, duration was no longer a reliable cue to the identity of the respective vowels. At the same time, the phonemes were already slightly different in terms of their qualities, and so these were likely to be paid attention to by language learners, who would have arrived at grammars

Table 3: Close–mid vowels before and after exaptation of qualitative differences, version 2.

	Stage 1	Stage 1.5	Stage 2
meet	[e:]	[e:]	[i:]
met	[e]	[e]	[e]
good	[o:]	[o:]	[u:]
god	[o]	[o]	[ɔ]

producing quality-based contrasts, with only a secondary difference in duration. A further exaggeration of the qualitative differences would have resulted in the values evident at stage 2. In effect, the development was advantageous for both the vowel phonemes (after the exaptation of the qualitative differences they maintained their identity which was threatened before) and for the trochaic foot, which could now be expressed more robustly, once duration was less tied up in the expression of phonemic vowel oppositions.

Since evolutionary change acts without foresight, it is no wonder that the newly established vowel qualities found themselves in the same sort of durational relations with already existing vowels as they had been before the change. This time, with the durational differences weakened, the situation was even more precarious. What can be observed by comparing the systems posited for the sixteenth century with that of the seventeenth century is the replacement of four vowel contrasts expressed mainly by duration with contrasts that are qualitative in nature (see Table 4).

Table 4: Sixteenth-century quantitative oppositions replaced with qualitative oppositions in seventeenth century (the long vowels after Lass (1999: 72) and the short vowels after Lass (1999: 91)).

	Sixteenth century	Seventeenth century
meet	i:	i:
bit	i	ɪ
beat	ε:	e:
bet	ε	ɛ
top	ɔ	ɒ
home	ɔ:	o:
moon	u:	u:
put	u	ʊ

An account invoking exaptation within a strictly evolutionary conception of language, then, can go beyond the phonologization account. First of all, it recognizes that co-opted features must have an advantage over resident features to replicate successfully. Here, it was posited that the new contrasts were better able to express phonological contrasts, and this is what helped them oust the residents in the long run. This adaptive aspect of exaptations is likely to be overlooked on the metaphorical reading, as in that case the label is taken over from the source domain (here, with the now debunked idiosyncrasies ascribed to it by Gould and Vrba [1982]) and is not updated. At any rate, acknowledging the adaptive advantage of the new structure forces the question of why it replicates better than the original structure. An answer to this question will in effect provide an answer to another question, i.e. why did the transition from stage 1 (“intrinsic” qualitative differences) to stage 2 (“extrinsic” qualitative differences) happen. In other words, it will provide an answer to the actuation problem (Weinreich et al. 1968). Additionally, the further exaggeration of the qualitative differences is only to be expected under this account. A non-adaptive take on exaptation would seem to suggest that a feature, once exapted, remains unchanged. Since exaptation is in fact only an initial step in adaptive change, however, the honing of that feature by further adaptive selection is not puzzling.

5 Conclusion

If one sees exaptation as a metaphorical label, divorced from other evolutionary domains, then the development in question would presumably either not be considered a case of exaptation, since it does not result in the creation of novel functions, or, if one lifted the “arbitrary restrictions” that stem from the disregard of what exaptation is outside linguistics, then the development in question would fall within the scope of exaptation, but little would be gained from treating it that way. If, however, one applies exaptation within a strictly evolutionary framework, where language change is seen as one manifestation of cultural evolution, one is forced to ask about the adaptive advantage of the new structure, and therefore to ask the “why” question of language change. Here, exaptation is a useful term to identify the initial stage of a new adaptation, but it does not constitute a new kind of language change.

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