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Co-opting exaptation in a theory of language change*

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In contrast with exaptation, which has been widely discussed over the last years, its conceptual counterpart in evolutionary biology, namely adaptation, does not seem to play any significant role in the actual linguistic debate. In the paper, the attempt is made to integrate this conceptual pair into our linguistic epistemology basically extending Lindblom's (1998) model of adaptive changes beyond the domain of phonological change. In this light, adaptive changes are characterized as oriented and responding to a general design of economy and plasticity, while exaptive changes are normally non-oriented and result from the refunctionalization of (partially pre-adapted) linguistic material.

1. Introduction

According to Lass (1990, 1997), who has made the term popular in linguistics, two properties should be attributed to exaptation (see the survey in Simon 2010). First, functional renewal, corresponding to its current employment in evolutionary biology, consists in the reuse of already extant grammatical material for new purposes. This is not simply to be understood as the attribution of a different function to a morpheme. In fact – and this is the second property that has to be attributed to exaptation – functional renewal must be conceptually coupled with the idea that the morpheme at stake must have been “already there, but either serving some other purpose, or serving no purpose at all” (Lass 1997:316). For this reason, exaptation has been seen as the reuse of ‘junk’, i.e., grammatical ‘garbage’ deprived of any function. However, Lass (1997:318) also observes that the linguistic material undergoing functional renewal need not be completely

* For constructive criticism and insightful suggestions I am very grateful to the editors of the volume as well as to two anonymous reviewers. Needless to say, I am solely responsible for views expressed and remaining mistakes.

de-functionalized: “Exaptation does not presuppose [...] “emptiness” of the exaptatum”.¹ Given that – viewed in these larger terms – the functional renewal of a certain element cannot be limited to exaptation, but is a far more widespread phenomenon in language (change), then the question arises of what is really the epistemological novelty brought about by exaptation, which can also help us distinguish this from other phenomena, and in the first place grammaticalization.

1.1 Exaptation as the counterpart of grammaticalization

In grammaticalization studies, functional renewal goes under the name of layering, namely “[t]he persistence of older forms and meanings alongside newer forms and meanings” (Hopper & Traugott 2003: 124). In this regard, Vincent (1995) has suggested to distinguish grammaticalization from exaptation by considering their different impact on the system. In the process of grammaticalization the morpheme develops a function which is “new relative to the grammatical system” (Vincent 1995: 437). This is shown for instance by the auxiliation process undergone by the Italian verb *stare* “to stay” in the progressive form *sto andando* “I’m going, lit. I stay going” because no progressive form was common in Italian before. In contrast with this, exaptation involves “the assignment of new morpho-syntactic functions to elements which are already centrally part of the grammar” (Vincent 1995: 438). Accordingly, the reuse of the old present indicative forms of Classical Greek as subjunctives in Tsakonian Greek (see Haspelmath 1998: 42) can be qualified as an exaptation because they were already “centrally part of the grammar”:

(1) Classical Greek	Tsakonian Greek
(<i>hína</i>) <i>phthain-ō</i> “I arrive”	<i>na ftén-u</i> “that I arrive”
(<i>hína</i>) <i>phthain-īs</i> “you arrive”	<i>na ftén-ere</i> “that you arrive”
(<i>hína</i>) <i>phthain-ī</i> “he/she/it arrives”	<i>na ftén-I</i> “that he/she/it arrive”

It is important to stress that for Vincent exaptation forms a conceptual pair with grammaticalization on the basis of the property ‘± part of the grammatical system’. A second distinctive property is their different ‘teleology’: exaptation has to be seen as the “re-grammaticalization of a morphological marker”, while grammaticalization represents “its continuation down the grammaticalization path on which it was historically embarked” (Vincent 1995: 438). This opens the way for interpreting grammaticalization as a ‘vertical’ process following a ‘natural’ path

1. More in general, see Smith (2006) for a discussion of this issue on the basis of the Romance pronominal system.

consisting in a number of converging phenomena: phonological erosion, syntactic obligatorification, semantic bleaching as they can be partially traced in the auxiliatation process of the Italian *stare*, while exaptation has to be seen as a 'horizontal' or 'lateral' change (see Joseph 2005), shifting the position of a marker within the system without any 'natural' path to follow as shown by the subjunctive forms of Tsakonian Greek.

In accordance with this view, in Gaeta (2004) the grammaticalization from below is discussed, namely the birth of grammatical alternations out of phonological rules as already suggested by Greenberg (1991). Accordingly, the case of the German umlaut as found in the plural of nouns like *Apfel / Äpfel* "apple(s)" is opposed to the r-plural of for instance *me / mer* "sea(s)" found in the French dialect of Jersiais. The former goes back to an Old High German suffix *-i* triggering the process of vowel harmony (see OHG *apful / epfili* "apple(s)") which subsequently disappeared leaving behind the root vowel alternation grammaticalized as a new plural marker. In contrast with this, in Jersiais French a plural marker *-r* occurs in lexemes like *lav[œ:] / lav[œr]* "washer(s)", *s[œ:] / s[œr]* "sure (pl.)", etc., which is due to the deletion of all final *r*'s unless followed by another (later deleted) consonant: Old French *mer* "sea" > *m[e]*, *merc* "land mark" > *m[er]*, etc. (see Morin 1986). The */r/* was prevented from deletion when followed by the plural marking *-s* which subsequently also underwent deletion. The remaining */r/* was then 'exapted', i.e., reused as a plural marker instead of the earlier *-s*, giving rise to a boundary shift. As a response to the phoneme deletion, the morphological boundary has moved leftwards recreating the preceding root+suffix schema: OF *mer / mers* > JF *me / mer*. The schema was subsequently extended to other nouns like *s[œ] / s[œr]* "elder-tree(s)". While the last consonant of the stems in Jersiais French has only been re-grammaticalized as a plural morpheme in consequence of the deletion chains, in German the phonological alternation has become 'part of the grammatical system' innovating the inventory of plural markers.

In contrast with this view, Lass (1990:99) treats the German umlaut as an instance of exaptation because of the reuse of the earlier alternation for a different purpose. In this way, he overlooks the essential aspect of the change, namely the introduction of a new coding technique for the plural, which turns out to be expressed only via stem vowel modification. Thus, even if the rise of the German umlaut might appear at first sight as an exaptation because of the functional renewal, if it is looked at from the perspective of the innovation of the coding techniques occurring in the language it can be qualified as a grammaticalization. In this regard, it must be added that grammaticalization not only implies the functional renewal as shown by the phenomenon of layering mentioned above; what is more, it does not necessarily involve innovation either. This can be shown again by the Italian progressive form mentioned above, which in substandard varieties

(for instance in Brindisi) has taken on a futural meaning replacing the older form *andrò* found in Standard Italian: *Domani sto andando a pescare* “Tomorrow I’ll go fishing, lit. I stay going to fish”. Lehmann (2002: 18) suggests the term renovation for those cases in which the result of a process of grammaticalization replaces a pre-existing construction expressing a grammatical category.

The opposition of exaptation and grammaticalization still remains an open issue: some critical voice has also ventured the suggestion that exaptation as a process of refunctionalization should include grammaticalization as a particular case, which makes it superfluous in the light of the general preference for the term grammaticalization (see De Cuypere 2005).² On the other hand, as the editors point out in the introduction to this volume, in the common parlance grammaticalization has become to a certain extent the conceptual counterpart of exaptation.

1.2 Accommodating exaptation into a theory of language change

Much of the discussion on the possible role of exaptation in a theory of language change – and more in general on the fruitfulness of importing this as well as other terms from biology and other disciplines – has suffered from the shortcoming that the term has been borrowed isolatedly, without considering the whole conceptual taxonomy to which it belongs in the loaning discipline. In particular, while in evolutionary biology exaptation forms a strict conceptual pair with adaptation, the latter term has been completely disregarded by those who have animated the debate on exaptation in linguistics in spite of its relevant usage in linguistic frameworks addressing the issue of language change (e.g., Lindblom 1988, 1998). For instance, Norde (2009: 115) observes: “[a]daptation and exaptation are discussed in one section, since it is not quite clear to me that the two are really different”. Notice that she suggests to treat exaptation “as a specific kind of adaptation, and this is a type of change that has often been associated with degrammaticalization, even though exaptation is not necessarily counterdirectional”. As will be discussed below, this suggestion stands in sharp contrast with the usage of exaptation as understood in evolutionary biology.

2. In a way, this reminds us of Dennett’s (1995: 281) view whereby exaptation has to be subsumed under adaptation (see the discussion in Section 2 below). This is generally true, but does not necessarily speak against the possible relevance of exaptation as opposed to adaptation. It depends on how we interpret the relation between the two concepts. As shown by the example of the German umlaut, the main difference between them can be seen in the way how they arise and in their impact on the system.

A partial exception is Heine (2003: 169) who discusses adaptation “as a process whereby old taxa are adapted to new taxonomic categories”, and accordingly, “it serves in particular to adapt grammatical forms to new word classes or morphological paradigms”. This usage of adaptation, besides being completely idiosyncratic with regard to its meaning in evolutionary biology, expresses “a rather trivial observation, which holds true for many kinds of morphosyntactic change” (Norde 2009: 115). It is my conviction that only after the incorporation of the term adaptation into the theory of language change we can really profit of the explanatory potential brought about by the adoption of its counterpart exaptation in linguistics. In this contribution, after a brief illustration of its role in evolutionary biology in §2, I will discuss in §3 how the conceptual pair adaptation / exaptation can be imported into an ‘evolutionary’ theory of language change; then in §4 I will provide empirical evidence drawn from different levels of analysis to show the advantages of my view.

Before starting, however, one might ask – as one anonymous reviewer does – what might be the advantage of importing terms and concepts from such a different discipline as evolutionary biology in which the object of investigation is clearly different, ontologically as well as empirically (see Croft 2006: 92 for a similar point). This question is related to the more or less implicit objection that we cannot take for granted that methods, concepts and processes observed in these disciplines are actually comparable. This objection appears particularly justified with regard to the role played by consciousness and intentionality in language and communication, which is normally discarded in evolutionary biology under the assumption that this would bring an intolerable degree of teleology into the explanatory picture (this will be dubbed as the ‘Lamarckian’ view in the next section).

While the same objection might generally apply to any borrowed concept or method (trivially, the concept of atom as developed by the Ancient Greek philosophy is far away from our actual understanding of an atomic nucleus), in practice we observe an uninterrupted borrowing and exchange of concepts across disciplines ever since in the history of science, more or less in a metaphorical or ‘adapted’ way. In the light of the ‘selfish’ attitude of scientific research, the only thing which seems to be relevant (despite any epistemological clash or inadequacy) is the fruitfulness of the concept for the borrowing discipline. This has always been true, from Linnaeus’ concept of (biological) taxonomy exploited for the language classification to the chemical notion of valence commonly used to identify verbal arguments. It is with this spirit that in what follows I intend to approach to question of the possible relevance of concepts like adaptation and exaptation for a theory of language change.

Besides, there is another reason why such an exchange seems to me to be particularly enriching. Similarly in a way to the issue of Darwinism and Lamarckism

in evolutionary biology as will be discussed in the next section, language change can be seen as a phenomenon of the third type: as Keller (1994) reminds us, in normal conditions the speakers don't consciously act to change their own language.³ Rather, their intentions are completely immersed within a social dimension which is to be evaluated in terms of more or less successful communicative exchange. In other words, language change results indirectly from language use (see Croft 2000: 170–176, 2006 for a critical discussion). Anticipating somewhat what will be said in §3.1, language change cannot be considered as Lamarckian in contrast with the Darwinian view required by evolutionary biology. It is with this spirit that Givón (2009: 19) sees the three grand developmental trends relevant to syntactic complexity – diachrony, ontogeny and evolution – as “equally driven by adaptive pressures”. Among the rich array of adaptive contexts: social interaction, cultural transmission, education, literature and fiction, humor and play, love and war, two core adaptive functions can be singled out: mental representation, intended as the individual mind's strive to make sense of the ‘reality’, and communication as the dimension in which individual minds are fully and constantly immersed. In other words, the adaptive approach to grammar (and language) is for Givón strictly connected with the essence of the human beings as talking machines, as already envisaged by Jakobson (1971: 675):

“The adaptive nature of communication” in its multiform varieties [...] involves two correlate genera – self-adjustment to the environment and the adjusting of the environment to one's own needs. Indeed, it becomes one of the “most exciting” biological problems and – again *mutatis mutandis* – it is also a vital concern of present-day linguistics.

The goal of a theory of language change is – among others – to understand why speakers unconsciously converge towards the adoption of certain linguistic behaviors which modify their internalized linguistic habits. It is with this general goal in mind that the adoption of terms like adaptation or exaptation has to be evaluated as fruitful or not. But before going explicitly into this aspect, one has to shortly introduce the terms as they are commonly understood in the loaning discipline in order to understand what their benefit might be for our general interest as linguists.

3. This is the crucial reason why language change cannot be opposed to evolutionary biology because of its alleged intentional nature, as one anonymous reviewer contends.

2. Adaptation and exaptation in an evolutionary approach

In evolutionary biology, exaptation and its dynamic counterpart exaptive change form a minimal conceptual pair with adaptation and adaptive change (see Gould & Vrba 1982; and Pievani 2005: 146–153 for a recent survey). The main difference between adaptive and exaptive changes resides in their origin. Adaptive changes result from a casual genetic variation giving rise to the mutation of (a feature of) an organism which subsequently undergoes adaptive selection: those organisms which display the casual mutation survive because they are better equipped than those not displaying the mutation. As a final result, the mutated organisms are normally said to have been adapted to the surrounding environment, although this formulation can give rise to a Lamarckian interpretation of the facts whereby the mutations are meant to improve the survival chances of the organisms. This strongly teleological view was already criticized by Darwin (1872: Ch. 4), who rejected any sort of teleology and pled for a metaphorical interpretation of the struggle for life intended as the selection of ‘the best to fit’. Accordingly, the selective advantage of the mutated organisms has to be measured in purely quantitative terms without any reference to the cultural or intentional dimension present in Lamarck’s idea that mutations follow the – more or less conscious – intention of fitting the environment better. This teleological bias was explicitly rejected by Darwin, although he recognized the ambiguous and to a certain extent metaphorical value of his terminology, because the usage of expressions like adaptation and natural selection might in fact envisage an intentional agent behind the observed phenomena, which was never meant to be the case. Andersen (2006: 80) criticizes this ambiguous terminology as the source of the distorted use made in the current epistemological debate of these terms within and outside evolutionary biology, and especially in linguistics. While this is surely true from a strictly epistemological point of view, the metaphorical potential of the terminology coined by Darwin (which by the way has also benefitted from the influence of other disciplines such as demography and economy) has surely attracted scholars from different disciplines with the aim of enriching their own conceptual background. Therefore, this ambiguity has brought about a positive cross-fertilization among different research fields which should not be forgotten.

In contrast with adaptive changes, exaptive changes represent for Gould & Vrba (1982) the co-optation or refunctionalization of a mutation to serve a different goal with regard to its original function. As a result, the mutated organisms can be said to have been exapted to the surrounding environment insofar as their mutation has been refunctionalized. Thus, the mechanism of adaptive selection acts twice in the case of exaptation: firstly when the casual mutation appears favoring the mutated organisms as in the so-called pre-adaptations, and

secondly when the casual mutation is re-used for a different goal favoring those organisms which display the refunctionalization. The re-use has to be interpreted in metaphorical terms: no teleology is implied but simply the selective advantage of the mutated organisms displaying the exapted, i.e., refunctionalized, trait over the others.

It must be added that under exaptation two different subtypes are included: pre-adaptations and the so-called spandrels. Pre-adaptations were already envisaged by Darwin (1872:145) as the answer to a possible objection raised with regard to the evolution of highly complex organs like for instance the eye: “in order to modify the eye and still preserve it as a perfect instrument, many changes would have to be effected simultaneously, which, it is assumed, could not be done through natural selection”. In other words, Darwin admits that a potential contradiction arises between the chain of mutations leading to a highly complex organ and the functionality of the organ which is being formed by the adaptive process. This contradiction might only be solved if simultaneous changes are assumed which ‘aim’ at forming the complex organ. Although he discards this hypothesis and strongly reaffirms the role of a gradual adaptive process: “it is not necessary to suppose that the modifications were all simultaneous, if they were extremely slight and gradual”, the contradiction is undeniable. Subsequently, a mechanism of pre-adaptation has been suggested, whereby “a structure is said to be pre-adapted for a new function if its present form which enables it to discharge its original function also enables it to assume the new function whenever need for this function arises” (Bock 1959:201).

While pre-adaptations represent a certain intermediate type between adaptive and exaptive changes, spandrels are claimed by Gould & Lewontin (1979) to provide instances of pure recycling of biological material to serve a different purpose because they are intended as the byproduct of the evolution of some other characteristic rather than a direct product of adaptive selection relating to (the functionality of) a certain organ. In other words, spandrels do not necessarily display a pre-adaptive character. On the other hand, critical opponents of exaptation have pointed out that a certain degree of pre-adaptation has always to be there also in the case of alleged spandrels like the famous panda’s thumb which originally was a sesamoid bone, subsequently reused as a thumb. In this way, spandrels are reduced to pre-adaptations. In this connection, Dennett (1995:281) even questions that “if you go back far enough, you will find that every adaptation has developed out of predecessor structures each of which either had some other use or no use at all”.

In brief, the mechanism of natural selection shared by adaptation and exaptation provides the dynamic part of the evolutionary scenario which determines the survival of the mutated organism in contrast to the non-mutated one. The

main difference between adaptation and exaptation seems to reside in the crucial role played by pre-adaptation which gives the mutation a teleological flavor absent in the case of adaptation (unless a Lamarckian approach is adopted, already criticized by Darwin as discussed above). In order to import the term into our linguistic epistemology, one has to be conscious of this starting point: exaptation is inherently connected with adaptation; the former cannot be understood without the latter (see Larson et al. 2013).

It must be added that exaptation has not been universally accepted in evolutionary biology. In the ongoing discussion, at least three different positions are represented (see Pievani & Serrelli 2011 for a survey): (i) those who accept the distinction between adaptation and exaptation as roughly sketched above; (ii) those who completely reject it because of its teleological flavor; rather, they try to reduce exaptive changes to the adaptive selection; (iii) those who accept the existence of a mechanism of pre-adaptation without invoking the existence of exaptation as neatly distinguished from adaptation (see Dennett's quote above). As summarized in the introductory paper by the editors of the volume, a similar debate is also ongoing within linguistics with regard to the nature and usefulness of exaptation, and similar positions of (partly critical) supporters and opponents are represented (for instance, Joseph this volume). However, the theoretical premises are far less clear because of the complete neglect of the conceptual pair adaptation / exaptation. To this I will turn my attention in the next section.

3. The role of adaptation in language change

Recently, several attempts have been made to look at language from an evolutionary perspective in terms of a complex adaptive system (see Croft 2000, 2006; Beckner et al. 2009) which is intrinsically developmental in Hopper's (1987) sense of emergent grammar. In particular, such a complex adaptive system is taken to display the following properties (Beckner et al. 2009: 2):

- (a) The system consists of multiple agents (the speakers in the speech community) interacting with one another.
- (b) The system is adaptive; that is, speakers' behavior is based on their past interactions, and current and past interactions together feed forward into future behavior.
- (c) A speaker's behavior is the consequence of competing factors ranging from perceptual mechanics to social motivations.
- (d) The structures of language emerge from interrelated patterns of experience, social interaction, and cognitive processes.

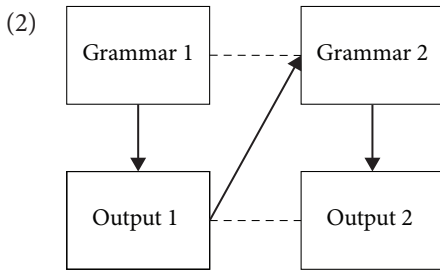
As can be gathered from this set of properties whereby a system has to be conceived as interactive, adaptive, competitive and emergent, being adaptive basically

amounts to being usage-based. I will take this in my background intending that the speakers' behavior is adaptive along the lines depicted above which envisage an interactional view of language conceived as the result of the past and current concrete interactions of the speakers. For instance, Maslova (2008) sees in the speakers' selective behavior the explanation for the effect of (uni)directionality typically attributed to grammaticalization with regard to the expansion of the semantic range of a linguistic pattern. This results from the mechanism of propagation of the change which implies that given a non-obligatory pattern E two strategies can be envisaged, one of which (A) licenses E in a certain context C, while the other (B) does not. This gives rise to an asymmetry with far-reaching repercussions for the selection process. In fact, when an A-speaker uses E_C in a conversation with a B-speaker, the latter hardly fails to notice the difference of A-speaker's linguistic behavior, because a constraint on the use of E is violated in the B-grammar. This is not true for an A-speaker, and therefore much harder if not impossible to do. Thus, B-speakers have the possibility to adopt the A-grammar (i.e., to replicate the behavior of A-speakers), while this is not immediately feasible for the A-speakers who are unlikely even to notice that there is another strategy to adopt.

In the next sections, I will leave somewhat in the background the dimension of propagation of a change which is intrinsically connected with the language intended as an adaptive, usage-based system and represents the second step of Croft's (2000, 2006) evolutionary model. My attention will focus on Lindblom's (1988, 1998) model of adaptive changes which concerns the first step of Croft's model, namely the replication: this will concretely serve to pursue the issue at stake, namely to assess whether the conceptual pair adaptation / exaptation may be useful for our understanding of language change.

3.1 Towards an adaptive model of language change

Language change is likely to take place during – and in consequence of – the process of replication of a certain linguistic structure (in Croft's 2000, 2006 terms: a *lingueme*) within a given communicative situation. The question is why this happens and how it can be modeled in a theory of language change, as briefly hinted above on the basis of the issue of directionality discussed by Maslova (2008). If we take seriously the idea that language use consists in the replication of certain *linguemes*, then a crucial role is attributed to the listener – the B-speaker – who qualifies as the real source of the change when she produces her own Output 2 resulting from her Grammar 2 on the basis of the perceived Output 1 produced by the A-speaker's Grammar 1:



In this deservedly popular model suggested four decades ago by Andersen (1973), the change is meant to take place (“abductively”) in the listener’s mind when she models her linguistic behavior elaborating on the environment (i.e., the speaker’s Grammar 1) in which she is immersed.

Elaborating further on Andersen’s (1973) abductive model, Ohala (1988: 179) sees the reason for most (phonological) changes in the listeners’ misperceptions, which “resemble scribes’ errors in copying manuscripts”. For instance, when the B-speaker hears the sequence [ɛ̃n] in which the vowel produced by the A-speaker is nasalized due to the following consonant, thus reflecting a “constant, time-less process that owes its existence to the physical constraints of the vocal tract” (Ohala 1993: 248), she might have an “innocent misapprehension”. Accordingly, instead of reproducing the sequence /ɛn/ intended by the A-speaker she might directly attribute the nasalization to the vowel especially when “the final N is weakly implemented such that it is difficult to detect or to associate with the preceding [V̄]”. This misapprehension leads to the phonologization of the nasal vowel /ɛ̃/ in Grammar 2.

While this view might at first sight recall the typical mechanism responsible for the casual mutations which underlie the process of natural selection depicted in §2 above, Ohala (1988: 179) expressly takes stance against any possible interpretation in evolutionary terms. In particular he rejects the adaptive perspective connected with the selection of one possible replication with regard to the others and in fact he concludes that “[l]ike scribal errors, there is no adaptive value to such variations”. What is more, no parallel is likely to be drawn between the evolutionary changes commonly observed in biology and those described in phonology, because “there is little evidence for subsequent optimization through competition of languages’ sound systems”. This is especially true if one thinks that “over the time span that linguists have been able to investigate the history of languages, c. six millennia, – in which time many languages’ phonologies, including their segment inventories, have undergone remarkable changes – there has been no detectable improvement in the communicative capacity of speech”. At any rate, Ohala (1988: 179) admits that “although variations that become fossilized in

sound change do not *per se* make speech adaptive, it may nevertheless be true that if one variant is adopted by or associated with a prestigious speaker or group, that might make it propagate more widely than others". In this sense, pronunciation norms may be adaptive insofar as they may benefit the speaker, but this is "sociolinguistic fact" and lies "outside the strictly phonetic domain" motivating the sound change.

Andersen (2006) as well shares Ohala's negative stance against the extension of an evolutionary view to language change. In particular, he considers that Output 2 to which Ohala's idea of misperceptions refers is the result of an intentional behavior while genetic mutations are casual in the sense of non-intentionally aimed at a better adaptation of an organism to the surrounding environment, unless a Lamarckian view is adopted. In Darwin's view, the evolutionary advantage results from a purely quantitative enhancement of the mutated organisms, which provides substance for the inference that they fit better the environment.

To my understanding, these objections emphasize two different aspects of the question. Ohala's criticism reflects the Uniformitarian Principle underlying the theory and the practice of modern linguistics (see Heine & Kuteva 2007: 28–32 for a recent discussion) whereby language has always been the way it is, at least in the historical times for which we have a reliable documentation. Any speculation on a possible evolutionary scenario is accused of a teleological bias inasmuch as it maps the evolutionary perspective directly on observed (historical) changes as an entelechy, i.e., in finalistic terms, as in the Lamarckian view. Since no measurable improvement seems to have characterized phonological systems ever since, this is taken to speak against an adaptive view of language change, because the changes cannot be said to 'adapt' language to better communicative purposes. However, as repeatedly emphasized above, this is not the way how evolutionary scenarios involving adaptation are normally conceived. As a matter of fact, also in biology adaptation does not imply any 'improvement' or 'progress' in teleological terms of the selected organism or of its species along any functional dimension (see Croft 2006: 115). We might rather be enabled in certain cases to speak of the complexification of an organism which thereby turns out to show a selective advantage against 'simpler' cognates. But notice that this nicely parallels what Givón (2009: 34) assumes with regard to the rise of syntactic complexity within the perspective of an adaptive ecology of human communication.

Andersen's observation is slightly different because he aims at espousing a consistent Lamarckian view of language change. Since language is an intentional activity, changes cannot result casually from the replication of a population of linguemes in contrast with what normally happens in evolutionary biology. Thus, the endorsement of an evolutionary perspective in linguistics can at best be made in purely metaphorical terms and has to be consistently Lamarckian because of

the intentional context in which language including its transmission is immersed: “A fair comparison of traditions of speaking (and culture) with evolution must recognize that traditions are in fact Lamarckian” (Andersen 2006: 80).

However, as pointed out in §1.2 above, nothing really hinges on the (epistemological) appropriateness of a certain term or concept when it is borrowed from a different discipline. What really matters is its fruitfulness for illuminating or explaining certain facts in the borrowing discipline. What is more, the borrowing of terms or concepts is always made on a certain metaphorical basis which can be more or less cogent. Thus, one cannot really consider verbal arguments in the same way as electrons orbiting around a nucleus (assuming that this still is the correct view for the representation of matter in physics or chemistry nowadays) or verbs as nuclei containing protons and neutrons. Nevertheless, the metaphor underlying the term (verbal) valence is perfectly understood and used in the current debate and even in introductory handbooks in linguistics. Therefore, I am not scared of being accused – as one anonymous reviewer actually does – of a metaphorical adoption of the term adaptation into linguistics. Rather, the real issue is whether this contributes to the advance of our understanding of language change. In this regard, Lindblom et al. (1995: 6) observe that “cultural and organic evolution share the same fundamental elements”, namely “a process of ‘selection’ from ‘variation’ in the presence of biasing ‘constraints’” where “[f]orms compatible with constraints stand in a better chance of being selected than those that do not”. In the face of such commonalities, it would be a mistake to give up exploring the theoretical viability of the adaptationist view. Adopting this perspective, Lindblom and collaborators attempt to understand how phonological changes can be viewed as adaptive in an evolutionary model of change.

Finally, against a Lamarckian conception of language change one can emphasize the third type nature of language change, as Keller (1994) puts it. In this regard, the misperceptions envisaged by Ohala don’t result intentionally from the listener’s behavior. Rather, they are an unconscious, unintended side-effect of the real intention of the listener, namely to interact with a speaker in a communicative situation. In this light, one cannot subscribe to Andersen’s view that language change resembles the Lamarckian conception on a par with the rest of the human cultural changes. It is in fact this unintended result of an intended activity which can be paralleled – *mutatis mutandis* – to Darwin’s conception of selection as the blind result of the immanent tendency towards favoring ‘the best to fit’. This keeps language change, especially with regard to its systemic dimension, distinct from other changes in the cultural domain as for instance the development of instruments and tools, of social relations and customs, etc. in which changing strategies are consciously pursued.

3.2 Modeling phonological change in adaptive terms

Lindblom et al. (1995:28) investigate adaptive changes under the perspective of the socio-phonetic adaptation hypothesis, which maintains that “phonetic forms are put to both articulatory and perceptual tests by speakers-listeners and that, in a significant way, such evaluations determine the phonetic shape of sound patterns”. Accordingly, the sociolinguistic factor, also recognized by Ohala, cannot be treated separately from its phonological equivalent, namely how the talkers perceive and judge their own performances.

Moreover, phonological changes cannot be entirely attributed to the listener, for the simple reason that “if a listener should decide to pronounce a word that she has misperceived, she could not do so unless she knew what that word was” (Lindblom et al. 1995:12). Thus, we should expect that the B-speaker simply restores the sequence /ɛn/ of Grammar 1 because she is already familiar with the word containing the sequence. In other words, in Ohala’s interpretation of Andersen’s abductive model depicted above a complete misperception should lead to non-recognizing the target sound and the lexical item in which it is contained, which seriously undermines the success of the communication. That this does not normally happen shows that there must be other aspects connected with the interaction speaker-listener. First, the misperception has to be only partial (a “mini-sound change”), “in the sense that lexical access occurs successfully despite a phonetic error” (Lindblom et al. 1995:12). Second, “if misperceptions are partial, errors will be corrected immediately on recognition” (Lindblom et al. 1995:12). Thus, in the crucial moment in which the listener turns speaker she has to decide whether to keep the error or simply restore the correct form.

In this light, the strict link between misperception and sound change assumed by Ohala has to be considerably weakened unless a number of assumptions are made on the way how language is perceived and produced. Here is where the adaptationist model comes in, which focuses on a double perceptual modality adopted by talkers in the scenario of sound change depicted by Ohala (1988, 1993). They can focus either on what is being said in a content- and knowledge-dependent mode, or on how something is said in a signal-oriented mode, especially when the reference to the contextual knowledge is somehow inhibited. It is this second mode “that provides the breeding-ground for new pronunciations (mini-sound changes)” (Lindblom et al. 1995:13).

On the other hand, misperceptions must be tempered by a mechanism deciding whether they are to be adopted or not in the subsequent production. Such a mechanism implies that “native speakers store in their phonetic memories, not only (lexical) motor-perceptual information on the ‘canonical’ (‘should-be’) pronunciation of each item, but also (relatively) unprocessed phonetic patterns

captured in sporadic moments of acoustic/auditory truth” (Lindblom et al. 1995: 17). Moreover, two possible scenarios can be imagined for a change, namely when either “modulation by signal-independent information is somehow inhibited”, as assumed in Ohalian misperceptions, “or becomes superfluous because intelligibility demands have already been redundantly satisfied, or are of secondary importance for social or speaker-related physiological or cognitive reasons” (Lindblom et al. 1995: 17). In this latter case the ‘how’-mode becomes of crucial importance, allowing the B-speaker to reconstruct Output 1 and to produce her own Output 2 on the basis of the conditions of the entire communicative situation in which she is located.

It must be stressed that the talkers are aware of the ‘should-be’ pronunciation and at the same time of the range of phonological processes that are normally controlled during the communication process. Lindblom et al. (1995: 8) suggest a model in which “[t]he ideal speaker makes a running estimate of the listener’s need for explicit signal information on a moment-to-moment basis and then adapts the production of the utterance elements (words, syllables or phonemes) to those needs”. Such a model responds to the general cognitive requirements of plasticity and economy which are necessary for the production of sufficiently informative signals by action systems. While economy is a general issue also within linguistic theory, plasticity is rather used in biology and neuroscience to refer to the capacity of an organism to adapt to the environment. In our case, under plasticity we can understand the capacity of contextually adapting our articulatory gestures as in the rounded realization of a lateral preceding a back rounded vowel due to co-articulation, as well as the ability of modeling our phonological system in response to external strains, for instance when remapping the phonological processing from the native language to a foreign language (see Parlato-Oliveira et al. 2010). Again, these adaptations are not to be seen as the result of an intentional activity.

In this light, the continuous modeling and adaptation of the signal takes place along a continuum with more forcefully hyper-articulated forms at one end and less energetic ‘hypo’-forms at the other. This H&H theory, besides giving a principled account of the origin of the phonetic variation, is at the heart of the ‘how’-mode seen above, because it attempts to explicitly determine what the speaker’s assumption is about the informational needs of the listener and how her own tacit demand for articulatory simplification has to be satisfied when a given phonetic form is produced.

The general cognitive requirements of plasticity and economy are in nice correspondence with the widely assumed typology of phonological processes (Donegan & Stampe 1979; Kiparsky 1988), and in particular ‘weakening’ processes such as assimilations, vowel reductions, consonant deletions and lenitions

on the one hand, and on the other ‘strengthening’ processes (‘polarizations’) like vowel shifts (e.g., tense vowels tend to be raised and lax vowels to fall) and consonant fortitions.⁴ It must be added that this correspondence is particularly welcome because it results from very different premises, of purely phonetic nature for the H&H theory and of phonological character for the strengthening and weakening processes. In this way, phonological processes of adaptive nature can be identified in accordance with the adaptationist model elaborated by Lindblom and collaborators.

Moreover, as suggested by Donegan & Stampe (1979), these phonological processes are expressly oriented as they obey well-defined functions and goals to which the speakers adapt their behavior during the speech act. On the other hand, the apparent teleology represented by the reference to terms like strengthening or weakening has to be downplayed by the observation that variations during the process of replication are fully casual – as Lindblom et al. (1995:26) put it: “Assimilations ‘just happen’”. Their diffusion and the probability of being retained can be partially predicted on the basis of (language-specific) parameters like word frequency, articulatory complexity, the so-called Size Principle maintaining that the inventory size of the system directly correlates with the number of (secondary) distinctive features (see Lindblom & Maddieson 1988), etc.

How can all of this be generalized beyond phonological change? Three aspects are of relevance in Lindblom’s adaptationist account: i. the social value of the new diverging replications, ii. their articulatory complexity and iii. their perceptual distinctiveness. As for the first aspect, the adoption of a certain variant by a social group can be extended to new speakers as a signal of their ‘solidarity’ with the group. By doing so, they increase their social fitness and signal their status and identity to outsiders, and in this sense the change can be considered ‘adaptive’ with respect to social variables (recall Givón’s adaptive pressures mentioned in §1.2 above). This sociolinguistic dimension can be easily extended to any language change, and in fact the latter can always be considered adaptive with respect to social variables: truly idiosyncratic changes running against social variables normally fade out unless they are able to attract a(n) (even minimal) group of speakers.⁵

4. The third type of phonological processes goes under the label of ‘prosodic processes’ and affects speech timing and syllable structure, e.g., compensatory lengthening, consonant gemination, epenthesis. They can be partially subsumed under the continuum depicted by the H&H theory and correspondingly accounted for in terms of weakening or strengthening processes.

5. In this regard, the general question of the actualization of a change should be discussed more extensively than what is possible to do here, but see Andersen (2001). Moreover, recall

What distinguishes adaptive changes from the others are the last two aspects which are strictly interrelated as they refer to the concrete motivation underlying the change and at the same time allow us to see these changes as ‘oriented’, namely the articulatory complexity and the perceptual salience (‘distinctiveness’). In particular, adaptive changes are meant to foster a dialectic balance across the articulatory costs resulting from the frequency or the structural complexity (e.g., the length) of an expression on the one hand and the extravagance of its perceptual benefits (the salience, the communicative efficacy, etc.) on the other. It is precisely the relevance of the speakers-listeners evaluations resulting from their (more or less) conscious confrontation with this dialectic between energy saving and distinctiveness that shapes in ‘adaptive’ sense their linguistic behavior. In the next section, we will try to extend this dialectic conception of adaptive changes beyond the domain of phonology.

3.3 Extending the adaptive model beyond phonological change

The picture outlined so far of an ‘adaptive’ understanding of instances of language change matching the three requirements of social value, complexity and distinctiveness allows us to extend Lindblom’s model beyond sound changes, and firstly to those cases which are typically known under the label of grammaticalization. In fact, grammaticalization has been interpreted as resulting from the speakers’ intention of increasing their communicative efficacy and/or to reach certain goals within a speakers’ community. In this regard, Haspelmath’s (1999) ‘ecological’ conditions provide an optimal base for an adaptive understanding of grammaticalization, insofar as they highlight the process of evaluation that the speakers-listeners carry out when they are immersed in concrete speech situations. First, grammar is understood in terms of a processing device according to which linguistic units are ordered along a continuum from maximally free / deliberate to maximally rule-bound / automated. Second, certain meanings of linguistic units are universally much more basic to speaking than others, and therefore are likely to become ‘entrenched’ much more often. Third, high frequency leads to greater ease of processing and therefore to routinization or automation which require less attention during the execution. These ecological conditions constitute the background for the grammaticalization process, whereby the employment of certain ‘salient’, i.e., communicatively effective, constructions gives rise to a concrete evaluation of the newly created structure in accordance with the maxims of

the brief discussion made above of Maslova’s (2008) suggestion concerning the propagation of certain types of changes as responsible for their (uni)directionality.

action underlying the speakers' behavior: 'Talk in such a way that you are socially successful at the lowest possible cost', etc. If the reaction is positive, this leads to a process of erosion of the construction due to its increased frequency and routinization which complies with a cost-saving strategy. Here, Lindblom's assumptions on the role of the listener can be recalled, who must have access to a double modality, the 'what'-mode and the 'how'-mode. It is this latter that provides the ideal breeding-ground for innovations. Dissociating the two dimensions allows the B-speaker to decide to repeat the innovation instead of restoring a more reliable and accepted construction. In addition, this choice may be socially convenient favoring in-group membership.

As an example, take the case of the Italian progressive form *sto andando* "I'm going, lit. I stay going" mentioned above. Simply relying on the 'what'-mode should lead to dismiss the construction because no compositional reading is allowed. But the focus on the 'how'-mode triggers in the listener the activation of the whole series of bridging / switch contexts (roughly: *sto calmo / a letto* "I stay calm / in bed" > *sto dormendo* "I stay sleeping" > *sto andando* "I stay going") which permit a meaningful interpretation that can be subsequently repeated if the result is favorable (see Heine 2002 for a discussion). This also accounts for the phenomenon of layering in which the new function coexists with the old one, because this requires a double access in terms either of the 'what'-mode or of the 'how'-mode depending on the linguistic context, the surrounding communicative conditions, etc.

Haspelmath (1999: 1060) emphasizes the inflationary effect of grammaticalization (see also Dahl 2001), whereby an initially effective construction undergoes routinization and subsequently loses its communicative advantage as long as more speakers use it. This inflationary effect also finds an adaptive explanation in the dialectic between the two modalities and in their connection with the general requirements of plasticity (tending to extravagance which is connected with perceptual benefits as discussed above) and economy. Moreover, it nicely reveals the nature of the third type phenomenon in the sense of Keller (1994), which "is explained if it can be shown to be the casual consequence of individual actions that realize similar intentions" (Haspelmath 1999: 1054). It is important to stress that in this way no appeal to teleology is necessary. Similarly to sound change, meaning extensions 'simply happen', generally via metaphors or metonymies as in the case of the French near-future based on *aller* 'to go': *je vais dormir* "I go to sleep / I'm falling asleep" > *je vais sortir* "I'm going to go out / I'll go out", which is even extended to *aller* with a dramatic effect of layering: *je vais aller* "I plan to go / I'll go". This also reveals the pandemic nature of grammaticalization.

Finally, grammaticalization displays another important trait of adaptive changes, as they have been depicted above for the phonological processes giving

rise to sound change, namely the reference to an oriented developmental ('vertical') path (see Vincent 1995). In fact, grammaticalization processes are largely unidirectional and normally follow well-defined 'chains' or 'paths' along which certain grammatical properties cluster around constructions with 'family resemblances'" (see Hopper & Traugott 2003: 108). In Gaeta (2004: 65), it has been suggested to treat grammaticalization processes as ideally 'funnel-shaped' channels, which only marginally exhibit deviations.

Although grammaticalization is a rather frequent and to a certain extent pandemic phenomenon, it does not exhaust the types of conceivable adaptive changes. With the focus on morphology, a number of other cases come to mind. For instance, the externalization of inflection (see Haspelmath 1993) occurring in an Italian left-headed compound like *capistazione* "station masters, lit. masters-station" > *capostazioni* represents a quite common instance of morphological change which can be considered adaptive inasmuch as it responds to the two general requirements of adaptive changes. On the one hand, it enhances economy because it facilitates the detection of markers carrying grammatical information by limiting their occurrence in pre-defined positions. On the other, increasing the perceptual salience of the final part of the word renders its detectability more plastic, i.e., adaptable to manipulation in a syntactic context. This as well as other changes increasing what Wurzel (1989) intends under the general label of system adequacy are likely to display an adaptive nature. For instance, the apparently contra-iconic change deleting the suffix of the 3rd person singular of the German verb *brauchen* "to need": *braucht* "needs" > *brauch* in a sentence like *er brauch nicht kommen* "he need not come" responds to the requirements of economy and plasticity insofar as the verb is assigned to the modal class which is morphologically characterized by this as well as by other well-defined inflectional properties (see Gaeta 2002). It is noteworthy to observe that these two adaptive changes, the case of *capostazione* and of *brauchen*, share a general trend towards markedness reduction that consists in an energy-saving, economic effect, while on the other hand it increases the consistency, namely the plasticity intended as the adaptability, of the system. Considered in these terms, markedness reduction becomes an important goal driving adaptive changes. In this regard, recent research on small children has shown that "markedness in communication is not just a linguistic phenomenon, but rather, in line with social-pragmatic views of language acquisition [...] it concerns the pragmatics of intentional communication more generally" (Liebal et al. 2011). Thus, markedness seems to invest different levels going from more specific linguistic features to more general social aspects of human interaction. Looking at markedness in terms of adaptive changes promises to open a new perspective for the general understanding of language (change) including the ontogenetic dimension. At any rate, this issue is too vast to be pursued here.

4. Exaptation as the counterpart of adaptation

Once that adaptive changes have been identified, they can then be contrasted with exaptive changes. The latter can be conceived of *ex negativo* as changes which are not 'oriented', i.e., they either cannot be reduced to the typology of strengthening and weakening processes seen above in phonology or do not follow the 'vertical' path typical of grammaticalization changes. In the next sections, I will attempt at providing a systematic picture of exaptive changes relating to the different levels of linguistic analysis, in phonology, in syntax, and finally in morphology (see also Los 2013 for a similar attempt based on a rather different theoretical background). Given the non-oriented nature of exaptation, the latter domain cannot be seen as the ideal 'final destination' of unidirectional channels as they are commonly assumed within grammaticalization studies (see Klausenburger 2000: 145; Gaeta 2004). At any rate, also because of the large discussion started by Lass, several morphological cases of exaptive changes have been pointed out, which might give the impression that this is the domain where exaptation is mainly found. It is clear, however, that in the broader perspective adopted here exaptive as well as adaptive changes generally profile two distinct types of change possibly affecting any part of language.

4.1 Exaptive changes in phonology

In the domain of phonology, a good instance of exaptive change is given by the rise of tones out of consonant deletions (see Gussenhoven 2004: 42–43 for a recent survey). For instance, in Mandarin Chinese (see Hagiège & Haudricourt 1978: 89–90) tonogenesis has to be related to the deletion of syllable-final laryngeal consonants, which are still preserved in modern cognate varieties such as Cantonese and Hakka. This is based on a common allophonic phenomenon, namely the occurrence of F_0 -perturbations after consonants which are normally not perceived as pitch difference, but as qualitative features on the consonants. For instance, a [t] with lowered F_0 will sound more like [d] than one with raised F_0 . However, the F_0 -perturbation can be 'misperceived' as pitch. When syllable-final consonants happen to be weakened as a consequence of an adaptive change, their lowering (in the case of [h]) or raising (in the case of [ʔ]) effect can be refunctionalized to express something else, namely the meaning distinction in minimal lexical pairs. The crucial point distinguishing the exaptive change from its adaptive counterpart is the lack of a more general motivation in terms of economy or plasticity which might allow us to assign the change to the typology of strengthenings or weakenings. Rather, the misperception is here co-opted for a completely different

function, lexical distinction. On the other hand, the Chinese tonogenesis cannot be said to give rise to a new grammatical coding as it was pointed out above with regard to German umlaut. This keeps such an exaptive change distinct from the grammaticalization ‘from below’ in which a new way of expressing grammatical meaning comes about. For this reason, the case of the German umlaut features an adaptive change in contrast with the Chinese tonogenesis in spite of the apparently similar mechanism whereby an allophonic alternation is refunctionalized.

In a way, the F_0 -perturbation may be seen as ‘pre-adapted’ for the subsequent tonogenesis. As already pointed out above with regard to the usage, also envisaged by Darwin, of pre-adaptation in evolutionary biology, this term does not imply a strictly teleological view as if the F_0 -perturbation were ‘predestinated’ for exaptation. On the other hand, it cannot be denied that a sort of pre-adaptation can also be assumed in many other cases which are typical instances of adaptive changes both within evolutionary biology and outside. For instance, one might think that movement verbs like *go* are ‘pre-adapted’ for being grammaticalized as future auxiliaries. However, Darwin’s intuition underlying the term pre-adaptation relates to the fact that this explains why a certain structure which is or has become dysfunctional or functionless has been kept and refunctionalized instead of being simply dismissed. Pre-adaptation emphasizes that vestiges of the new possible function were already present to a certain extent in the structure. It is in this sense that the term pre-adaptation is used here. Such a sort of ‘pre-adaptation’ is held responsible for the refunctionalization of the allophonic F_0 -perturbation which should have disappeared after the weakening process. This is the crucial property of exaptation already emphasized by Lass in his seminal (1990) paper: after the neutralization of the segmental contrast in syllable-final consonants, the F_0 -perturbation has become ‘junk’, i.e., function-less, and reused to carry out a different function.

A further instance of exaptive change in phonology comes from the rise of the so-called syllable cut prosodies typically characterizing German as suggested by Vennemann (2000) in the shade of Eduard Sievers and Nikolai Trubetzkoy. In this case, the vowel length characterizing the phonological system of Middle High German was subsequently lost as a distinctive property and partially reorganized on the basis of the syllable structure. Accordingly, short vowels were lengthened when occurring in open (stressed) syllable: Middle High German *tăc* / *tă.ge* ‘day(s)’ > Early New High German *tăc* / *tă.ge*. This led to a dissociation of the feature length from the single vowel which was reinterpreted as contextually related to the prosodic structure (open stressed syllable). The exaptive change comes in as a consequence of this reinterpretation because the lengthening process was subsequently associated with (and therefore refunctionalized as) the way how the syllable containing the vowel is ‘cut’, i.e., ended. If the syllable is smoothly cut, then

the vowel normally is tense and long (if it also happens to be stressed); otherwise, i.e., if the syllable is abruptly cut, the vowel is lax and short. Accordingly, we observe in the modern German form $T[a:]g / T[a:]ge$ “day(s)” the lengthening of the stressed vowel – even in closed syllable – in the presence of a smooth syllable cut in contrast with a short vowel occurring in the presence of an abrupt cut: Middle High German *brücke* “bridge” > modern $Br[yk]e$. This process was accompanied by the degemination of long consonants which emphasized the abrupt character of the vowel-consonant transition by means of the ambisyllabic consonant. It is interesting to observe cases of wrong cut, namely of vowels associated with the abrupt cut and concomitant ambisyllabicity of the following consonant instead of the expected smooth cut and heterosyllabicity of the consonant especially when the latter was a dental stop. For instance, in contrast with the development of *Tag* sketched above the MHG word *gäte* “husband”, with short vowel and short consonant like *tác*, has given rise to the modern German $G[at]e$, with abrupt syllable cut and ambisyllabic consonant, similar to the MHG *mätte* “mat”, with short vowel but long consonant, which has become $M[at]e$. Notice that the ‘wrong’ outcome of *gäte* stands in neat contrast with the expected development displayed by the MHG *náme* “name” which has become $N[a:]me$ with a smooth syllable cut. In other words, the length characterizing the MHG vowels was refunctionalized as an overt manifestation of the smooth syllable cut in modern German. In the perspective adopted here, long vowels can be said to be pre-adapted for signaling the smooth cut.

4.2 Exaptive changes in syntax

Leaving for the moment morphology aside, we can treat as an exaptation the fixation of a certain word order in syntax. For instance, the largely ‘free’ and/or pragmatically governed word order of Latin has become (more) fixed in all Romance languages, taking on the function of signaling subject- and objecthood which used to be encoded by means of case-marking in Latin. In particular, the shift toward SVO has been claimed to be motivated by the strong correlation between subject- and topichood: in our terms, we might say that topics were pre-adapted for becoming subjects. This word order was subsequently exapted when the system of case marking definitely collapsed (see Hock 2010: 67).

Similarly, it can be shown that German has evolved towards a quite strict V2 order, in which the second position of the finite verb in the clause signals the initial position occupied by the topical constituent. In this regard, Hinterhölzl & Petrova (2010) observe that the V2-pattern found in modern German was initiated by aboutness topics in sentences expressing subordinating discourse relations. In the

following Old High German examples, the V2-sentence (3b) clearly contrasts with the V1 sentence (3a) insofar as the first position is occupied by a discourse referent already introduced earlier:

- (3) a. *uuarun thô hirta In thero lantskeffi* (Tat. 35, 29)
 were there shepherds in that area
 “There were shepherds in that region”.
- b. [*ih bin guot hirti* = “I am good shepherd”]
guot hirti tuot sina sela furi siniu scaph (Tat. 225, 16)
 good shepherd does his soul for his sheep
 “A good shepherd gives his soul for his sheep”.
- c. *seno nu thô uuas man In hierusalem* (Tat. 37, 23)
 look now there was man in Jerusalem
 “Behold, there was a man in Jerusalem”.
- d. *uuanan uueiz ih thaz?* (Tat. 2, 8)
 whence know I this
 “From where do I know this?”.

As an alternative to the pattern in (3a), the pattern in (3c) is found which involves a V2-clause with the sentence initial adverb *thô* “there / then”. In contrast with the sentences expressing subordinating discourse relations like (3b) which serve to introduce a hierarchical structure in the discourse, the patterns in (3a) and (3c) express coordinating relations which indicate that two discourse situations belong to the same level of discourse hierarchy, as when in a typical narration two situations occur in a temporal sequence. Hinterhölzl & Petrova (2010) suggest that the V2-pattern has been generalized with the help of the *thô*+V2-pattern which has become a frequent alternative to the V1-pattern in the oldest German texts. This also implies the refunctionalization of *thô* as a basic discourse linker expressing the temporal sequence of two discourse situations in coordinated discourse situations, normally signaled by V1-sentences. This refunctionalization was made possible by the partial redundancy of the originally deictic particle *thô* as shown by the examples (3a) and (3c), in which it is followed by an explicit locative phrase. It must be added that the V2-pattern was already fixed in Old High German in the case of polar questions in which the first constituent is a focus element (3d).

In contrast with what has taken place in German, Brinton & Stein (1995: 42) argue that the subject inversion found in English sentences like (4c–d) “represents a kind of syntactic exaptation since with the loss of systematic V-2 order, inversions are rendered meaningless [...] and are thus available for exaptation”. While in Old English the V2-pattern was common with adverbs occupying the first sentence position such as *þa* “then” and *nu* “now” (4a) similarly to Old High German (3a), this pattern subsequently collapsed when the SVO-pattern became fixed. It

was at this point that the sentence displaying inversion was refunctionalized to convey a discourse-structural meaning, namely a break or an unexpected development in the discourse (4c) or a focused subject (4d):

- (4) a. *ða he on his wege rad, þa beseah he on þæt eadigan mæden*
 then he on his way rode, then looked he on that blessed maiden
 “When he was riding on his way, he looked at that blessed maiden”.
 (*Life of Saint Margaret* 53; see Los 2013: 277)
- b. *With that Saladyne went and met his brother, whom he welcomed with all courtesy, and Rosander gave him no less friendly entertainment; brought he was by his two brothers into the parlour where they all sate at dinner.*
 (Th. Lodge, *Rosalynde*; see Brinton & Stein 1993: 41)
- c. *In comes Chomsky.*
- d. *The plane circled above the San Francisco area, and spread out under me were the farm where I was born, the little town where my grandparents were buried.* (P. Kael, *Movies on Television*; see Brinton & Stein 1993: 41)

The particular ‘presentative’ value of (4c–d) was uncommon before the exaptive change characterizing the modern usage: in the Early Modern English example (4b) “it is not expected that the story continues with the two brothers, or that they are brought into focus” (Brinton & Stein 1993: 41).

More in general, it is fairly well known that the quite ‘free’ SOV word order as is usually reconstructed for Proto-Indo-European (see Clackson 2007: 165–168 for a brief survey) has given rise to the varied outcomes (a more or less rigid SVO in the Romance languages and in English as discussed above, a rather rigid SOV and VSO respectively in most Anatolian and Celtic languages) which are generally taken to result from the refunctionalization of certain patterns serving different pragmatic and syntactic functions as for instance focus, left-detachment, etc.

This is the key for understanding all these changes in terms of exaptation: a certain word order associated with a given pragmatic property (e.g., topichood) has been co-opted to endorse a precise syntactic function (e.g., subjecthood). Or, in the perspective adopted here, it can be seen as ‘pre-adapted’ to undertake the subsequent syntactic function.

It has to be noted that the fixation of word order is a controversial issue within grammaticalization studies: while in Meillet’s (1912) seminal paper it is listed among the classical instantiations of the phenomenon, later studies have argued that word-order changes do not belong to grammaticalization because they do not share its basic character, namely a change from lexical to grammatical status, often via metaphoric or metonymic shifts which are generally understood in terms of chains outlining a unidirectional path as discussed above (see Sun & Traugott 2011).

Furthermore, word-order changes cannot be conceived of as unidirectional. In this regard, Faarlund (2010:203) expressly claims that “all known changes involving ‘freedom’ of word order are unidirectional. No language has to my knowledge reported to have changed from having fixed to having free word order”.⁶ This claim is somewhat surprising for at least two reasons. First, immediately below his claim, Faarlund admits to “have hitherto written ‘free’ within quotes, thereby indicating that word order is not really completely free”. In fact, even in most so-called free word order languages such as for instance Latin or Proto-Indo-European “there are certain rules of linear order”, which can also be ultimately due to general “discourse functions”. Thus, speaking of ‘free’ word order is an utter simplification which distorts the fact that any language must have some principles of linearization. And, on the other hand, speaking of fixed word order means that a certain linearization obeys syntactic (e.g., the coding of syntactic relations) rather than pragmatic principles. Second, and more importantly, the falsification of such purported unidirectionality is given by word order changes: if a language L displays a severely fixed word order, then it follows that this fixed word order should never change, because any modification might only arise relaxing the fixed order. It must be added that cases of change towards a more free word order are not unknown, as for instance pointed out by Luraghi (2010:224) for spoken French which “is apparently abandoning configurationality and moving in the direction of a new type of non-configurationality, where the order of constituents is free”. Finally, a different question is to consider that not all conceivable word order changes are attested. In this regard, Hock (2010:67) observes for instance that “there does not seem any historical documentation of a shift toward SOV, except through contact” and changes toward VSO are rare, which let him conclude that there is “a considerable gap in our knowledge of what motivates word order shift”.

At any rate, word-order changes are often strictly related to grammaticalization, in the sense that they may come to mark grammatical relations, which makes the distinction not an easy task. In fact, Hopper & Traugott (2003:60) suggest a compromise between two different understandings of word-order changes according to which

they should not be identified with grammaticalization in the narrower sense. However, given a broader definition of grammaticalization as the organization of grammatical, especially morphosyntactic material, they cannot be excluded from consideration.

In my view, this compromise solution is unsatisfactory because it overshadows the real fact that grammaticalization intended as a specific process has little to do

6. I thank the editors of the volume for pointing this out to me.

with word-order changes, both phenomenologically (no semantic bleaching, no unidirectionality) and theoretically (no oriented or ‘vertical’ path in our adaptive terms). On the other hand, a broader understanding of grammaticalization runs the risk of making the term generic and therefore useless as a heuristic device: is the word-order change concerning the position of the adjective in Romance from a pre-nominal to a post-nominal place (e.g., in Italian *un vecchio amico* “an old friend” > *un amico vecchio* “a friend who is old”) somehow related to grammaticalization? Probably, the correct answer is yes and no. Of course, the word-order change is related to grammaticalization in the sense that it contributes to ‘give a form to the grammar’. But it cannot be seen as an instance of what we consider to be a process of grammaticalization. To be sure, it is not only grammaticalization processes that can be made responsible of ‘giving a form to the grammar’. A further argument against treating word-order changes as representatives of the process of grammaticalization comes from the observation that they can change over time from a more rigid to a less rigid type, or from a certain order e.g., Head-Modifier, to its inverse Modifier-Head (see the discussion of Faarlund’s claim above). Lehmann’s (1992:407) stance that “[r]igid order restrictions cannot be directly loosened”, but only “substituted by a freer order when the construction in question is renewed” does not help much because the essence of unidirectionality consists exactly in the scarce possibility of upgrading grammatical(ized) morphemes.

In the perspective adopted here, the fixation of a certain word order is understood as an exaptive change because it refunctionalizes a certain linearization carrying a certain pragmatic function which provides in this way the ‘pre-adaptation’. In this way, it is clearly distinguished from an adaptive change like grammaticalization, although we have already seen above in the case of tonogenesis that the two types of change can be interrelated. For instance, the word-order change observed with the German morpheme *wegen* in (5a) is a clear signal of its grammaticalization with regard to the Middle High German source noun *wec* “way, place, part” as found in older constructions like (5b):

- (5) a. *seines Argwohns wegen* > *wegen seines Argwohns*
 his.GEN mistrust.GEN *wegen*
 “because of his mistrust”
- b. *um alsolich erbe, als uns annevalen solde*
 about all.such heritage as us come should
von unser muter wegen
 of our.GEN mother.GEN ways.DAT
 “about all this heritage as it should come to us from the part of our mother”.
 (Hess. *Urkund.*, see Szczepaniak 2009:98)

In this way, *wegen* cannot be analyzed any longer as inflected form of *wec* depending on the preposition *von* as it was originally in (5b). In addition, it has also taken on the most common word order found in German, which is mainly characterized by prepositions (see the reconstruction in Szczepaniak 2009: 98–101).

4.3 Exaptive changes in morphology

Finally, let us come to the most discussed examples of exaptive changes, those taking place in morphology. Because of the Janus character of morphology, more syntactic in its inflectional subpart and more lexical in derivation or word-formation, I will provide examples of exaptive changes which are clearly to be attributed to either subpart.

As for inflectional morphology, the case of the Italian nouns can be mentioned which select two different plural markers associated with different gender values on the basis of a clear semantic differentiation: *membro* “member (masc.)” → *membri* “members (masc.)” / *membra* “limbs (fem.)”, *osso* → *ossi* “bones (masc.)” / *ossa* “bones (fem.), e.g., of the skeleton”, etc. (see Giacalone Ramat 1998: 113). Here, the old plural marker *-a* of the Latin neuters has been exapted to convey a quite specific meaning, generally referring to a cohesive aggregate, and extended to other stems like *muro* “wall” → *muri* / *mura* (see Acquaviva 2008: 159, who even considers “the ending *-a* as the semantic, morphological, and phonological sides of a single lexeme-deriving process that creates plural lexemes”).

On the side of word-formation, the Latin suffix *-aticum* forming denominal adjectives like *silva* “forest” → *silvaticus* “wild”, which were also sporadically nominalized as in *via* “road, journey” → *viaticum* “provisions for the journey”, has survived in Old French adjectives like *sauvage* “wild”, *ombrage* “shady”, etc. However, the nominalized forms developed a considerable importance, not only as isolated items like *voyage* “journey”, but especially as an independent suffix co-opted for forming abstract collective nouns denoting either the whole set of properties characterizing the base noun or its ensemble as in *langue* “tongue, language” → *langage* “language (faculty)”, *feuille* “leaf” → *feuillage* “foliage”, *baron* “baron” → *baronnage* “baronage”, etc. From here it was further extended to verbal bases, especially those denoting an activity involving several entities or a quite complex action, and more recently technical operations: *arriver* “to arrive” → *arrivage* “delivery (of goods)”, *affiner* “to refine” → *affinage* “maturing (of cheese)”, *alunir* “to land on the moon” → *alunissage* “moon-landing”, etc. With this value, the suffix was borrowed in the other Romance languages as well: Italian *allunare* / Spanish *alunizar* → *allunaggio* / *alunizaje* (see Gaeta 2015). It must be added that the ‘learned’ variant of the Latin suffix *-aticum* is fairly productive in French as well

as in the other Romance languages forming denominal adjectives: Fr. *problème* / It. *problema* / Sp. *problema* “problem” → Fr. *problématique* / It. *problematico* / Sp. *problemático* “problematic”, etc.

4.3.1 From inflection to derivation

A partially different discourse concerns those cases in which an inflectional form has been re-grammaticalized in a different function typical of the derivational domain. Here the case for exaptation has been made (see Lass 1997: 323), for instance with regard to the German adverb *tags* “in the day” in which the old genitive form *-s* has been reused to form an adverb, and subsequently extended to nouns to which the suffix did not belong etymologically as in *nachts* “at night”. While this case might be considered marginal because of its limited productivity, the so-called long infinitive of Romanian, which goes back to the old Latin infinitive (e.g., *exprimo* “I express” → *exprimere* “to express”), provides a clear-cut example of exaptation from inflection to derivation. Here, the suffix *-re* has been co-opted to form action nouns (6a), which can be normally pluralized (6b), are usually blocked by the occurrence of other action nouns (6c), are clearly distinct from true (so-called short) infinitives (6d) and so-called supines (6e) insofar as they behave like a typical action nominal displaying the syntax normally found in noun phrases (6f) (see Gaeta 2015 for the details):

- (6) a. *a exprima* “to express” → *exprimare* “expression”
a învăța “to learn” → *învățare* “acquisition”
 b. *cântare* “singing, song” → *cântări* “songs”
demolare “demolition” → *demolari* “demolitions”
 c. *a muri* “to die” → **murire* / *moarte* “death”
a ajuta “to help” → **ajutare* / *ajutor* “help”
 d. *El vorbește fără a comunica nici o idee.*
 he talks without to communicate no one idea
 “He talks without conveying any idea.”
 e. *Aici e de câștigat un premiu.*
 here is of win.SUP a prize
 “There is a prize to be won here.”
 f. *învățare-a limbilor străine*
 acquisition-DEF languages.DEF.PL.GEN strange.F.PL
de către englezi
 of toward English.M.PL
 “the acquisition of the foreign languages by the English”

Changes from inflectional to derivational morphology have been regarded as instances of degrammaticalization (in the German and in the Romanian example

one can speak of deinflectionalization, see Norde 2009:153–157), and accordingly opposed to grammaticalization as ‘counter-directional’. However, I don’t subscribe to this point of view for the simple reason that they remain within the common (and highly grammaticalized) domain of morphology (they are “already centrally part of the grammar”, recall Vincent 1995), in which they express different but parallel (and partially overlapping) functions. Claiming that ‘inflection is more grammatical than derivation’ to justify the assumption of a degrammaticalization in the German and in the Romanian example is circular exactly like its counterpart claim that ‘derivation is more lexical than inflection’ which – for the sake of coherence – should lead us to completely exclude (the rise of) word-formation from the sphere of grammaticalization processes.

Even worse, in many cases the two subparts of morphology are so strictly interwoven that it is almost impossible to have changes affecting one level without having changes on the other. Take for instance one of most discussed cases of grammaticalization, namely the Romance adverbs formed on the basis of the Latin constructions containing *mens* “mind” (see Norde 2009: 41–46 for a critical survey):

- (7) a. Lat. *clarā mente* “with a clear mind” > Fr. *clairement* /
It. *chiaramente* / Port. Sp. *claramente* “clearly”
b. *succulento* “succulent” → **succulentamente* /
succulentemente “succulently”
violento “violent” → **violentamente* /
violentemente “violently”
c. *corrente* “current” → *correntemente* “currently”
sapiente “wise” → *sapientemente* “wisely”

Few authors have observed that in concomitance with the grammaticalization of *mens* as a suffix the adjective takes the feminine marker *-a-* in Italian, Portuguese and Spanish. However, the latter has lost inflectional status and acquired a derivational motivation insofar as it does not express agreement anymore: it has become a base allomorphy required by the suffix. In some cases, it also displays properties of ‘constructionalization’ as for instance with Italian adjectives like *violento* “violent” (7b), where the adverb has the form *violentemente* instead of the expected **violentamente* because of the quite large family of adjectives ending with *-nte* (7c), mostly going back to old present participles. Is this a case of degrammaticalization? Not more than the loss of inflectional properties (for instance the TAM-values) undergone by the English modals (see *Last year John *must / had to go to school*), or the loss of the inflectional value of the infinitive marker in concomitance with the grammaticalization of the Romance future: *CANTĀRE HABEŌ* “I have to sing” > Fr. *chanterai* / It. *canterò* / Sp. *cantaré* / etc. “I will sing”. Such an

interpretation would deprive grammaticalization of any heuristic value. On the other hand, it has to be considered that any case of grammaticalization contains a certain part of phonogenesis or morpho-phonogenesis (see Lazzeroni 1998), which is strictly connected with the component of decategorialization always accompanying the process (see Hopper & Traugott 2003: 106).

Is the allomorphy of the Romance adverbs a case of exaptation? As it has been discussed above, exaptive changes entail a re-grammaticalization, intended as “concept innovation” by Lass (1997: 319), namely a new motivation of the extant linguistic material. Therefore, the answer depends on how we interpret the term ‘concept innovation’. Should the Romance allomorphy imply a true re-functionalization of the alternation, then we might be enabled to see this as an exaptive change. To my mind, this case cannot be made for the base allomorphy of the Romance adverbs because no clear function can be attributed to it. In a similar way, the linking element occurring in a German compound like *Tag-es-ordnung* “agenda, lit. day-LE-order” has been treated as an instance of exaptation (see Wegener 2008). Here, old case-forms (genitives) have been integrated into compounds giving rise to various types of reanalysis. As discussed at length by Szczepaniak (this volume), this account is not watertight, because only some of the linking elements can be analyzed as the refunctionalization of bound material between the immediate constituents of compounds. At any rate, Szczepaniak concludes that the emerging linking elements represent merely a formal renovation of an already existing category.

It is important to stress that the re-motivation qualifying the exaptive changes cannot be seen as an improvement of the system adequacy or as a markedness reduction as suggested above for the adaptive morphological changes. For this reason, they may appear as guided by a certain “*bricoleur’s* craft”, as Lass (1997: 316) puts it, because they do not seem to respond to a general design. Nor are they likely to result from common processes which may become routinized under certain conditions.

4.3.2 *Spandrels?*

The exaptive changes discussed so far display a pre-adaptive character insofar as a certain property provides the basis for (in a way, ‘triggers’) the mechanism of refunctionalization, as if it were ‘pre-adapted’ for the new function. However, it is also possible to conceive true ‘spandrels’, namely a refunctionalization which is pure ‘*bricolage*’ in the sense that the exapted form cannot be seen as pre-adapted for the new function. One example, particularly clear if contrasted with the rise of the suffix *-mente* discussed above, is the suffix *-burger* found in *cheese-burger*, *chicken-burger*, etc. There is nothing in the meaning of *hamburger* that might have envisaged the refunctionalization of the final part of the word as a special suffix

for denoting sandwich types. In a similar way, the final *r*'s refunctionalized as plural marker in Jersiais French discussed above cannot be seen as pre-adapted for the new function in consequence of their peculiar properties. In this sense, they are a spandrel, a co-optation which is completely independent of their original function, if they had one.

5. Conclusion

To sum up, the importation into our linguistic epistemology of the conceptual pair adaptation / exaptation has proven useful inasmuch as it has allowed us to see the functional value of the corresponding changes from a broader evolutionary perspective. Adaptive changes, i.e., changes matching the three requirements of social value, complexity and distinctiveness as they have been sketched above, are essentially oriented ('vertical') and originate from widely attested processes of variations responding to a general design of economy and plasticity. In contrast, exaptive changes are normally non-oriented ('horizontal') and result from the manipulation of features already occurring in the speech signal which are subsequently refunctionalized to serve a different purpose.

On this basis, the conceptual pair adaptation / exaptation neatly describes distinct processes of language change, which are quite frequent within and across languages and can be interrelated, although they result from very different premises and obey quite different constraints. While adaptive changes such as grammaticalization have been investigated in great detail although in a different perspective from that adopted here, much remains to be done in order to understand the nature of exaptive changes insofar as they contribute to shape the grammar of a language, as for instance in the case of tonogenesis and word-order fixation. If, as Lindblom et al. (1995:29) suggest, "not all evolutionary change is adaptive", exaptation promises to offer an interesting perspective for accommodating a number of phenomena which defy a proper classification because of their apparently inconsistent properties. On the other hand, the perspective opened by the conception of adaptive changes can help us reconsider from a new vantage point traditional issues like the role of markedness (reduction) in language change.

Finally, the perspective of the propagation of a change was intentionally left aside in this paper. In this regard, Los (2013) has suggested that exaptation might be particularly favored in contexts where a breakdown in transmission has taken place because this makes it more challenging for B-speakers to recover the interpretation of a feature in a certain context. Nevertheless, they will often succeed by fine-tuning hypotheses until they have a reasonable fit, which might result into an exaptive change. If this were true, then the exaptive changes would be different

from the adaptive ones also because of the ecological conditions in which the speakers are immersed. However, whether this suggestion really captures substantial differences of the respective propagation scenario will only be understood if the two kinds of changes are carefully distinct, as has been attempted here. It is my hope that a correct understanding of exaptation as the conceptual counterpart of adaptation will shed light on this as well as on other aspects of language change.

References

- Acquaviva, Paolo. 2008. *Lexical Plurals: A morphosemantic approach*. (= *Oxford Studies in Theoretical Linguistics*, 20.) Oxford: Oxford University Press.
- Andersen, Henning. 1973. "Abductive and Deductive Change". *Language* 49:4.567–595.
doi:10.2307/412063
- Andersen, Henning. 2001. "Actualization and the (Uni)directionality of Change. *Actualization: Linguistic change in progress* ed. by Henning Andersen, 225–248. (= *Current Issues in Linguistic Theory*, 219.) Amsterdam & Philadelphia: John Benjamins.
doi:DOI: 10.1075/cilt.219.11and.
- Andersen, Henning. 2006. "Synchrony, Diachrony and Evolution". *Competing Models of Linguistic Change: Evolution and beyond* ed. by Ole Nedergaard Thomsen (= *Current Issues in Linguistic Theory*, 279.), 59–90. Amsterdam & Philadelphia: John Benjamins.
- Beckner, Clay, Richard Blythe, Joan Bybee, Morten H. Christiansen, William Croft, Nick C. Ellis, John Holland, Jinyun Ke, Diane Larsen-Freeman & Tom Schoenemann. 2009. "Language Is a Complex Adaptive System: Position paper". *Language Learning* 59:1.1–26.
doi:10.1111/j.1467-9922.2009.00534.x
- Bock, Walter J. 1959. "Preadaptation and Multiple Evolutionary Pathways". *Evolution* 13:2.194–211. doi:10.2307/2405873
- Brinton, Laurel J. & Dieter Stein. 1995. "Functional Renewal". *Historical Linguistics 1993: Papers from the 11th International Conference on Historical Linguistics, Los Angeles, 16–20 August 1993* ed. by Henning Andersen (= *Current Issues in Linguistic Theory*, 124.), 32–47. Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.124.
- Clackson, James. 2007. *Indo-European Linguistics: An introduction*. (= *Cambridge Textbooks in Linguistics*) Cambridge: Cambridge University Press. doi:10.1017/CBO9780511808616
- Croft, William. 2000. *Explaining Language Change: An evolutionary approach*. (= *Longman Linguistics Library*) London: Longman.
- Croft, William. 2006. "The Relevance of an Evolutionary Model to Historical Linguistics". *Competing Models of Linguistic Change: Evolution and beyond* ed. by Ole Nedergaard Thomsen (= *Current Issues in Linguistic Theory*, 279.), 91–132. Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.279.08cro
- Dahl, Östen. 2001. "Inflationary Effects in Language and Elsewhere". *Frequency and the Emergence of Linguistic Structure* ed. by Joan Bybee & Paul Hopper, 471–480. (= *Typological Studies in Language*, 45.) Amsterdam & Philadelphia: John Benjamins.
doi:10.1075/tsl.45.24dah
- Darwin, Charles. 1872. *The Origin of Species*. 6th ed. London: John Murray.

- De Cuypere, Ludovic. 2005. "Exploring Exaptation in Language Change". *Folia Linguistica Historica* 26.13–26. doi:10.1515/flih.2005.26.1-2.13
- Dennett, Daniel C. 1995. *Darwin's Dangerous Idea: Evolution and the meanings of life*. New York: Simon & Schuster.
- Donegan, Patricia & David Stampe. 1979. "The Study of Natural Phonology". *Current Approaches to Phonological Theory* ed. by Daniel Dinnsen, 126–173. Bloomington: Indiana University Press.
- Faarlund, Jan T. 2010. "Word Order". *The Continuum Companion to Historical Linguistics* ed. by Silvia Luraghi & Vit Bubenik, 201–211. London & New York: Continuum.
- Gaeta, Livio. 2002. "Umlaut Extension in German Modals as Natural Change". *Diachronica* 19:1.1–41. doi:10.1075/dia.19.1.02gae
- Gaeta, Livio. 2004. "Exploring Grammaticalization from Below". *What Makes Grammaticalization? A look from its fringes and its components* ed. by Walter Bisang, Nikolaus P. Himmelmann & Björn Wiemer, 45–75. (= *Trends in Linguistics. Studies and Monographs*, 158.) Berlin & New York: Mouton de Gruyter.
- Gaeta, Livio. 2015. "Action Nouns in Romance". *Word-Formation: An international handbook of the languages of Europe* ed. by Peter O. Müller, Ingeborg Ohnheiser, Susan Olsen & Franz Rainer, vol. II, 1165–1185. (= *Handbooks of Linguistics and Communication Science*, 40.2.) Berlin & New York: Mouton de Gruyter.
- Giacalone Ramat, Anna. 1998. "Testing the Boundaries of Grammaticalization". *The Limits of Grammaticalization* ed. by Anna Giacalone Ramat & Paul J. Hopper, 107–127. (= *Typological Studies in Language*, 37.) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/tsl.37.05gia
- Givón, Talmy. 2009. *The Genesis of Syntactic Complexity*. Amsterdam & Philadelphia: John Benjamins. doi:10.1075/z.146
- Gould, Stephen J. & Richard C. Lewontin. 1979. "The Spandrels of San Marco and the Panglossian Paradigm: A critique of the adaptationist programme". *Proceedings of the Royal Society of London B* 205.581–598.
- Gould, Stephen J. & Elisabeth S. Vrba. 1982. "Exaptation – A missing term in the science of form". *Paleobiology* 8.4–15.
- Greenberg, Joseph H. 1991. "The Last Stages of Grammatical Elements: Contractive and expansive desemanticization". *Approaches to Grammaticalization* ed. by Elizabeth C. Traugott & Bernd Heine, vol. I, 301–314. (= *Typological Studies in Language*, 19.1.) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/tsl.19.1.14gre
- Gussenhoven, Carlos. 2004. *The Phonology of Tone and Intonation*. (= *Research Surveys in Linguistics*) Cambridge: Cambridge University Press. doi:10.1017/CBO9780511616983
- Hagège, Claude & André Haudricourt. 1978. *La phonologie panschronique*. (= *le linguiste*, 20.) Paris: puf.
- Haspelmath, Martin. 1993. "The Diachronic Externalization of Inflection". *Linguistics* 31:2.279–310. doi:10.1515/ling.1993.31.2.279
- Haspelmath, Martin. 1998. "The Semantic Development of Old Presents: New futures and subjunctives without grammaticalization". *Diachronica* 15:1.29–62. doi:10.1075/dia.15.1.03has
- Haspelmath, Martin. 1999. "Why is Grammaticalization Irreversible?". *Linguistics* 37:6.1043–1068. doi:10.1515/ling.37.6.1043
- Heine, Bernd. 2002. "On the Role of Context in Grammaticalization". *New Reflections on Grammaticalization* ed. by Ilse Wischer & Gabriele Diewald, 83–101. (= *Typological Studies in Language*, 49.) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/tsl.49.08hei

- Heine, Bernd. 2003. "On Degrammaticalization". *Historical Linguistics 2001* ed. by Barry J. Blake & Kate Burridge, 163–179. (= *Current Issues in Linguistic Theory*, 237.) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.237.12hei
- Heine, Bernd & Tania Kuteva. 2007. *The Genesis of Grammar: A reconstruction*. (= *Studies in the Evolution of Language*, 9.) Oxford: Oxford University Press.
- Hinterhölzl, Roland & Svetlana Petrova. 2010. "From V1 to V2 in West Germanic". *Lingua* 120.315–328. doi:10.1016/j.lingua.2008.10.007
- Hock, Hans Heinrich. 2010. "Typology and Universals". *The Continuum Companion to Historical Linguistics* ed. by Silvia Luraghi & Vit Bubenik, 56–69. London & New York: Continuum.
- Hopper, Paul. 1987. "Emergent Grammar". *Berkeley Linguistics Society 13: General session and parasession on grammar and cognition* ed. by Jon Aske, Natasha Berry, Laura Michaelis & Hana Filip, 139–157. Berkeley: Berkeley Linguistics Society.
- Hopper, Paul & Elizabeth C. Traugott. 2003. *Grammaticalization: Second edition*. (= *Cambridge Textbooks in Linguistics*) Cambridge: Cambridge University Press. doi:10.1017/CBO9781139165525
- Jakobson, Roman. 1971. "Linguistics in Relation to Other Sciences". *Selected Writings*, vol. II, 655–696. The Hague & Paris: Mouton (Orig. in *Main Trends of Research in the Social and Human Sciences*, Paris & The Hague: Mouton-UNESCO, 1970).
- Joseph, Brian. 2005. "How Accommodating of Change is Grammaticalization? The case of 'lateral shifts'". *Logos and Language* 6:2.1–7.
- Keller, Rudi. 1994. *Sprachwandel. Von der unsichtbaren Hand in der Sprache*. 2nd ed. (= *UTB für Wissenschaft / Uni-Taschenbücher*, 1567.) Tübingen & Basel: Francke.
- Kiparsky, Paul. 1988. "Phonological Change". *Linguistics: The Cambridge survey* ed. by Frederick J. Newmeyer, vol. I, 363–415. Cambridge: Cambridge University Press.
- Klausenburger, Jürgen. 2000. *Grammaticalization: Studies in Latin and Romance morphosyntax*. (= *Current Issues in Linguistic Theory*, 193) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.193
- Larson, Greger, Philip A. Stephens, Jamshid J. Tehrani & Robert H. Layton. 2013. "Exapting Exaptation". *Trends in Ecology and Evolution* 28:9.497–498. doi:10.1016/j.tree.2013.05.018
- Lass, Roger. 1990. "How to Do Things with Junk: Exaptation in language evolution". *Journal of Linguistics* 26.79–102. doi:10.1017/S0022226700014432
- Lass, Roger. 1997. *Historical Linguistics and Language Change*. (= *Cambridge Studies in Linguistics*, 81.) Cambridge: Cambridge University Press. doi:10.1017/CBO9780511620928
- Lazzeroni, Romano. 1998. "Fonomorfogenesi". *Sintassi storica: Atti del XXX Congresso della Società di Linguistica Italiana* ed. by Paolo Ramat & Elisa Roma, 75–82. Roma: Bulzoni.
- Lehmann, Christian. 1992. "Word Order Change by Grammaticalization". *Internal and External Factors in Syntactic Change* ed. by Marinel Gerritsen & Dieter Stein, 395–416. (= *Trends in Linguistics. Studies and Monographs*, 61.) The Hague & Berlin: Mouton de Gruyter.
- Lehmann, Christian. 2002. *Thoughts on Grammaticalization*. 2nd rev. ed. Erfurt: Arbeitspapiere des Seminars für Sprachwissenschaft der Universität Erfurt.
- Liebal, Kristin, Malinda Carpenter & Michael Tomasello. 2011. "Young Children's Understanding of Markedness in Non-Verbal Communication". *Journal of Child Language* 38.888–903. doi:10.1017/S0305000910000383
- Lindblom, Björn. 1988. "Phonetic Invariance and the Adaptive Nature of Speech". *Working Models of Human Perception* ed. by Ben A.G. Elsedoorn & Herman Bouma, 139–173. London: Academic Press.

- Lindblom, Björn. 1998. "Systemic Constraints and Adaptive Change in the Formation of Sound Structure". *Approaches to the Evolution of Language* ed. by James R. Hurford, Michael Studdert-Kennedy & Chris Knight, 242–264. Cambridge: Cambridge University Press.
- Lindblom, Björn, Susan Guion, Susan Hura, Seung-Jae Moon & Raquel Willerman. 1995. "Is Sound Change Adaptive?". *Rivista di Linguistica* 7:1.5–37.
- Lindblom, Björn & Ian Maddieson. 1988. "Phonetic Universals in Consonant Systems". *Language, Speech and Mind: Studies in honour of Victoria A. Fromkin* ed. by Charles N. Li & Larry M. Hyman, 62–78. London: Routledge.
- Los, Bettelou. 2013. "Recycling 'Junk': A case for exaptation as a response to breakdown". *Historical Linguistics 2011: Selected papers from the 20th International Conference on Historical Linguistics, Osaka 25–30 July 2011* ed. by Ritsuko Kikusawa & Lawrence A. Reid, 267–288. (= *Current Issues in Linguistic Theory*, 326) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.326.18los
- Luraghi, Silvia. 2010. "The Rise (and Possibly Downfall) of Configurationality". *The Continuum Companion to Historical Linguistics* ed. by Silvia Luraghi & Vit Bubenik, 212–229. London & New York: Continuum.
- Maslova, Elena. 2008. "Unidirectionality of Grammaticalization in an Evolutionary Perspective". *Studies on Grammaticalization* ed. by Elisabeth Verhoeven, Stavros Skopeteas, Yong-Min Shin, Yoko Nishina & Johannes Helmbrecht, 15–24. (= *Trends in Linguistics. Studies and Monographs*, 205.) Berlin & New York: Mouton de Gruyter.
- Meillet, Antoine. 1912. "L'évolution des formes grammaticales". *Scientia (Rivista di scienza)* 12.384–400. (Reprinted in Antoine Meillet, *Linguistique historique et linguistique générale*, Paris: Champion, 1948, 130–148).
- Morin, Yves-Charles. 1986. "On the Morphologization of Word-Final Consonant Deletion in French". *Sandhi Phenomena in the Languages of Europe* ed. by Henning Andersen, 167–210. (= *Trends in Linguistics. Studies and Monographs*, 33.) Berlin & New York: Mouton de Gruyter.
- Norde, Muriel. 2009. *Degrammaticalization*. Oxford: Oxford University Press. doi:10.1093/acprof:oso/9780199207923.001.0001
- Ohala, John. 1988. "Discussion of Björn Lindblom's 'Phonetic Invariance and the Adaptive Nature of Speech'". *Working Models of Human Perception* ed. by Ben A.G. Elsedoorn & Herman Bouma, 175–183. London: Academic Press.
- Ohala, John. 1993. "The Phonetics of Sound Change". *Historical Linguistics: Problems and perspectives* ed. by Charles Jones, 237–278. (= *Longman Linguistics Library*) London: Longman.
- Parlato-Oliveira, Erika, Anne Christophe, Yuki Hirose & Emmanuel Dupoux. 2010. "Plasticity of Illusory Vowel Perception in Brazilian-Japanese Bilinguals". *Journal of the Acoustic Society of America* 127:6.3738–3748. doi:10.1121/1.3327792
- Pievani, Telmo. 2005. *Introduzione alla Filosofia della Biologia*. (= *Biblioteca di Cultura Moderna*, 1179.) Bari & Roma: Laterza.
- Pievani, Telmo & Emanuele Serrelli. 2011. "Exaptation in Human Evolution: How to test adaptive vs exaptive evolutionary hypotheses". *Journal of Anthropological Sciences* 89.1–15.
- Simon, Horst J. 2010. "'Exaptation' in der Sprachwandeltheorie. Eine Begriffspräzisierung". *Prozesse sprachlicher Verstärkung. Typen formaler Resegmentierung und semantischer Remotivierung* ed. by Rüdiger Harnisch, 41–57. (= *Linguistik – Impulse & Tendenzen*, 37.) Berlin & New York: De Gruyter.

- Smith, John Charles. 2006. "How to Do Things Without Junk: The refunctionalization of a pronominal subsystem between Latin and Romance". *New Perspectives on Romance Linguistics: Selected papers from the 35th Linguistic Symposium on Romance Languages* ed. by Jean-Pierre Y. Montreuil, vol. II, 183–205. (= *Current Issues in Linguistic Theory*, 276.) Amsterdam & Philadelphia: John Benjamins.
- Sun, Chaofen & Elizabeth C. Traugott. 2011. "Grammaticalization and Word Order Change". *The Oxford Handbook of Grammaticalization* ed. by Heiko Narrog & Bernd Heine, 378–388. (= *Oxford Handbooks in Linguistics*) Oxford: Oxford University Press.
- Szczepaniak, Renata. 2009. *Grammatikalisierung im Deutschen: Eine Einführung*. (= *Narr Studienbücher*) Tübingen: Narr.
- Vennemann, Theo. 2000. "From Quantity to Syllable Cuts: On so-called lengthening in the Germanic languages". *Rivista di Linguistica* 12:1.251–282.
- Vincent, Nigel. 1995. "Exaptation and Grammaticalization". *Historical Linguistics 1993: Papers from the 11th International Conference on Historical Linguistics, Los Angeles, 16–20 August 1993* ed. by Henning Andersen (= *Current Issues in Linguistic Theory*, 124.), 433–445. Amsterdam & Philadelphia: John Benjamins. doi:10.1075/cilt.124.34vin
- Wegener, Heide. 2008. "The Regrammaticalization of Linking Elements in German". *Theoretical and Empirical Issues in Grammaticalization* ed. by Elena Seoane & María José López-Couso, 333–354. (= *Typological Studies in Language*, 77.) Amsterdam & Philadelphia: John Benjamins. doi:10.1075/tsl.77.18weg.
- Wurzel, Wolfgang U. 1989. *Inflectional Morphology and Naturalness*. (= *Studies in Natural Language and Linguistic Theory*, 9.) Dordrecht: Kluwer.