Explanation in typology

Diachronic sources, functional motivations and the nature of the evidence

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Introduction

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The present volume addresses a foundational issue in linguistic typology and language science more generally. It concerns the kinds of explanation that typologists provide for the cross-linguistic generalizations they uncover, i.e. for so-called universals of language. The universals at issue here are usually probabilistic statements about the distribution of specific structures, such as the classic Greenbergian generalizations about word order and morphological markedness patterns. Some examples are given in (1)–(4) below:

(1) With overwhelmingly greater than chance frequency, languages with normal SOV order are postpositional. (**Greenberg1963**)

(2) A language never has more gender categories in nonsingular numbers than in the singular. (**Greenberg1963**)

(3) If a language uses an overt inflection for the singular, then it also uses an overt inflection for the plural. (**Croft2003**: 89, based on **Greenberg1966**: 28)

(4) In their historical evolution, languages are more likely to maintain and develop non-ergative case-marking systems (treating S and A alike) than ergative case-marking systems (splitting S and A). (**BickelEtAl2015**: 5)

As can be seen from these examples, cross-linguistic generalizations of this kind may be formulated in terms of preferred types in synchronic samples or in terms of higher transition probabilities for these types in diachronic change (cf. also **Greenberg1978**; **Maslova2000**; **Cysouw2011**; **Bickel2013** for discussion

of the latter approach). But this is, strictly speaking, independent of the question we are primarily concerned with here, namely how to best account for such generalizations once they have been established.

The most widespread typological approach to explanation is grounded in functional properties of the preferred structural types: For example, typical correlations in the ordering of different types of phrases (e.g. object–verb and NP–postposition) have been argued to allow efficient online processing (e.g. **Hawkins1994**; 2004). Markedness patterns in morphology (e.g. the distribution of zero expression in case, number or person systems) have been attributed to economy, i.e. the desire to leave the most frequent and hence most predictable constellations unexpressed, or rather to a competition between economy and the motivation to code all semantic distinctions explicitly (e.g. **Haiman1983**; **Comrie1989**; **Aissen2003**; **Croft2003**; **Haspelmath2008**; among many others). The general idea behind this approach is thus that speech communities around the world are subject to the same kinds of cognitive and communicative pressures, and that the languages they speak tend to develop structures that respond to these pressures accordingly, or, as **Bickel2014** puts it, "in such a way as to fit into the natural and social eco-system of speakers: that they are easy to process, that they map easily to patterns in nonlinguistic cognition, and that they match the social and communicative needs of speakers."

There is a clear parallel to evolutionary biology here, in that languages are said to *converge* on similar structural solutions under the same functional pressures, just like unrelated species tend to develop similar morphological shapes in order to be optimally adapted to the specific environment they co-inhabit (**Deacon1997**; **Caldwell2008**; **EvansLevinson2009**; **Givón2010**). When applied to language, this line of explanation at least implicitly invokes what is known as "attractor states", i.e. patterns of structural organization that languages are drawn into in their course of development.[1] For this reason, one could also speak of a **result-oriented** approach to explanation.

There is, however, another way of looking at the same patterns, one that redirects attention from the functional properties to the diachronic origins of the linguistic structures in question. On this view, many universal tendencies of order and coding are seen as by-products, as it were, of recurrent processes of morphosyntactic change, notably grammaticalization, but without being adap-

[1] The term attractor state (or basin of attraction) is adopted from the theory of complex dynamic systems (cf., e.g., **Cooper1999**; **HoweLewis2005**; **Holland2006**), which has become increasingly popular as a way of viewing linguistic systems as well (cf. **BecknerEtAl2009** and **Port2009** for general overviews, and **Haig2018** (among others) for its application to typological data).

tive in the above sense: There is no principled convergence on similar structural traits because these traits might be beneficial from the perspective of processing, iconicity or economical communicative behaviour. Instead, the current synchronic distributions are argued to be long-term reflections of individual diachronic trajectories, in particular the diachronic sources from which the structures in question originate. **Givón1984** and **Aristar1991**, for example, suggested that certain word-order correlations may simply be a consequence of a given ordering pair (e.g. Gen–N & Rel–N, or V–O & Aux–V) being directly related diachronically: Auxiliaries normally grammaticalize from main verbs that take other verbs as complements, and since these complements follow the verb in VO languages, they also follow the auxiliary in the resulting Aux–V construction; the mirror-image pattern holds for OV languages (cf. also **Lehmann1986**: 12–13). If this line of reasoning extends to most other word-order pairs, there is no need to motivate the synchronic correlations in functional-adaptive terms, e.g. by saying that the correlations arise *in order to* facilitate efficient sentence processing.

In the domain of morphology, **Garrett1990** argued that patterns in case marking, specifically of differential ergative marking, are exhaustively explained by the properties of the source of the ergative marker: When ergative case arises from the reanalysis of instrumental case, the original characteristics of the latter, such as a restriction to inanimate referents, are directly bequeathed to the former. The result is a pattern in which animate A-arguments are left unmarked, but since this is a direct "persistence effect" (**Hopper1991**) of the history of the ergative marker, there is again no need for an additional functional-adaptive explanation in terms of other principles, such as a drive for economical coding patterns. Rather than being result-oriented, then, this way of explaining universals can be characterized as **source-oriented**.

Such source-oriented explanations thus move away from attractor states of grammatical organization and often emphasize the importance of "attractor trajectories" instead (**BybeeBeckner2015**: 185): In some domains of grammar, the patterns of reanalysis and ensuing grammaticalization are so strikingly similar across the world's languages that it is not surprising that they yield similar outcomes, such as strong correlations between V–O & Aux–V or V–O & P–NP ordering. In other cases, it is argued that many individual, and partly very different, diachronies are capable of producing a uniform result, but without any consistent functional force driving these trajectories. **Cristofaro2017**, for instance, claims that this is the case for plural markers: An initial system without number marking can develop an overt plural morpheme from many different sources – usually by contextual reanalysis – and thus ultimately come to contrast a zero singular

with an overt plural, but these developments are neither triggered nor further orchestrated by a need for economical coding: They do not happen to keep the (generally more frequent) singular unmarked and the (generally less frequent) plural overtly signalled.

In other words, whether the individual diachronic trajectories are highly similar or rather diverse, the premise of the source-oriented approach is that they can scale up to produce a predominant structural pattern in synchronic samples. Hence they obviate the need for highly general functional principles tying these patterns together.

While the source-oriented approach was still a more marginal position in previous volumes on explaining language universals (e.g. **Hawkins1988a**; **Good2008**), it has gained considerable ground over the last decade, notably in a series of articles by Cristofaro (e.g. **Cristofaro2012**; 2014; 2017) but also in other publications (e.g. **Creissels2008**; **GildeaZúñiga2016**). Moreover, while the basic thrust of the two explanatory approaches is straightforward, clarification is needed on a number of – equally fundamental – details. After all, both approaches are functionalist in nature, as they rely on domain-general mechanisms (cf. **Bybee2010**) to explain the emergence of language structure and linguistic universals; and in both approaches, these mechanisms constrain how languages "evolve into the variation states to which implicational and distributional universals refer" (**Hawkins1988b**). But as **Plank2007** notes, "what is supposed to be the essence and force of diachronic constraints would merit livelier discussion." It is the goal of the present book to offer precisely a discussion of this kind.

The volume begins with a programmatic paper by **Martin Haspelmath** on what it means to explain a universal in diachronic terms. He aims to clarify how diachrony is involved in result-oriented and source-oriented accounts, respectively, and thus lays out a general conceptual framework for the explanation of universals. At the same time, Haspelmath opens the floor for debating the strengths and weaknesses of the two explanatory accounts at issue here. His own position is that, in many cases, current source-oriented explanations are ill-equipped to truly explain the phenomena they intend to account for, and hence cannot replace result-oriented motivations. Haspelmath's arguments for this position, as well as his terminological proposals, provide a frame of reference to which all other contributions respond in one way or another.

The lead article is followed by two endorsements of source-oriented explanations, articulated by **Sonia Cristofaro** and **Jeremy Collins**, respectively. They both describe the approach in widely accessible terms, allowing also readers outside of linguistic typology to appreciate the general argument as well as the

specific examples discussed. The phenomena themselves involve domains that are particularly well-known for being explained in functional-adaptive terms, namely differential argument marking, number marking and word-order correlations, and these are all argued to be best captured by persistence effects from their respective diachronic origins.

We then proceed to papers that allow for progressively more room for functional-adaptive motivations and, importantly, for methodological discussions on how to obtain evidence for such pressures. Accordingly, all of these papers adduce novel empirical data and discuss them in light of the present debate.

Matthew Dryer's paper is an immediate follow-up on Collins' discussion of word-order correlations. On the one hand, Dryer argues that the various correlates of adposition–noun ordering (e.g. OV and NP–P, and Gen–N and NP–P) are, indeed, best accounted for in source-oriented terms. In particular, only this approach proves capable of explaining the occurrence (and the individual semantic types) of both prepositions and postpositions in SVO languages. On the other hand, however, Dryer contends that there are some significant correlations for which a source-based account either fails to offer an explanation or else makes the opposite prediction of the patterns we find synchronically. Dryer concludes, therefore, that neither a purely source-based nor a purely result-based explanation is sufficient to deal with word-order correlations.

In a similar fashion as Dryer's paper, **Holger Diessel**'s article demonstrates that different aspects of the same grammatical domain – in this case adverbial clause combinations – are amenable to different types of explanation. Whereas some typological characteristics of the structure and position of adverbial clauses can successfully be accounted for by their source constructions (and thereby supplant earlier processing-based explanations), others are still best rendered in functional-adaptive (and hence result-oriented) terms.

Karsten Schmidtke-Bode offers a review of Hawkins' (2004, 2014) research programme of "processing typology", examining the plausibility of Hawkins' functional-adaptive ideas in diachronic perspective. On a theoretical level, it is argued that a predilection for efficient information processing is operative mostly at the diffusion stage of language change, regardless of the source from which the respective constructions originate. On a methodological level, the paper proposes that the cross-linguistic predictions of Hawkins' programme can be tested more rigorously than hitherto by combining static and dynamic statistical models of large typological data sets; this is demonstrated in a case study on the distribution of article morphemes in VO- and OV-languages, respectively.

An important methodological point is also made by **Ilja A. Seržant**, who claims

that functional-adaptive pressures may not actually surface in standard typological analyses but do become visible in qualitative data from transition phases. Based on diachronic data from Russian, he shows how the development of differential object marking was crucially influenced by considerations of ambiguity avoidance (and hence a classic functional-adaptive motivation), over and above the constraints inherited from the source construction. In the absence of such longitudinal data, transition phases can be identified on the basis of synchronic variability, and Seržant shows that a wide variety of languages currently exhibit variation in differential object marking that mirrors the diachronic findings from Russian, and that is not predictable from the source meaning of the marker in question.

Susanne Maria Michaelis adds another source of data to the debate at hand. She argues that creole languages provide a unique window onto the relationship between synchronic grammatical patterns and their diachronic trajectories, as the latter are often relatively recent and also accelerated when compared to normal rates of grammatical change. The developments are, consequently, more directly accessible and less opaque than in many other cases. By inspecting creole data on possessive forms in attributive and referential function (e.g. *your* versus *yours*), Michaelis finds evidence for the development of the same kinds of coding asymmetries that this domain offers in non-contact languages around the world. She proposes that the data are indicative of result-oriented forces that drive diverse diachronic pathways towards the same synchronic outcome. This stance contrasts most explicitly with Cristofaro's, who interprets such situations in exactly the opposite way (i.e. as providing evidence *against* a unifying functional explanation).

Natalia Levshina, finally, adopts an entirely different methodological approach to illuminate the present discussion: In her paper, she showcases the paradigm of artificial language learning, which can be employed to inspect whether users of such newly acquired languages develop performance biases that are in keeping with hypothesized functional principles, such as an increasingly efficient distribution of morphological marking. Her case study clearly demonstrates such biases and discusses where they may ultimately come from, i.e. how they fit into the new conceptual framework of constraints offered by Haspelmath's position paper.

The volume is rounded off by a brief **epilogue** in which **Karsten Schmidtke-Bode** and **Eitan Grossman** summarize and further contextualize the arguments put forward by the contributors.

Overall, the purpose of the present book is to provide a state-of-the-art overview

of the general tension between source- and result-oriented explanations in linguistic typology, and specifically of the kinds of arguments and data sources that are (or can be) brought to bear on the issue. It should be made clear from the outset that the two types of explanation are framed as antagonistic here even though in most cases, an element of both will be needed in order to fully account for a given grammatical domain. As we emphasize in the epilogue, the diachronic source of a grammatical construction certainly constrains its further development, but the major issue at stake here is the extent to which result-oriented, functional-adaptive motivations enter these developments as well. By the end of the day, universals of language structure will thus differ in the *degree* to which they are shaped by such adaptive pressures.

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Chapter 1

Some language universals are historical accidents

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In this short paper, I elaborate on previous work by **Givón1971** and **Aristar1991** to argue that a substantial part of the well-known word order correlations is best explained by grammaticalisation processes. Functional-adaptive accounts in terms of processing or learning constraints are currently weakly substantiated, and they suffer from the fact that they do not adequately control for language-internal inheritance patterns. More generally, historical relatedness between different types of phrases constitutes an important confound in typological research, one that needs to be taken seriously before word order correlations are motivated by anything other than the diachronic patterns that link the word order pairs in question.

1 Introduction

There are surprisingly few properties that all languages share. Almost every attempt at articulating a genuine language universal tends to have at least one exception, as documented in **EvansLevinson2009**. However, there are non-trivial properties that are found in if not literally all languages, enough of them and across multiple language families and independent areas of the world, that they demand an explanation.

An example is the fact that languages have predictable word orders. If a language has the verb before the object, it tends to have prepositions rather than postpositions, as in English; if the verb is after the object, it is a good bet that the language will have postpositions rather than prepositions (**Greenberg1963**). The ordering of different elements such as a possessed noun and its possessor, or a noun and elaborate modifiers (complex adjective phrases, relative clauses), are to some extent free to vary among languages, but again tend to fall into correlating

types (**Dryer1992**; **Dryer2011**). Why should knowing the word order of one category in a language help predict the orderings of other categories? One prominent view holds that these patterns reflect an innate harmonic ordering principle of Universal Grammar, which is ultimately argued to solve the logical problem of language acquisition (**Pinker1994**; **Baker2001**; **Roberts2007**). This would amount to what Haspelmath (this volume) calls a "representational constraint" on the shape of grammars. Another possible explanation is that word-order correlations have evolved in the service of efficient language processing (e.g. **Hawkins1994**; **KirbyHurford1997**), i.e. for functional-adaptive reasons. We find this view in the functional-typological literature (e.g. **Dryer1992**; **EvansLevinson2009**) as well as in computer simulations in the literature on language evolution (**VanEverbroeck1999**).

However, I would argue that many of these patterns are not evidence of our psychological preferences, but are accidental consequences of language history. More specifically, they are accidental in the sense that they arise as a by-product of grammaticalisation processes. These processes do not seem to have word order correlations as a goal, nor is there good evidence for a "pull force" in that direction. Accordingly, grammaticalisation is an *alternative* to functional motivations here, and an understanding of this historical dimension is thus crucial to explaining word order correlations. In this short paper, I first elaborate this claim (§2) based on an earlier publication (**Collins2012**), before I outline its consequences for typological theory and practice (§3). In doing so, I am extending a line of argumentation by **Givón1971** and **Aristar1991**, but I relate the discussion specifically to the concerns of the present volume, and to Haspelmath's position paper in particular.

2 Word order correlations as a result of grammaticalisation

Grammaticalisation is the process by which new grammatical categories can be formed from other (often lexical) categories. For example, Mandarin Chinese has a class of words which might be called prepositions from a cross-linguistic point of view but which clearly have their historical roots in verbs. An example is 从 *cóng*, which in modern Mandarin is a preposition meaning 'from' but which in Classical Chinese was a verb meaning 'to follow'. It has lost its ability to be used as a full verb, requiring another verb such as 'come' in the sentence, just as English requires a verb in the sentence *I come from London.* Other Chinese prepositions such as 跟 *gēn* 'with' also have a verbal origin, and many preposition-like words such as 给 *gěi* 'for' and 在 *zài* 'in/at' even retain verbal meanings ('give' and

'to be present') and verbal syntax (such as being able to be used as the sole verb in the sentence and to take aspect marking). These patterns of inheritance directly explain why the two types of constituents (i.e. PP and VP) have the same word order: Prepositions and verbs were once the same category, and they simply have not changed their word orders since then. Since the verb precedes its NP object in classical and modern Chinese, its prepositional offspring in modern Chinese also precedes its NP complement. Interestingly, Chinese also has postpositions, such as *li* 'in', and these, too, are simply continuations of their lexical sources (cf. also **Dryer2018** [this volume]). Thus *li* is etymologically 'interior' or 'village', hence *fangzi li* 'in the house' might be glossed more literally as 'the house's inside'. Again, the ordering of the younger construction as noun (*fangzi*)–postposition (*li*) reflects the order of the older construction with genitive (*fangzi*)–noun (*li*). Very similar remarks apply to Niger-Congo languages like Dagaare in Ghana, which also shows typologically mixed adpositional phrases (**Bodomo1997**).

More generally, the pattern of adpositions inheriting the ordering of the noun or verb they derive from is replicated in different language families: We find it in many Oceanic languages (**LynchEtAl2002**: 51), where adpositions are transparently nouns and reflect whatever ordering of genitive–noun the language has (hence it can be either prepositional, as in Hawaiian, or postpositional, as in Motu); we also see it in Indo-European languages (e.g. English *across* < 13 ct. Anglo-French *an cros* 'on cross' (**BordetJamet2010**: 16)), in Japanese (e.g. *kara* 'from' < 'way', *si* restrictive particle < 'do' (**Frellesvig2010**: 132–135)), in Australian languages in which adpositions are morphologically still nouns (**Dixon2002**), in Tibetan and Burmese (De**Lancey1997**), and so on. **HeineKuteva2007** even remark that "we are not aware of any language that has not undergone such a process".

Grammaticalisation can also often explain the ordering of verb and object correlating with genitive and noun ordering (**Dryer2011**). Certain types of verb phrase derive historically from noun phrases made up of a nominalised verb and its patient argument in a possessive construction. An example is Ewe:

(1) Ewe (Atlantic-Congo, Gbe; **Claudi1994**: 220)
Me-le é-kpɔ dzí.
1SG.-be.at 3SG.POSS/OBJ-see surface/on
'I am seeing him.' (lit. 'I am on his seeing.').

Ewe is normally SVO but employs the genitive–noun ordering here ('his seeing'), creating a construction which is SOV. Nominalisations of this kind are used cross-linguistically for expressing aspect (such as the continuous aspect

in Ewe), for subordinate clauses (expressing 'I was surprised that he saw me' as 'I was surprised at his seeing of me' in Javanese, cf. **Ogloblin2005**: 618) and for voice marking (in Austronesian languages, cf. **Himmelmann2005**: 174). These verb phrases can become the most frequently used and unmarked verb phrases in the languages, thus the basic verb–object order of a language can evolve from a genitive–noun construction, even if the nominal origins of the verb form are no longer transparent.

This development of (main-clause) verb phrases from nominalised verbs with a possessor object is again attested in very different language families, although it is more complicated to reconstruct. A typical example is the evolution of VOS ordering in Proto-Austronesian, which has been inherited by over a thousand Austronesian languages or evolved further into SVO or VSO (**Adelaar2005**). It is now generally accepted that verb phrases in Austronesian languages evolved from nominalising verbs, with a sentence such as 'The children are looking for the house' deriving from a Proto-Austronesian construction of the type 'The children are the searchers of the house'. **StarostaEtAl1982** as well as **Kaufman2009** present several pieces of evidence in favour of this diachronic hypothesis: For example, the voice markers on verbs derive from nominalising morphemes, cognates of which still exist in Tagalog and other languages, such as the locative voice marker *an* which is also used for deriving place names (*aklat-an* 'library' < *aklat* 'book'). Moreover, the direct object of the verb is marked with the genitive marker *ng* or put into the genitive case if a pronoun. Both nominalisation and the use of equational sentences of the form AB 'A is B' are extremely common in conservative Austronesian languages and presumably in Proto-Austronesian, allowing this frequently used construction to become a standard form of predication. Thus the verb–object ordering in Austronesian languages derives simply from the noun–genitive ordering of Proto-Austronesian, which is still retained in these languages. At a stroke this word order correlation is accounted for in roughly a sixth of the world's languages.

As **Sasse2009** notes in a comment on **Kaufman2009**, the situation in Austronesian is "not as 'exotic' as it seemed to be at first sight, especially not for a Semiticist or an Afroasiaticist". He notes that the Cushitic languages also replaced their finite verb forms with participles and are used with dative marking on the agent, in effect saying 'I have heard it' as 'To me was hearing' (**Sasse2009**); and that the dative pronouns eventually grammaticalised further to finite verbal morphology. This change also took place in the Iranian and Indo-Aryan languages, stretching over a large linguistic area.

Sasse also notes independent developments of agents marked with genitive

case in Mayan and Inuit languages, and **Gildea1997** made a similar reconstruction for the Cariban language family, of which the famous OVS language Hixkaryana is an example: It has genitive marking on the object, effectively expressing 'the enemy will destroy the city' as 'it will be the city's destruction by the enemy' (**Gildea1997**), explaining among other things why the subject is placed last, and why it has ergative marking. One can add to this list many languages in Asia, as described in **YapEtAl2011**, such as Tibeto-Burman languages that often use nominalised forms in main clauses (e.g. 'goat-killing exists' for 'he is killing a goat', cf. De**Lancey2011**: 349), and even Japanese, in which argument markers such as *ga* were originally genitive markers (**Shinzato2011**). Examples of Niger-Congo languages such as Ewe were given earlier and are discussed by **Claudi1994**, while Heine describes how many Nilo-Saharan and Chadic languages render desiderative sentences in the following way:

(2) Angas (Afro-Asiatic, Chadic; **Heine2009**: 31)
Musa rot dyip kə-shwe.
Musa want harvest POSS-corn
'Musa wants to harvest corn.' (lit. 'Musa wants the harvesting of the corn.')

The historical data thus show that these processes of grammatical change are not limited to individual languages or families but can instead be found much more widely, and independently of one another. They lead us to predict, then, that ultimately all correlations between the ordering of elements in verb phrases (V–NP), adpositional phrases (P–NP) and possessive noun phrases (GEN–NP) are due to direct historical connections between pairs of phrases (cf. also **Croft2003**: 77–78 for more discussion of such pairs). In the next section, I consider the implications of this assumption for both explanation and methodology in linguistic typology.

3 Consequences for typology

As historical evidence for the grammaticalisation account is accumulating, one may ask whether this makes alternative, functional-adaptive explanations invalid. Recall from above that on non-nativist approaches, word order correlations are often argued to make sentences easier or more efficient to parse in real time, as compared to sentences with mixed head–dependent ordering patterns (e.g. **Hawkins2004**). Is it possible that these factors play a role alongside grammaticalisation, such that, for example, processing demands filter out certain difficult-to-

process constructions, as **KirbyHurford1997** suggest (cf. also **Christiansen2000**)? Put somewhat differently, could it not be the case that grammaticalisation happens to produce orderings that are easy to parse?

There is currently not much evidence to substantiate this view. From a theoretical perspective, there is no indication that the processes involved in grammaticalisation are instigated by considerations of efficient parsing or learning. They happen through pragmatic inference in specific communicative contexts (**HopperTraugott2003**: Ch. 4), through widespread metaphorical mappings (cf. **Deutscher2005**: Ch. 4) and by means of chunking of repeated sequences (**Bybee2002**). Through these mechanisms, a new construction begins to emerge that gradually emancipates from its original lexical source. Since it is gradual, this process often creates a chain of intermediate cases, such as denominal adpositions in Tibetan, some of which still require genitive marking (e.g. *mdun* 'front') while others have shed this marking (e.g. *nang* 'inside'; cf. De**Lancey1997**: 58–59). In other words, grammaticalisation has its origin in common non-linguistic processes (cf. also **Bybee2010**: 6–8) and has predictable consequences, such as the gradual and sometimes only partial elimination of the morphology associated with the source. Importantly, a hallmark of grammaticalisation is syntagmatic "freezing" (**Croft2000**: 159; cf. also **Lehmann2015**: 168), so that the order of the elements in the new construction mirrors the order of elements in the source. The result is a "correlation" between the syntagmatic structure of the old and the new construction, but one that effectively rests on inertia rather than overarching processing principles that work towards a correlation.

From a methodological perspective, processing and learning accounts are an example of a broader trend of the "ad hoc search for functions that match the universals to be explained", as **Kirby1999** puts it. Attempts in the evolutionary literature to simulate processing or learning with computers in order to derive Greenberg's word order universals (e.g. Van **Everbroeck1999**; **KirbyChristiansen2003**), have a particularly "just-so" flavour: All that computer simulations can do is show that processing or learning preferences of individuals can cause these correlations to emerge over time, all other historical factors being equal, not that they are actually responsible. What we would thus need is independent historical evidence that processing concerns do, in fact, guide historical change. There are some attempts to show this, for example, in earlier English (e.g. **Fischer1992**; **ClarkEtAl2008**), when the language appeared to converge on the word order correlations after a period of freer word order. This could indeed be evidence for word order correlations emerging at least in part out of processing considerations; but there are other possibilities in this case which need to be inves-

tigated further, such as it being related to the rise of analytic verb forms and periphrastic *do*, to the loss of inflections or as a result of contact from French (cf. also **FischervanderWurff2006**: 187–188 for some of the controversies). The historical role of processing is unclear even in this case, and there is no conclusive cross-linguistic evidence for it either.

One possibility for establishing such causal relations cross-linguistically would be to look for cases of correlated evolution, i.e. situations in which a change in one word order can be shown to be followed by a change in another word order in the history of a language, or in its descendants. For example, if a language has verb-object order and prepositions but then changes to having object-verb order and postpositions, then this suggests that the two word orders are functionally linked (if this event takes place after any grammaticalisation linking these verbs and postpositions). The only solid statistical test of this so far has been a widely discussed study by **DunnEtAl2011**. Dunn and colleagues examined the ways in which four language families have developed (Bantu, Austronesian, Indo-European and Uto-Aztecan) and tested models of word order change using a Bayesian phylogenetic method for analysing correlated evolution. They found that some word orders do indeed change together: For example, the order of verb and object seems to change simultaneously with the order of adposition and noun in Indo-European. A model in which these two word orders are dependent is preferred over a model in which they are independent with a Bayes factor of above 5, a conventional threshold for significance. This seems to vindicate the idea that adpositions and verb-object order are functionally linked in Indo-European, and the pattern also holds up in Austronesian. It does not show up in the smaller and younger families Uto-Aztecan and Bantu, although that may be because of the low statistical power of this test when applied to small language families (cf. **CroftEtAl2011**). But a more important drawback is that there is no control for language contact. What could be happening is that some Indo-European languages in India have different word orders because of the languages that they are near, such as Dravidian languages, which also have object-verb order and postpositions. A similar point could be made about the Austronesian languages that undergo word order change, which are found in a single group of Western Oceanic languages on the coast of New Guinea, which is otherwise dominated by languages with object-verb order and postpositions.

In the context of the present discussion, an important result of **DunnEtAl2011**'s (**DunnEtAl2011**) paper is that word orders are very stable, staying the same over tens of thousands of years of evolutionary time (i.e. summing the time over multiple branches of the families). In this light, it is also instructive to note that

some typologically "mixed" or non-correlating languages show the same inert behaviour: Despite the fact that grammaticalisation has produced a mixture of prepositions and postpositions (e.g. in Chinese or Dagaare), the resulting systems have also survived for many generations, or even thousands of years, without showing any inclination to change. This, too, is a problem for processing-based theories, which sometimes explicitly predict that such inconsistencies should die out (e.g. **KirbyHurford1997**).

In the absence of convincing evidence for functional-adaptive motivations, I suggest that we accept that different types of syntactic constituents share their ordering patterns because they are historically related to each other, i.e. because they are linked by common ancestry. This also has important methodological consequences for typology. The kind of historical relatedness we observe here qualifies as a subtle, language-internal variant of Galton's problem (cf. **Cysouw2011** for an introduction), and it is thus actually a *confound* in typological samples. Just as other, more widely known, types of historical relatedness, such as a genealogical or areal interaction between two data points in a sample, need to be controlled for before one can test for a typological correlation, so does the language-internal historical relatedness between the grammatical patterns that make up that correlation. Put differently, languages in which possessor arguments are known to have developed from former object arguments and have simply adopted their order from this source, do not constitute an independent data point in support of the alleged word order correlation. For typological practice, this entails that we need large databases of attested grammaticalisation pathways, and that we need to examine more carefully the actual markers and their (likely) etymologies before we set out to test a functional-adaptive hypothesis. In principle, it would then be possible to inspect whether certain grammaticalisation pathways tend to be taken only in certain types of languages; for example, do postpositions only develop from nouns in a genitive construction ('table's head' > 'table on') if the language also places the verb after the object? It is easy enough to find exceptions to that, such as Dagaare (Atlantic-Congo), which has taken this route to postpositions despite being a VO language (**Bodomo1997**). But in a large database, we might still find interesting structural constraints, as well as geographical patterns, that could potentially speak for or against functional-adaptive motivations in addition to grammaticalisation.

For now, the major point is that the historical non-independence of data points can create correlations that are not causal. Such spurious correlations are well-known from non-linguistic research (cf., e.g., the spurious correlation between chocolate consumption and Nobel Prize winners; cf. also **RobertsWinters2013**

for further discussion), and my claim in this paper is that this is a serious methodological pitfall in the domain of word order correlations. Given the naturalness of grammaticalisation, and the above observation that word orders tend to be preserved and long retained after grammaticalisation, invoking functional-adaptive motivations to explain the correlations in question is not only redundant, but actually wrong-headed. It is as if one wanted to claim that there was a deeper ecological reason why chimpanzees and humans share 98.8% of their DNA, rather than just the primary historical reason, which is that they have a common ancestor.

Having said this, it should be pointed out that I am neither arguing against functional-adaptive explanations in general, nor am I denying the relevance of processing to understanding word order patterns as such, including some combinations of word order that tend to be preferred over others. For example, the fact that VO languages strongly tend to have postnominal relative clauses is plausibly related to processing constraints (**Hawkins2004**). Similarly, correlations between numeral–noun and adjective–noun ordering do not have a clear explanation in terms of grammaticalisation, but they do seem to be functionally linked and hence show interesting dependencies in experiments in artificial language learning (e.g. **CulbertsonEtAl2012**; cf. also **Dryer2018**) [this volume]). But with more and more diachronic evidence coming to light, historical links between many grammatical categories (VPs, auxiliaries, genitives, adpositions) can no longer be dismissed as marginal and as "lack[ing] generality" (**Hawkins1983**). Our default assumption, then, should be that the core word order correlations are first and foremost an accidental by-product of grammaticalisation.

Haspelmath2018 (this volume) actually acknowledges this type of explanation, at least for the ordering patterns of adpositional phrases, and labels it a "mutational constraint" – a situation in which historical sources and grammaticalisation pathways directly determine the synchronic outcomes and hence make functional-adaptive explanations superfluous. On the other hand, he rejects "common pathways" as too weak to have explanatory power in typology. But how common is "common", and when do we begin to speak of a mutational constraint? It is perfectly possible that common pathways (such as those documented in **HeineKuteva2002**; 2007), while not exhausting the possible sources and routes, are still frequent enough to produce a principled synchronic result. Therefore, I disagree with Haspelmath (**??**) that we need not be able to understand the diachronic patterns behind a universal tendency if there is a good functional-adaptive motivation available for it. In the case of word order correlations, and possibly other domains of grammar, it is the other way around: We first need to

understand the diachronic links between different types of phrases and then control for them when we attempt to establish whether there are universal correlations beyond historical dependencies at all. It may turn out that the real question is why it should ever be the case that the order of grammaticalised categories, such as adpositions, genitives or auxiliaries does *not* correlate with that of their source constructions.

4 Conclusion

Word order correlations are often invoked as evidence for universals of language acquisition or language processing. In this paper, I have argued that, before we can do so, it is important to understand the historical background of these patterns, which standard interpretations do not take into account. Given the naturalness and the non-teleological nature of grammaticalisation processes, it should be our default assumption that the order of grammaticalised categories retains the order of their respective source constructions. From this perspective, word order correlations are far from mysterious and, in many cases, do not require functional-adaptive motivations (such as specific processing principles) or innate constraints (such as a head-ordering parameter). Instead, the correlations arise during the creation of new constructions by extending old constructions. The grammaticalisation processes involved are well-understood and ubiquitous (cf. **Bybee2015**). And although we will never be able to have a full picture of the possible routes that lead to adpositions, auxiliaries, genitives, etc., the ones we know of seem common enough to produce the correlations in question. At the very least, they constitute language-internal dependencies, in Galton's spirit, that need to be controlled for in any typological investigation of word order correlations, in addition to areal dependencies that hold across languages. If they are not, one runs the risk of erroneously inferring causation from correlation, as the word order correlations would appear so strong that they require a deeper explanation, when in fact they are largely dependencies built into the sample.

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