

## Where is Functional Explanation?

Frederick J. Newmeyer  
University of Washington  
(to appear in *CLS-37*)

### 1. Introduction

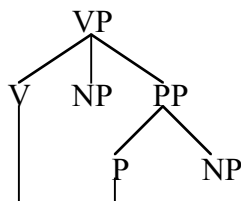
The purpose of this paper is to explore the locus of the form-function interplay in the syntax of natural language. The remainder of §1 begins by briefly outlining the evidence that grammars are functionally motivated to a significant degree. It goes on to present two hypotheses governing the relationship between external motivation and grammatical form: ‘atomistic functionalism’ and ‘holistic functionalism’. The former posits a close linkage between sub-properties of grammars and external motivation, while the latter posits that the relationship between the two is very indirect. Section 2 is devoted to outlining some problems encountered in trying to choose between the two hypotheses and concludes that an examination of language change offers the best hope for accomplishing this goal. The following two sections, §3 and §4, point out some severe difficulties with atomistic function. Section 5 is a brief conclusion.

### 1.1 Grammars and functional motivation

The background assumption for this paper is that the grammars of natural languages have been shaped to a considerable degree by external functional considerations. I consider the evidence to be overwhelming that (at least) two external functional pressures have left their mark on grammars: pressure to parse sentences rapidly and pressure to keep form and meaning in alignment (i. e. pressure for structure-concept iconicity). Such evidence is presented at length in Newmeyer (1998: ch. 3); the remainder of this section will be devoted to a brief illustration of the effects of these two pressures.

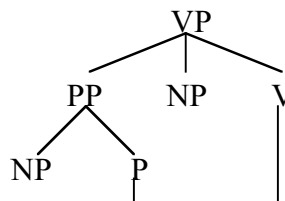
As far as parsing is concerned, typological generalizations about constituent orderings reflect the fact that it is in the language user’s interest to recognize the major constituents of the sentence as rapidly as possible. For example, one of the most longstanding typological generalizations in syntax (see Greenberg 1963) is that VO languages tend to have prepositions and OV languages tend to have postpositions. There are four logical possibilities, illustrated in (1a-d): VO and prepositional (1a); OV and postpositional (1b); VO and postpositional (1c); and OV and prepositional (1d):

(1) a.



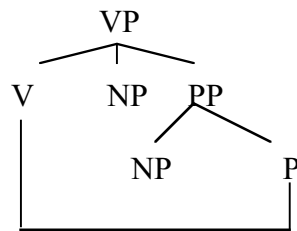
VO and prepositional (common)

b.



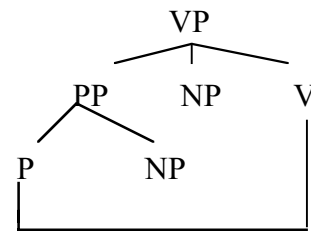
OV and postpositional (common)

c.



VO and postpositional (rare)

d.



OV and prepositional (rare)

As noted in Hawkins (1994), in (1a) and (1b), the two common structures, the recognition domain for the VP is just the distance between V and P, crossing over the object NP. But in (1c) and (1d), the uncommon structures, the recognition domain is longer, since it involves the object of the preposition as well. The reasonable conclusion, then, is that the typological generalization about the correlation between verb-object order and adposition type reflects the preference of language users to process input rapidly.

Hawkins (2001) proposes another important processing principle, Dependent Nodes Later, whose effects on syntactic structure have been profound:

(2) Dependent Nodes Later: If node B is dependent on node A for a property assignment, the processor prefers B to follow A.

This principle accounts for a wide variety of well-known typological generalizations, among which are the following:

(3) Examples of Dependent Nodes Later:

- a. Fillers tend to precede gaps
  - i. *Wh*-questions
  - ii. Relative clauses
  - iii. Control structures
  - iv. A wide variety of ‘deletion’ constructions
- b. Antecedents tend to precede anaphors
- c. Topics tend to precede predications (cf. Japanese *wa*)
- d. Restrictive relative clauses tend to precede appositives
- e. Agents tend to precede patients
- f. Quantifiers/operators tend to precede elements within their scope

Iconic motivation for grammatical structure is a theme in a much functionalist writing. For our purposes this means that the form, length, complexity, or interrelationship of elements in a linguistic representation reflects the form, length, complexity or interrelationship of elements in the concept that that representation encodes. For example, it is well-known that syntactic units tend also to be conceptual units. In his classic studies of the effects of iconicity in

syntax, Haiman (1983; 1985) points to a multitude of cases where grammatical distance and conceptual distance are correlated. Consider, for example, the following well-known pair of examples:

- (4) a. John caused Bill to die by inadvertently buying him a ticket on a plane that ended up crashing.  
b. ?John killed Bill by inadvertently buying him a ticket on a plane that ended up crashing.

The oddness of (4b) results from the fact that lexical causatives (e.g. *kill*) tend to convey a more direct causation than periphrastic causatives (e.g. *cause to die*). So, where cause and result are formally separated, conceptual distance is greater than when they are not. Haiman also points to the distinction between alienable possession (e. g. *Mary's book*) and inalienable possession (e. g. *Mary's heart*). In no language is the grammatical distance (measured in terms of constituent structure branching) between the possessor and the possessed greater for inalienable possession than for alienable possession.

The assumption that much of grammatical structure is motivated by external functional pressure is a fairly uncontroversial one. It is worth pointing out, for example, that Chomsky has never questioned it. As long ago as 1975 he wrote:

Surely there are significant connections between structure and function; this is not and has never been in doubt. ... Searle argues that 'it is reasonable to suppose that the needs of communication influenced [language] structure'. I agree. (Chomsky 1975: 56-58).

More recently, Chomsky has argued that displacement phenomena (handled by movement rules in the framework for syntactic analysis that he defends) probably exist to facilitate language use, both in terms of parsing needs and the demands of information structure (Chomsky 1995: 316-317). The primary issue that divides Chomsky and his co-thinkers from functionalists is not the issue of functional motivation of grammars per se, but the degree of such motivation and the (subjective) intrinsic interest of focusing on this motivation in one's research program.<sup>1</sup>

## 1.2 Two views of the form-function interface

The question to be addressed in this paper therefore is not *whether* aspects of grammars are functionally motivated, but *how* they are functionally motivated. That is, it will discuss the issue of where the form-function interface is located and the related issue of how close the link is between properties of grammars — rules, principles, structures, constructions, and so on — and functional forces. Broadly speaking, there are two positions with respect to these questions, which I will call 'atomistic functionalism' (AF) and 'holistic functionalism' (HF):

(5) Atomistic functionalism (AF): There is direct linkage between properties of particular grammars and functional motivations for those properties.

(6) Holistic functionalism (HF): There is no direct linkage between external functions and grammatical properties. The influence of the former on the latter is played out in language use and acquisition and (therefore) language change and is manifested only typologically.

The goal of this paper is to argue for the correctness of HF and to point out the inadequacies of AF.

As I read the literature, much of mainstream functionalism subscribes to AF, though it is instantiated differently in different approaches. It is common to find accounts in which subparts of individual grammars are said to be functionally-motivated. For example, John Haiman, whose work is cited above, observes that iconicity and economy are important motivating factors in grammars and goes on to attribute particular constructions in particular languages to the effects of iconicity or economy, as the case may be (Haiman 1983: 814). Along the same lines, Dik (1989) calls attention to cross-linguistic variation in the indirect object construction. Some languages have the order represented in (7a), some the order represented in (7b), and some both orders:

- (7) a. Verb — Direct Object — Indirect Object
- b. Verb — Indirect Object — Direct Object

Dik links the first order when it occurs in a particular language to the function of iconicity, since it reflects the movement of the object from the donor to the recipient. The second order, according to Dik, has a functional linkage as well, since it places the ‘more prominent’ indirect object before the ‘less prominent’ direct object (Dik 1989: 215).

Likewise, any approach that attributes a degree of prototypicality to a grammatical property is an example of AF, given the standard functionalist position that prototypicality facts are motivated externally. In frameworks as otherwise disparate as George Lakoff’s ‘Cognitive Linguistics’ (Lakoff 1987) and Paul Hopper’s ‘Emergent Grammar’ (Hopper 1987; 1988), categories, constructions, and processes in individual languages can be assigned a degree of prototypicality. In general, the claim is that the better functionally motivated a property is, the more prototypical it is and — therefore — the more it exhibits the characteristic behavior of members of its class.

We also find generative (or generative-influenced) approaches embodying AF. One strain of Optimality Theory (OT) links the constraints of that model to external functional motivations. This program was initiated in phonology by Bruce Hayes (1998), who argues that OT constraints reflect principles of perceptual salience and ease of articulation. Martin Haspelmath suggests that such

constraints, whether syntactic or phonological, should be restricted to those that reflect ‘constraints on language users’ (Haspelmath 1999a: 197). And the research program being carried out for syntax by Judith Aissen and Joan Bresnan explicitly sets out to provide a functional explanation for the constraints of OT, particularly those expressible as markedness hierarchies. The goal of the Optimal Typology Project, which they head, is to:

... develop a fully explicit Optimality Theoretic approach to markedness hierarchies in syntax, and to test it against both crosslinguistic typological research and language-internal studies of syntactic structures. ... [to] captur[e] both the universal and the ‘soft’ properties of hierarchies with harmonic alignment in syntax ... and the more general idea of functional/typological grounding of syntactic markedness constraints ... (<http://www-ot.stanford.edu/ot/#Project> activities)

More concretely, the goal of Aissen (2000) is ‘to develop an approach to [differential object marking] within OT which is at the same time formal *and* expresses the functional-typological understanding of [that phenomenon]’ (p. 4; emphasis in original). This paper incorporates functionally-motivated hierarchies and attempts to provide functional motivation for the constraints themselves. For example, a constraint that penalizes the absence of case marking is attributed to the listener-oriented principle ‘minimization of perceptual confusion’. Another set of constraints are regarded as being rooted in ‘iconicity’, since they favor morphological marks for marked configurations. And a constraint that penalizes the morphological expression of case, on the other hand, is said to have an economy-based motivation, since it reduces the amount of structure that needs to be processed.

In HF, on the other hand, elements of grammars are not accompanied by or linked to their functional motivations. The linkage is far more indirect and can be detected only by an examination of many languages. That is, grammars as wholes reflect the ‘interests’ of language users, but there is no question of parceling out rules, constraints, constructions, and so on of individual grammars and assigning to them a functional motivation. In the course of the paper, the more concrete aspects of an HF approach will become clear.

## **2. Some problems in deciding between atomistic and holistic functionalism**

The choice between atomistic and holistic functionalism is clouded by the fact that it is by no means clear that there is, at present, much content to the claim that each elements of grammar can be paired with a functional explanation (§2.1). A further complication is posed by the fact that psychologically-determined preferences of language users do not always point to robust typological generalizations about grammars (§2.2).

## **2.1 On the content of the claim that grammatical processes are linked to functional motivations**

A methodological problem immediately arises in trying to decide between AF and HF. We need to raise the question of the content of the claim that every element of grammar has a functional motivation. In phonology, at least, there is a long tradition, going back to the work of the Prague School in the interwar years pointing to the phonetic grounding of phonological rules. The ‘markedness’ and ‘faithfulness’ constraints of OT phonology have analogues in most approaches to phonology, they seem to encompass a great percentage of well-understood phonological processes, and, at the same time, seem grounded in the behavior and abilities of language users. But nobody understands or, in the foreseeable future, is likely to understand the full set of external factors that might combine to account for the properties of syntactic structure. The functionalist literature has mooted literally dozens of potential factors, ranging all the way from economy, iconicity, and parsing to love of metaphor and ‘playfulness’. In short, even the plausible external motivations are so numerous, so diverse, and so open-ended that any conceivable rule or constraint in any framework could be provided with one.

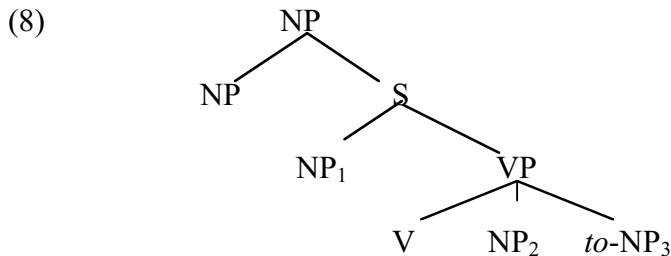
By way of illustrating the ease with which any conceivable grammatical construct might be provided with some functional motivation, consider the transformational rules of pre-principles-and-parameters approaches. Even though they formed the target of functionalist assault for their abstractness and seeming divorce from anything that might be considered user-based (see, for example, Givón 1979), they too were argued by certain linguists to have functional motivations. For example, Langacker (1974) classified transformational rules in terms of whether they raised, fronted, or backed grammatical elements and claimed that each formal operation was designed to facilitate a particular discourse function (see also Creider 1979).

## **2.2 Atomistic functionalism and psycholinguistic experimentation**

We can imagine one possible check on runaway functional explanations, namely to demand that each reflect in some fairly direct way experimentally ascertained preferences of language users. Parsing and iconicity-based explanations come out pretty well in that respect. The advantage to parsing sentences rapidly can hardly be controversial. We know that parsing is fast and efficient. Every word has to be picked out from ensemble of 50,000, identified in one third of a second, and put in right structure. And as far as iconicity is concerned, we know that comprehension is made easier when syntactic units are isomorphic to units of meaning than when they are not. Experimental evidence has demonstrated that the semantic interpretation of a sentence proceeds on line as the syntactic constituents are recognized.

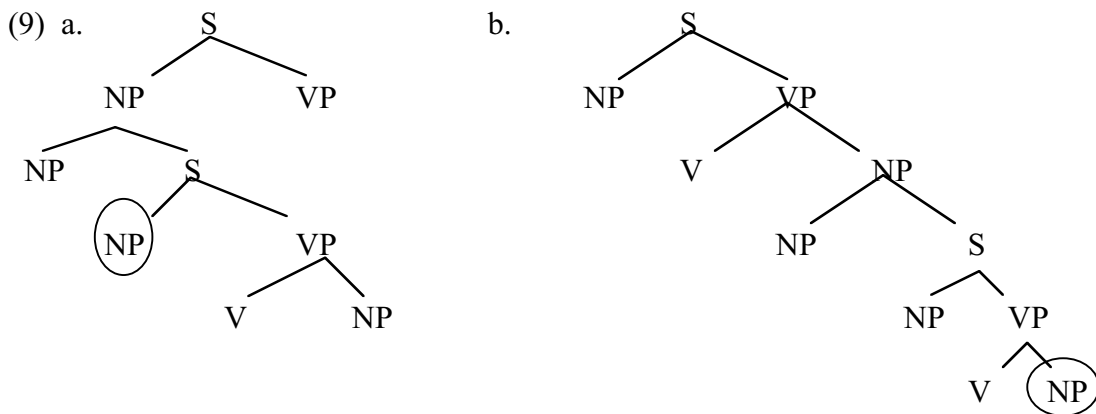
Nevertheless, the link between experimentally-determined preferences of users and cross-linguistic facts about language is too tenuous to narrow significantly the class of functional explanations. An example from Kirby (1998)

will illustrate. There are two ways that we can talk about relative clause movement strategies in particular languages. One is in terms of the permitted grammatical relation of the moved item. We have known since Keenan and Comrie (1977) that there is an Accessibility Hierarchy for movement. If a language can relativize a direct object (NP<sub>2</sub> in the tree below), it can relativize the subject (NP<sub>1</sub>). If it can relativize the indirect object (NP<sub>3</sub>) it can relativize both the subject and the direct object. And so on for more ‘oblique’ grammatical relations:

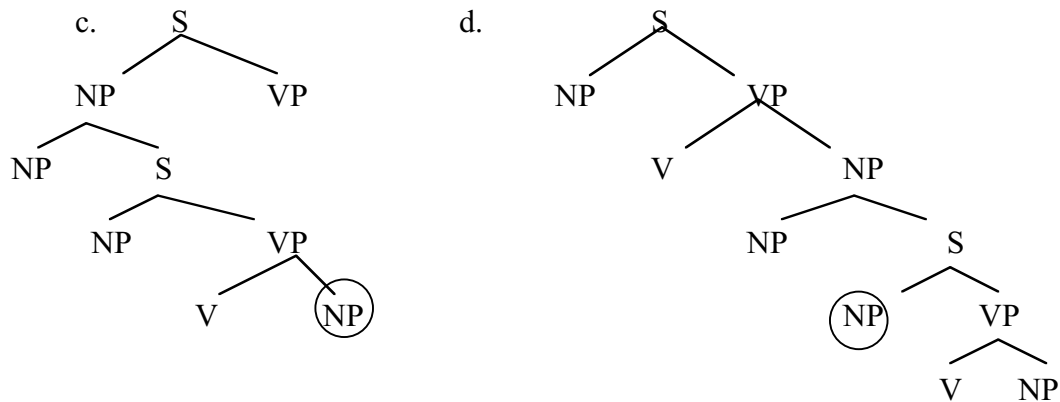


Here we do have a case where psycholinguistic experiment reveals the same preference. Native speaker subjects perform in ways consistent with the cross-linguistic hierarchy. In other words, the more abstract parsing-based explanations for the Keenan-Comrie Hierarchy translate into concrete results in the psycholinguistic laboratory

Now, consider another way that relative clause movement can be typologized. One can speak of ‘parallel function relatives’ and ‘non-parallel function relatives’. In parallel function relatives, the grammatical relation borne by the moved relative pronoun and the grammatical relation borne by the relative clause itself are the same. In non-parallel function relatives, they differ. Trees (9a-d) illustrate:



Parallel function relatives (the relativized NP is circled)



Non-parallel function relatives (the relativized NP is circled)

Now, as Kirby notes, experimental subjects overwhelmingly prefer parallel function relatives; non-parallel function relatives present considerable processing difficulty for them. One might predict then that parallel function relatives would predominate cross-linguistically over non-parallel function relatives or that there would be an implicational relationship demanding that if a language has non-parallel function relatives it necessarily has parallel function relatives. Neither is true, however. Kirby attributes this fact to properties of universal grammar. In his explanation, structural principles governing predication and *Wh*-Movement demand that a language user automatically acquire object-subject relatives when subject-subject relatives are acquired and subject-object relatives when object-object relatives are acquired.

### 3 Language change as a testing ground for atomistic and holistic functionalism

In this section, it will be argued that facts about language change decide in favor of holistic functionalism. Section 3.1 explains why diachronic facts are better suited than synchronic ones in terms of enabling a choice between the two approaches to functionalism. Sections 3.2, 3.3, and 3.4 make the case that studies of historical retentions, propagations, and innovations, respectively, decide in favor of holistic approaches.

#### 3.1 Atomistic functionalism at the synchronic and diachronic level

There is a means by which we can at least partly get around the problem posed by the over-availability of functional explanations and the sometimes tenuous independent evidence for some of these functional explanations. That is to focus on *language change* as a testing ground for AF versus HF. Changes — at least those that are attested or reconstructed with a high degree of certainty — are more concrete and easier to study than more abstract properties of grammars. It is far easier, for example, to answer question (10a) than question (10b):



- (10) a. What was the functional motivation (if any) for the appearance of ‘supportive *do*’ in the history of English syntax?  
b. What is the functional motivation (if any) for the presence of ‘supportive *do*’ in the syntax of Modern English?

Also, an understanding of (10a) helps to shed light on (10b) in a way that an understanding of (10b) is not necessarily helpful to an understanding of (10a).

Now, it seems that AF rather strongly implies a particular view of language change. If grammars are collections of properties that have functional motivations, then any *change* in a grammar is necessarily a change in the degree of functionality of one or more of those properties. Clearly, such a view embodies a default assumption about the nature of language change. It will — at least in the typical case — be in the direction of maximizing the functionality *of* those properties. If that were not the case, it is difficult to see what content AF could possibly have — indeed, what interest it could possibly have. It would be an odd theory that demanded a functional motivation for each, say, grammatical rule, but disavowed the necessity for rule changes to be consequences of the maximization of function. Likewise, if some new property is added to the grammar, it will — by hypothesis — have to be functionally motivated. Such a conclusion follows automatically from the hypothesis that grammatical properties are linked to functional motivations.

As it turns out, a number of functionalists have taken the strongest possible position along these lines, namely, that individual instances of language change must be functionally motivated:

Saying that a certain feature of linguistic design or change cannot be functionally explained is tantamount to saying that we have not yet been able to find a functional explanation for that feature (Dik 1986: 22)

Other functionalists have taken a somewhat weaker approach to the grammar-function linkage, in that they recognize that synchronic grammars are filled with rules of dubious functional utility, but they nevertheless still uphold the idea that each instance of language change is functionally motivated. Such a view embodies a weaker version of AF that holds only diachronically. Talmy Givón argues along these lines:

What I will argue here is that, in each instance, a *crazy* synchronic state of the grammar has arisen via diachronic changes that are highly *natural* and presumably motivated independently by various communicative factors. (Givón 1979: 235, emphasis in original)

If the weaker version of AF fails at the diachronic level, then the stronger version could hardly be correct at the synchronic level. The remainder of the paper will

therefore focus primarily on language change as a testing ground for AF versus HF. It will conclude that there is no diachronic support for AF.

Ever since the work of Weinreich et al. (1968), it has been standard to break down the process of language into three stages, stated in (11) in chronological order:

- (11) a. innovation (the first appearance of the change)  
b. propagation (the adoption of the change by the speech community)  
c. retention (the transmission of the change from grammar to grammar in successive generations)

The following section will examine each in terms of their response to external functional pressures such as parsing, iconicity, and so on. It will argue that many, but by no means all, innovations are functionally motivated in this sense, while propagations and retentions tend not to be. Hence, AF fails at the diachronic level and therefore cannot be correct at the synchronic.

For expository reasons, I will treat them in reverse chronological order: first retention, followed by propagation, and concluding with innovation.

### 3.2 Retention

Let us begin with a couple of simple questions about the grammar of Mary Miller, a native speaker of English. One is: ‘Why do subjects precede objects?’ The other is: ‘Why aren’t there null subjects?’ We could supply very functionalist-sounding answers to those questions: ‘Subjects precede objects because they have cognitive prominence over objects and cognitive prominence is iconically represented’; and ‘There are no null subjects because agreement is too weak to license them’.

But those are the wrong answers. Mary Miller’s grammar has those properties because the grammars of her parents and peers have them. Except in unusual historical circumstances, one’s grammar reflects to an extremely high degree the grammars of those in one’s speech community. The factor that best explains why a person’s grammar has the properties that it has is *conventionality*. Grammars differ only slightly from generation to generation. As noted by William Croft (1995: 522), this stability in a sense has a functional motivation, since it is rooted in mental routinization and social convention. More recently, Croft has made the perspicacious observation that:

... a central aspect of a speaker's use of language is convention. When I say *Who did you meet yesterday?*, I put the interrogative pronoun *Who* at the beginning of the sentence because that is the convention of my speech community. I know the conventions of my speech community, and my use of language will serve its purpose best most of the time if I conform to the conventions of my speech community. It may be that the initial position of *Who* is partly motivated by pragmatic universals of information structure, or partly specified by an innate Universal Grammar. In fact, one (or both)

of those factors may be the motivation for the origin of the convention. But that is not why I have put it there in that utterance. (Croft 2000: 7)

‘Conforming to the conventions of one’s speech community’ is not, of course, the sort of functional motivation that has been claimed to underlie constraints. Models of grammar such as AF that see constraints as being tied synchronically to motivations such as parsing and iconicity are thus empirically off-base. Grammars do reflect the effects of motivations such as parsing pressure and pressure towards iconicity, of course. But these effects make themselves felt over historical time, and are not ‘registered’ internally to the grammars themselves. (This point is made forcefully with respect to phonology in Hale and Reiss 2000 and Buckley 2000). In a nutshell, the forces (functional or otherwise) that bring a construction into a language are not necessarily the same ones that keep it there. To give one example in support of this claim, consider the Modern English genitive. It may either precede or follow the noun it modifies:

- (12) a. GEN-N: Mary’s mother’s uncle’s lawyer
- b. N-GEN: the leg of the table

The GEN-N ordering is unexpected, since English is otherwise almost wholly a right-branching language. So why do English-speaking children acquire the GEN-N ordering? The short — and 100% correct answer — is ‘conventionality’. They learn that ordering because they detect it in the ambient language of their speech community. But the long answer is very interesting and drives home the great divide between the functional explanation of a grammatical change and force of conventionality that leads to the preservation of the effects of that change.

Old English 1000 years ago was largely left-branching with dominant orders of OV and GEN-N. This is the correlation motivated by parsing efficiency (Hawkins 1994). The shift to VO order in the Middle English period was matched by a shift to N-GEN order. A text count of 85% N-GEN has been reported for Middle English in Kirby (1998) and Fischer (1992). We do not know details of why this happened. Lightfoot (1991) suggests that as tokens of VO order in main clauses increased, cues that English was OV declined, leading English to be reanalyzed as VO underlyingly. But then, after a certain time, everything started to reverse itself, with the text count of GEN-N order increasing dramatically. Why did this reversal occur? According to Kroch (1994), it may have been a result of the two genitives becoming ‘functionally differentiated’. The GEN-N construction became favored for animates while the N-GEN construction has tended to be reserved for inanimates (see also Wedgwood 1995 and Kirby 1998).

Now, then, what would the relation be between the rules and principles that license these two orders in Modern English and the functional motivations that gave rise to them? The answer is that it is so indirect as to be uninteresting. The current state of the English genitive is a product of over a thousand years of changes, many functionally motivated when they occurred, but preserved in the

language primarily by the force of conventionality. Yes, it was undoubtedly parsing pressure that led Old English to be predominately GEN-N. That pressure no longer exists, but the order does. If the need for ‘functional differentiation’ is part of the explanation for why that order was preserved, one challenges any advocate of AF to demonstrate that that particular functional force is a motivating factor in the grammars of English speakers today and to identify the particular constraints to which this factor is linked. Among other problems that would need to be addressed is the fact that the functional differentiation is only partial. That is, inanimates can occur in the GEN-N construction (13a is not horribly unacceptable) and animates can occur in the N-GEN construction (as in 13b).<sup>2</sup>

- (13) a. The table’s leg  
b. The mother of the lawyer

The point is that languages are filled with structures that arose in the course of history to respond to some functional pressure, but, as the language as a whole changed, ceased to be very good responses to that original pressure. Such facts are challenging to any theory like AF, in which the sentences of a language are said to be a product of constraints that must be functionally motivated.

AF confounds what we know with how what we know *got to be* what we know. Parsing ease, desire for functional differentiation, pressure for an iconic relationship between form and meaning, and so on are indeed forces that shape grammars. These forces influence adult speakers, in their use of language, to produce variant forms consistent with them. Children, in the process of acquisition, hear these variant forms and grammaticalize them. In that way, over time, certain functional influences leave their mark on grammars. There is no place — indeed no *need* — for the functional forces to match up in a one-to-one fashion with particular constraints internal to any particular grammar.

### 3.3 Propagation

It is by now well established, I think, that functional utility has little to do with whether any particular innovation in language use is incorporated into the grammars of the individuals making up a particular speech community. Work such as Milroy (1987) has demonstrated that the mechanisms of propagation are social, not linguistic. That is, whether an innovation will become entrenched is for the most part a function of the social networks within the speech community.

Let us make the assumption that that social forces and functional forces are independent variables — after all, one does not gain prestige over one’s peers by being better than they in effecting an iconic relationship between form and meaning! What this means is that in only 50% of the time will the ‘more functional’ variant become entrenched. This fact has fairly grave implications for AF. Consider an innovation that was adopted by the speech community some generations earlier because it was used by an influential member of that community, even though its functional motivation (in the sense that grammarians

use the term) was less than that of the form that it replaced. It seems that AF has two options with respect to the rule or constraint that characterizes that innovation. One would be find some functional motivation (parsing, iconicity, etc.) that it could plausibly be said to serve and to link it to that function; the other would be to link it to the function of ‘prestige enhancing’, or some such thing. Both alternatives are unacceptable. The former simply represents a post hoc attempt to save the core idea of AF. The latter will, in the typical case, fail empirically — the prestige factors that led to the propagation of the form are unlikely to be responsible for its retention after several generations.

### 3.4 Innovation

As opposed to retentions and propagations, one can indeed make the case that many innovations are motivated by user-based external functions. This is particularly true for those that arise language-internally. For example, many tend in the direction of increasing ‘iconicity’, in that they increase the degree of transparency of the mapping before form and meaning. Croft (2000) discusses a number of mechanisms by which such a change can be effected. One is what he calls ‘hyperanalysis’, in which an existing irregularity in the form-meaning mapping is eliminated. An example is the loss of governed dative and genitive objects in several Germanic languages. This process began in Old English even before the loss of the case system in general. The following examples, from Allen (1995: 133, 135), illustrate a governed genitive giving way to a structurally-determined accusative:

- (14) a. Micel            wund            behofað            micles            læcedomes  
           great.NOM    wound.NOM    needs            great.GEN        leechcraft.GEN  
                           ‘A great wound requires great medicine’
- b. ... swa        heo    maran            læcedom            behofað  
           ... so        it     greater        leechcraft.ACC        needs  
                           ‘... so it requires better medicine’

Croft also discusses ‘hypoanalysis’, in which a contextual property of a form is reanalyzed as an inherent property. The history of German umlaut provides an illustration. The umlaut process was phonemicized in the Carolingian period (9<sup>th</sup> - 10<sup>th</sup> centuries), morphologized in Middle High German, and became hypoanalyzed as plural marker in Early New High German. Hence we now have *Baum* / *Bäume* ‘tree’ / ‘trees’, where there is no historical motivation for the umlaut in the plural.

Many innovations appear to be parsing-motivated, as well. Foremost among these are those that aid parsing by making language more ‘harmonic’, that is, by increasing branching-direction consistency. This often takes place by means of the reanalysis of an existing construction. For example, as noted by Li and

Thompson (1974), Ancient Chinese had mostly SOV harmonies, but SVO order. Over time, SVO was reanalyzed as SOV. An important step involved the morpheme *ba*, which originally meant ‘to take hold of’. In serial constructions *ba* was reanalyzed as object marker. In other words:

(15) S *ba* + O V > S O V

Another class of parsing-motivated changes involves the reordering of existing elements. For example, Harris and Campbell (1995: 229) note that Old Georgian was SVO with SVO harmonies, while Modern Georgian is SOV with SOV harmonies. In the course of time, existing prepositions turned into postpositions, while genitives and relatives were moved in front of the head.

However, not all innovations make things easier for language users, in any obvious sense of the term ‘easier’. Historical linguists with a functionalist bent tend to stress the common tendency to rule generalization in language change, that is, where an existing rule tends to broaden its scope to maximize the transparency of the link between form and meaning. We have just seen a couple examples of this process. But the reverse is also common, that is, where we have the *shrinking* of the applicability of a rule, sometimes with consequences that run counter to any iconic relationship between form and meaning. To cite one example, Old English, like most modern Germanic languages, was a V2 language, with a productive process moving verbs from V to I to C. For reasons that have been much debated in the literature on the history of English, the I-to-C movement has become restricted to tensed auxiliaries, as (16a-b) shows:

- (16) a. Have you been working hard?  
b. \*Worked you hard yesterday?

But bafflingly, some phrasal elements in Spec,CP still trigger this inversion and some do not:

- (17) a. Under no circumstances will I take a day off.  
b. \*Given any possibility will I take a day off.  
(18) a. So tall is Mary, she can see into second story windows.  
b. \*Solved the puzzle has Mary, so she can be proud of herself.

There is no way that the set of changes leading to the fragmentary instances of inversion in Modern English — all internally triggered, as far as I know — can be said to have led in the direction of greater ‘functionality’.<sup>3</sup>

Or consider the historical changes in French negation, in particular, the grammaticalization of *pas* from noun to negative particle. In Old French sentences with negative force, the negative particle *ne* was often reinforced by the use of semantically appropriate independent nouns. With motion verbs, for example, *ne* was accompanied by the noun *pas* ‘step’. Other negation-reinforcing nouns

included *point* ‘dot, point’, *mie* ‘crumb’, *gote* ‘drop’, among others. As French developed, *pas* began to accompany *ne* even where no motion was taking place, displacing its rival negation-reinforcers. Since the seventeenth century *pas* has been virtually compulsory in the negative construction. There were several innovations in this entire process, and it is hard to see how any of them led to increased ‘functionality’ of the process of negative formation in French. Old French negative formation could not have been simpler. Presumably, an AF-oriented theory would predict that French would have left things alone.

In fact, a number of linguists have claimed that the changes associated with grammaticalization are literally *dysfunctional* (see, for example, Haspelmath 1999a; b; Dahl 2000). Table I presents some typical grammaticalization-related changes:

Category Change	Example	Discussion
N > P	Latin <i>casa</i> ‘house’ > French <i>chez</i> ‘at (somebody’s place)’	Svorou (1994)
N > C	English <i>while</i> ‘period of time’ > <i>while</i> ‘SIMULTANEITY’	Kortmann (1996)
ProN > Agr	Lat. <i>Illam video</i> ‘I see that one’ > Span. <i>la veo a María</i> (OBJ. AGR.)	Givón (1976)
N > Num	Chinese <i>men</i> ‘class’ > <i>-men</i> ‘PLURAL’	
V > P	Yoruba <i>fi</i> ‘use’ > <i>fi</i> ‘with’	Lord (1993)
V > C	German <i>während</i> ‘enduring’ > <i>während</i> ‘while, during’	Kortmann and König (1992)
V > Asp	Lezgian <i>qačuz awa</i> ‘taking, is’ > <i>qaču-zwa</i> ‘is taking’	Bybee and Dahl (1989)
V > T	Greek <i>thélo na páo</i> ‘I want to go’ > <i>tha páo</i> ‘I’ll go’	Bybee et al. (1994)
A > P	English <i>like</i> ‘equal’ > <i>like</i> ‘similative’	Maling (1983)
A > D	Latin <i>ipse</i> ‘himself’ > Sardinian <i>su</i> ‘the’	
A > Num	English <i>all</i> > Tok Pisin <i>ol</i> ‘PLURAL’	

Some grammaticalization changes (lexical > functional category) from Haspelmath (1999: 1045)

Table I

Are the changes depicted in the table ‘functional’? That all depends on what one might mean by ‘functional’. According to Haspelmath, they have their origins in what he calls ‘speaker extravagance’, whereby language users make unusually explicit formulations in order to attract attention. The first Old French speakers to say *casa* instead of simply *a* were not making anything ‘more functional’ either for themselves or their addressees, at least not if ‘functional’ has something to do with maximizing economy of effort, being more semantically

transparent, and so on. In fact, just the opposite is the case. Speakers were adding an unnecessary complication to the grammar for the sake of, essentially, showing off. But a sizeable percentage of well-studied instances of grammatical change are grammaticalization-related. It does not say much in favor of AF if grammars are full of words, constructions, and rules that entered the language for — essentially — anti-functional reasons.

So far, we have confined our discussion to the innovation of ‘internal’ changes, namely, those that do not seem to have been triggered by language contact. But a huge amount of grammatical change is contact-induced. Here, functional factors are even more remotely at the root cause of the changes. Indeed, borrowed forms are often counter-functional from a language user’s perspective. Harris and Campbell (1995: 136-142) point to a number of contact-induced word-order disharmonies. Amharic was originally VO, like most Semitic languages, but borrowed OV and genitive-noun order from the neighboring Cushitic languages. Nevertheless, it retained prepositions. Ahom (Thai) borrowed modifier-head order from Assamese (Indo-European) or some Tibeto-Burman language. Munda languages borrowed Modifier-head order from Dravidian. And Pipil, Xinca, and Copainalá Zoque borrowed VOS from neighboring Mayan languages. All of these cases led to disharmonies, resulting in decreased parsing efficiency, without any obvious gain in functionality in some other respect.

Perhaps the most dramatic example of the possible dysfunctional consequences of borrowing involves the history of English word stress. Old English word stress was very simple, and not significantly different from the Modern German rule (Moore and Knott 1965):

(19) The first syllable is stressed, except for words containing certain prefixes, in which case the root syllable is stressed

As far as Modern English is concerned, it suffices to consult the approximately 200 pages of Chomsky and Halle (1968) devoted to this question. What was responsible for the increased complication? Most importantly, England was invaded and conquered by Old French-speaking Normans. Some of the words that entered English as a result were stressed by the Old French rule and some by the Latin rule, both of which are pretty simple (20a-b):

(20) a. Old French: The last syllable is stressed, except for words ending in schwa.

b. Latin: The penultimate syllable is stressed if it is strong, the antepenultimate if it is weak.

But the net result of the synthesis of these simple rules after hundreds of French words poured into English was the monstrosity that we have today. There is no coherent sense of the word ‘functional’ that would allow anybody to conclude that changes in English stress patterns have become more ‘functional’.



#### 4 Some further difficulties with atomistic functionalism

Other difficulties with atomistic functionalism arise from the fact that functionally-motivated innovations overgeneralize beyond their functional utility (§4.1), that functionally-motivated principles can have dysfunctional consequences (§4.2), and that functionally-motivated principles can compete with each other (§4.3).

##### 4.1 The overgeneralization of functionally motivated principles

What makes a defense of AF even more difficult — at either the diachronic or synchronic level — is the fact that functionally motivated principles tend to generalize beyond their functional need. That is, they become grammaticalized. Island constraints provide good illustrations. I have no doubt that their ultimate origins are in parsing efficiency (see Newmeyer 1991). Nevertheless, over time, their range of applicability has extended beyond those cases in which they serve an obvious function. For example, Janet Fodor (1984) has given examples of sentences that are ungrammatical because they contain constraint violations, even where there are no processing difficulties:

- (21) a. \*Who were you hoping for \_\_\_ to win the game?  
b. \*What did the baby play with \_\_\_ and the rattle?

Along the same lines, she points to pairs of sentences of roughly equal ease to the parser, where one is grammatical and the other contains a constraint violation and is therefore ungrammatical (22a-b; 23a-b):

- (22) a. \*John tried for Mary to get along well with \_\_\_\_.  
b. John is too snobbish for Mary to get along well with \_\_\_\_.
- (23) a. \*The second question, that he couldn't answer \_\_\_\_ satisfactorily was obvious.  
b. The second question, it was obvious that he couldn't answer \_\_\_\_ satisfactorily.

Universal grammar in interaction with the structural system of English decides the grammaticality; the parser takes a back seat. Again, such examples suggest that the linkage between individual constraints in the grammar and functional motivations is rather weak

##### 4.2 Dysfunctional consequences of functionally-motivated principles

Lightfoot (1999) has even provided an example of how a constraint can have *dysfunctional* consequences. Consider condition (24):

- (24) Traces of movement must be lexically governed

This condition does a lot of work — for example, it accounts for the grammaticality distinction between (25a) and (25b):

- (25) a. Who<sub>i</sub> was it apparent [**e<sub>i</sub>** that [Kay saw e<sub>i</sub>]]?  
b. \* Who<sub>i</sub> was it apparent yesterday [**e<sub>i</sub>** that [Kay saw e<sub>i</sub>]]?

In (25b) the word *yesterday* blocks government of the intermediate trace (in bold-face) by the adjective *apparent*. Or consider phrase (26):

- (26) Jay's picture

(26) is at least 3-ways ambiguous: Jay could be the owner of the picture, the agent of the production of the picture, or the person portrayed (the object reading). The derivation of the object reading is depicted in (27):

- (27) [Jay<sub>i</sub>'s [picture e<sub>i</sub>]]

Notice that the trace is governed by the noun *picture*. Now consider phrase (28):

- (28) the picture of Jay's

(28) has the owner and agent reading, but not the object reading. That is, Jay cannot be the person depicted. The derivation, schematically illustrated in (29), explains why:

- (29) \*the picture of [Jay<sub>i</sub>'s [e e<sub>i</sub>]]

The trace of *Jay's* is not lexically governed; rather it is governed by another empty element, understood as 'picture'.

Lightfoot is quite open to the possibility that condition (24) is functionally motivated:

... the general condition of movement traces ... may well be functionally motivated, possibly by parsing considerations. In parsing utterances, one needs to analyze the positions from which displaced elements have moved, traces. The UG condition discussed restricts traces to certain well-defined positions, and that presumably facilitates parsing. (Lightfoot 1999: 249)

However, he goes on to show that this condition — functionally motivated though it may be — has dysfunctional consequences. The problem is that it blocks the straightforward extraction of subjects:

- (30) a. \*Who<sub>i</sub> do think [e<sub>i</sub> that e<sub>i</sub> saw Fay]?

b. \*Who<sub>i</sub> do you wonder [e<sub>i</sub> how [e<sub>i</sub> solved the problem]]?

Sentences (30a-b) are ungrammatical because the bold-faced subject traces are not lexically governed. Indeed, in the typical case, subjects will not be lexically governed. Nevertheless, it is safe to assume that it is in the interest of language users to questions subjects, just as much as objects or any other syntactic position. In other words, the lexical government position is in part dysfunctional.

Interestingly, languages have devised various ways of getting around the negative effects of the condition. They are listed in (31a-c):

- (31) Strategies for undoing the damages of the lexical government condition:
- a. Adjust the complementizer to license the extraction.
  - b. Use a resumptive pronoun in the extraction site.
  - c. Move the subject first to a nonsubject position and then extract.

English uses strategy (31a):

- (32) Who do you think saw Fay?

Swedish uses strategy (31b):

- (33) Vilket ord<sub>i</sub> visste ingen [hur det/\*e<sub>i</sub> stavas]?  
Which word knew no one how it/e is spelled?  
'Which word did no one know how it is spelled?'

The resumptive pronoun *det* replaces the trace, so there is no unlexically governed trace to violate the lexical government condition. And Italian uses the third strategy (31c). In Italian, subjects can occur to the right of the verb and this is the position from which they are extracted (as in 34):

- (34) Chi<sub>i</sub> credi [che abbia telefonato e<sub>i</sub>]?  
who do-you-think that has telephoned?  
'Who do you think has telephoned?'

What we see here in other words are functional patches for dysfunctional side-effects of functional principles. The whole package is, in a sense, functionally motivated — after all, it does let us communicate — but it does not make much sense to attempt to provide functional motivations for each of the component parts.

In a nutshell, then, to ask the question: 'Is this rule or constraint (or whatever) functionally motivated?' is to ask the wrong question. No rule or constraint has a functional motivation in and of itself, but rather only within the total system in which it occurs. To reinforce this point with a different example,

let us consider the rule of *Wh*-Movement (35) and the constraint (or parameter setting, if you will) (36):

(35) *Wh*-Movement: Front *wh*-expressions

(36) HEAD-RIGHT: Heads uniformly follow their complements and adjuncts

Is *Wh*-Movement functionally motivated? It certainly seems to be, since it plays a role in marking scope and reserving a ‘special’ position for focused elements. What about HEAD-RIGHT? Again, this constraint appears to be functionally motivated, since there is a parsing advantage to for all heads being on same side of their complements (Hawkins 1994). But what is *dysfunctional* is for any language to have *both* of them. Most head-final languages do not have *Wh*-Movement and there is a good reason for that. *Wh*-Movement creates too much temporary ambiguity in OV langs if arguments moved away from their subcategorized position. OV languages tend to make arguments ‘toe the line’ — *Wh*-Movement is rare and A-movements are in general disfavored. In other words, all other things being equal, in grammars with *Wh*-Movement, the constraint, HEAD-RIGHT is dysfunctional. But these are just two grammatical processes out of, presumably, thousands. For any pair — or triple, or quadruple, etc., etc. — of processes one can ask the degree to which that association of processes is a ‘functional’ one. After all, only the most ardent anti-structuralist would deny that languages are tightly connected wholes. So what place is there, then, for assigning a function to any individual part of a grammar? The root of the problem for AF is the fact that functional explanation is vastly too complex to allow individual functions to be attached to individual grammatical elements.

#### 4.3 The problem posed by competing motivations

Complicating still further the possibility of linking processes and functions is the problem of multiple competing factors, pulling on grammars from different directions. As has often been observed, the existence of competing motivations poses the danger of rendering functional explanation vacuous. For example, consider two languages  $L_1$  and  $L_2$  and assume that  $L_1$  has property X and  $L_2$  has property Y, where X and Y are incompatible (i. e., no language can have both X and Y). Now assume that there exists one functional explanation (FUNEX<sub>1</sub>) that accounts for why a language might have X and another functional explanation (FUNEX<sub>2</sub>) that accounts for why a language might have Y. Can we say that the fact that  $L_1$  has property X is ‘explained’ by FUNEX<sub>1</sub> or the fact that  $L_2$  has property Y is ‘explained’ by FUNEX<sub>2</sub>? Certainly not; those would be totally empty claims. Given the state of our knowledge about how function affects form, we have no non-circular means for attributing a particular property of a particular language to a particular functional factor. The best we can do is to characterize the general, *typological* influence of function on form.

But this situation is typical of what is encountered in external explanation. Consider cigarette smoking and lung cancer. We know that smoking is a cause of

lung cancer. We also know that eating lots of leafy green vegetables helps to prevent it. Now, can we say with confidence that John Smith, a heavy smoker, has lung cancer *because* he smokes? Or can we say that Mary Jones, a non-smoker and big consumer of leafy green vegetables, does not have lung cancer for that reason? No, we cannot. Most individuals who smoke several packs a day will never develop lung cancer, while many nonsmoking vegetarians will develop that disease. To complicate things still further, most smokers are also consumers of leafy green vegetables, so both external factors are exerting an influence on them. The best we can do is to talk about *populations*.

The external factors affecting language far murkier than those affecting health. It would therefore be a serious mistake to entertain the idea of linking statements in particular grammars with functional motivations, as is entailed by AF. Rather, we need to set the more modest goal associated with HF, namely, that of accounting for typological generalizations. But that is hardly an insignificant goal. If accomplished, it will achieved one of the central tasks facing theoretical linguistics today — coming to an understanding of the relationship between grammatical form and those external forces that help to shape that form.

## 5 Conclusion

This paper has examined two hypotheses governing the manifestation of the influence of external function upon syntactic form. The first, atomistic functionalism, posits that each element of grammar is paired with an external function. The second, holistic functionalism, posits a more indirect, purely typological, link between grammars and functions. The conclusion is that holistic functionalism is better motivated than atomistic.

## Acknowledgement

I would like to thank Herb Stahlke for his extensive comments on the presented version of this paper.

## Notes

<sup>1</sup> Functionalists, in general, have rejected the idea of innate grammatical knowledge, while formalists, in general, have defended this idea. However, the Baldwin Effect (Hinton and Nowlan 1987) allows for the evolution of neural mechanisms that encode (functionally) beneficial attributes/behavior in a population that has a fair amount of plasticity at birth in brain wiring. Hence, there exists a mechanism by which UG principles might have become biologized without increasing the survival and reproductive possibilities for any particular individual who, by chance, happened to have acquired one or more of them. The Baldwin Effect has been pointed to as a means by which functionally-motivated grammatical constraints might have become innate (see Newmeyer 1991; Kirby and Hurford 1997; Kirby 1998; Aissen and Bresnan 2001).

<sup>2</sup> The preceding several paragraphs appear also in Newmeyer (2001). In answer to the ‘challenge’ levied there, Aissen and Bresnan (2001) cite unpublished work that observes that speakers of Modern English are more likely to use animate genitives than inanimates in the GEN-N construction and more likely to use inanimate genitives than animates in the N-GEN construction. To account for these and related facts, they propose universal OT constraints that penalize

inanimate specifiers more than animate specifiers and penalize animate complements more than inanimate complements. Hence, Aissen and Bresnan conclude that 'variation in grammatical structure can be directly associated with the same (functionally motivated) constraints whose rerankings are associated with historical changes and typological variation' (ms. p. 5).

I have no quarrel with the idea that it is more 'natural' to prefer animate specifiers and inanimate complements and that this preference can make itself manifest in language use. But it is a long stretch from there to conclude that the preference is encoded in *the grammar of English*. After all, both positions are possible for both animates and inanimates. The idea that the relative discourse frequency of one construction over another is encoded in grammatical statements embodies a degree of rejection of the competence-performance dichotomy not found in any functionalist theory of syntax with the possible exception of Hopper's Emergent Grammar. Consider the implications. It is the case both for English and cross-linguistically that complex subordination tends to be preferred in formal discourse and simple coordination in informal. By parity of argument, the grammar would need to incorporate constraints associating the formality of the situation with syntactic structure. From there, we are but a short step away from the program of Late Generative Semantics, which argued that *all* factors relevant to morpheme occurrence in discourse are a matter for grammatical analysis (see Lakoff 1974 and the discussion in Newmeyer 1986).

<sup>3</sup> A full treatment of inversion possibilities in the history of English would require several volumes. Oddly, some inversion triggers were historically late innovations, even while the majority of fronted phrases ceased to function as triggers. For recent discussion, see Nevalainen (1997).

## References

- Aissen, Judith. 2000. Differential object marking: Iconicity vs. economy. Unpublished ms., UCSC.
- Aissen, Judith and Bresnan, Joan W. 2001. Optionality and functionality: Objections and refutations. *Natural Language and Linguistic Theory* 20.
- Allen, Cynthia L. 1995. *Case Marking and Reanalysis: Grammatical Relations from Old to Early Modern English*. Oxford: Clarendon Press.
- Buckley, Eugene. 2000. What should phonology explain? Unpublished ms., University of Pennsylvania.
- Bybee, Joan L. and Dahl, Östen. 1989. The creation of tense and aspect systems in the languages of the world. *Studies in Language* 13:51-103.
- Bybee, Joan L., Perkins, Revere D. and Pagliuca, William. 1994. *The Evolution of Grammar: Tense, Aspect, and Modality in the Languages of the World*. Chicago: University of Chicago Press.
- Chomsky, Noam. 1975. *Reflections on Language*. New York: Pantheon.
- Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
- Chomsky, Noam and Halle, Morris. 1968. *Sound Pattern of English*. New York: Harper and Row.
- Creider, Chet. 1979. On the explanation of transformations. *Syntax and Semantics, volume 12: Discourse and Syntax*, ed. by Talmy Givón, 3-22. New York: Academic Press.
- Croft, William. 1995. Autonomy and functionalist linguistics. *Language* 71:490-532.
- Croft, William. 2000. *Explaining Language Change: An Evolutionary Approach*. London: Longman.
- Dahl, Östen. 2000. Grammaticalization and the life-cycles of constructions, Unpublished ms., University of Stockholm.
- Dik, Simon C. 1986. On the notion 'functional explanation'. *Belgian Journal of Linguistics* 1:11-52.
- Dik, Simon C. 1989. *The Theory of Functional Grammar; part 1: The Structure of the Clause*. Functional Grammar Series, vol. 9. Dordrecht: Foris.

- Fischer, Olga C. M. 1992. Syntax. *The Cambridge History of the English Language*, ii. 1066-1476, ed. by N. Blake, 207-408. Cambridge: Cambridge University Press.
- Fodor, Janet D. 1984. Constraints on gaps: Is the parser a significant influence? *Explanations for Language Universals*, ed. by Brian Butterworth, Bernard Comrie and Östen Dahl, 9-34. Berlin: Mouton.
- Givón, Talmy. 1976. Topic, pronoun, and grammatical agreement. *Subject and Topic*, ed. by Charles Li, 149-88. New York: Academic Press.
- Givón, Talmy. 1979. *On Understanding Grammar*. New York: Academic Press.
- Greenberg, Joseph H. 1963. Some universals of language with special reference to the order of meaningful elements. *Universals of Language*, ed. by Joseph Greenberg, 73-113. Cambridge, MA: MIT Press.
- Haiman, John. 1983. Iconic and economic motivation. *Language* 59:781-819.
- Haiman, John (ed.) 1985. *Iconicity in Syntax*. Typological Studies in Language. Amsterdam: John Benjamins.
- Hale, Mark and Reiss, Charles. 2000. 'Substance abuse' and 'dysfunctionalism': Current trends in phonology. *Linguistic Inquiry* 31:157-69.
- Harris, Alice C. and Campbell, Lyle. 1995. *Historical Syntax in Cross-linguistic Perspective*. Cambridge Studies in Linguistics, vol. 74. Cambridge: Cambridge University Press.
- Haspelmath, Martin. 1999a. Optimality and diachronic adaptation. *Zeitschrift für Sprachwissenschaft* 18:180-205.
- Haspelmath, Martin. 1999b. Why is grammaticalization irreversible? *Linguistics* 37:1043-68.
- Hawkins, John A. 1994. *A Performance Theory of Order and Constituency*. Cambridge Studies in Linguistics, vol. 73. Cambridge: Cambridge University Press.
- Hawkins, John A. 2001. Why are categories adjacent? *Journal of Linguistics* 37.
- Hayes, Bruce P. 1998. Phonetically driven phonology: The role of optimality theory and inductive grounding. *Functionalism and Formalism in Linguistics*, ed. by Michael Darnell, Edith Moravcsik, Frederick J. Newmeyer, Michael Noonan and Kathleen Wheatley, 243-85. Amsterdam: John Benjamins.
- Hinton, G. and Nowlan, S. 1987. How learning can guide evolution. *Complex Systems* 1:495-502.
- Hopper, Paul J. 1987. Emergent grammar. *Berkeley Linguistics Society* 13:139-57.
- Hopper, Paul J. 1988. Emergent grammar and the apriori grammar postulate. *Linguistics in Context: Connecting Observation and Understanding*, ed. by Deborah Tannen, 117-34. Norwood, NJ: Ablex.
- Keenan, Edward L. and Comrie, Bernard. 1977. Noun phrase accessibility and universal grammar. *Linguistic Inquiry* 8:63-99.
- Kirby, Simon. 1998. *Function, Selection and Innateness: The Emergence of Language Universals*. Oxford: Oxford University Press.
- Kirby, Simon and Hurford, James. 1997. Learning, culture, and evolution in the origin of linguistic constraints. *Proceedings of the Fourth European Conference on Artificial Life*, ed. by Phil Husbands and Harvey Inman, 493-502. Cambridge, MA: MIT Press.
- Kortmann, Bernd. 1996. *Adverbial Subordination*. Berlin: Mouton de Gruyter.
- Kortmann, Bernd and König, Ekkehard. 1992. Categorical reanalysis: The case of deverbal prepositions. *Linguistics* 30:671-97.
- Kroch, Anthony. 1994. Morphosyntactic variation. *Chicago Linguistic Society* 30: 180-201.
- Lakoff, George. 1974. Interview. *Discussing language: Dialogues with Wallace L. Chafe, Noam Chomsky, Algirdas J. Greimas [and others]*, ed. by Herman Parret, 151-78. The Hague: Mouton.
- Lakoff, George. 1987. *Women, Fire, and Dangerous Things: What Categories Reveal about the Mind*. Chicago: University of Chicago Press.
- Langacker, Ronald W. 1974. Movement rules in functional perspective. *Language* 50:630-64.
- Li, Charles N. and Thompson, Sandra A. 1974. An explanation of word order change SVO -> SOV. *Foundations of Language* 12:201-14.
- Lightfoot, David W. 1991. *How to Set Parameters: Arguments from Language Change*. Cambridge, MA: MIT Press.

- Lightfoot, David W. 1999. *The Development of Language: Acquisition, Change, and Evolution*. Blackwell/Maryland Lectures in Language and Cognition, vol. 1. Oxford: Blackwell.
- Lord, Carol. 1993. *Historical Change in Serial Verb Constructions*. Amsterdam: John Benjamins.
- Maling, Joan. 1983. Transitive adjectives: A case of categorial reanalysis. *Linguistic Categories: Auxiliaries and Related Puzzles 1: Categories*, ed. by Frank Heny and Barry Richards, 253-89. Dordrecht: Reidel.
- Milroy, Lesley. 1987. *Language and Social Networks, Second Edition*. Oxford: Basil Blackwell.
- Moore, Samuel and Knott, Thomas A. 1965. *The Elements of Old English*. Ann Arbor: George Wahr.
- Nevalainen, Terttu. 1997. Recycling inversion: The case of initial adverbs and negators in Early Modern English. *Studia Anglica Posnaniensia* 31:203-14.
- Newmeyer, Frederick J. 1986. *Linguistic Theory in America: Second Edition*. New York: Academic Press.
- Newmeyer, Frederick J. 1991. Functional explanation in linguistics and the origins of language. *Language and Communication* 11:3-28.
- Newmeyer, Frederick J. 1998. *Language Form and Language Function*. Cambridge, MA: MIT Press.
- Newmeyer, Frederick J. 2001. Optimality and functionality: A critique of functionally-based optimality-theoretic syntax. *Natural Language and Linguistic Theory* 20.
- Svorou, Soteria. 1994. *The Grammar of Space*. Amsterdam: John Benjamins.
- Wedgwood, Daniel. 1995. *Grammaticalization by Reanalysis in an Adaptive Model of Language Change: A Case Study of the English Genitive Constructions*, University of Edinburgh: MA thesis.
- Weinreich, Uriel, Labov, William and Herzog, Marvin I. 1968. Empirical foundations for a theory of language change. *Directions for Historical Linguistics*, ed. by W. Lehmann and Y. Malkiel, 95-188. Austin: University of Texas Press.