

Speaker-Hearer Asymmetry as a Factor in Language Evolution: A Functional Explanation For Formal Principles of Grammar

Author(s): Frederick J. Newmeyer

Proceedings of the Sixteenth Annual Meeting of the Berkeley Linguistics Society (1990), pp. 241-247

Please see “How to cite” in the online sidebar for full citation information.

Please contact BLS regarding any further use of this work. BLS retains copyright for both print and screen forms of the publication. BLS may be contacted via <http://linguistics.berkeley.edu/bls/>.

The Annual Proceedings of the Berkeley Linguistics Society is published online via [eLanguage](#), the Linguistic Society of America's digital publishing platform.

Speaker-Hearer Asymmetry as a Factor in Language Evolution: A Functional Explanation For Formal Principles Of Grammar*

Frederick J. Newmeyer
University of Washington

Many assume that the positing of an innate universal grammar (UG) forfeits any possibility of a functional explanation for why grammars have the properties that they do. Bates and MacWhinney (1979), for example, contrast the 'functionalist' model, in which the nature of grammars is determined and the child's acquisition of grammar is guided 'by the pragmatic and semantic structure of communication interacting with the performance constraints of the speech channel', with the 'autonomous syntax view', which posits 'abstract categories [and] innate clues about the range of possible human grammars' (1979: 168). It is clear that Bates and McWhinney see these positions as incompatible.

There is a way, however, that autonomous syntax and functionalism can be reconciled. For example, a grammatical principle might have become encoded in our genes by virtue of its being so successful in facilitating communication that the survival possibilities of those possessing it were enhanced. Thus a functional explanation would hold at the evolutionary level.

In this paper, I do in fact propose an explanation based on evolutionary pressure for certain principles of UG. In particular, I raise and attempt to answer the question of why a principle of grammar might become biologized.

It has frequently been suggested that many aspects of grammars have a plausible functional motivation, from predominant word order possibilities of predicates and arguments within clauses (Tomlin 1986) to the types of categories and rules out of which grammars are constructed (Creider 1979) to the principles that constrain their operation (Givón 1979). To the best of my knowledge, however, what has never been observed before is that those grammatical phenomena whose explanation is most convincingly attributed to some principle of UG tend to be those whose functional grounding is asymmetrical between speaker and hearer.

Let us begin with the UG principle of Subjacency, which in English is responsible for violations of grammaticality such as (1a-b)¹:

- (1) a. *What_i do you wonder where John put ____i?
b. *What_i do you believe the claim that John ate ____i?

Various scholars have pointed to a functional grounding for Subjacency (Givón 1979, Berwick & Weinberg 1984, Frazier 1985a). As they note, violations of this principle tend to be structures which create problems for the hearer in matching the displaced *wh*-element with its coindexed gap. However, it is rarely pointed out that Subjacency performs no particular service for the speaker, whose 'easiest' task would simply be to '*wh*' any Noun Phrase regardless of its subcategorized position in the structure. Hence, Subjacency exhibits a functional asymmetry.

The same point can be made with respect to Principle A of the Binding Theory (Chomsky 1981), for short 'Anaphor Binding'. Violations of this principle are exhibited in (2):

- (2) a. *John_i told Mary to help himself_i.
b. *John_i thinks that himself_i should be nominated.

While Anaphor Binding may help the hearer more efficiently to pair anaphoric elements and their antecedents, it seemingly complicates matters for the speaker, who, of course, is fully aware of the identity of the intended referent and is thus forced to make a 'personally'

unnecessary grammatical distinction. Anaphor Binding is therefore functionally asymmetrical as well.

Analogous points can be made with respect to the Case Filter and the ECP (see also Chomsky 1981), though space constraints prevent an elaboration in this paper.

The tendency for innate constraints to exhibit a functional asymmetry is a natural consequence, I believe, of evolutionary pressure for language to serve as an ever more efficient medium of communication. In cases where the ease of the speaker and the needs of the hearer were in direct conflict, an obvious solution presented itself -- to bypass directly the push-pull between speakers' demands and hearers' demands by incorporating those constraints necessary to the hearer directly into the innate language faculty itself. Thus arose the principles of UG, allowing a stable innate core to language, immune to the functional exigencies of the moment.

It may seem at first blush a bit ironic that function-based factors should lead to an innate UG, but a moment's reflection should dispel the irony. If we agree with the functionalist thesis that the ability to communicate by spoken language is a paramount human attribute, and played a major role in the survival and development of the species, then we would *expect* anything that facilitates this process to become biologized. If Subjacency really does ease communicators' burdens, then wouldn't its biologization have conferred an advantage to the species?

There was no evolutionary pressure, however, to biologize what aided speaker and hearer equally. There would hardly be any benefit in encoding in our genes some linguistic principle that the path of least effort would lead both participants in a discourse to follow anyway.

One might wonder whether the existence of parsing principles poses a dilemma for my hypothesis. Clearly, such principles are innate -- we do not 'learn' how to parse sentences. But then, pursuing the logic of the argument, if both speaker and hearer benefit from parsing principles, what caused them to become innate; if, on the other hand, such principles are functionally asymmetrical, then why were they not encoded in UG?

The answer, I believe, is that most, if not all, parsing principles are rooted in memory abilities, and are therefore essentially extensions of a preexisting faculty; that is, parsing principles were the inevitable consequence of the memory faculty adapting itself to the newly-emergent language faculty.

Let us consider by way of example the parsing principle Early Immediate Constituents (EIC), proposed in Hawkins (to appear). EIC asserts that orderings of words are preferred which enable the parser to recognize all IC's of some mother node as rapidly as possible. Thus EIC explains (among other things) why in V-O languages there is a tendency for heavy constituents to occur at the right margins of their verb phrases; why, for example, (3b) and (4b) are preferred to (3a) and (4a) respectively:

- (3) a. ?I consider everybody who agrees with me and my disciples about the nature of the cosmos to be smart.
- b. I consider (to be) smart everybody who agrees with me and my disciples about the nature of the cosmos.
- (4) a. ?I met the twenty-three people who I had taken Astronomy 201 with last semester in the park.
- b. I met in the park the twenty-three people who I had taken Astronomy 201 with last semester.

As Hawkins notes, 'one of the most fundamental tasks that the syntax module performs, evidently with quite remarkable speed and efficiency, is to group words together into the hierarchically organized phrases of the linguist's constituent structure representation' (ms. p. 6). EIC is instrumental to this task, abetting the speaker *as well as* the hearer in the task of organizing -- as well as perceiving -- rapid speech.

All of the foregoing remarks depend, of course, upon Subjacency and Anaphor Binding being UG-principles. If they (or the effects that led to their postulation) are to be

located outside of UG, then the correlation that forms the nexus of this paper would be a wholly spurious one. Therefore, the bulk of what follows will be devoted to presenting properties that characterize principles of UG.

The strongest arguments for innate principles of UG are those based on the poverty of the stimulus presented to the child language learner. How could the child have learned such-and-such a principle inductively, one reasons, given its abstractness, the limited amount of relevant information provided, and the speed of acquisition? One's first thought might be that poverty of the stimulus arguments are neutral between identifying UG principles and parsing principles, since both are innate. Nevertheless, the *effect* of a parsing principle should typically be a distinction in, or judgment of, acceptability that is learnable through positive evidence alone, while the *effect* of a UG principle should not be. Just as a logical point, there is no reason that distinctions in acceptability whose explanation is based in the structure of the parsing mechanism should present learning difficulties. A learnability problem therefore points directly to an innate UG, not to the parser, which merely employs the existent grammar in language use.

So, for example, Hoekstra and Kooij (1988) motivate Subadjacency as a UG principle by pointing out that positive evidence alone could hardly suffice to enable the child language learner to come to the conclusion that (5a) is ambiguous as to the scope of *where*, while (5b) is not:

- (5) a. Where did John say that we had to get off the bus?
- b. Where did John ask whether we had to get off the bus?

Interestingly, Freedman & Forster (1985) and Frazier (1985b) have argued on the basis of how Subadjacency violations are parsed that this constraint cannot be built into the parser, thereby challenging the earlier claim by Marcus (1980) and Berwick & Weinberg (1984) that it doubles as a UG and a parsing principle.

Poverty of the stimulus arguments also apply (though perhaps not as strongly) to Anaphor Binding. It is by no means evident how positive evidence could lead to the conclusion that (6a) is grammatical, and (6b) ungrammatical, thereby supporting the innateness of Anaphor Binding:

- (6) a. John seemed to Mary to help himself.
- b. *John appealed to Mary to help himself.

Now let us turn to EIC. Even though this processing principle, which, again, explains the contrasts of (2) and (3), is innate, there are no poverty of the stimulus arguments applicable to the *acquisition* of these contrasts. Positive evidence can reveal that V-VP-NP, V-AP-NP, and V-PP-NP are options to V-NP-VP, V-NP-AP, and V-NP-PP respectively, as well, I suspect, as the conditions under which the former would be likely to be used instead of the latter.

Or take cases where the effects of EIC have been fully grammaticalized. EIC predicts that more languages are likely to have N-Adj-S' orders than N-S'-Adj, but in this fact I see no evidence for a UG principle, since there is no compelling poverty of the stimulus argument that learners must choose the former order. I assume that if anything is learnable from positive evidence, it is the possible ordering of the constituents of phrases and clauses -- a phenomenon about which EIC has a great deal to say and principles of UG very little.

A second diagnostic for a UG principle is the nature and degree of variation that it exhibits. The current consensus is that each principle admits to variation in a highly circumscribed way, namely by allowing different parameter settings whose values are ordered with respect to one another by the set-theoretic relation of proper inclusion. Take the question of the possible governing categories for Anaphor Binding, where there exists variation from language to language and even between different anaphors within a particular language. Manzini and Wexler (1987) have argued that this variation is highly

systematic: β can be a governing category for δ just in case β is the minimal category that contains δ and a governor for δ and has one of the grammatical elements enumerated in (7) (I am oversimplifying somewhat for ease of exposition):

- (7) a. a subject; or
- b. an Infl; or
- c. a Tense; or
- d. a 'referential' Tense; or
- e. a 'root' Tense.

Interestingly, the set of categories that have a subject includes the set that has an Infl; the set that has an Infl includes the set that has a Tense; and so on.

While the possible bounding nodes for Subjacency have not been subject to the same cross-linguistic scrutiny as the possible governing categories for Anaphor Binding, the findings of Keenan & Comrie (1977) suggest that very much the same sort of variation might be at work here. They found a universal hierarchy with regard to relative clause formation depicted in (8):

- (8) Subject > Direct Object > Indirect Object > Major Oblique Case NP > Genitive NP > Object of Comparison

All languages relativize from subject position; if a language relativizes from a position lower on the hierarchy, it will also relativize from higher positions. It seems probable that their work, translated into current theoretical conceptions, will lead to conclusions about variation in possible bounding nodes that conceptually parallel those of binding domains.

As Manzini and Wexler note, parameterized hierarchically-organized variation is precisely what learnability considerations would lead us to expect. And Piatelli-Palmerini (1989), drawing on the work of J.-P. Changeux, points out that the idea of a UG characterized by a pre-programmed chain of multiple hierarchically ordered internal 'switches' accords well with much current thinking in neurobiology.

Non-UG-related variation in language is quite different. Most importantly, it tends to be graded rather than discrete. Anaphors that are not bound in their governing category in English are impossible, except for those subject to an independent discourse-based condition (Zribi-Hertz 1990), but when is a heavy NP 'too heavy'? To take another example, Dryer (1980) defends at length the generalization that languages are more likely to have sentential noun phrases in final position than in internal position, in initial position than in internal position, and in final position rather than in initial position. Hawkins (to appear) argues that these generalizations are a consequence of EIC. But we do not have here the characteristic property of a UG principle; the choices that languages make in this respect are not matters of choosing the proper 'switch-settings', but rather reflect statistical tendencies which themselves are rooted in the speed with which relevant syntactic nodes can be recognized by the parser.

Surely the graded consequences of parsing principles is a function of the fact that they in turn are rooted to one degree or another in human memory, which itself demands a description along a continuum.

A third characteristic of UG principles is their abstractness. Typically, they manipulate grammatical elements inaccessible to speakers' conscious awareness. So, for example, Subjacency governs the relationship between an overt element and a null element (i.e. a trace), as in overt *Wh*-movement, between two null elements, as in the case of the relationship between an empty operator and its trace, and scopal interpretation where no syntactic movement has occurred at all, as in example (9) from Lakota, discussed in Foley and Van Valin (1984):

- (9) Wičhaša wā takū ophethu ki he wālaka he
 man a WH/smthg 3sg-buy the that 2sg-sec-3sg Q

They note that this sentence may be interpreted to mean 'Did you see the man who bought something?', but not 'What did you see the man who bought', a fact that follows directly from Subjacency governing (invisible) movement in LF.

Likewise, Anaphor Binding affects null anaphors as well as overt ones. Indeed, the basic insight that led ultimately to the Binding Theory is that the relationship between an anaphor and its antecedent parallels that between the launching and landing sites of NP movements.

I have seen no evidence that non-UG principles ever make reference to null grammatical categories. EIC, for example, treats all NP's the same, whether they are overt or null.

Finally, UG principles tend to be at a further remove from the functional factors that originally motivated them than are functionally-motivated principles not belonging to UG. For example, while Subjacency might have become biologized for the purpose of aiding the hearer to pair antecedents and gaps, there are innumerable sentences that violate this principle (and are therefore ungrammatical) that are nevertheless perfectly easy to understand. Take, for example, a 'Coordinate Structure Constraint' violation such as (10), which in all likelihood can be subsumed under Subjacency:

- (10) *What did John eat beans and?

Not only does this sentence present no processing difficulties, but it forms a minimal pair with grammatical sentence (11), in which Subjacency has not been violated:

- (11) What did John eat beans with?

The divergence over time between selectionally-shaped form and the functional pressures that originally shaped the form is, of course, the norm in evolutionary history. In the general case, form will change to reflect a changing environment only if doing so has a positive effect on the survival and reproductive possibilities of the organism possessing the particular formal structure. Hence, we retain our appendix, even though its utility to digestion has disappeared due to changed diets caused by a changed environment. Fair-skinned people who have migrated to sun-bathed countries show no genetic tendency from generation to generation to darkening of the skin (though if skin cancer rates in Australia are any indication, this might change).

One might speculate then that Subjacency was established as a principle of innate UG before the language faculty supported coordinate structures. Since questioning elements within such structures was never communicatively vital, this principle remained the same. Or alternatively (and perhaps more plausibly), Subjacency might have arisen to disallow certain structures that were difficult to process, yet likely to be uttered, without regard to its effects on parallel -- yet communicatively nonessential -- structures that presented no processing difficulties.

Whichever option is correct, Subjacency illustrates par excellence that central to language design are autonomous grammatical principles that cannot be reduced in toto to the functional principles that in the distant past brought them into being.

There is no question, on the other hand, of parsing principles or principles based, say, on cooperative communication displaying the same sort of form-function disparity. If a sentence were found that was predicted by EIC to create processing difficulties that did not in fact do so, then that would be prima facie evidence that EIC, as a principle of sentence processing, was in need of refinement. Subjacency, as a grammatical principle, is under no such obligation.

In closing, it needs to be stressed that while UG principles point to asymmetry, asymmetry alone does not lead irrevocably to a UG principle. For example, one way to

keep the speaker in check is to build constraints directly into the *production system*. Cutler (1987) and Levelt (1989) discuss innate production constraints whose sole function seems to be to ease communication, the former involving the formation of neologisms and the latter guaranteeing that on-line repairs follow a particular well-formedness rule.

Why then were Subadjacency and the other constraints not made production constraints, a solution which, like the UG solution, would effectively prevent sentences like (1) and (2) from being uttered? I suspect that the reason is that the planning units of production (see Levelt) are too short for this to have been a workable possibility.

Finally, asymmetry exerts no pressure toward an innate constraint if it does not lead to communication being impaired. So, as Slobin (1977) has pointed out, speakers and hearers have different 'interests', as far as the packaging of a linguistic form is concerned. The former wish to minimize the articulatory effort in producing it, the latter the effort of understanding. The result is a spectrum of possibilities within a range acceptable to both, from an inflectional 'speaker-oriented' morphology, as in Serbo-Croatian, at one end, to an agglutinative 'hearer-oriented' morphology, as in Turkish, at the other. And in the realm of discourse, Horn (1984) has pointed to a 'division of pragmatic labor' to deal with asymmetries in the needs of speakers and hearers.

Interestingly, some languages have found a way to handle 'awkward' pairings of antecedents and gaps without recourse to a UG principle. This has been accomplished by means of resumptive pronouns, which fill the gap of the displaced *wh*-phrase. Thus in English, Subadjacency-violating (and therefore ungrammatical) (12a) becomes grammatical if the gaps are filled with pronouns, as in (12b):

- (12) a. *He's the kind of person who when you meet ___ you like ____.
b. He's the kind of person who when you meet him you like him.

What the use of resumptive pronouns does is to reduce the degree of asymmetry by making things a little more difficult for the speaker (who has to remember to mark the gap) and quite a bit easier for the hearer (who has the gap marked and can thus link more easily its position to the fronted *wh*-phrase).

Why then, given a possible solution to the asymmetry problem not involving a novel principle of UG, did such a principle arise at all? Why do some languages allow resumptive pronouns, but not others, and why do some languages that have them (like English) restrict their use severely? At the present time, I have no answer to offer to these questions.

To conclude, then, formal autonomous grammatical principles are compatible with a functionalist perspective on language. Indeed, it would seem that the more of a functionalist one is, the more one should be drawn to the idea of autonomous innately-specified universal grammar.

ENDNOTES

*I would like to thank Keith Denning, Matthew Dryer, David Gil, Jack Hawkins, and Willem Levelt for their comments on the subject matter of this paper. None bears any responsibility for the content. For more extended discussion, see Newmeyer (in preparation).

¹The principle of Subadjacency dates from Chomsky (1973) and unifies several of the extraction constraints proposed in Ross (1967). In different ways, Kayne (1984) and Chomsky (1986) attempt to unify Subadjacency and the ECP, a result which, if correct, has no bearing on the conclusions of this paper.

REFERENCES

- Bates, Elizabeth and Brian MacWhinney. 1979. A functionalist approach to the acquisition of grammar. *Developmental pragmatics*, ed. by E. Ochs and B. Schieffelin, 167-211. New York: Academic Press.
- Berwick, Robert and Amy Weinberg. 1984. *The grammatical basis of linguistic performance*. Cambridge, MA: MIT Press.
- Chomsky, Noam. 1973. Conditions on transformations. A festschrift for Morris Halle, ed. by S. Anderson and P. Kiparsky, 81-162. New York: Holt.
- Chomsky, Noam. 1981. *Lectures on government and binding*. Dordrecht: Foris.
- Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.
- Creider, Chet. 1979. On the explanation of transformations. *Syntax and semantics*, Volume 12: discourse and syntax, ed. by T. Givón, 3-21. New York: Academic Press.
- Cutler, Anne. 1987. Speaking for listening. *Language perception and production*, ed. by A. Allport, et al., 23-40. New York: Academic Press.
- Dryer, Matthew. 1980. The positional tendencies of sentential noun phrases in universal grammar. *Canadian Journal of Linguistics* 25.225-262.
- Foley, William and Robert Van Valin. 1984. *Functional syntax and universal grammar*. Cambridge: Cambridge University Press.
- Freedman, Sandra and Kenneth Forster. 1985. The psychological status of overgenerated sentences. *Cognition* 19.101-131.
- Frazier, Lynn. 1985a. Syntactic complexity. *Natural language parsing*, ed. by D. Dowty, L. Karttunen, and A. Zwicky, 129-189. Cambridge: Cambridge University Press.
- Frazier, Lynn. 1985b. Modularity and the representational hypothesis. *NELS* 15.131-144.
- Givón, Talmy. 1979. *On understanding grammar*. New York: Academic Press.
- Hawkins, John. To appear. A parsing theory of word order universals. *Linguistic Inquiry*.
- Hoekstra, Teun and Jan Kooij. 1988. The innateness hypothesis. *Explaining language universals*, ed. by J. Hawkins, 31- 55. Oxford: Blackwell.
- Horn, Laurence. 1984. Toward a new taxonomy of pragmatic inference: Q- and r-based implicature. *Meaning, form, and use in context: Linguistic applications*, ed. by D. Schiffrin, 11-41. Washington: Georgetown University Press.
- Kayne, Richard. 1984. *Connectedness and binary branching*. Dordrecht: Foris.
- Keenan, Edward and Bernard Comrie. 1977. Noun phrase accessibility and universal grammar. *Linguistic Inquiry* 8.63-99.
- Levelt, Willem. 1989. *Speaking*. Cambridge, MA: MIT Press.
- Manzini, Maria-Rita and Kenneth Wexler. 1987. Parameters, binding theory and learnability. *Linguistic Inquiry* 18.413-444.
- Marcus, Mitchell. 1980. *A theory of syntactic recognition for natural language*. Cambridge, MA: MIT Press.
- Newmeyer, Frederick. In preparation. *Functional explanation in linguistics and the origins of language*. *Language and Communication*.
- Piatelli-Palmerini, Massimo. 1989. Evolution, selection, and cognition. *Cognition* 31.1-44.
- Ross, John. 1967. *Constraints on variables in syntax*. MIT Ph.D. dissertation.
- Slobin, Dan. 1977. *Language change in childhood and in history*. *Language learning and thought*, ed. by J. Macnamara, 185-214. New York: Academic Press.
- Tomlin, Russell. 1986. *Basic word order: Functional principles*. London: Croom Helm.
- Zribi-Hertz, Anne. 1990. Anaphor binding and narrative point of view: English reflexive pronouns in sentence and discourse. *Language* 65.695-727.