J. Child Lang. **31** (2004), 944–948. Printed in the United Kingdom

DISCUSSION

DOI: 10.1017/S0305000904006427

Inversion without grammar

WILLIAM O'GRADY
Department of Linguistics, University of Hawaii at Manoa
ograd y@hawaii.edu

INTRODUCTION

MacWhinney's paper focuses on the role of input and learning strategies in explaining how language is acquired, essentially denying the poverty of stimulus assumption on which the so-called 'logical problem of language acquisition' is based.

I believe that MacWhinney is right in his opposition to UG, but I disagree with his decision to place so much of the explanatory burden on the input and on learning. Although a large number of phenomena no doubt are acquired in just this way, an input-based approach falls short on a number of counts in the long run. The notorious phenomenon of structure dependence is a case in point.

The puzzle is as simple as it is intriguing: how does a child who is exposed to sentences such as (1) realize that question patterns in English are formed by 'fronting' the verb in the main clause rather than the first verb in the sentence?

(1) Can birds fly?

We know that the structure-dependent generalization (i.e. 'Front the verb from the main clause') is the right one because of what happens when we form the question corresponding to sentences such as (2).

(2) Birds [that are healthy] can_fly.
first verb *verb in main clause*

Here the two generalizations part ways, with only the structure-dependent hypothesis giving the right result.

(3) a. The verb from the main clause is 'fronted' (structure-dependent generalization):
Can [birds that are healthy] _ fly?

b. The first verb is 'fronted' (non-structure-dependent generalization):
*Are [birds that healthy] can fly?

But how do children figure this out? Traditionally, as Pullum & Scholz (2002: 17) note, just two options are put forward – children arrive at the correct result via a principle of Universal Grammar, or they do it via induction from experience thanks to exposure to patterns such as (3a). The UG view, of course, holds that such sentences are too infrequent to support induction.

Is induction feasible?

It has recently been suggested that induction from experience is at least worthy of consideration, and that sentences such as (3a) make up perhaps 1% of the interrogative patterns and more than 10% of the yes–no questions in at least certain types of discourse (Pullum, 1996; Pullum & Scholz, 2002). This may undermine Chomsky's (1980: 40) suggestion that one could go through one's entire life without ever encountering such sentences, but it does not solve the learnability problem.

As MacWhinney notes, sentences such as (3a) appear very rarely in speech TO CHILDREN (perhaps once in three million utterances. Yet we know that even three-year-old children make no mistakes of the relevant type (Crain & Nakayama, 1987). How is this possible?

MacWhinney tries to save the input hypothesis by suggesting that a different type of pattern supports induction of the right generalization, namely *wh*-questions such as (4), which are in fact plentiful in speech to children. (This example, from speech to Nina, is cited by Pullum & Scholz, 2002: 44.)

(4) Where's [the other dolly [that was in here]]?
(cf. [The other dolly [that *was* in here] *is* where])

As can be seen here, it is the verb in the main clause, not the first verb in the sentence, that gets fronted.

The inference from inversion in *wh*-questions to inversion in yes–no questions is far from straightforward, however. For one thing, it is possible that inversion is triggered by a different mechanism in the two question types.[1] After all, there are languages that have inversion in *wh*-questions, but not in yes–no questions (Greenberg, 1963).

[1] Moreover, the most common instance of this pattern appears to involve *where* followed by a copula. Without considerable pre-analysis by the child, it might be unclear whether this is an instance of subject–verb inversion rather than the type of locative inversion found in patterns such as *On the floor is a book that I bought for you*.

But there is perhaps a more fundamental question involved here: does anyone on either side of the debate really believe that a child who for some reason was not exposed to sentences such as (4) would be unable to figure out how inversion works in English? That is, would such a child really be incapable of choosing between (3a) and (3b)?

The issue could eventually be explored in a variety of ways, even assuming that it is impractical to conduct an experiment in which caregivers avoid producing sentences such as (4) in the presence of their child. One might, for instance, take advantage of natural variation in the type of sentences used by particular caregivers to investigate whether children who hear more sentences such as (4) are able to 'pass' the Crain-Nakayma test earlier, all other things being equal.

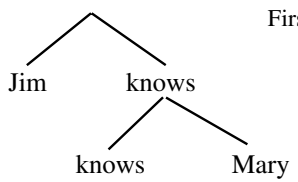
In any case, for what it is worth, my intuition is that even a child who is not exposed to sentences such as (4) would not produce monstrosities such as (3b). How can this be?

Another perspective

There is a way to approach the problem of structure dependence that involves neither the input nor UG. The key assumption, which is developed in detail in O'Grady (to appear), is that sentences are formed by an efficiency-driven, linear computational system (a processor, in fact) that operates from left to right, combining words in accordance with their lexical requirements.

On this view, a sentence such as *Jim knows Mary* is formed in the following two steps. (I assume that *know* is a transitive verb that looks to the left for its first argument and to the right for its second argument.)

(5)



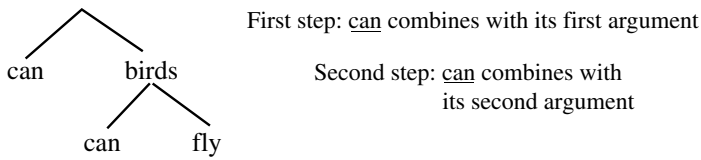
First step: know combines to the left with its first argument

Second step: know combines to the right with its second argument

I take (5) to be a simple record of the manner in which the sentence is formed – one step at a time from left to right, by first combining the verb with the nominal *Jim* and then combining it with the nominal *Mary*.

Consider now what happens in the case of a simple yes–no question such as *Can birds fly*?. (I assume that copula and auxiliary verbs differ from other verbs in looking to the right for both their arguments in questions.)

(6)

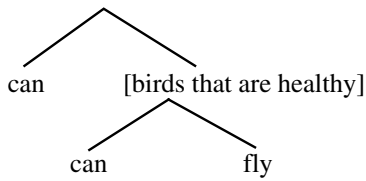


Matters are also straightforward in the case of (4a), repeated here as (7).

(7) Can [birds that are healthy] _ fly?

Here *can* combines to the right with both arguments, first the complex NP *birds that are healthy* and then the bare infinitive *fly*.[2]

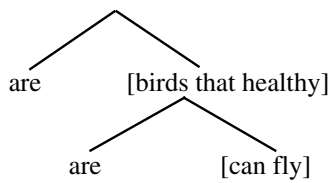
(8)



But two problems arise in the case of the unacceptable (4b), repeated here as (9).

(9) *Are [birds that healthy] can fly?

(10)



As illustrated here, the first argument of *be* in this sentence is the internally ill-formed **birds that healthy*. Moreover, *be* needs an adjective as its second argument, but none is available.

In sum, there is a reason why utterances like (9) are not heard in the speech of children (or anyone else). But the reason has nothing to do with UG and nothing to do with the input either. It has to do with the fact that the linear computational system used for sentence formation in human language cannot construct such sentences in a way that satisfies the lexical requirements of their component words.

[2] In fact, of course, the complex NP will itself have to be built step by step; I simplify by not illustrating this part of the sentence formation process here. See O'Grady (to appear) for details.

CONCLUSION

I am in agreement with the emergentist thesis – the properties of language are determined by more basic non-linguistic forces, not by an inborn Universal Grammar. However, this does not mean that there is no logical problem of language acquisition.

Development – perhaps even error-free development – does sometimes take place in the absence of instruction or RELEVANT experience. In fact, the syntax of yes–no questions appears to be one such case. But that does not mean that there is an innately specified grammar that includes a principle of structure dependence.

To the contrary, it suffices to posit a linear computational system that builds sentences step by step from left to right, resolving each word's lexical requirements at the first opportunity. The relevant facts simply fall out without the need for either an inborn principle or exposure to sentences that directly illustrate structure dependence.

REFERENCES

Chomsky, N. (1980). On cognitive structures and their development: a reply to Piaget. In M. Piatelli-Palmarini (ed.), *Language and learning: the debate between Jean Piaget and Noam Chomsky*. Cambridge, MA: Harvard University Press.

Crain, S. & Nakayama, M. (1987). Structure dependence in grammar formation. *Language* **63**, 522–43.

Greenberg, J. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In J. Greenberg (ed.), *Universals of language*. Cambridge, MA: MIT Press.

O'Grady, W. (to appear). *Syntactic carpentry: an emergentist approach to syntax*. Mahwah, NJ: Erlbaum.

Pullum, G. (1996). Learnability, hyperlearning and the poverty of stimulus. *Proceedings of the Berkeley Linguistics Society* **22**, 498–513.

Pullum, G. & Scholz, B. (2002). Empirical assessment of stimulus poverty arguments. *Linguistic Review* **19**, 9–50.