

CHAPTER ONE

HOW LANGUAGE ACQUISITION REVEALS MINIMALIST SYMMETRY IN THE *WH*-SYSTEM

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1. Introduction

Linguistic theory has sought elegance through economy, locality, and a simple theory of transformation (movement). A natural form of elegance — a part of what makes a grammar ‘perfect’, in Chomsky’s terms — should be, we argue, *symmetry* in the operations that cross structural types.

Recent work by Chomsky (2008) has taken a logical step in the theory of locality: Full Transfer (see below) should occur at the phase level. The idea, in brief, is that strict locality should lead — in the ideal form — to semantic, syntactic, and phonological Transfer of information to a cognitive/productive component at each phase boundary, such as the traditional clause, or CP, level. This then achieves an optimal interface between grammar and other mental systems.

We suggest that the system of feature satisfaction seeks to fulfil the interface goal of Full Transfer. In brief, Chomsky (2008) introduces the concept as the logical fulfilment of the concept of a phase: Information is transferred to phonological, syntactic, and semantic interfaces (as we discuss below). Therefore it is the concept of Transfer, not the notion of feature satisfaction itself, that drives the system and has the primary explanatory power. It provides an explanation for why, as we will show, *wh*-scope-marking appears spontaneously in acquisition in single clauses and why partial movement (PM) — that is, the occurrence of a partially moved *wh*-phrase in CP₂, licensed by a scope marker in CP₁ (as in German, for example) — appears spontaneously where it is not found in the target grammar.

This chapter first argues that the child’s acquisition path can go through UG options found in other languages. Then we introduce how acquisition theory can adopt modern notions of Phrase Transfer and how other grammars exhibit PM and empty or covert operators, following a generalization by Fanselow & Mahajan (2000); we present evidence from

a large corpus that supports the claim that empty operators correlate with PM in acquisition. Finally we show that acquisition data fills a logical UG possibility of a phonetically real empty operator in single clauses by examining how children respond to both *who bought what*-sentences and long-distance movement.

1.1. Scope-Marking Expletives

What happens when a grammar fails to fulfil derivational requirements? Here UG must provide options or the system will fail. A classic example of such a solution is the projection of semantically ‘empty’ expletives in overt positions, such as *there are three boys*, where *boys* moves invisibly to the subject, causing verb agreement, and where the expletive satisfies the case requirement. Our focus, scope-marking *wh*-expletives in PM-constructions, is seen the same way in a number of languages (see below): They mark landing sites for invisible movement. Thus expletives in general have evolved as conceptually marginal, ‘elsewhere’ conditions. However, as is often the case, what at first seems to be a marginal rescue device may reflect deep properties of grammar.

We claim in this chapter that *wh*-expletive insertion should appear at the same point as Transfer occurs following the same logic, maintaining symmetry among constructions. If true, it follows that scope-marking expletives should be possible in single-clause constructions as well as long-distance constructions. In particular, for a child, it can be a simplifying default delivering an interpretation for a comprehension challenge when the sentence spoken is not in the child’s production grammar, which we will now explain.

1.2. The Acquisition Perspective on Linguistic Theory

How does acquisition reflect on fundamental properties of UG? Does it provide a unique avenue to UG? We argue here, what is implicit elsewhere, that, if the child cannot accommodate a sentence to his grammar, then the child will select from UG a ‘default’ to prevent the sentence from crashing. We argue that ‘default’ operations are reflections of *Initial State Options* that a child can use *without* any guiding input. In that sense, the term ‘default’ does not capture the important status of such operations well, and we prefer the term *Initial State Options*. We predict:

- (1) *Initial State Options* appear ‘spontaneously’ in the acquisition process.

This prediction applies particularly in *comprehension* contexts where a child must respond to whatever an adult says whether or not it has an obvious analysis in the current child grammar. These Initial State Options should be perfect reflections of principles of economy, which in turn respond to the demands of interfaces:

- (2) Initial State Options are direct indicators of the principles of interface economy. Initial State Options arise directly (i.e. ‘spontaneously’), without specific input.

A consequence of this perspective is that children will pass through grammars that may reflect other non-target languages; see e.g. Roeper (1982, 1999, 2007), Yang (2000), Chomsky (2008). In an ideal system, such operations do not depend upon prior parametric decisions, but may require the identification of some lexical items (such as *wh*-words).

1.3. How Many Grammars Does UG Cover?

It is sometimes asserted that the extent of UG is revealed by the variation found in natural language. However, upon reflection it is obvious that UG could easily extend to grammars that do not exist, or once existed. Whatever biologically defines the set of possible grammars might not happen to appear in the set of grammars we know or happen to have studied. Imagine if one continent were not yet discovered, like Australia, then all of the insights that derive from Warlpiri for UG would not only not be known, but they would be defined as outside of UG, hence UG might easily be designed so as to exclude them. Excluding possibilities that should not be excluded has the effect of unnecessarily clouding — or making suspect — deeper principles. If predictable options appear in acquisition, then they can rectify what look like arbitrary restrictions in UG

Suppose we imagine that studied grammars constitute 1/100th (to be rather arbitrary) of possible human grammars supplied by biology, then it is not just possible but probable that children will pass through grammars that have not been revealed in other grammars, but are within the bounds of UG. Furthermore, the acquisition process might make that eventuality more likely — for instance, the absence of some lexical knowledge might lead to briefly eliciting a grammar that happens not to have appeared among the existing grammars and which disappears when more lexical knowledge is obtained. We will argue that precisely this is the case.

2. Transfer and the Place of Long-Distance Movement

Chomsky's (2008) notion of Transfer is the logical endpoint of a theory of locality:

- (3) [T]here are Transfer operations: one hands the SO already constructed to the phonological component, which maps it to the SM interface (“Spell-Out”); the other hands SO to the semantic component, which maps it to the C-I interface. Call these SOs *phases*. Thus SMT entails that computation of expressions must be restricted to a single cyclic/compositional process with phases. In the best case, the phases will be the same for both Transfer operations. To my knowledge, there is no compelling evidence to the contrary. Let us assume, then, that the best-case conclusion can be sustained. It is also natural to expect that along with Transfer, all other operations will also apply at the phase level [...].
(p. 9 of the 2005 MIT ms., note omitted)

Why did this definition not emerge long ago? It was the implicit direction of grammatical theory once the locality of cyclic *wh*-movement became clear. However, Full Transfer is exactly what long-distance movement avoids, a topic which has stood in the centre of research for several decades. The Transfer Hypothesis reinforces the view that children avoid long-distance cyclic constructions if there is an option that preserves locality.¹

If children mis-project grammars, what is the engine of change that shifts them to an adult grammar, particularly if their mis-projection fulfils locality requirements? A classic view, which we support, is that the addition of lexical features forces shifts in syntactic analysis. In particular, deVilliers, deVilliers & Roeper (to appear) argue that the child must learn exactly which verbs project indirect questions in order to move to the adult grammar.

2.1. *Transfer, Partial Movement, and Feature Attraction*

We argue that Transfer arises in instances of adult PM:

¹ Chomsky (2008) addresses the absence of articulation in adult English of *wh*-words at the CP-phase boundary (clause) with this observation: “We leave open the question of how, or whether, expression of the features on C relates to the CP-internal syntax” (p. 10, fn. 26 of the 2005 MIT ms.).

- (4) **Was_i** glaubt Hans **mit wem_i** Jakob jetzt t_i spricht?
 what believes Hans with who Jakob now talk
 “With whom does Hans believe that Jakob is now talking?”

The scope marker *was* “what” in the higher clause is linked to the *wh*-phrase *mit wem* “with who(m)”, in the lower clause. The expression *mit wem* occurs at the edge of the phase, where it has moved syntactically and been transferred to the phonology for pronunciation. The interpretation in terms of argument structure of the lower verb also occurs at this point.²

The last twenty years have seen a huge array of evidence on behalf of the claim that children spontaneously produce such sentences, which fits our claim. DeVilliers, Roeper & Vainikka (1990) found extensive evidence that children interpreted the medial *wh*-word as a contentful *wh*-expression and treated the initial one as a scope marker for both adjuncts and arguments:

- (5) a. How did he learn what to bake? *adjunct-argument*
 b. When did he learn how to bake? *adjunct-adjunct*

In both instances, the medial-WH is answered (*what, how, etc.*) just in case there is another WH in the higher clause (*what, how, etc.*). That word then functions as a *wh*-expletive scope-marker because it adds no argument structure content to the interpretation (see also Crain & Thornton 1998, Weissenborn, deVilliers & Roeper 1995).

Thornton (1990) showed that the effect could be elicited. She found examples of PM in L1 children elicited production, and analysed on par with German, along McDaniel’s (1989) lines. According to Thornton, English children questions involve a scope marker (*what*) in [Spec,CP1] (the higher clause) which licenses the real *wh*-phrase (*which animal*) partially moved to [Spec,CP2] (the lower clause).

- (6) ***What*** do you think ***which animal*** says “woof woof”?
 (7) ***What*** do you think ***which Smurf*** really has roller skates?

Other studies of L2 children learners of English showed that PM occurred with second language learners as well. Gutierrez’ (2005) production data

² See Rizzi (2006) for the development of the concept of ‘criterial freezing’ which suggests that children answer medial questions have the wrong criterion for the scope-discourse interpretation. Our proposal below can be seen as a proposal for *how that error occurs*.

are illustrated below in (8-9) (see also Schulz 2004).

- (8) **What** do you think **which baby** had eaten the cake?
 (9) **What** do you think **who** lived in the house?

The adult long-distance counterparts will be respectively:

- (8') Which animal do you think had eaten the cake?
 (9') Who do you think lived in the house ?

2.2. *Wh-in-situ and Invisible Scope-Markers*

What happens in those languages which have *wh*-in-situ? Cheng & Rooryck (2000), based on Mathieu (1999), provide extensive arguments and evidence for the concept of an invisible scope marker, present in French and other languages, to account for *wh*-in-situ:

- (10) [_{CP} **Op_i** [_{IP} Jean aime [_{VP} *t_i* **quoi_i**]] (Mathieu 1999)
 Q_i John likes what
 “What does John like?”

They also suggest that the underspecified morpheme is defective because it is ambiguous between a *wh*-phrase and *yes/no*-marker.

Oiry & Demirdache (2006) and Oiry (2008) show that the effect occurs in child French as well for long-distance movement, even though, predictable under our view, it is not found in the adult grammar. It does still appear in long-distance in situ environments, attested as being part of many French adult grammars (see also Strik 2003 from the protocol of Jakubowicz 2003). Data from children elicited production are illustrated in (11).³

- (11) a. Q tu crois **quoi** qui est caché dans l’sac?
 you believe what C is hidden in the-bag
 “What do you believe/think is hidden in the bag?”

³ Examples (11a-b) are taken from Oiry (2002), (11c-d) from Strik (2003). Two notes on the data from Oiry. First, according to Oiry & Demirdache (2006) and Oiry (2008), (11a) is ambiguous between a direct and an indirect dependency analysis; see their paper for more details. Second, # in (11b) indicates a phonological pause.

- b. Tu penses *quoi* # que # Tinky Winky l'adore?
 you think *what* C Tinky Winky CL.loves
 "What do you believe/think Tinky Winky likes?"
- c. Tu penses *quoi* que je lis?
 you think *what* C I read
 "What do you believe/think that I am reading?"
- d. Tu penses *qui qui* me lit des histoires ?
 you think *who* C° PR read the stories?
 "Who do you think read me stories?"

Moreover, Oiry & Demirdache (2006) find that overt/covert operators co-exist in the grammars of children (from Oiry 2002, 2008), as in (12a), and (12b) showing respectively covert and overt markers:

- (12) a. **Q** Tu penses *où* elle est cachée, l'assiette?
 Q you think *where* she is hidden, the-plate
 "Where do you think the plate is hidden?"
- b. Est-ce que tu penses qu'est-ce qui est cache dans le lit?
 ESK⁴ you think *what* is hidden in the bed
 "What do you think is hidden in the bed?"

Note that the absence of an overt scope marker in (12a) is not so surprising, given that, as illustrated in (10), French adult grammar exhibits this kind of scope marker.

Abdulkarim & Roeper (2003) also show that the effect of a matrix occurs in English with *whether* at the comprehension level. Children are asked the question in (13), to which many answered "no". This can only be an answer to (14):

- (13) *Situation*
 [She did brake the bike, but she said that she did not brake it.]
 "Did she say whether she braked the bike?"
- (14) a. whether she said whether she really broke the bike:
 as if the truth of the lower *whether* were to be what she said
 b. what did she say about whether she broke her bike.

The other alternatives lead to a "yes" answer to the question in (13). If

⁴ ESK (*est-ce que*) is analyzed as a *yes/no*-scope marker in the French adult grammar — French children mis-analyze it as a potential licenser for the partially moved *wh*-phrase.

the child answers only the truth of the lower *whether*, then the answer is “yes”, if child answers only upper *say-whether*, it is “yes” she did say something about whether she broke it. Therefore they exhibit PM of *whether* to the medial CP, which gets a “yes” answer and covert movement over the verb “say” whether she told the truth, which is “no”.

Yip & Matthews (2001) report covert movement in spontaneous speech with bilingual children acquiring Cantonese and English (children aged 4.01 and 5.03, respectively), as in (15a-b), and Wakabayachi & Okawara (2003) report it with children in Japanese learning English (15c):

- (15) a. You think what nut I am getting now? (picking nut out of a tin)
 b. You think where is Sophie? (hiding under table)
 c. OP Do you know what is in the bag?

A covert scope marker checks the Wh-features of C^0 and marks the proposition as interrogative with scope over the matrix verb, *know* (it is arguable that the scope marker is overt if *do* itself can be analyzed as a scope-marker, but this perspective would require a full analysis of *do* in child grammar).

The options in child grammar are found in adult grammar cross-linguistically, such as Ancash Quechua, Bahasa Indonesia, and Kitharaka:

- (16) *Ancash Quechua* (Cole & Hermon 1994)
 (Qam) kreinki **imata** Maria munanqanta José rantinanta?
 you think what Marie want José buy
 “What do you think Maria wants José to buy?”
- (17) *Bahasa Indonesia* (Saddy 1991)
 Bill tahu **siapa yang** Tom cintai?
 Bill knows who FOC Tom loves
 “Who does Bill know that Tom loves?”
- (18) *Kitharaka* (Muriungi 2004)
 U-ri-thugania ati **n-uu** John a-ring-ir-e *t*?
 2SG-T-think that FOC-who John SP-beat-T-FV⁵
 “Who do you think that John beat?”

Fanselow & Mahajan (2000) and Fanselow (2006) then develop a far-

⁵ The abbreviations for morphemes used in (18) are as follows: 2SG = second person singular, T = tense, FOC = focus, SP = simple past, and FV = final vowel.

reaching observation about the connection between *wh*-in-situ and PM, following them we suggest that:

- (19) Every language with *one-clause covert operator* has partial movement in two clauses.

We have found new evidence that children spontaneously show exactly this pattern from a large experimental source, the DELV test, discussed below, with an important extension, dictated by the Transfer Hypothesis.

Now we are in a position to ask the question we asked at the outset, in terms of the full symmetry of the system:

- (20) Do single clauses show the fully symmetrical range of options?

If they do, then we predict:

- (21) *Symmetry Hypothesis*
A single clause should allow an overt-scope marker as well as a covert scope-marker by the logic of this account.

This is predicted for UG but not attested. Therefore we can ask whether it appears in children's grammar.

3. Disorders and the Symmetry Hypothesis: Experimental Evidence

In the development of a new instrument for language assessment (*DELV: Diagnostic Evaluation of Language Variation* - Seymour, Roeper & de Villiers 2005, copyright TPC, 2000) over 1,000 children were tested in advance on questions that involved both pair-list readings and embedded questions,

- (22) *Pictures and sentences*
The father ate an apple and the boy ate a banana.
Who ate what?

and a scene and situation like the following,

- (23) Mother watches TV and learns to bake a cake.
How did she learn *what* to bake? → “a cake” (not “from TV”)

or a scene like this:

- (24) A boy asks a man what to buy for his teacher.
 “Bologna”, the man answers.
- (25) Who did he ask *what* to buy →
 child answers: “Bologna” (not “Man” or “Teacher”)

Medial-WH answers are/PM is found among a group of 297 children, 4-9yrs F (1,504) = 29.94, $p < .001$, $\eta^2 = .137$; age: F(5,975) = 7/69, $p < .001$, $\eta^2 = .071$). In response the pair-list questions an interesting phenomenon arose. The general results were:

- (26) a. 4375 answers from 1400 children in full sample
 b. 1125 → non-paired
 c. 492 = object or adjunct
 = 43,73% of the unexpected answers.

More precisely:

- d. 20% of children answer only object
 [*who ate what* → “an apple and banana”]

An age breakdown shows that the answer occurred most frequently with younger children:

- (27) 80% came from children 5 years and under;
 203 answers produced by 4-year-olds (41%);
 48 answers by 5-year-olds;
 80 answers by 6-year-olds (not equal numbers in each group).

This result is compatible with the notion that the children treat the first *wh*-word (*who*) as a scope marker for the second in comprehension.

- (28) Hypothesis: first WH = scope marker
 who ate what
 scope real Q
 ←=====

This result then fills the missing niche in the symmetry prediction:

So children mis-analyze the *who*-form as a scope marker — instead of a scope marker neutral form expected such as *what*.

Now we can pursue the cross-linguistic parameter. The prediction is that the object-only answer will correlate with PM on an individual by individual basis. Consider again sentences like:

- (29) Who_i did the boy ask *t_i* what_j PRO to buy *t_j*?
(medial answer/partial movement: “Bologna”)

The result was a clear correlation for 20% of the children among 788 who gave PM responses:

- (30) 172/788 (roughly 20%) children
→ both medial-WH and object-only in double-WH

Again there is an age effect with a significant correlation:

- (31) 26 by 6-year-olds
101 produced by 5-year-olds
43 by 4-year-olds (fewer 2-year-olds involved)

The conclusion is that the correlation observed by Fanselow is found in the acquisition data, but extended to include overt scope markers in single clause environments.

4. Scope Marker Interpretation

There is some controversy over the semantic impact of the scope marker. Herburger (1994) and Lahiri (2002) have argued that PM imposes factivity on the lower clause⁶. In effect what is said must be true for the speaker, while in full long-distance movement the lower clause can be false, as in English:

- (32) What did John say that he bought?

Under the Full Transfer account the factivity requirement would be natural because it means that the scope marker embeds the semantic

⁶ See Oiry (2008); false or non-presupposed subordinate has strong effect on French children’s production of long-distance questions.

content of the lower clause, but does not change its argument structure or its truth-value. The scope marker adds a further restriction, namely that the objects bought were also mentioned, but the notion that the truth value and argument structure can be transferred at the phase edge as the hypothesis predicts receives support. Dayal (2000) provides an analysis of PM as indirect-dependency which also entails that the lower clause receive a complete interpretation within its Phase. Abdulkarim (2001) and Oiry & Demirdache (2006) suggest that UG allows both and the acquisition sequence reflects a movement from indirect-dependency to covert movement to a scope marker. (See Oiry & Demirdache (2006) and Oiry (2008)) for exploration of this approach.) All of these analyses are compatible with the view that the PM reflects Transfer.

4.1. Explanatory Weight: Transfer and Feature Satisfaction

Our discussion has focussed on the conceptual force of Transfer. We have not addressed the role of feature attraction and satisfaction and how it can be fashioned to support our account. Two underlying issues are important:

- (33) a. How does feature attraction work when cyclic movement is involved?
 b. How does the child correctly identify the features to be satisfied when they are lexical projections from a higher verb?

Current theory has not fully resolved how to modify the highly restrictive notion of moving a feature in order to satisfy or value an identical feature when cyclic movement is involved. In principle, the feature is satisfied once, not twice. As usual, there are many technical options where it is not clear what their conceptual consequences are. Our focus is to make the theory naturally fit an acquisition path.

The natural upshot of a theory of feature satisfaction is that movement stops after one movement when a feature is satisfied. Chomsky has in fact proposed to explain PM on this basis, supporting a suggestion by Koster (2003) that Tense [T] originates in CP but is expressed in TP because the feature is inherited by the lower node which then executes agreement, when the T-element moves into it. Therefore it does not move all the way to the position where the T-feature [T] originates, but like PM, is expressed below its ultimate scope position.

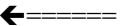
It is natural then to suppose that PM results from a *wh*-movement that is frozen because agreement has occurred. Now however we have to ask

exactly what the feature content of that node is such that we can both explain why it is frozen and why a child advances beyond it with additional knowledge.

The child must do three things:

- (34) a. They have to identify the content of *wh*-words which does not exclude their still functioning as expletives (*what* or *how* in German or Russian)
- b. They have to realize that some verbs project indirect questions.
- c. And they have to realize the semantic force of indirect questions.

One device to capture this evolution is to imagine that there are two kinds of features: [Q(uestion)] and a second feature [I(ndirect) Q(uestion)] (see deVilliers, deVilliers & Roeper, in preparation for development of this approach and its connection to African-American English). Until the child realizes that the feature is an indirect question, they assume that it is a direct question. Because it is a direct question, it must be answered. This seems to be intuitively natural.

- (35) [scope marker verb [CP [Q] ... what]


The initial *wh*-word can rescue the derivation by application of a default scope marker rule, which does not deny the interpretation that occurs at the point of Transfer.

How then would a child make this realization that the indirect question need not be answered? They could have an experience where they hear a sentence like (36),

- (36) How did she learn what to bake?

and then hear the answer “from TV” from an adult and see that *what* is never answered.

Now, if we imagine that a Q-feature is associated with the matrix CP, then in Rizzi’s (1997) terms of a Force Phrase, it carries exactly the notion of direct question ([Q]), and movement beyond the first phase could be motivated without answering the indirect question.

(37) [Q] verb [CP [... what]

If a child now hears (38),

(38) What did he say he bought?

which has no IQ-marker, it moves again to the higher clause with a Q-marker (for a direct question) where that feature is satisfied.

This account may be essentially correct, but it is seriously complicated by language diversity and the meaning of *wh*-words. Bošković (2000) has argued that Slavic languages have [Foc] and/or [Q] associated with *wh*-words. This allows multiple *wh*-fronting because both a Q-feature and a Foc-feature are available to be satisfied. Schulz (2004) has proposed that if [Foc] is projected in the lower clause, then it will motivate the existence of PM in those languages where it occurs. In those languages that have only [Q], no PM arises. The *wh*-word stops in the medial position because it satisfies the Foc-feature.

This is possible, but it leaves this problem: Children who pass through a [Foc] stage must somehow drop this feature in order to become English speakers.

It is neither entirely clear how to analyze Focus, nor clear how then a child would block [Foc]. However processes which involve de-topicalization, which may involve reanalysis of intonation patterns, could be involved. The problem is a part of an extending agenda in linguistics.

4.2. *A Possible Trigger*

Cheng & Rooryck (2000) have argued that *wh*-in-situ involves reference to a fixed set or we can use Bošković's term, a closed set.⁷ That is, in Pesetsky (1987)'s term, when speaker and hearer have a fixed set of entities in mind which play a role in the discourse (D-linked elements).

Suppose we now argue that the child, when they hear an indirect question is forced to the realization, by virtue of the open nature of the higher verb, that no fixed set is involved, as in a sentence like:

- (39) a. Ask Mom what to do.
b. Bill wondered where to go.

⁷ Heizmann (2006) discusses how children learn 'exhaustivity' for cleft constructions which exhibit focus, hence a closed set.

Now the pure [IQ] form is realized. This blocks the [Foc]-reading unless it is reinstated by new structures of the kind found in Slavic languages, like *what*, *who bought*.

We leave this as a principal suggestion for how the acquisition path can be explained. A full answer would require that we explore how focus works, which engages multiple *wh*-expressions, clefted structures, and intonation.

Does the *wh*-scope-marking system also fit other types of Initial State Options? In the larger acquisition scheme we may ultimately find that scope-marking is a species of concord, as Felser (2004) has argued. It is well-known that children find negative concord easy to represent and often impose it on languages, like English, that do not show it.

5. Conclusion

We have argued that PM reflects the most basic form of minimalist symmetry: Each phase seeks an optimal interface with other systems as Chomsky has argued.

In rough terms, the fact that the *wh*-expression moves to the edge of the phase, is pronounced there, and interpreted at that point is all compatible with the acquisition data.

- (40) Phonology (Spell-Out)
 Syntax (local movement to phase edge)
 Semantics (answer medial question)

This analysis has been made explicit in Chomsky's concept of Transfer. It is the logical endpoint of reasoning about locality: all interfaces are engaged at every phase edge. Much remains to be explored about such a strong hypothesis — for instance, the exact nature and force of indirect questions — but the prominence of PM in child grammar is a strong piece of evidence that the logic of locality is moving in the right direction. The fact that subtle support comes from outside the realm of intuitions and has both naturalistic and experimental support, provides one of the most important forms of 'independent' and converging evidence that linguistics can provide to future exploration in more biological terms.

To summarize the technical claims, we have argued that both one and two clause structures exhibit the full pattern of logical possibilities for overt and covert movement in UG.

- (41) *who ate what* = *Invisible*:
 single clause: [CP *wh*-OP verb what]
 two clause: [CP1 *wh*-OP verb [CP2 what ...]]
Visible:
 1. *wh*-scope verb ... [what ...]
 2. *wh*-scope verb what

The now irrefutable fact that these structures appear in comprehension and production in the acquisition of a wide languages and across many L1-L2 environments shows that the existence of *spontaneous* features of grammar — even those found in no adult grammar — are important strands in ultimately building a biological model of language ability.

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