

The Acquisition Path for Wh-Questions

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1.0 Introduction

The topic of wh-questions has been central in language acquisition because it has been pivotal in linguistic theory itself. Rare and intricate sentences---across all known grammars---revealed that wh-extraction was sharply limited by structural “barriers” to movement. Refinement of these questions has progressed from Ross’s (1967, 1986) first Island constraints to the Barriers work (Chomsky 1981) to Chomsky’s recent Strong Minimalist Thesis (2005, 2008a). The critical claims are about *what does not happen*, for which no direct empirical evidence can arise. Hence no empirical learning procedure could conceivably work to learn “barriers”. Our perspective is the traditional one: what kinds of innate constraints does a child bring to the acquisition problem and what principles of grammar are on view? A modern extension of that perspective comes from the question: how do innate principles of grammar create an interface with other domains of mind?

What should an acquisition theory look like? One primary question is about the Initial State: is there a set of Default representations with which a child begins? From there, questions arise about the mechanisms whereby the child constructs a grammar across many domains, or modules. Given UG considerations, we can

argue that the child seeks to restrict how much information he assimilates at each step, namely:

The Modular Interface Constraint:

A child first represents a new construction in a single module

We take the classic notions of syntax-internal modules to include at least a Movement module, a Case module, a Binding module, and a Thematic role module, the boundaries of which are still open to discussion. Therefore we predict acquisition will be governed by a broad constraint that favors single modules over modular interaction. Where can we see an example of this order in acquisition? A classic case is the contrast between A-movement (e.g. passive) in (1), and A-bar –movement (wh-) in (2). They differ both in landing sites-A-movement goes to subject-position and A-bar movement to an element in the CP system- and in Case.¹ In English, A-movement precedes case-assignment, while wh-movement follows it, so wh-movement shows the same case in both positions and can be analyzed in a single module, the movement module:

1) A-movement:

passive: John saw me/ I was seen by John

2) A-bar movement:

wh-movement: I saw what/what did I see

¹ Tornyova and Valian (2009) point to the impact of morphology and other dimensions in their cross-linguistic comparison of inversion in English and Bulgarian. We argue that there is a specific mechanism whereby modules are integrated which must be articulated. The general idea that other factors influence the acquisition path does not provide the mechanism whereby information across modules is integrated, which is crucial to understanding the acquisition differences in cross-linguistic variation.

In the same vein, the prediction is that Topicalization, as A-bar movement, could be acquired very early, precisely because it shows no impact of case-marking change:

3) I like him → him I like²

If there is no interaction with another module, then the application of the rule is transparent on the surface of the grammar, and that would make it is easier to acquire³. It has in fact often been claimed that children grasp Topicalization very quickly (Gruber, 1967, Grinstead, 2004). In contrast, the acquisition of A-movement is delayed (Borer & Wexler, 1987; see Deen, this volume). Though case is mastered early in English, mastering the passive must entail representing the impact of both modules of movement and case, which are not morphologically independent. Were that not the case, we would expect a stage in English where the child says:

4) *me was pushed

but this has never been reported.⁴ Therefore children at an early stage in English either analyze the subject as unmoved, and therefore receiving nominative case, or they immediately grasp that A-movement precedes case marking.

Take a more directly relevant case in the acquisition of wh-questions. One task of a child is to identify the lexical properties of wh-words. The wh-words enter English in roughly the order: *what* and *where*, then *how*,

² WH-movement also has complex historical interactions with case-assignment, but appears to be moving toward independence: complete loss of –m in whom in favor of who.

³ Interesting new complications arise when we consider modular interactions in other languages, where for example, case might appear on wh questions.

when, where and later *why*, and last, *which* or *whose*). One can ask: Does this occur before or after the words are linked to *movement* chains? In fact, children may not complete lexical analysis before they link wh-words to movement chains. They appear to recognize Question Force in a moved position—seeing it within a single module—before they work out how they differ from each other in meaning. Evidence shows that wh-words are confused (*how* and *why*) long after they first analyze them within the movement module, as expected under our constraint. This is most evident in languages with rich case systems, like German where dative, accusative, and genitive are distinct, but wh-words and movement appear before case is mastered.

Moreover children recognize movement chains before they fully grasp the logical properties of *sets* and *exhaustivity* with question words (see discussion below)—which enter into a Logical Form module. The process of integration is what the description of the acquisition mechanism must capture. In what follows, we will illustrate this concept of modular complexity for both Discourse linking and Logical form.

Full wh-acquisition introduces many questions often linked to the unusual semantics of wh-questions. Let us outline roughly what must be acquired with an eye toward cross-linguistic variation. (Occasional special terminology introduced here is described in the sections below and defined in more detail as needed).

A) The **lexical** properties of wh-words. Some are arguments, required by the verb (*what, who, where*) and some are adjuncts (*how, when, why, where*) which freely relate to any verb. There is also internal morphology that must be identified: a Wh- morpheme may

- i) Attach to other morphemes (what=wh+that, where=wh+there, when=wh+then).
- ii) Show case-assignment overtly (who/whom/whose—and others in other languages)

B) The **semantic** properties of wh-words

- i) They refer to a set
- ii) The set must be exhaustive (who committed the crime)

iii) Multiple wh-words enter into Pairing relations (who bought what)

C) The **movement** properties of wh-words, varying across languages:

i) They may not move overtly, just at Logical form.

ii) They may allow or disallow Long-distance movement altogether

who did John say Bill claimed Mary invited__

iii) Partial Movement may occur where the wh-question moves only partway:

What did John say Bill claimed who Mary invited (German, Romani, many others)

iv) Pied-piping may occur where more than a wh-word is moved to the front:

Which car from Brazil did Bill want to buy___?

D) **Multiple** wh-words may or may not move together or obey Superiority:

i) Superiority: a condition that blocks one wh-word from moving over another, limiting their ordering:

*what did who buy”

ii) Multiple Wh-Fronting (Bulgarian, Serbo-Croatian)

“who what where did he put it”

Each of these features of wh-movement could, in principle, emerge independently or be decided independently, and the order of decisions could be fixed by UG or be subject to the nature of the input. If we can identify linked decisions, parameters, or chains of implication, they will simplify the acquisition task.

The literature from the last thirty years is voluminous, and so we focus here on major issues. Our goal will be to connect the current data and theory in those domains where a theoretically reasonable acquisition story can be told, and to point out promising avenues for future work. The chapter is divided into three major sub-

topics:

- a) Wh-questions as movement rules within a single clause, entailing debates about the scope of the formal generalizations the child makes and whether the underlying structures are adult-like.
- b) The logical properties of wh-questions, and semantic properties of sets, exhaustivity and scope.
- c) Long distance movement, principled restrictions and barriers to movement, and interfaces with semantics and pragmatics (including the Strong Minimalist Thesis from Chomsky, 2008a).

2.0 Movement rules

2.1 Landing site

In modern revisions of linguistic theory (Chomsky's Minimalist Program, 1995) elements (including *wh*-forms) are said to *move* because they contain a set of features that are attracted to a certain "landing site" in the linguistic structure matching those features. Considering languages that exhibit overt wh-movement, a *direct* question moves to a landing site at the front of the sentence. The label for the position in the phrase into which it moves is the "CP" or Complementizer Phrase. Each clause in a sentence has the potential for such a position, although it is not always occupied. In (3), the CP position is marked for a *direct question feature*, which the *wh*-word must match:

- 5) What did the boy buy ____?
 CP [wh +direct Q] [wh +direct Q]

In those languages that exhibit wh-movement, young children produce initial wh- almost immediately.

The first use of wh-question force may be with fixed phrases like “*what dat*” or “*whazzat*”. However even with very limited syntax spontaneous expressions occur like:

6) English: (Roeper & Rohrbacher 1994; MacWhinney 2000)

where go?

what hit

what watch huh

where go bye bye

where zip it, huh

where waving

German: from Spinner & Grinstead (2006):

Was das denn?

what that then

“What’s that, then?”

Wo ist?

Where is

“Where is (it)?”

Wo sind die Ringe?

Where are the rings?

French: from Zuckerman (2000)

Comment tu as fait ça ? (Fronting)

how you have done that

‘How did you do that?’

Qu’est-ce que tu as fait? (KESK)

KESK =what you have done

‘What did you do?’

In Indonesian wh-in-situ, or no overt wh-movement, is the norm in the adult language. It is evident very early in children (from Cole, Gil, Hermon & Radmor, 2001):

7) Minum *apa* ya? HIZ-27

drink what yes

[Experimenter asks child what he wants to drink; child reflects]

“What will I drink?”

Bikin *apa* ya? HIZ-32

make what yes

[Child playing with crayons, wonders what to draw]

“What should I make?”

Mana taronya? HIZ-31

where put-ASSOC

[Child carrying a chair, wondering where to put it]

“Where should I put it?”

Consider, however, that although in situ wh- is fairly common in adult French (*il va ou*—he went where), children do not necessarily use in situ wh-questions at the start (Oiry, 2003; Zuckerman, 2000; Plunkett, 1992). In

French, inversion is required if the *wh*- word is fronted, but children begin with an initial *wh*-word and without inversion, that is, they produce questions starkly at odds with the input (Zuckerman, 2000). The difference between true *wh*-in-situ languages and those with *wh*-movement is thus evident from the beginning. Clearly some kind of parameter has been set from the input, but still children can ignore parts of the input. Therefore the child's analysis is not complete.

What should the analysis of these early *wh*-questions be? They could be the result of movement, or simply Merged, like any other word selected from the lexicon, in keeping with an important UG hypothesis:

Merge is preferred over Move.

Rizzi (1997) has proposed an elaborated sequence of nodes on the left periphery for adults which a) may not all be universal, and b) may involve a number of acquisition steps, some of them possibly parameterized, distinguishing Force (e.g. Imperative, Question), Topicalization, and Focus phenomena. Certainly the earliest *wh*-questions have Question Force, but that is not necessarily sufficient to fix the structure. It is clear that if the nodes are not all universal, then the child has a substantial challenge in determining the sequence and labeling of each node of the left periphery.

What else do we know about the left periphery in child grammar? Spinner and Grinstead (2006) make the interesting argument that three quite different forms: overt subjects, topicalized objects, and *wh*-questions co-occur in the acquisition of Spanish, but emerge at different points in German. Why should this be so? Spinner and Grinstead make the theoretical assumption that overt subjects are in a discourse-sensitive part of the left periphery in Spanish, a pro-drop language, so all of these phenomena in Spanish entail a position in the left periphery (8a). But German (8b), is a non-pro-drop language, and since its overt subjects are not discourse dependent, they are not in the CP. In consequence they appear independently of, and before, *wh*-questions in

acquisition.

8) a) Spanish : Topic/CP

Topic

Wh-

Subj

b) German: Topic/CP Spec-IP

Topic

subj

Wh

But is this Topic/CP node in the left periphery already the same as the adult CP? In the theoretical literature, the “fine structure of the left periphery” is regarded as a pre-existing structure that includes a division of the functions of the Complementizer Phrase into landing sites for questions (Force), Topics, and Focus as different from one another, but not all are present or playing the same role in every language. Therefore although the full array may be part of UG, the child must select nodes relevant to his language. It would be natural for the child to refine the structure as new information arises. One possibility suggested by the discussion above is that the child begins with a proto-CP, and it undergoes an actual process of Splitting as suggested by Hollebrandse and Roeper (1997) to end up with a distinct series of nodes with different functions. In other words, the historical terms “Split-IP” and “Split-CP” may define actual acquisition processes. Unfortunately these fascinating questions suffer from the mismatch between an elaborate theory and minimal data. The child’s early utterances are so attenuated that these claims are highly theory-dependent. Still this roadblock may not be fatal. If we look to the next step, we can reason back to the claim that, whatever that first node holds, it may not be the adult CP.

Traditionally questions entail agreement between the auxiliary and the head, under Spec-Head Agreement (Rizzi (1991), but we will discuss an alternative motivation below. This agreement gives rise to auxiliary movement from I to C:

9) What can he juggle?

Without spec-head agreement, auxiliary movement is not required.

10) *What he can juggle?

Note that this occurs when there is no question force as in exclamatives:

11) What things he can juggle!

However, (10) is what children often produce, with clear question force. This could be analyzed under the assumption that the child's Proto-CP has a C node, but not a full Spec-Head representation that forces Agreement:

12) Where daddy is going?

What mommy can do?

Why me can't do that

(Brown 1973, Tornyova and Valian 2009)

If the child lacked a full Spec-Head projection, we predict that (10) would occur.⁵ The joint theoretical observations that Merge is a primitive operation and that the Left-periphery varies across languages makes it plausible under Minimalism that the child would begin with Merge. So let us make an acquisition claim at this point similar to de Villiers (1991):

A child shifts from merging the wh-word to fill a C node to fully articulating a CP with a Spec position.⁶ Some background on subject-auxiliary inversion in acquisition is necessary before advancing the argument on behalf of this claim.

2.2 Auxiliary movement in questions

The first question to be considered is whether auxiliary inversion is learned all at once or in a piecemeal or lexical fashion. Lexical sensitivity in acquisition has been argued from many quarters (Tomasello, 2003), even within the generative framework (Roeper 1993; Roeper & de Villiers 1994; Wexler & Borer 1987 among others). Linguistic theory under Bare Phrase Structure maintains that individual lexical items project one item in 13) (push) as the label of the node when they Merge. “Push” can take *wagon* or any noun as its complement.

13) push

⁵ In fact, Lasnik and Saito (1992) proposed a C without a Spec as a way to explain various barrier phenomena.

⁶ Children do have structure-dependent rules for aux inversion, as Crain and Nakayama (1987) have shown quite definitively. They invert full NP’s like “the boy who is here” and not simply the first auxiliary “is the boy who is here happy” and not with the “closest” auxiliary. Their claim is that the operation of auxiliary inversion is structure-dependent as young as age 3 years. Nevertheless because it is a local operation and a limited set of auxiliaries are involved, it can be acquired with lexical restrictions, where either auxiliaries or their semantics may be restricted, especially before the age of three.

/ \
 push wagon

The higher node is replaced by V as more elements fit the pattern. This is essentially identical to recent lexicalist claims of Rowland and Pine (2000), except insofar as they argue that lexical extensions are the full explanation. But for generative approaches, the extensive array of lexical exceptions (for children as well as adults) *complicate*, rather than *facilitate* the child's grasp of the generative rule. Ultimately, and traditionally, the lexicon carries lexical exceptions that *violate* the productive rule. Therefore the child must be sure *not* to generalize them. The fact of lexical exceptions makes it more remarkable that a child ever decides to promote a general rule.

Ultimately, something forces the child to see beyond the extensive variation to just the right principle of inversion that applies to any NP AUX string to make a question. But what forces the child to see it? The answer is not clear, but the interaction of modules may play a role here. If the child were to just project a pair of independent frames:

14) NP Aux
 Aux NP

that would fail to capture Number Agreement that obtains between them. Since the construction interacts with the Number-Agreement system, a different linguistic module, we have the variants:

15) Is he
 Are they

and these link to:

- 16) He is
They are

If children have to solve both of these problems, the system becomes much simpler if the operations are performed in this order:

Number Agreement

Subject-Auxiliary Inversion

This is another version of our argument that constructions which involve two modules are a greater challenge than constructions whose analysis is transparent within a single module. The solution to the interaction of these modules depends upon both the recognition of two general rules and their ordering.

This ordering, which affects languages with richer agreement more than English, must be kept separate from an additional form of lexical uncertainty which is frequent in English: Main verb inversion (like V2 in German) which applies to *be* in English (and *have* and *be* in some British English) supports the hypothesis that inversion might involve the Main Verb:

- 17) Are you here?
Have you any money?

American English has moved toward isolating the SAI to pure auxiliaries by introducing *do*-support with main verb *have*:

18) Do you have any money?

Predictably children assume the construction is limited to auxiliaries, and may briefly produce forms like 19):

19) Do it be here⁷?

Such children must then do a further reanalysis and put *be* back into an exceptional class of Main Verb inversion in English with respect to the Inversion rule, although it participates in the modular ordering of Agreement before Inversion. Thus it is misleading to call it “auxiliary inversion” when it involves Main verb “*be*” as well.

2.3 Auxiliary Inversion and Building a CP

How can these properties of auxiliary inversion help us to determine the nature of the child’s CP?

Consider that a robust fact about language acquisition is that English children fail to perform subject-auxiliary inversion in *wh*-questions long after they perform the same operation in *yes/no* questions (Tyack and Ingram 1977; Erreich 1984; deVilliers 1991):

20) Can I sing

What I can sing

One might have predicted that the inversion operation in *yes/no* questions would extend immediately to *wh*-questions. The discrepancy in inversion between the two types of questions calls for a theoretical explanation. If we follow the proposal above that the initial merge involves only C, i.e. that there is one C position, but no Spec position, it means only one position is available. This predicts exactly that one can have auxiliaries in this first

⁷ This is also found in African-American English with habitual *be*.

position or wh-questions, but not both.

However, whether the auxiliary is absent or in uninverted position in wh-questions is empirically complex,⁸ with the weight of data now in favor of the auxiliary being mostly *absent* in wh-questions before appearing in inverted position (Stromswold 1990; Rowland & Pine 2000). In other words, if the auxiliary is present at all in a question, it is likely to be inverted. It could be that if inversion is called for, but grammatically impossible for the child, then the child avoids the auxiliary altogether. So failure to include the auxiliary could itself be a response to a child's sense of structural conflict: they hear questions with inversion, but their grammar is missing a position for it. Since they know that an uninverted auxiliary (what he can do) is also not target-consistent, a "conservative" move⁹ would be to avoid producing sentences with auxiliaries or main verb BE.¹⁰

Individual variation is also unmistakable. Stromswold (1990) reports an average inversion rate of 93%

⁸ Brown (1973) pointed to a specific case where the child Adam produced a large number of *why* and *why not* questions that appeared to be immediately appended to declaratives his mother had just uttered:

Mother	Adam
You bent that game	Why me bent that game?
He was playing a little tune	Why he play little tune?
You can't dance.	Why not me can't dance?
I don't see any	Why not you see any?

Brown interpreted these as a transformational rule applied in discourse, onto the base sentence supplied by Adam's mother. Several others have noticed this phenomenon, and given it a different interpretation, focusing on the special case of *why* (Thornton 2007; de Villiers 1991). This account fits the notion that children have a simple version of Merge available to them.

⁹ This is in the sense of conservativity which Snyder (2007) has carefully documented. It is not clear how to account for this phenomenon, but a theory of Multiple Grammars where a child has grammars that are in conflict might lead in this direction.

¹⁰ Syntax is not the end of the story. Possible semantic motivation for inversion must be considered as a further factor. See Roeper (2009) and deVilliers (2010) for evolving work on the role of propositions in this domain.

for children in *wh*-questions, though individual children's rates range from 60.1% to 99.3%. In addition, sometimes there can be quite a long period of unstable development, with the adult rate of 100% inversion not becoming fixed until at least age 5. First, we consider the evidence that children build a full CP to house the *wh*-word and the auxiliary in C. Then we consider the thorny question of lexical variation versus productivity, both in the *wh*-words and in the auxiliaries that invert.

Suppose the critical step in subject aux inversion is the realization of a full CP with a Spec node. What could trigger it? De Villiers (1991) discovered a possible trigger. There is a developmental correlation between the appearance of inverted auxiliaries in *wh*-questions and subordinated indirect questions:

- 21) John asked what he can do
 What can he do

de Villiers (1991) argued that the appearance of the *wh*-word in medial position coincides with its analysis as part of CP, subcategorized and lexically governed by a particular verb in the matrix sentence. In modern terms, verb subcategorization must project into a new clausal Phase, which is marked by a Phase-Edge position, namely the Spec of CP.

The subcategorization across a Phase boundary provides the trigger that the appropriate position for the question feature is in Spec of CP, rather than in a lower inaccessible Topic position. One consequence of this re-analysis is that it makes available the C-position into which the auxiliary can move, because *Wh-* is in Spec of CP, hence the appearance of inversion in the matrix clause thereafter.

If the higher verb *ask* lexically projects a *wh*-feature into the next clause, UG requires that it goes onto the Spec of CP in the subordinate clause because only the SPEC (Edge) position is a landing site for movement, and the feature must be satisfied by Movement not Merge. Therefore we argue that Indirect Questions serve as a good SPEC trigger:

spread-out nature of the development could be an artifact of the frequency of the wh-forms compounded by sampling (Snyder, 2007). It is conceivable that with a richer statistical analysis, the development might prove not to be so lexically specific. That is, the change to Spec-CP might in fact be immediately productive, but because the wh-questions differ in frequency, their appearance of inversion and subordination occurs at different time points. This would be a good research question to pursue further.

A second vital factor that needs to be considered in explaining the slow emergence of complete aux-inversion in wh-questions is the nature of the verb that subcategorizes for the CP. There is huge variation in English and cross-linguistically in the type of CP that any given verb permits, so this is clearly a subcategorization that requires lexical learning (de Villiers 1991; Felser 2004). If the child permits a Spec-CP under one verb (*ask*), there is no guarantee that this would be true for another verb (*wonder*), and so the result would be variability in development not only across wh-words, but across verbs. It follows that matrix clause inversion would have to depend for each child on when they recognized lexically specific subordination for a set of critical verbs (*ask, tell, wonder, say, know, think about* which take indirect questions, unlike *think, believe*), which do not. This lexical variation in the adult language naturally predicts the individual variation found in the acquisition path.

Thirdly, consider a further impact of lexical specificity that needs more clarification. It is clear that a child may produce a limited kind of wh-aux combination, at the start, as in the case of the contraction “*what’s*”. Such cases might represent misanalyses of the wh-word, so the child’s whole output needs to be analyzed as in Brown’s (1973) examples from Adam. How widespread might this be? Could the child develop a whole set of routinized forms “*whatac’n*” (what can), “*where’s*”, “*whydoes*”? In a study of 12 young English-speaking children’s spontaneous speech, analyses of their errors in wh-questions suggested piecemeal acquisition of the inversion rule for different *auxiliaries*, not all-at-once acquisition of the movement rule (Rowland, Pine, Lieven & Theakston, 2005). It must be noted that the children were under age 3 years. These authors argue that a great many of the early wh-questions were formulaic, such as “*what’s ...*” or “*where’s ...*” with a contracted copula or

auxiliary that may not be analyzed as a separate element at this stage. Non-inversion errors were extremely rare, only about 1.7% of all the wh-questions produced. Other errors, also rare, include cases where the auxiliary is doubled:

23) What did he can see?

These latter errors more often occur with a copy of the same auxiliary in both positions:

24) What did he did see?

and these questions have been taken by generative linguists as evidence of a movement rule that has not deleted the copy from its original position (Hurford, 1975). However Rowland et al. see in such questions the mark of formulaic, piecemeal learning, in which fragments of two sentence types have been combined.

Those who have argued on behalf of a more lexical/construction grammar in young children (e.g. Tomasello, 2003) would argue that this kind of patterning is exactly what would and does occur, in contrast to UG accounts in which children would not make concatenations that lack grammatical justification. Lexically specific subcategorizations make sense grammatically, but fusing any two elements that co-occur frequently would not be expected under UG.

Nevertheless, the lack of lexical diversity is a problem to be reckoned with in explaining the early stages of subject-aux inversion. The phenomenon cannot be a reflection only of the more restricted set of things children want to talk about, because it would fail to explain why particular auxiliaries are used but stay uninverted in wh-questions. A grammatical explanation is in order.

So why are individual auxiliaries inverted or not at different rates, with the same wh-word (Rowland et al, 2005)? It seems necessary to do the kind of fine-grained analysis of each auxiliary in yes/no questions and wh-

questions in each child, to see if a child had mastered that auxiliary inversion for yes/no questions but not for wh.

This has not been established, though Rowland et al write:

“The differences cannot be attributed to the child having failed to learn the lexical forms. All the Manchester corpus children except Ruth produced a number of examples of copula are, auxiliary are, and auxiliary have in their speech by Stage III and were capable of producing correct utterances with these forms in other structures at the same time as they produced substantial numbers of wh-question errors.”

If that proves to be the case, which is likely given the differential rates reported, then the argument about the joint requirements of different modules might need further expansion.

The child has to integrate three things:

- a) that this lexical item can invert in English
- b) that agreement, if needed, must be ordered before inversion
- c) that there is a spec-CP and therefore a place in C for the aux in a wh-question

It appears that these three demands place an extra burden on the grammar of wh questions in English, with the defaults being either:

- i) Good agreement but no inversion (a and b without c)

Or

- ii) Inversion but possibly nonagreement (a and c without b)¹²

¹² We must also account for the fact that many English dialects around the world have exactly this kind of non-

In French, Zuckerman (2000) explored the acquisition of particular wh-words and their structures using an elicitation task, unfortunately with older children so the extension to the pattern of development is only speculative but interesting. As mentioned, there was a disparity between the children's preferences for different kinds of structures and those of their parents. In fact Wh-elements that received more Fronting responses from adults, received less Fronting from children, and Wh-elements that received more in-situ responses from adults received fewer in-situ from children. Zuckerman argues that the input is only an indirect influence in moving children through hypothetical stages: first in situ, then fronted without inversion, then inversion, and that these stages occur independently for each wh-word. As in English, there are lexical restrictions in French e.g. *pourquoi* (why) is never found in situ.

In stark contrast to English, in children acquiring Romance languages, there is no individual variation in subject-aux inversion: children in several languages show a 100% adult-like inversion rate from their very first production of wh-questions (Goodall, 2005). This pattern has been attested in Catalan (Serrat & Capdevila 2001), European Portuguese (Soares 2003)), Italian (Guasti 2000), and Spanish (Leroux & Dalois 1998; Serrat & Capdevila 2001). Why might this be so?

It is controversial in the adult theories of Romance as to where an *overt* subject resides in the structure. In Spanish, Italian, European Portuguese and Catalan the wh form is adjacent to the verb, and the subject can not intervene between auxiliary and verb:

- 25) a. Che cosa ha detto Maria? [Italian]
 what has said Maria

inversion, from African-American English to Singaporean English, to Trinidadian, to South African Black English (quite obviously not derived from each other). At some point, those who speak Mainstream English, receive enough individual inversions with all wh-words to eliminate the variation.

- “What did Maria say?”
- b. Onde foi a Maria? [European Portuguese]
 where went the Maria
 “Where did Maria go?”
- c. Què farà en Joan? [Catalan]
 what do the Joan
 “What will Joan do?”
- d. Adónde fue María? [Spanish]
 where went Maria
 “Where did María go?”

There are several accounts of where the subject might be in wh-questions in Romance, but Perez-Leroux and Dalois make a good case that the subject in Spanish, at least, remains VP internal, and does not raise to spec-AGR.¹³ The verb raises to IP, but does not move further. This also accounts for why “inversion” also appears, in embedded questions as well as matrix wh questions at least in some dialects of Spanish (Perez-Leroux and Dalois, 1998) because it is really not inversion, but base-generated. It is then not surprising that children acquiring Spanish show no problems with the ordering of verb and subject in questions, because apparent “inversion” involves no extra movement.

In German, all verbs move to C even in declaratives, therefore again, we see no failure of inversion. Notably we find V2 (“inversion”) with both main verbs and auxiliaries as in the examples cited, such as:¹⁴

¹³ There are continuing unresolved problems, such as Case assignment.

¹⁴ See Roeper 1973 for a specific comparative production test showing V2 in German at a time when there is no inversion in English.

26) “Where is (it)?”

Wo sind die Ringe?

Where are the rings?

27) Was ma(chst) du?

What do you?

“What are you doing?”

German allows *wh* and Topic in Spec CP, and Main Verb in C, thus the categories are more general from the outset allowing the children to represent them unambiguously from the input without splitting the CP. Since all declaratives have the same requirement of verb movement, no non-inversion stage occurs for *wh*-questions. A similar result is found for Bulgarian, again with no apparent delay in auxiliary/verb inversion (Tornyoova & Valian 2009).

Thus the refined concept of the CP is matched by refined cross-linguistic comparisons. This is an important joint success of acquisition and linguistic theory. These cross-linguistic results stand in contrast to the constructionist picture of acquisition in which lexical patterns are gradually amassed by the child on the basis of the frequency of their co-occurrence. These children make early language particular decisions that involve not only the Head Parameter but such properties as V2, swiftly implicating many other steps, including auxiliary movement and overt subject movement. Discourse and Focus factors are relevant to the decisions in German and Spanish (Spinner & Grinstead, 2006). The lexical particularity of specific *wh*-words in English (*how come you can sing*) and Italian (*perche*) (Thornton, 2007), and the homophony of the most frequent auxiliaries and main verbs in English, understandably delay the recognition that subject-auxiliary inversion in English is fully productive.

2.4 Structural Approaches to Subject-Object asymmetry

We turn now from subject-aux inversion to how *wh*-expressions move to the CP-domain. There has been ongoing debate in the theoretical literature about whether invisible movement from IP to CP is obligatory for adults for subject questions (*who came?*). A prediction from Economy of Derivation and Merge-over-Move is that:

Children acquire non-movement structures before movement structures which therefore predicts that subject questions would emerge before object questions. Since it is difficult to find linguistic evidence for the movement of subjects outside of their original IP position to CP, the order of acquisition offers unique perspective on the question. If the child has no CP at all, or changes nothing about the structure of the sentence, it is possible to produce an apparently well-formed subject question:

28) Who ate the cake?

In contrast, an object question requires a syntactic slot of some sort at the front of the sentence to house the moved *wh*-word and potentially also the auxiliary or *do*- support:

29) What did she eat?

If we assume that the child has a CP from the early stages, and moves the subject *wh*-word into it, then subject *wh*-questions should still be easier than object *wh*-questions because of a) the shorter distance that they move and b) no requirement of auxiliary movement or *do*-support.

In terms of comprehension, similar claims can be made that object questions require more processing than subject questions. From a parsing perspective, the distance of movement is further from object position to

CP, than from subject position. The parsing perspective is partly captured within linguistic theory itself via the concepts of Shortest Move (a reflection of the Minimal Link condition and economy) and coincides with predictions under Relativized Minimality (see also Jacobowicz 2011). Therefore object questions in English might be more demanding in their syntactic requirements than subject positions. It is clearly an interesting question to ask whether there is any asymmetry in the acquisition of subject versus object questions. O'Grady (1997) predicted an asymmetry in development as a consequence of the syntactic 'distance' between the *wh* filler and its gap. According to this syntactic distance hypothesis, the differential difficulty is related to the length of the A-bar chain involved.

In what follows we will consider evidence from several sources: early comprehension and production of matrix clauses, and then performance with more complex two clause sentences that attempt to isolate where the child faces a challenge.

2.5 Asymmetry in matrix questions

How soon do children understand subject and object questions in simple sentences? Early work on three-year-olds tested in studies by Ervin-Tripp (1970) and Tyack & Ingram (1977) suggested that children of that age were unable to correctly answer either subject- (Ervin-Tripp, 1970) or object- (Tyack & Ingram, 1977) questions. Some early experimental comprehension studies with preschool children report that object *wh*-questions are misunderstood more often than subject-*wh*-questions (Ervin-Tripp 1970, Tyack and Ingram 1977; but see Cairns & Hsu 1978). More recent work has tried to minimize task demands, by measuring eyegaze in even younger children.

The earliest ages at which comprehension has been explored by this method are 13,15, and 20 month olds in a study by Seidl, Hohlich & Jusczyk (2003). Toddlers were seated in an eyetracker allowing the investigators to track looking direction at two objects, following a short animation in which one object hit another e.g. an apple hit a set of keys. Objects had names that would likely be familiar even to the youngest subjects. The study

compared e.g.

- 30) a. Subject-question: “What hit the apple?”
 b. Object-question: “What did the apple hit?”
 c. Where-question: “Where is the apple?”

The findings were that by 20 months, toddlers could respond appropriately to simple subject-, object-, and where-questions. That is, there were statistical differences in their eyegaze to the right versus the wrong object. Moving even younger, 15-month-olds looked appropriately for simple subject- and where- questions, but not for object-questions. So 15- month olds showed the predicted asymmetry between object and subject questions. The 13-month-olds were unable to respond appropriately to any of the question types. This study suggests that comprehension of object-questions emerges between 15 and 20 months.

These results suggest an asymmetry of a subtle kind, operating in comprehension to privilege subject questions over object questions even before any overt evidence of questions is likely in the children’s speech. The possibility is that there is a shift in grammar happening between 15 and 20 months, presumably very early parameter setting of Head Direction, and assuming knowledge of canonical argument frames for the verb. But it is at least conceivable that the necessary grammar is already formed at 15 months, and the change is in processing resources (Santelmann & Jusczyk 1997) Though very important and suggestive, we may still need other indices than eyegaze to unpack what is going on in the grammars of young children. For example, we cannot be sure that the wh-word was even understood as a question. Substituting X for the wh-word would entail a similar preferential looking pattern, if say X was a topic:

- 31) X hit the apple
 X did the apple hit

X is the apple

The prediction is that young children would also show difficulty with a true topicalization like “X the apple hit”. The experiment really has a logically prior condition in which the *wh* word and the question force is eliminated and the question about movement asymmetry is addressed with topicalization.

The research on children’s *production* of subject versus object questions is mixed, with different results depending on the age of the children and the subtlety of the analysis conducted. Cross-linguistic evidence is necessary to fully explore the factors responsible.

Some early work on *wh*-questions reported earlier emergence of object (*what*) or predicate questions (*where*) than subject questions (Klima & Bellugi, 1966). However Stromswold (1990) was among the first to explore this issue in a large-scale way, using longitudinal samples of speech from 12 English-speaking children in CHILDES. Surprisingly, she found that object questions were found to be acquired at the same age or earlier than subject questions for simple sentences, and both appeared between age 2-3yrs. Nonetheless, she argued that if one takes the base frequency in the adult language into account, one could argue that objects are earlier than subjects because subject questions are much rarer in the input (see also Philip, Coopmans, Atteveldt, van der Meer, 2001)

Studies of production in experimental formats attempted to motivate each type to equalize frequency considerations. Here it is generally found that English-speaking children produce more well-formed subject *wh*-questions than well-formed object *wh*-questions in elicited speech (Ervin-Tripp 1970, Wilhelm & Hanna 1992, Yoshinaga 1996, Friedmann, N., Belletti, A., & Rizzi, 2009). Cross-linguistically, in languages such as Hebrew (Friedmann, N., Belletti, A., & Rizzi, 2009), French (e.g. Jakubowicz, C., & Gutierrez, J., 2007) and Italian (Guasti, 1996; De Vincenzi, M., Arduino, L.S., Ciccarelli, L., Job, R., 1999), subject questions were found to be easier for children to produce than object questions in experimental conditions. In a study of older children with grammatical SLI, Van der Lely & Battell (2003) found that object questions presented particular difficulties for

these children with language delay. In an elicited production task using a Clue type detective game, children with SLI produced forms such as the following, suggesting serious problems with object wh- movement, in particular with gap filling and tense:

- (w) a. *Who did Mr Green saw somebody?
 b. *Which did Mrs Peacock like jewellery?
- (x) a. *What cat Mrs White stroked?
 b. *What did she spotted in the library?

In a follow-up study (van der Lely, Jones and Marshall, 2011) on judgment of ungrammatical wh-questions with older children and adolescents with grammatical SLI, an asymmetry was found with subject questions more accurately judged for *which* and *who* questions but not for *what* questions. Friedmann and Novrodotsky (2011) report that subject questions are significantly easier to comprehend in older children with grammatical SLI who speak Hebrew.

2.6 Intervention effects

Could it be, not the fact of movement or the distance involved, but the content of moved objects that causes this problem? Much of linguistic theory has focused on “intervention” effects that block movement of one element over another, as in Barriers to wh-movement, to which we turn below. However recent acquisition work suggests that a much deeper principle may be involved. The fundamental finding first observed for the passive voice by Postal (1971) is that an NP that moves or crosses over another NP sharing some features, in particular animacy, results in a kind of interference effect.¹⁵:

¹⁵ Baker, Johnson, and Roberts (1989) sought to assimilate the notion to Principle B, since disjoint reference applies to implicit arguments as well, and they suggested that *-ed* could be construed as a pronoun.

*?I was kissed by myself.

Animacy identity does not bother adults in parsing a clefted passive such as:

33) It was the girl the boy liked t.

But for children and aphasics, almost any shared features cause a block or sharply reduce acceptability. It seems that moving the NP *the girl* over the NP *the boy* is difficult. We will now review some of the approaches with these broad facts in mind.

Grillo (2008) argued that this cross-over effect was critical for passives, and others have found it to be critical for Principle B sentences, object–clefts and object questions (Friedman et al (2009) However, exactly which features create this clash and how it should be formulated at different levels of grammar remains an important and open question.

In wh-movement, a related concept was articulated by Rizzi (1991) as Relativized MInimality where a specific Spec-Head Agreement mechanism was used which blocked Adjuncts from moving over Adjuncts or Arguments over Arguments. The core idea remains, but the conditioning effects become very subtle. For example, Negation blocks long-distance movement of Manner in a sentence like:

32) ?How didn't John say that Bill played baseball

and the explanation is that both are “adjuncts”, so *how* mistakenly undergoes AGREEMENT in the Neg phrase

I was helped → someone helped me and not I helped myself.

However children acquire the disjoint reference restriction on passives by 3-4 years, long before they stop making principle B errors, so it appears to be something deeper than pronominal coreference.

which stops further movement.¹⁶

One approach, exploiting the Spec-Head Agreement notion, has been developed by Guasti, Branchini and Arosio (2005) following the work of Franck, Lassi, Frauenfelder & Rizzi. (2006). They found in an elicited production task with 4-5 year olds that the object questions were considerably easier if the two DPs (the subject and the object) were differentiated for animacy features. They proposed that the difficulties children experience in the production of *wh*- object questions arise because the object copy takes on the features of AGR-S, i.e. interferes with the Agree relation between the postverbal subject and the verb (see the paper for the technical details).

The possibility of intervention effects between two like NPs has been most thoroughly explored recently in the domain of comprehension, but its characterization is an open issue. Friedmann, Belletti, & Rizzi, (2009) propose to locate the difficulty with object *wh*-questions in the structural similarity between the object and the intervening subject. That is, because both subject and object share the feature [+NP], object *wh*-questions (39) are difficult to produce and to understand.

38) Who saw the man?

39) Who did the man see?

Although *who* could be generic, they found that a block is even more likely for questions such as *which boy* where both subject and object are marked for definiteness (via *the* and *which*) again indicating that the notion of “similarity” or “identity” is, at times, being construed even more subtly:

40) Which boy did the man see?

¹⁶ But the effect is not strong for adults and, again, if one puts Focal stress on *didn't*, it seems to improve the sentence by making it no longer fully identical.

The research has found that both typically developing children and those with SLI evidence especial difficulty with the object-which questions because of the presence of the intervening, referential NP. They argue that this reflects the process of assigning thematic roles to NP's under cross-over (see also Friedmann & Costa (2010) on a similar effect in European Portuguese).

2.7 Asymmetries in long distance wh-questions

A test domain for these claims arises in long distance (LD) wh-movement. Is subject wh-extraction (41) easier than object extraction (42)?

41) Who did you see __play baseball

42) What did you see someone play __

An adult speaker of English finds both easy to say and understand.

In LD movement, object-movement is clearly further than subject movement and object questions should therefore be more difficult to parse. But if Intervention effects hold the key rather than distance, the predictions turns out differently. A close look at the movement path reveals a special and striking fact about object LD movement: the object must move over two subjects. However, in long distance movement of a subject, the subject itself must also move over another subject:

43) what did you think John made __

←obj===Xsubj=====Xsubj=====

who do you think ___ made a cake

←subj==Xsubj=====

Therefore if we extend the Intervention concept in a logical way to include not just features such as +NP and animacy, but also particular grammatical relations, we find precisely that it is the Subject, not the Object, which causes a conflict for subject LD questions, even though the LD object passes over *two* other NP's. This illustrates the “relativized” notion perfectly with different levels of grammar and different stages responding to various levels of similarity that are open to syntactic representation. The theory of Agreement articulated originally by Kayne and utilized by Guasti specifically distinguishes Object-Agreement from Subject-agreement and therefore the grammatical relation concepts are already written into the Feature system that undergoes agreement.

How do the data look so far? The acquisition evidence is tantalizing but contradictory. Stromswold (1990) in her study of spontaneous production in English investigated the emergence of long-distance questions in complex sentences,

44) Who did she say she liked _____

and the results are very clear: *object* questions emerged first in speech. All children asked at least one long distance object question (mean age 2;10), but only one child asked a long distance subject question (at 5;0).¹⁷

It is possible that there is an asymmetry of opportunity in spontaneous speech, so elicited production studies try to equalize opportunity to see if there is still an asymmetry. Jakubowicz and Strik (2008) did an elicited production study in French and Dutch, with 4 year olds, 6 year olds and adults, targeting long distance

¹⁷ To date we can find no studies of spontaneous LD questions in other languages, clearly an important lacuna in the literature, though they will undoubtedly be rare.

movement. In French, it was clear that LD object questions were most frequent and LD subject questions least frequent in all groups, particularly in the adult and the 6 year old groups. However, LD questions of both types were rare in Dutch, as children adopted a Copying strategy instead (see below). When they did occur, there was no sign of a preference in Dutch for LD object questions over subject questions. If anything, children produced more LD subject cases, but the LD questions represent a small residue relative to the preference for Copying.

There are some contradictory data from Philip et al on long distance question understanding. They tested the structural distance hypothesis using Dutch, which allows an ambiguity in long distance wh-question sentences such as in 45a) which has either a subject (45b) or object (45c) interpretation:

- 45) a. Wie zei je dat de beer natspoot?
 who said you that the bear squirted
- b. Wie zei je dat [t [de beer natspoot]] (S-WH)
 S O V
- c. Wie zei je dat [de beer [t natspoot]] (O-WH)
 S O V

Because Dutch allows scrambling of definite references, “de beer” could be the subject or object of the lower clause, and therefore “wie” could be linked to the object or the subject trace. The examples are matched for changes in canonical word order, and both require the animate question *wie* (*who*). Thus any differences in preference for subject versus object interpretation could not be due to the confounds of SVO order or a preference for animate references for *wie*. They used a truth-value judgment task with 4-7 year old Dutch children and adult speakers. The *syntactic distance hypothesis* that they explored made the prediction that Dutch

children would prefer an S-WH analysis of (45a), and that O-WH interpretation would be dispreferred due to its greater processing difficulty because of the extra distance. They predicted that Dutch adults, in contrast, would be equally likely to interpret it as a subject or object question, as they are no longer constrained by syntactic distance.

Dutch adults showed no difference in the allowability of these options in a Truth value judgment task, however children were more likely to accept the subject than the object interpretation. Philip et al take this as evidence that children show an effect of structural distance in parsing *wh*-questions. They argue that, “It seems that it is a universal property of language processing that the further a *wh*-expression is removed from its gap the more difficult it is to process *wh*-movement. The effects of this difficulty are so pronounced in preschool children’s performance that they even can be detected with off-line techniques”.

An interesting further issue arises when we consider the Partial Movement option which will be a focus of our concern below. Younger speakers are prone in their errors to produce Partial Movement questions, in which the *wh*- word appears in the medial position. We have an extended discussion of this acquisition phenomenon in the next section, but we can ask in advance of that discussion, is there more of a tendency to produce partial movement for subject than for object questions? The asymmetry would follow under the assumption that Partial Movement does not involve any further movement for subjects, therefore no Intervention occurs. That is, partial movement is a way of avoiding LD movement and the special intervention difficulties for subject questions.

Relevant evidence exists on three languages to date: English, French and Dutch, but unfortunately the results vary across the languages. The data on English come from a small sample of children (14) studied by Thornton (1990) in an ingenious elicitation task designed to get the 3-5 year olds to produce long distance questions such as:

46) Who do you think really is in the can?

A small number of PM questions were produced, with a what scope marker and a medial question, but a larger number were copying cases such as:

50) Who do you think who's in there, really really really? (Amber 4;6).

For both types of constructions, the strategy was more common (about twice as often) for subject questions than object questions, though only a subset of the children did it at all.

As mentioned, Jacubowicz and Strik (2008) studied the long distance subject, object and adjunct questions obtained from French and Dutch speakers aged 4, 6 and adult, who produced “other” responses that included both Partial Movement and Copying. For French, the asymmetry holds: Partial movement questions were more frequently produced by children in the case of subjects than for objects. In fact there were none for object questions. The nontarget construction was more productive for subject questions (see (51a)), though it also appears in the case of adjunct *where* and adjunct *why* questions (see (51b) and (51c) respectively) e.g.

51) a. **Qu'est-ce que** Billy a dit **qui** boit de l'eau? 28

what is it that Billy has said who drinks water

'Who did Billy say is drinking water?'

b. **Qu'est-ce que** Lala a dit **où** le poisson nage?

what is it that Lala has said where the fish swims

'Where did Lala say that the fish is swimming?'

c. **Qu'est-ce que** Lala a dit **pourquoi** Grenouille part?

what is it that Lala has said why Frog leaves

‘Why did Lala say that Frog is leaving?’

Thus the hypothesis about a difficulty with long distance subject questions continues to receive support for French and English.

But once again, Dutch changes the picture. The Dutch children did not show a greater tendency to produce either PM or Copying for subject versus object questions. Note that the exceptions (Jacubowicz & Strik, 2008; Philip et al, 2001) to the generalization being explored, namely that LD subject questions are harder than LD object questions, are for Dutch. Why might Dutch be exceptional? Dutch allows scrambling of the NPs as well as wh-copying, and is analyzed as an SOV language, unlike English and French. Perhaps scrambling within the subordinate clause precedes wh-movement, but adds an extra level of complexity to the object questions, making them harder to comprehend. But why is production also different? The impact of these factors on Intervention remain for further work – perhaps in other languages - to disentangle. In section (4.3) where Superiority phenomena are discussed, we encounter a possibility that might reconcile the Dutch findings.

We began by asking whether matrix subject questions were easier than object questions, and the data seem to confirm that for English at least. However long distance movement of subject and object gives rise to competing explanations in terms of parsing: distance versus intervention effects predict different orders of difficulty. More research is needed in this domain.

3.0 Quantificational Properties of Wh-questions

4.1 Pairing

The acquisition path for wh-questions entails semantic complexity that is entangled with the syntax. The

semantics falls into sharp relief because there are sentences as in 52):

52) Who ate what?

which are simple to parse, well within a child's memory ability, but require the child to coordinate three semantic ingredients. First, a single wh-word requires reference to a set. Thus the sentence *who came* requires an answer with a set, not an individual (though often it is a set of one) which is secondly, exhaustive: no relevant *eater* can be omitted. (X) has yet a third requirement: pairing. The exhaustive sets of *who* and *what* must be pairwise linked. The child's experience of such sentences is minimal---they are virtually absent in the CHILDES database: a total of 5 examples have been found by Grebenyova (2006a) in the entire English database¹⁸. The impoverished input makes this a perfect domain in which to look for UG-coordinated abstract capacities. What is the acquisition path for these properties? An attractive hypothesis from a Full Competence model would be:

All wh- properties are immediately triggered with the Question-feature

If so, these semantic properties –reference to a set, exhaustivity and pairing- should appear as soon as a child begins to ask questions, perhaps as soon as the wh- word engages the Force node in CP, if we treat it cartographically as in Rizzi (1997). In fact there is evidence that some children are able to provide paired and exhaustive answers to questions at the age of 3yrs (de Villiers and Roeper (1993). This suggests that the Q-feature does engage hypotheses about other wh- properties. Nevertheless, of critical importance is the fact that half the children at least recognize the question force of wh-words but *not* the exhaustiveness or pairing, giving

¹⁸ Roeper corpus has two imperfect examples, each of which carries pairing:

“whose bed is who” [comment on Goldilocks] 4yrs

‘which foot is which foot’ [=which foot is which] 5yrs]

instead what we call a “singleton” response (detailed below, see Schulz & Roeper 2011). So the Force property of wh-words appears to be a feature independent of the exhaustive set and pairing properties.

How could this be captured? Currently evolving theories posit an Information Structure, part of which is Logical Form (LF). Logical Form is involved with still higher projections above the syntactically visible CP. If children have the CP for a Q-feature, but LF representations are unfixed, then they could recognize Question force without the other properties. Quantifier scope relations are generally captured by invisible movement operations to the front of the sentence at LF (cite).

Information Structure captures the fact that Intonational Focus, Discourse-linking, Propositional commitments *and* Scope phenomena must interact. Information Structure is difficult to clearly incorporate in our reasoning because it is theoretically in flux (Krifka, 2007), but it is clear that Focus, Presuppositions, and Implicatures are factors which must be built into the acquisition mechanism.

There are two hypotheses here to test. First, there is the hypothesis that the properties of sets, exhaustive sets and pairing are under separate control and could appear at different times in acquisition. For instance, the Q-feature could be a syntactic feature on wh while the Exhaustivity property could belong to Information Structure and thus they could take separate acquisition paths. Kratzer (2009) has suggested that exhaustivity could be a Default pragmatic property, while Zimmerman (2010) has suggested that it could be an implicature. If properties of constructions like paired-wh do not appear altogether, then that would support those theories that claim that different dimensions of grammar are engaged.

The second hypothesis is that properties in common to quantifiers and wh might co-occur, being governed by the same module. In fact, there is suggestive direct evidence for a connection in acquisition between quantification with wh-words and typical quantifiers (*every*). Strauss, Roeper, Pearson, de Villiers & Seymour (2006) has shown that the same children who make exhaustivity errors on sentences like *who bought what* also tend to exhibit quantifier “spreading” (see Philip chapter) for sentences like *every dog has a bone*. That is, they have not yet acquired the right properties of either wh or “*every*” as a quantifier, under one hypothesis. If both

forms are suddenly acquired together, it could suggest a common “exhaustivity” feature that is realized on *every* and *wh-*. Evidence for that latter coincidence is not yet established (but see Schulz & Roeper, 2011).

4.2 Pragmatic Background

To capture the subtle, microscopic steps in the acquisition path, we must begin with a careful look at the pragmatic environment. For the majority of questions, a single (“singleton”) answer is appropriate e.g. when the set consists of one item:

53) What are you reading?

The newspaper.

In some non-wh-question contexts a multiple answer is called for by pragmatics (perhaps the Gricean maxim of quantity):

54) Is someone at the door?

Yes, Bob, Mary, and Sally.

A paired answer is not ungrammatical with a single wh-question, though it may be more than is required:

55) What are your students reading?

John is reading Moby Dick, and Bill is reading Jane Austen, and...

Consider a question in court like “Who was in the car the night of the murder?”. It would lead to a charge of

perjury if you mention just one person when there were three. “Who is sitting where?” requires person-by-person answers even if it might pragmatically seem adequate to say, “They are all on chairs”. Note however that even here, contextual restrictions have to be recognized. If we say: “what is in the icebox?” we mean “what (to eat)” and not “drawers, paint, and cold air”. Thus a pragmatic *accommodation* is needed.

The critical point is that no matter what the context is, for adults:

- a) wh-words require a set reading and
- b) “wh- verb wh-” expressions require paired readings.

How does the set property emerge? As mentioned, several experiments have shown that initially, both typically-developing children and those with language delay provide singleton answers in contexts where adults provide multiple answers (see Finneran 1993, de Villiers & Roeper 1993, Schulz and Roeper 2011). In environments where there is a strong bias for adults to give an exhaustive set, children persist in providing a singleton answer. For example, in Roeper, Schulz, Pearson and Reckling (2007), a picture was presented of a number of girls, and the question asked,

56) Who is wearing a sweater?

The adult answer would be to point to the three girls who are wearing sweaters. However, young children often point to only a single instance of a girl wearing a sweater. Disordered children stay in the singleton stage much longer. One response from a child was particularly revealing, “I don’t know which one to choose” which indicates that the child was pragmatically aware that several girls fit the description, but took the *who*-question as

a request for a single person.¹⁹

This path from singleton to exhaustivity has been replicated in many European languages (Schulz, 2009) in part via work from the COST²⁰ project, which has shown that children in 11 out of 12 languages move from singleton to exhaustive readings in a common manner. Yet Schulz (2009) shows cross-linguistic differences which reveal how contexts which inherently call for pairing can be enhanced by explicit markers. In a language like German the presence of an exhaustivity marker *alles* (*all*) encourages children to provide the exhaustive answer, and appears to trigger the knowledge that *wh*-words without *alles* are exhaustive as well. Children who fail to see *wer-alles* as exhaustive fail without exception to see *wer* as exhaustive, signaling that some link must exist (Schulz, 2009). A similar difference emerges between Bulgarian and Polish: Bulgarian has a plurality marker in the *wh*-word that seems to trigger early exhaustivity, but Polish children lag well behind (Gavarró Lewandowski & Markova, 2010), providing only 40-60% exhaustive answers at age 5.

While an explicit marker like *all* can apparently enhance the speed of a child's recognition of a covert feature on another word, what stands out is the uniformity across the languages in the realization of a sophisticated notion like pairing. One would expect that large variations in morphology, word-order, case and Focus movement across languages would cloak comparisons in obscurity. A result of this kind must have architectural implications. In a broad sense it supports modularity: while carrying Force and quantification features, *wh*-pairing must proceed fundamentally independent of case-marking, agreement, and lexical variation in *wh*-morphology in the child's hypothesis space. Otherwise the acquisition path for *wh*-pairing in each language would be entangled in how the children realize, for instance, case-marking on *wh*-words in languages

¹⁹ It is often suggested that the verb-agreement suggests a singular referent:

who is

However the same experiment was carried out by Bart Hollebrandse in Dutch where plural verbs are allowed (cf who are) and children persisted in giving singleton answers.

²⁰ A European Union Project on cross-linguistic analyses of disorders and dialects run by Uli Saureland.

where it is very rich.

An interface question arises here. Is there a relationship between linguistic exhaustivity and the cognitive operation of “being complete”? A natural hypothesis—particularly if one takes a cognitive view—is that children will proceed from a singleton reference to a plural reference, and finally move to an exhaustive reference. That is, given five out of six girls are wearing a sweater, children first point to just one, later to say three of the five and only gradually point to the exhaustive set. But that does not happen: children move from a singleton answer to an exhaustive answer, suggesting that a specific feature is triggered. Less than 2% of children ever point to more than one, but less than an exhaustive answer (i.e. an insufficient plural) (Schulz 2009; Roeper et al 2007). The complete shift is what we expect if a specific property or Feature is triggered. ²¹

Pairing shows a similar path. Children begin with either singleton, single pair or single set (all objects or all subjects) answers. They exhibit exhaustive pairing reliably by 4 ½ (though again, this achievement is systematically delayed for children with language disorders (Finneran), Shulz 2010) and shows cross-language variation (Shulz, 2007).

57) Who ate what?

Correct answer: “Daddy ate the apple and baby ate the banana”

Wrong answers: “apple and banana”

²¹ Our discussion leaves many questions open. One question (see Heizmann-Dodd (in preparation) is whether there is a single acquisition path for exhaustivity, uniting performance in wh questions, quantifiers, and cleft sentences). She has shown that cleft sentences like:

a) “it was the bush that sprouted up” followed by a question “Is that right?”

in comparison to:

b) “the bush sprouted up” followed by “Is that right?”

are exhaustive for adults (“no the tree did too” for (a) not (b)).

“Daddy ate the apple”

Notice that the phenomenon of pairing requires c-command in syntax, in that the subject wh-must dominate the object or adjunct wh-s. When the wh-words do not c-command each other, as in conjunction, the pairing is broken (Krifka 2001). Note the contrast where (58a) allows *how* and *what* lists and (58b) requires pairing:

- 58) a) How and what did Bill sing
 b) How did Bill sing what²²

Ideally, then, experimentation needs to show that different answers are elicited when coordination occurs. This would provide solid evidence that linguistic structure is involved.

We can also ask: How far does pairing go? Schulz (2010) boldly pushed the question even further beyond the daily experience of children, looking at pairing across three wh-words:

- 59) Who gave what to whom²³

²² Schulz and Roeper (2011) tested the conjunction “who ate and what” in which pairing should be broken, but it was observed in many children’s answers. However further pilot evidence (Frattoli 2010) suggests that conjunction can break pairing if sentence-initial ellipsis is present : as in “How and what did Bill sing”. If this can be substantiated, then children are sensitive to the c-command constraint that one wh- word must dominate another to engage obligatory pairing.

²³ It is not the case that all instances of 3-term wh-words elicit pairing. Under Multiple Wh-Fronting in Slavic, Gavarro shows that it is not obligatory. A variety of fronting phenomena allow pairing to be optional in Slavic--- which means it is a pragmatic option, unforced by the grammar---see Boscovic (1997, 2000, 2002) and others for

[grandma gave toy to child, the man gave a bone to the dog, the mother gave a bucket to the girl]

Children aged 5 quite easily extended the pairing requirement beyond two, though there were more errors than with only two.

In sum, a number of formal properties are isolated by a close examination of acquisition and the introduction of cross-linguistic perspectives. We are able to separate the acquisition of sets, exhaustivity, and pairing. The modularity of the wh-Operator system is suggested by the relatively few effects of cross-linguistic variation in case-marking, word-order and the like.²⁴

3.3 Superiority

The acquisition of the phenomenon of superiority provides a splendid example of complex language-specific data that a child masters with little help because example in the input data are extremely rare (the “sparse data problem” discussed by Yang (this vol)). Therefore abstract parameters in UG must play a critical role but these are far from worked out. The central contrast, found in English is:

- 60) who bought what
 *what did who buy [compare: what did Bill buy]

discussion.

²⁴ A number of pertinent L2 studies have been undertaken on LD questions in English. See Hawkins (2005) who discusses the claim that L1 Transfer with [+uninterpretable] features does not occur, and Yusa (1999) for discussion in terms of the transfer of Multiple Spec capability across languages. Schulz (2004) shows that the basic phenomenon of spontaneous Partial Movement is robustly found in many L2 languages (see also Strik 2009).

However, not all languages show this difference, including German. What kind of variation in multiple Wh-s is revealed by a cross-linguistic comparison? A language may or may not:

- a) allow multiple wh- (English does, Italian does not)
- b) allow multiple wh-fronting (English does not, Bulgarian and Polish do)
- c) allow an intervenor between fronted wh-words (Polish)
- d) allow Single Pair readings (Japanese, Singhalese (Hagstrom, 1998))
- e) allow overt movement at all (Chinese does not, so any pairs would be in situ)

Each of these phenomena deserves investigation in acquisition. In English, which-questions like (61) allow superiority violations (Pesetsky 2000), and the claim is that it is because such questions are directly Discourse-linked, (D- linked), and therefore can be licensed from a Discourse referent and need not be fully reconstructed in their site of origin.

61) Look at the boys. Which boys do which girls like t?

Children must have knowledge of divisions between linguistic modules to prevent them from being misled by *apparent* superiority violations, such as in D-linking. A variety of theories have sought to explain superiority effects in terms of semantics or pragmatics, but we will argue in what follows that a core syntactic factor—economy—provides the best explanation. However, that entails providing an explanation for linguistic variation.

The question we ask is: Is superiority essentially syntactic or semantic from an acquisition perspective? Weissenborn, de Villiers & Roeper (1996) undertook a cross-linguistic study with identical stories and materials which asked whether 4yr olds in English obeyed superiority and those in German did not. The participants were 17 English children and 21 German children (4-6yrs). The method was designed to elicit double wh-questions

that might reveal obedience to Superiority or not.

One experimenter played the role of a bird puppet, and the children were told that the puppet decided everything that should happen with a set of toys. So the child had to ask the puppet what to do with the toys each time by completing the question begun by the experimenter. There were occasions designed for pairing among *who*, *what*, *where*, *when* and *how* questions.

62) “So we need to know who is gonna sleep, and we need to know where they’re gonna sleep. So we have two things to ask the puppet, but we can ask only ONE question, so let’s try:

“Who....” (would result in obedience to superiority : who sleeps where?)

Or on another occasion:

“Where...” (would result in a violation of superiority in some situations: where is who gonna sleep?)

A total of 45 “double questions” of the type:

63) Who can wear what?

were produced by the 17 children, and only 1 of these violated Superiority (notably using the discourse-sensitive “*which*”):

64) “When is which gonna use the bathtub?”

Clearly, English speaking children resisted Superiority violations, often turning the question around to obey the constraint (one child actually said, “It’s better if I start”).

In a follow up on a very large scale in the testing of the DELV assessment test, we provided two

occasions for the production of double wh-questions, one with the correct lead-in question in terms of superiority and one with no lead-in. Only the older children (age 7 and up) in this very diverse sample were able to produce double wh-questions, but when they did produce them, they obeyed superiority almost without fail. Out of 623 “double wh-questions” produced from children aged 4 to 10 years on two items, the exceptions to Superiority are just the ones in 65):

65) What are which kids are wearing?

Which hat belongs to who?

Which hat is which kid wearing?

Which hat belongs to which?

Which hat belongs to who?

Which hat is which kid wearing?

But all these apparent violations involve *which*. The evidence suggests that Superiority is robustly obeyed in English speaking children.

3.3.1 Absence of Superiority in German

In contrast, the German-speaking children in Weissenborn et al (1996) gave different results. 14 of the 21 children clearly allowed double questions in 42/112 answers. Of these over a third (15/42) were superiority “violations”, including two-argument cases e.g.

66) “was kann wer spielen”)

what can who play?

As well as adjunct- argument cases e.g.

“wo soll wer schlafen”

(where should who sleep),

The German children allow superiority violations in identical contexts to those in which English children do not.

These results provide a unique perspective from which to view a variety of proposals about Superiority of different types. All semantic proposals link superiority to quantification and LF.²⁵ Whatever the details of various LF theories, they lead to the hypothesis that children will acquire Superiority at the same point at which similar LF scope phenomena are mastered. However, evidence is accumulating on quantifiers, negation, and other phenomena (see Philip (this volume) and Musolino (this volume) to show that children have problems with scope assignment up until around age 6yrs or later.)²⁶ What then explains the early acquisition of superiority in English and its absence in German?

First we should consider an account of German proposed by Grohmann (2002) that in German, apparent superiority violations involve D-linking, so that the German version of *what did who say* cannot be uttered out of the blue. If so, German superiority “violations” resemble the D-linked cases of *which* in English:

²⁵ For example Higginbotham and May (1981) argue that:

Free scope exists if both quantifiers are at the same node at LF (Absorption)

who bought what → [what, who] [t buy t]

Under their assumptions, if one element is not in CP then something they define as Absorption - which allows either element to have wide scope - cannot work and pairing cannot be generated. In the following the *who* remains inside the VP and does not move to LF (which is not consistent with other theories):

who bought what → [who_x, what_y [t_x buy t_y]]

[CP what₁ did [t [VP who buy t]

²⁶ Notoriously adult judgments are also often quite weak, see Reinhart (2006).

67) The boys and girls all came. Which boys do which girls like?

However, since our experiment was discourse-identical in both languages, this approach cannot predict that 4-yr-old children would exhibit a contrast across English and German. Why would English children not generate “*what did who buy*” as D-linked as well? Although Discourse-linking in German may have merit as an explanation for adults, we argue instead that the fact of early acquisition favors an account based on syntax.

Other theories argue for a syntactic basis for superiority, namely the Minimal Link Condition, including Chomsky (1995) and Cheng & Rooryck (2000). They argue that superiority is a byproduct of economy of representation calling for a shorter distance movement. To put it briefly, *what* has further to move in [what [did who buy t]] than *who* has to move in [who [t bought what]]. If children have a grasp of syntax, then we can predict that they would observe this constraint early on.

Yet such theories do not account for German without a further twist because it looks like a pure distance requirement would rule out Object before Subject in German as well. Ferguson and Groat (1994) revised the definition of distance to capture German:

Distance is measured in terms of Constituent Boundaries crossed.

We can translate that claim into modern theory by proposing that Boundaries = Phases. (Note that we have not provided a full technical account, as that would depend upon how the inner structure of VP is represented in Phase theory.) But their solution depends upon a further step: the idea that the Head Parameter governs more than the object. They assign a different structure to the German VP, which we can call the Extended Head Parameter: The subject and object are both inside the VP.

If we assume economy of representation in terms of the number of Phase boundaries like VP, each form moves the same distance to CP in German:

- 68) a. [CP wer [hat [VP t was gekauft]] = who has what bought
 b. [CP was [hat [VP wer t gekauft]] = what has who bought

To repeat, if both subject and object wh- chains originate in the same Phase, the distance moved is the same and therefore no economy difference is present, thus no superiority violation occurs.

If again, the OV/VO Head Parameter includes the position of the subject, then the asymmetry between English and German is available at the point at which children set the Head parameter. It follows that the superiority contrast between English and German will be evident to children with no direct evidence, simply on the basis of economy of derivation. There is evidence that the Head parameter is set very early (Roeper, 1973, Wexler, this volume). Whether or not the Extended Head Parameter (suggested by Ferguson and Groat) is likewise immediately available at that point is a matter of future investigation. Recall that Dutch- an SOV language- was the exception to the intervention effects that predicted subject questions would be harder than object questions. It is possible that the proposal here might explain the discrepancies in those results. And in what follows, from rather different perspectives, we will provide further evidence that the notion of Phase is pivotal in the acquisition process.²⁷

3.3.2 Superiority in Slavic and Multiple-Fronting Languages

Now we can confront an important new question: What happens to Superiority in Multiple wh Fronting

²⁷ The VP-internal subject hypothesis must be refined to capture these claims. Minimalist theory allows a language specific variation in the projection of features to nodes which would have to be properly restated.

languages like Russian, Bulgarian and Polish? Rojina (2004) and Grebenyova (2006a, 2006b) explored the acquisition of multiple fronting for Russian. Grebenyova showed that multiple interrogatives are very rare in the input (in her study of Varvara's CHILDES database, for the age range 1;7–2;11, there was one multiple interrogative sentence in the adult input). Yet in two elicitation tasks with English and Russian preschoolers (aged 3.5–6.5) she obtained multiple interrogatives from young children almost as often as adults. The only difference was that the Russian children left one of the *wh* words in situ, rather than move it to Focus as in adult Russian (see below). However adult Russian apparently does not have any ordering restriction on the multiple *wh* forms: no superiority restrictions apply.

Taking into account some recent work on Bulgarian and Polish may lead to a re-consideration of a broader set of factors. In these languages, the two *wh*-words are both moved to the front of the sentence. Yet Bulgarian obeys superiority in this ordering, whereas Polish does not. However, despite surface appearances of similarity, the languages are argued to differ in the landing sites of the two *wh*s. Rudin (1988) first observed that Bulgarian *wh*-interrogatives form a unique constituent in the left periphery of the clause, while Polish allows for intervening material (e.g. clitics, adverbials, parentheticals) to occur between the *wh* constituents. Romanian patterns like Bulgarian, while the Polish-type pattern is found in Russian, Czech and Serbo-Croatian. In later work, Bošković (1997, 2002) argues for two mechanisms of 'wh-fronting':

- (i) pure (syntactic) *wh*-movement (to Spec,CP to check the $u[+wh]$ feature of C°), and
- (ii) focus movement ('non-*wh*-fronting'; licensed by the $[+focus]$ feature of C° or Foc° and due to the inherent focus feature of *wh*-s).

(ii) involves no change in meaning. Gavarró, Lewandowski & Markova, (2009) argued that in Bulgarian all *wh* constituents move to $Int(errogative)P$. This Interrogative head operates under a "Attract closest" constraint, resulting in strict Superiority because of obedience to economy, or shortest move. They provide evidence that in

Polish only the *first* wh- moves to the spec of this Interrogative head. The *remaining* wh- constituents are moved to a different Head, suggested in Gavarro et al to be Focus, as in Boscovic (2002).

“Wh-movement (to Spec,CP): C° bears an u[+wh] feature and via *Attract Closest* of Chomsky (1995) assures that WH₁ moves first to check this feature, hence *Superiority effects observed*. Focus movement (to Spec,CP or some lower FocP forced by the [*attract-all-focus*] feature of C°/Foc°):²⁸ *not sensitive to Superiority*: it does not matter in which order wh-phrases will check their inherent focus features and check the *attract-all-focus* feature of the attractor (the same number of maximal projections is crossed).”

Gavarro et al, 2009

As a result, Polish shows a different syntactic pattern in its multiple wh-fronting: the grammar permits intervening elements to appear after the first wh- constituent, between the Interrogative and Focus heads. In terms of Superiority, the effects are more limited than in Bulgarian: Superiority effects are obtained between the first and second wh, but not between wh₂ and subsequent questions.

Gavarro et al (2009) report the results of a repetition task with 3-5 year old Polish and Bulgarian-speaking children. They gave the children single and multiple wh-questions to repeat, and included some that were ill-formed in one of the languages, for example, with intervening material or Superiority “violations” (note that these would not count as problems in adult Polish), or in situ wh (disallowed in both). The results revealed awareness of the language-specific properties of multiple wh interrogatives: The Bulgarian children avoided intervening constituents (by omitting them) and Superiority violations (also by omitting constituents, sometimes reversing them). The Polish children allowed intervening constituents and although they sometimes omitted one of the wh-words, they did not reverse the order of wh-questions. Both groups corrected some in-situ wh-constituents by fronting them.

²⁸ Since Chomsky (1995) it is believed that one and the same head can attract a particular feature more than once.

What can we conclude? The cross-linguistic variation itself--in a very rare phenomenon---points toward very early articulation of both different nodes and different feature content of these nodes, leading to different kinds of obedience to superiority. We have suggested that they exhibit parameter-like linking based on the Head parameter the first step of which may be set early (Wexler (this volume) While many details remain to be worked out, the central contrast is that the appearance of exhaustive pairing is constant across all of these languages, while obedience to superiority shows a wide variety of language-specific variation. For instance, Multiple-Wh-fronting languages move to Focus as well as CP. The principle of Superiority appears to be a UG universal that shows its presence in rare data despite apparent counter-examples (D-linking).

The facts across languages strongly suggest that children must follow an acquisition path that allows demarcation of different modules of the grammar in order to guarantee learnability. The child must not be misled by discourse-linking into thinking superiority violations are acceptable. How to conceive of the path of acquisition with interacting modules that engage discourse as a part of Information Structure is an important task on the acquisition theory agenda.

4.0 Barrier Theory and the Strong Minimalist Thesis

4.1 Long distance movement

One of the most active areas of research in wh-questions is concerned with islands (Ross, 1967, 1986) or barriers to movement (Chomsky 1986), for example from two clause sentences. This work takes on special significance in acquisition because it promises to reveal what children know without being taught, namely, some abstract properties of Universal Grammar (de Villiers 1996).

We assume that in a multi-clause sentence like (69), the wh-form moves through all intermediate possible landing sites, namely the CP at the front of each clause, but fails to stop if its features are not perfectly matched.

If a landing site is not “open,” the movement cannot advance. In (69), there is an open CP (CP₂) in the “bought” clause, but there is no matching feature, so the wh-word advances to CP₁, where it does match the feature.

- 69) What did the boy say he bought ____?
 [CP₁ [Wh+direct Q] [CP₂]]

By contrast, an indirect question in (70) will move to a CP position with the right features to host an indirect question:

- 70) John learned how to play baseball
 [CP₁ learn [CP₂: +indirect Q]]
 +indirect Q =====>

The *how* stays below in CP₂ because the word *learn* “projects” a possible indirect question in the CP of the following (lower) clause. That is, the verb has as part of its lexical entry the possibility that it can take an embedded or indirect question. Example (70) is an indirect question and the *how* in (70) is not actually answered, unlike a real question (71),

- 71) How did John learn to play baseball?

Finally, long distance movement is not always permitted in the adult grammar. Consider the following context: a woman buys a car on Monday, using her lottery winnings. On Saturday she calls her brother to tell him all about the lucky break she got. If the question were:

- 72) When did the woman say she bought the car?

The question is potentially ambiguous: either Monday (when she bought it) or Saturday (when she told her brother). However, if the sentence includes a *wh*-word in the middle, or “medial” complementizer position, CP₂, as in (73),

73) When did she say how she bought the car?

[CP₁ (+ Q) [CP₂ (+indirect Q)]]

The long distance interpretation of the *wh*-question *when*, namely “when she bought the car” (Monday) is now unavailable because its path through the landing site in the intermediate or medial CP, is blocked by the complementizer *how*. The lower clause is called an “island” (Ross, 1967), and the elements in it “cannot get out of the island.” The principle is that the path, namely each CP, must be open at every point for long distance movement to be allowed. In the case of an island sentence, the short distance reading is still possible, namely the one in which the *wh*-word originates next to the verb *say*, i.e. “when she said it” (Saturday).

Islands for movement formed the heart of theoretical work for 25 years and, eventually, spawned the concept of Phase. Evidence for islands was itself abstract or defined by “absence”: movement rules, such as *wh*-movement, do not permit extraction from islands. Islands include relative clauses and other complex NPs, indirect questions, or more generally, complements with a *wh*-word (*when does John know how to sing *t*), and adjunct clauses (*what did John drink milk after eating *t*).

Children obey these never-articulated constraints.²⁹ Experimentation clearly supports the classic

²⁹ Violations occur, but very rarely, and those that do may be based on echo-focus:

“what do dogs sweat through their ___”

Errors are virtually unattested in typically developing children (but see Wilson & Peters, (1988) for an unusual case from a blind child). These cases call for an explanation as well. One possibility is that they are based on Focus from a previous sentence:

argument that UG places boundaries on grammatical interpretations. Young children are presented with questions following stories that provide potential and plausible answers for both interpretations, essentially, pragmatically inviting violations. The earliest such study was that of Otsu (1981), who looked at children's answers to wh-questions containing relative clause barriers. Otsu tested whether preschool children would allow a wh-question to come from inside a relative clause. His stories were designed to make the blocked interpretation salient, for example:

74) This boy is painting a picture of a bird with a blue brush.

The bird has long wings with pink feathers.

Question: What did the boy paint a bird that had long wings with?

Adults can only get the reading "a blue brush." The answer "pink feathers," would require the what-question to move from inside the relative clause, "the bird that had long wings." Otsu's 4-6 year olds did respect the relative clause barrier, though the performance was not perfect until children gave other proof that they could comprehend relative clauses. In later work with relative clauses, de Villiers and Roeper (1995) used adjunct questions instead of arguments, and their 3- to 5-year-old subjects were very good at avoiding long distance readings with relative clauses. However, in a larger sample of children, the barrier of relative clauses was not as strong as the barrier of wh-complements (almost 20% errors compared to <10%: de Villiers, Roeper, Bland-Stewart & Pearson, 2008), a fact that still deserves further exploration³⁰.

"people sweat through their SKIN"

with a kind of phonological Focus-based Radical Reconstruction allowing syntactic violations (see discussion of Bulgarian and copying below, as we argued above.

³⁰ One approach to these facts might come from considering Extraposition. If the relative clause is extraposed, as in:

a woman came in [who wore a mink coat]

In another early study, de Villiers, Roeper & Vainikka (1990) compared 3-6 year olds' answers to a variety of different forms of adjunct and argument questions, with either no medial *wh*, argument *wh*, or adjunct *wh*. Children as young as age three and a half allowed long distance movement of *wh*-questions. They heard stories followed by ambiguous questions that permitted the children a choice between two interpretations of the site of the *wh*-trace. For example, the following short story (75), accompanied by pictures for the children) was used to set the stage of the ambiguous question in 76:

75) Story:

This little girl went shopping one afternoon, but she was late getting home. She decided to take a short way home across a wire fence, but she ripped her dress. That night when she was in bed, she told her mom, "I ripped my dress this afternoon."

76) Question: When did she say she ripped her dress?

The two possible interpretations of the question are reflected in the story: Is *when* connected as an adjunct to say, or as an adjunct to *rip*?:

a) When_i did she say [trace_i] she ripped her dress? (at night)

OR

b) When_i did she say she ripped her dress [trace_i](that afternoon)

the relative is now attached to the topmost CP, but it has escaped the NP-island. Therefore its barrier status is weaker. If the child performed extraposition automatically it would be outside an object NP as well: [the bird] [that flew with long wings t]].

The 3- to 6-year-old children in the study readily provided either answer to questions like (76), suggesting that they do permit long distance movement. de Villiers, et al (1990) tested whether the same children would block LD interpretations in the presence of a medial wh complementizer. Consider question (77) with a medial adjunct

77) When did she say how she ripped her dress?

[CP Q when] [CP2 indirect Q how]

Here the answer “that afternoon” is blocked. The initial small study confirmed that 3-6 year old children obeyed these barriers to LD movement. In a follow up study, de Villiers & Roeper (1995) tested a small group of children throughout a preschool year every three or four months, and again found that barriers were obeyed. Vainnikka and Roeper (1995) showed that children obeyed barriers even when the barrier was completely invisible, choosing an answer that was depicted in a picture but never mentioned. The barrier was invisible because it involved an Operator linked to a hidden relative clause:

78) The boy bought the lemonade [Op to drink t].

The NP *the lemonade* is the object of both *buy* and *drink*. The derivation links the *lemonade* to a hidden Operator in a purpose clause inside the NP which behaves like a relative clause:

79) [bought the lemonade which was to drink]

and therefore does not allow an adjunct *where* to be extracted from it:

- 80) “The boy wanted to drink lemonade under a tree
 [picture of boy buying lemonade at a stand]
 Where did he buy [it OP to drink t]] t → lemonade stand (where-buy),
 *under a tree (where-drink)

The conclusion is inescapable: Children allowed movement across clauses only when appropriate in UG.

However, the theories behind the linguistic phenomena continue to evolve.

Rizzi (1991) pointed out that there are important distinctions between movement possibilities for adjunct versus argument questions. Argument questions (*who, what*) circumvent barriers and allow movement more easily than adjuncts (*how, when, where, why*). When one compares the long distance movement possibilities of different questions, this distinction becomes significant. Compare the adjunct question in (81a) with the argument question in (81b) where we can see exactly that a non-obligatory adjunct will block long-distance movement of an adjunct-wh, while the obligatory argument-wh is not blocked:

- 81) a) When did Mary ask how to help?
 b) Who did Mary ask how to help?

The answer to (81a) is unambiguous: the question is about when Mary asked the question, not when to help, that is it is acceptable under the reading where the trace is in the first clause. But given some reflection, the answer to (9b), is ambiguous: it could be asking who Mary asked, or it could be asking who she wanted to help. In (81b) the long distance reading of *who* is possible. The wh-word seems to have moved long distance despite the intervening how question³¹.

4.2 Relativized Minimality and the Argument/Adjunct Distinction

³¹ Even though their explanation in the current frameworks is less clear, these facts still stand.

A variety of theories can explain these phenomena but the core contrast between adjuncts and arguments is captured by Rizzi's theory of Relativized Minimality, the precursor to the intervention concept we discussed above:

82) In a configuration: X...Y...Zn

X cannot govern Z if a closer governor of the same type is available.

Types = Argument (what, who) or Adjunct (where, why, how)

Since in (81a) the *how* is closer to the trace than *when*, it blocks the proper government of *when*. However, in (81b) the *who* is the closest *argument* to the trace and the intervening adjunct (a different Type) does not block it. Children's responses indicate clear knowledge of this distinction (de Villiers et al 1990, 2008).

In related work, Goodluck, Foley and Sedivy (1992) found children did not allow extraction out of entire clauses that are adjuncts (e.g. temporal adverb clauses), and other adjuncts have also been explored (see de Villiers et al, 2008).

In general, the results reveal extraordinary conformity to barriers, even in large-scale studies of typically developing children, and even in children with language delay (de Villiers et al 2008). The basic results on similar structures have been confirmed in German and French (Weissenborn, Roeper & de Villiers, 1995), Dutch, Italian, Spanish and Greek (Baauw 2002, Leftheris 1991), and Arabic (Abdulkarim & Roeper, 1997, Abdulkarim, 2001) (for an early review see Roeper & de Villiers, 1993).

There are several fascinating questions that remain unanswered in this literature. For instance, what happens in a language with no *wh*-movement, like Chinese or Japanese? Do children still show resistance to interpretation of *wh*-questions from inside an island? (See Otsu and Sugiyaki (this volume) for discussion of Asian grammars.)

Perhaps most bewildering of all, but overlooked at the time, is the fact that long distance interpretation was so popular a choice for children, though not for adults. In general, four year olds in the absence of a barrier provide long distance answers about 70% of the time, the opposite of the adult preference for a short distance construal. This fact revealed the striking difference between no-barrier and barrier sentences (where long distance responses were less than 10%). But the strong preference for LD movement seemed to violate our expectations of natural economy: why would children prefer long movement to short? Why is the lower clause the preferred origin of the wh-question?

Two decades later we see the result as a clue to deeper UG principles and to a second robust finding, namely, the fact that children often prefer to answer the medial question in a question such as:

83) When did she say how she ripped her dress?

For example, children might answer this by saying “the fence tore it”, that is, answering the medial *how*. This type of answer is curious because it has no basis in adult English, but it is permissible in other languages. As we shall see, the explanation ultimately goes to the heart of modern Phase theory.

4.3 Phase Theory, Spontaneous Partial Movement and Interpretation

The option for more local movement, resulting in a medial direct question in a sentence, exists in some dialects of German and other languages such as Hindi and Romani (McDaniel 1989; McDaniel, Chiu & Maxfield 1995)). Recent reports have distinguished several varieties in the world’s languages and there are some important recent analyses of the adult data (Dayal 2000; Abdulkarim 2001; Fanselow 2005; Schulz 2004; Oiry & Demirdache 2006). In these languages, a lower-clause wh-question word moves only to the medial CP where it has the status of a real question and is pronounced. Thus its movement is locally constrained. Such constructions

are called Partial movement (that is, the wh movement is only to the first or embedded CP) and they occur in languages that also allow in-situ wh-words (Fanselow 2005). They are marked by a second wh-word in front, usually identical. In fact, identical copies sometimes occur almost unnoticed in English:

84) HOW did you say how you were able to fix your bike?

Most people answer how-you-fixed it (with a screwdriver), not how you said it (very loud).

Across languages, there are several varieties of constructions that have medial wh-words serving as direct questions (Fanselow 2005 for an overview). In the extreme, there is Simple Partial Movement, that is cases with no marking in the top clause except perhaps an invisible Q marker for Force, that is indicated by intonation. SPM always co-exists in languages that also have full wh-movement and wh-in-situ. The example below in 85) is from Slave (Fanselow), but this form is common in Malay languages (Cole & Hermon 1998):

85) a. Raymond [Jane judeni ri yili] kodhisho
Raymond Jane where FOC 3-be 3-know

b. Raymond [judeni Ri Jane yili] kodhishi
“where does Raymond know that Jane is”

More common is a medial wh with an initial overt Q particle or wh-question word that tends to be the most unmarked form in the language, such as *was* in German (Partial Movement) (Fanselow 2005):

86) WAS glaubst du Wen Irina t liebt what believe you
Who-acc Irina loves “who do you believe that Irina loves?”

And still more common is Copying, in which the medial question word is echoed in form by the initial question word as in German and Frisian (Fanselow 2005):

- 87). Wo denkst du wo sie wohnt
 Where/what think you where she lives
 “Where do you think she lives”

The jury is still out as to the relationship among these forms, and why the varieties occur. Some theorists lump them into one category, and others consider the differences significant. Hiemstra (1986) suggests what is shared and what is different across the constructions.³² She argues (as do others) that wh-movement is always the movement of a wh-feature. But languages vary as to what needs to be “pied-piped” when the wh-feature moves. In long distance wh-movement constructions, the whole feature matrix, including the phonetic matrix, of the wh-phrase is moved. Other languages may allow nothing except the wh-feature to move, in which case it must be spelled out in the landing site. It will be usually phonetically realized by the most unmarked wh expression of the language: *was* in German, *wat* in Frisian, *kyaa* in Hindi, etc.

4.3.2 Wh-Copying and Indirect Dependency

³² Under Feature theory it is not clear what motivates two movements if every movement requires checking off a feature.

Schulz (2004) suggests that movement to medial wh- satisfies a Focus feature, not a question feature. Were it a real indirect-Q feature it would be immune to movement under Rizzi’s notion of Criterial Freezing (2006), which blocks extraction from a classic indirect question:

*who do you wonder__went

If movement to a Criterial position occurs, satisfying the indirect Q, then no further movement is possible. (See Rizzi (2006) for a full explanation.)

Finally, there is the possibility of featural pied-piping in which person-number features of the wh-phrase are also moved: the feature complexes copied upwards like [wh, 3rd sg., acc] will then be spelled out as the corresponding wh-words. This gives rise to the Copy Construction. However, Wh-copying is ungrammatical with complex Wh-phrases: the copying seems to be restricted to pronominal features (Chomsky 1981) and cannot carry sufficient feature information to realize morphologically a complex Wh-phrase like “*which boy*” (Thornton, 1990).

88) Wh-Copying: Complex (PP) Wh-Phrase:

*Miti welchen Jungen glaubst du mit welchen Jungen Hans spricht?

“With which boy do you think with which boy Hans talks?”

A further dimension of theoretical interest is the analysis of these forms as either ‘direct dependency’, in which the lower clause is subcategorized by the top verb, or “indirect dependency”, in which the lower clause is essentially an adjunct or a separate sentence like (Dayal 1994, 2000):

89) What did you say - where are we going tonight?

We will attend to the fact that the different types occur in children learning different languages to different degrees, a fact that requires some explanation. In addition, we believe that the best evidence is for a direct dependency analysis in the case of the child’s grammars, but it is still an open question as we shall see.

Throughout the work on comprehension of complex questions, we originally intended the medial question (e.g. *what* in 90) in our stimulus sentences to be merely the “barrier” to long distance movement of the *how*. But children answered the medial, to our surprise.

90) How did she say what she bought?

Adult answer: "She whispered it"

Child answer: "Cake"

Furthermore, although the error is common at 3 and 4 years of age, it persists until children are 6 or 7, and even longer for children with language disorders (de Villiers et al, 2008). We recognized the error as a reflection in children's grammars of what McDaniel had pointed out as Partial Movement in several languages (de Villiers et al, 1990). The medial answer has been found in six languages (Roeper & de Villiers, 1993), and prominently, in L2 acquisition by Asian, French, and Basque learners (See Schulz 2006; Liceras 2010)

As discussed earlier, Thornton (1990) found production data in an elicitation paradigm suggesting that children adopted these alternate grammars. The majority of questions of this sort matched the medial-Wh questions and the initial Wh-phrases, as illustrated in (53):

91) Who do you think who is in the box?

What do you think what Cookie Monster likes.

Two children who asked medial-Wh questions also asked questions in which the Wh-phrases did not match, as shown in (92):

92) What do you think who jumped over the fence?

So Copying was more common than Partial movement, and no Simple Partial Movement was observed.

Yet children in different languages use one or more of these types to different degrees. For example, as well as Partial movement, Simple Partial Movement (no overt initial wh) occurs in French-speaking children

(Oiry & Demirdache 2006):

- 93) Tu crois quoi qui est caché dans l'sac ? Oiry (2002)
 you believe what C-that is hidden in the-bag
 'What do you think is hidden in the bag?'

They argue that there is a non-lexical Q morpheme in French that licenses both wh-in-situ —be it in the child or the adult grammar— and partial wh-movement in the child grammar. But other forms are also observed in French with the form *Qu'est-ce que*:

- 94) Qu'est-ce que tu crois qu'est-ce caché dans le sac ? Oiry (2002)
 what-is-it-that you believe what-is-it hidden in the bag
 'What do you think that is hidden in the bag?'
- Qu'est-ce que tu penses qu'est-ce que j'aime lire ? Strik (2008)
 what-is-it-that you think what-is-it-that I like read
 'What do you think that I like to read?'

Qu'est-ce que is exclusively a matrix question, and cannot occur in the medial position as an indirect question in adult French.

Oiry and Demirdache argue that children who produce these forms have a grammar that allows essentially juxtaposition and coindexing of two matrix questions at the initial stage. They make an analogy between this and the "indirect dependency" analysis of Hindi in Dayal (1994, 2000). In Hindi, the in-situ wh-phrases each move at LF to the specifier position of the CP dominating them, yielding two local wh-dependencies. The connection between the two clauses is established indirectly by coindexing the matrix wh-phrase and the subordinate wh-question. In French LI, Oiry and Demirdache see reflections in overt syntax of this strategy at an early stage.

Oiry & Demirdache propose a developmental sequence for French in which children's grammars progress from

- “1) an indirect dependency stage which involves simultaneous local covert or overt movement of an argument wh-phrase in both the matrix and the subordinate clause;
- 2) a direct dependency stage involving local wh-movement to the subordinate Spec CP —licensed by an expletive Q morpheme in the matrix; and
- 3) a long movement stage which involves either overt or covert movement of an embedded wh-phrase to the matrix Spec CP”.

This account is quite natural under the view that new material is initially subject to a) Merge over Move and High Attachment.(Adjoined at the Root). The new merged structure now entails that the wh-word c-commands the rest of the clause and the child to seek the creation of an internal merge relation...and a covert movement analysis becomes possible. In other words, the wh-connection shifts from a co-indexing to a movement representation.

4.3.3 Evidence for Movement

How can we tell if the relation is one of movement or co-indexing? Abdul-karim (2001) showed in a subtle experiment that movement must be involved. We know that negation is a barrier to adjunct movement. If there is covert movement in these copied forms, then the presence of intervening negation should force a short-distance answer. Abdul-karim used examples like:

- 95a) why did she say why she slept
- b) why didn't she say why she slept

Children from ages 3 to 5 strongly preferred the long distance reading for (a) and the short distance reading for (b). This provided dramatic proof that movement is involved.

Furthermore, how much is moved—how much is “pied-piped” along—is also a source of variation in

languages, but some occurs in production as Thornton (1990) has shown. In Thornton's study, the children seemed to resist Wh-copying of complex wh-forms, though a couple were recorded:

96) Ben 3;11

What one do they think what one has the big marble?

Katie B. 4;4

What ones did they guess of these guys what ones they kicked in the leg?

Notably, these copies occur only with Tensed clauses—this fact will figure significantly in our proposals about how to capture children's grammars.

Children who produce these copied structures also judge them to be grammatical in judgment tasks (McDaniel, Chiu and Maxfield, 1995). So spontaneous production, comprehension and judgment evidence all demonstrate the child's attraction towards a non-target grammar reflecting Partial movement. Such findings have been reported in children in several other languages both in comprehension (Weissenborn, Roeper & de Villiers, 1995; Greek, Leftheri, 1991) and in elicited production (Oiry (2008), Jacobowicz & Strik (2008) and Strik (2009)). We conclude:

Children adopt a partial movement option in their productions in the preschool years.

The evidence provides strong, spontaneous support for cyclic syntactic movement and the psychological reality of invisible chains. In sum we have found not only evidence for cyclic chains in the acquisition data, but evidence on five varieties:

Co-indexing: what (do you think?)..... who did it (indirect dependency)

Copying: what did he say what...?

Simple Partial movement: Invisible Op.....wh

Pied-Piping: which animal did he say which animal

Partial Movement: How.....what.....

The data is not fine-grained enough for us to see if all children pass through distinct stages---or how far they vary across languages—but they all occur as spontaneous behavior even when not in the target language. Collectively, they show that not only the chains, but the content of chains [trace, copy, wh-expletive] are represented in the child grammar.

One fact remains to be explained: comprehension--- interpretation---reflects these options longer than production. The interpretation we will now argue engages the interface properties of Phase theory.

4.3.4 Interpretation: child evidence for grammar’s primary Interface

What governs the interpretive consequences of partial movement? Is the medial answer by children identical in meaning to the adult semantics of partial movement? A tantalizing asymmetry remains: the preference for the medial interpretation remains longer than partial movement in production.

To address these questions, we need to return to first principles. What mechanism exactly blocks movement? Barrier theory is open to many technical representations. How can children know a property of UG which, to the average person, seems so arcane? And yet the most abstract principles, like gravity, are never obvious on the surface of phenomena. We shall argue that an explanation emerges from a different angle, involving the interface of Phase theory with semantics. The child’s interpretation follows from a principle that dictates locality for both syntactic chains and semantics.

Until recently in syntactic theory, “islands” to movement were the constraints that needed to be explained, and long distance movement was considered the normal condition. However, in the most recent versions of Minimalist Theory (SMT; Chomsky 2006), a new concept has emerged for what were regarded as “islands” to movement, now called a “Phase.” Chomsky argues that under ideal circumstances, the syntactic

component transfers its contents to the phonological and interpretive components of the language system one “phase” at a time:

“There are Transfer operations: one hands the Syntactic Object (SO) already constructed to the phonological component, which maps it to the Sensori-Motor interface (“Spell-Out”); the other hands SO to the semantic component, which maps it to the Conceptual-Intentional interface. Call these SOs phases. Thus Strong Minimalist Thesis 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.”

This may seem like a highly technical claim, but at bottom it is very intuitive and opens a new vista of explanation and motivation for the acquisition path. It explicitly argues that the semantic interpretation occurs cyclically. Thus in the ideal scenario, a wh-word will move to the Head of a Phase, and be pronounced and interpreted there.³³ But then the basic fact of wh-displacement across a clause boundary (in English) is in competition with the more general principle of “locality,” namely, completing the operation within the clause, or more precisely, the Phase. In an English 2-clause sentence, as in (97), the wh-word moves to the front of the sentence, to CP₁, and leaves an unpronounced trace at CP₂.

³³ This is a simplification of the discussion. Under the view that the Phase-Head is processed in the next Phase, then the wh-word would not be a part of the lower Phase. Under a notion of “inheritance”, it could be. We believe that these issues should be resolved with attention to the acquisition data. See Hornstein, Nunez & Grohmann (2005), and Boeckx (2008).

97) [CP₁ What did John say [CP₂ trace he bought trace]]

Nevertheless the SMT now asserts that the ideal grammar would prefer to move, pronounce, and interpret a wh-word at the boundary of the first Phase, namely the subordinate CP, not the matrix CP or sentence initial position where English speakers pronounce it. Therefore the child should interpret the *what* at the first Phase boundary where it delivers the meaning *what-bought*, i.e. what was actually bought, and not *what-said-bought*. This is exactly what happens. However, there is an additional semantic and pragmatic step in that we, and the child, answer a question by connecting the semantic meaning [he bought something+Q feature, and possibly a set of possible alternative answers] to the world.

The SMT thus leads us to expect an interpretation of the intermediate wh-word. Interpretation of the lower clause is called for whenever the IP Phase Edge is met, and indeed *how* should be interpreted in the lower, not the upper clause in (98).

98) When did John say [how he played baseball]?

Children would answer how-he-played, not how-he-said.

The idea that producing overt medial wh-words is linked to a parallel interpretation preference receives direct support in the work of Oiry (2008). She found that exactly those French children who in production added a lower copy also interpreted the medial question with respect to only the lower clause.

But there is a further discovery in acquisition, and that will involve further theoretical steps, many of which are at the edge of contemporary theory. Children interpret not only overt wh- words, but traces as well as connected only to the lower verb:

99) [she bought a cake but said she bought paper towels]

“what did she say [t she bought t]?”

The error here is that children answer with the “truth” *what she bought* (“*paper towels*”), not *what she said she bought* (*a birthday cake*). (especially de Villiers 1999, 2005; de Villiers & Pyers 2002).

In other word, the child is led into two errors in a language like English: direct questions as overt medial wh-words, and interpretation of a trace inside the lower clause with no scope from the first clause. How does the grammar recover? How do we account for this unusual interpretation of a trace—quite different from adults? Does it reflect a natural step in UG inasmuch as it occurs “spontaneously” without adult examples of any kind?

The steps or triggers for this process of change are still speculative, though we know it seems to occur between 4 and 7 years (de Villiers & Pyers 2002; de Villiers et al 2008). A theory of acquisition that accommodates interfaces must incorporate the impact of semantic and pragmatic properties. In keeping with Chomsky’s early remark (1976) that acquisition is consistent with “triggering experience”, the experience involves the semantics and the pragmatics as well. By considering these properties, we are led to an account of the child and adult grammar that captures several lines of reasoning at the edge of current syntax (Chomsky (2005, 2008)).

To summarize briefly: the SMT captures a UG linguistic default, namely, Interpret at each Phase. From there it leads to an important pragmatic step: It leads to the child’s interpretation of the wh-word within the lower clause and an interpretation of the semantics in the world. We take it as a natural concomitant to semantics that the child will seek a pragmatic interpretation as well, that is, to link the meaning to context. This forces a factive or a “true” answer, which is exactly what children produce. Speaker-factivity arises in the adult language in many contexts as well with particular (factive) verbs and adjectives Kiparsky & Kiparsky 1976; deCuba 2006):

:

100) John was surprised that Bill played baseball.

John revealed that Mary was dead.

You cannot reveal something that is not true.³⁴

It has been argued by some that adults retain a factive reading as well for Partial Movement constructions (Herburger 2001): that in a sentence,

101) was hat er gesagt was er gekauft hat

(what did he say what he bought)

it is only possible to ask a question when what he said he bought was what he actually bought. If true, how does a subordinate clause get its property of non-factivity, or opacity?³⁵ Put differently, this tight constraint would seem to make LD movement itself impossible. It is clear that verbs subcategorize not only whether they take a CP at all, but also for what its properties are with respect to the tense (finite, nonfinite or subjunctive). So the higher verb can prevent, by projection of critical features onto the lower CP, the immediate phase-interpretation of a clause. Until the child recognizes the projected (inherited) feature on the lower CP, we argue that it must be interpreted.

4.4 Tense, Propositionality and Point of View

³⁴ This is not to overlook the fact that in real discourse, almost anything can be cancelled.

John revealed his promotion with great fanfare, and then it turned out not to be true.

John saw his mother in the kitchen, but it turned out it was someone else.

Nevertheless factive clauses must be seen as true propositions because they function as presuppositions for later discourse.

³⁵ These are widely discussed in philosophy as “opaque contexts” because the truth of the lower clause is not from the speaker’s perspective.

How and where exactly does the grammar project propositions? Tense, or finiteness, is the domain in which truth or assertion seems to operate. For example, Klein (2006) discusses the notion of finiteness or FIN as follows:

“FIN carries (at least) two distinct meaning components:

1. The tense component: it marks past, in contrast to present or future;
2. It marks that an assertion with respect to whatever is said is made — in contrast to the possibility that no such assertion is made.”

It is the TENSE marker that commits the sentence to being a proposition (as was recognized in early labels: “Tensed-S Propositional Island” or more recently “Phases are propositional” (Chomsky (2007: 107)). Pesetsky and Torrego (2001) and Chomsky (1995) have all argued that the Tense marker must covertly move to the CP, that is, in languages where there is not overt V2 movement. We propose a further purpose for this covert movement, that the Tense carries a feature for Point of View which is responsible for making the clause opaque.

While research on Point of View has traditionally been linked to indexicals (*I, you*) and locatives (*here, there*), it can be extended to marking Subject (not speaker) perspectives on opaque domains by putting a PoV marker into the CP of the lower clause (and a Default Speaker PoV in the matrix clause) as argued by Hollebrandse & Roeper (1998); Hollebrandse (2000); Speas (2004), Kratzer (2002) and de Villiers, 2005). Following the literature that links Tense and the Propositional Islands, and Klein on the notion that Tense carries Assertion, we argue that the Tense node also carries a POV feature which must be in agreement with the POV element in the CP. Building on the claim that Tense moves to CP covertly, we now argue that it has both a syntactic and a semantic motivation if POV shift is involved, following the spirit of the SMT. That is, the PoV feature on Tense carries a default Speaker value unless and until it is moved to the CP where it is “re-valued” by the POV because of the lexical properties of the higher verb projection. The upper verb imposes its PoV on the

lower proposition:

wonder => Spec- C

+Ind Q +IndQ

+Subj-PoV +SubjPoV

In such opaque environments, stated technically, the higher verb forces the lower CP and TP to “inherit” its projections, which includes complementizer, indirect Q marker, and PoV (speaker or subject).

When the TENSE marker moves to the CP, then at the CP it can be in agreement (Spec-Head) with a PoV marker projected by the higher verb, which is linked to the matrix subject—a topic which we articulate further below. This approach captures grammatically at least part of the phenomenon of opacity.

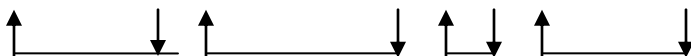
This view that some form of Agreement must occur between the CP and the IP (see also Klein, 2006) constitutes a further acquisition step for the child, and one that is apparently not immediately made. In the absence of that agreement, the child assumes the Speaker’s Point of View on the assertion, rather than the matrix Subject’s Point of View. As a result, it is factive, or a true assertion as far as the speaker is able to claim. True subordination of the clause occurs when there is an agreement between the CP and IP, that allows the matrix Subject’s Point of View onto the clause, hence it allows lies, mistakes, false beliefs:

102) She said she saw a UFO.

Consider then the wh-movement derivation of the long distance question in the adult grammar:

103)

CP [What did TP [t she say CP [t TP [t she saw t]]]]



Step 4

Step 3

Step 2

Step 1

104) Stage of derivation:

- i) She said [[she saw what?]]
- ii) She said [[what she saw]]
- iii) She said [what [she saw]]
- iv) What she [[said she saw]]
- v) What did she [[say she saw]]

In step 1, the *wh*-question moves to the edge of the IP Phase, perhaps into Topic position, where it retains its original full copy meaning.³⁶ with a Default Speaker-PoV. In step 2, it moves to the next Phase, namely CP, and it must have an open PoV value to take on the subject PoV in the CP. In step 2, however, the *wh* inherits the PoV of the subject from the verb *say*, so that the answer to the question is no longer just what was *seen* but what she said she *saw*. In step 3, it moves to the edge of the sentence to the second Topic position, then in step 4 it moves to spec-CP of the matrix clause, where it is pronounced as a *wh*-question. (de Villiers & Roeper, 2009).

Why do children interpret the *wh*-word in the lower clause? A recent line of research on movement (Miyagawa 2006; Sauerland & Elbourne 2003) has identified Total Reconstruction. The idea is that a kind of movement exists which occurs at only Phonetic Form or PF. From the hearer's point of view, Total Reconstruction means reconstructing the word in its original position. But this Total reconstruction at PF is blind to semantic and syntactic effects. Normally, an interpretation is contingent not just on where an element started out in the phrase marker, but also on its final position. A moved constituent derives part of its meaning from its

³⁶ Topic position is most likely given the existence of *wh*- in exclamatives such as

What nice clothes you are wearing!

Notably, they do not entail inversion, so the *wh* is not in spec-CP.

new position³⁷.

In Total Reconstruction, the wh-element is completely reconstructed to the place where it started out.

Thus the child who hears:

105) What did she say [t she bought t]

reconstructs:

106) ? she said [what she bought]

and then

107) she said she bought what

In this way, the interpretation depends only on its original position in the lower clause. Then when it moves to the edge of the first phase, it gets an interpretation solely within that Phase. Adult wh-movement entails interpretation at both the original and the landing sites, i.e. both PF and LF (Logical Form) changes.

The possibility is that the child begins with Total Reconstruction in wh-movement, although it eventually occurs only in scrambling, binding, and echo environments in the adult grammar.³⁸ Miyagawa (2006) argues that

³⁷ An example is binding:

Which picture of Bill did he like? [Bill = he or someone else]

He liked which picture of Bill [he = someone else]

where Bill is higher than he only after movement has occurred.

³⁸ Thanks to S. Cable for suggesting this possibility to us.

We have argued that when the Tense moves to CP, it carries a PoV Feature. What happens if there is no Tense node, for instance, as is arguably true for infinitives? Here we make a sharp acquisition prediction. If the construction has no Tense, such as an infinitive, then it will also carry no PoV shift. Therefore we should find that children do not produce errors on wh-extraction from infinitives. This is exactly what seems to occur.

110) What did Mary want to buy?

Children have no difficulty with 110) even though opacity and a possible truth-contrast remains: what she actually bought may not be what she *wanted* to buy. The same children at 3 years old children who do not mistake *what she did buy* for *what she wanted to buy* do mistake *what she bought* for *what she said she bought* (de Villiers, 2005⁴⁰).

This underscores the syntactic nature of the acquisition path: it is specifically the derivational path of the syntactic chain, not simply a contrast between reality and what a sentence expresses which the child must master. In sum, we have argued that the CP can carry a Subject-PoV, linked to Tense, which produces opacity in the realm of truth. The child's grammar must incorporate the PoV feature onto the subordinating CP, and also form an Agree relation to the Tense of the lower clause. We correctly predicted that infinitives, lacking a Tense, would not force a clash, though more targeted research is necessary.

In conclusion, we have seen that the acquisition evidence uniquely highlights the power of the Strong Minimalist Thesis, itself the first and strongest interface claim in minimalism.

5.0 Conclusion

⁴⁰ But see Perner, Sprung, Zauner & Haider (2003) for an explanation in terms of the different conceptual development of desires and beliefs. Though this is undoubtedly a factor, there remains a contribution of the syntax of these expressions, even in German *that* clauses with *want* (see de Villiers, 2004).

The domain of *wh*-questions provides an illustration of the expectation that subtle acquisition data can provide unique evidence of core, but empirically obscure, properties of grammar.

We have reviewed three major areas of *wh*-question acquisition, relating to the movement rules in simple sentences, the logical properties of *wh*, and the barriers that constrain movement across clauses. Here we summarize the major points from each domain, and point to the unanswered questions.

- 1) Landing Site: is the landing site the same for adults as it is for children, in spec-CP? We have argued that given the nature of cross-linguistic variation in such nodes as Focus and Topic, it is not likely that the child at age two can fully determine the structure of the left periphery.
- 2) Lexical specificity: English data suggests considerable lexical variation in *wh* and auxiliary, justified by the uncertainties of the adult language. However cross-linguistic data contradicts the lexicalist position that the forms will be learned piecemeal: the lexical variability complicates acquisition, which makes it more difficult to recognize the productive UG principles.
- 3) Principles of economy: we have argued for a) Single Module principle for acquisition, and provided evidence for b) Merge over Move, and c) Length of derivation, and d) Total Reconstruction as both guiding and constraining acquisition. The Superiority phenomena are interestingly nuanced across languages and deserve further exploration in a greater range of languages to figure out which parameters need to be set first.
- 4) Interpretation: We have argued that a) the emergence of quantification (reflected in exhaustivity in *wh*-words) is not immediate, and b) the interpretive character of the SMT overconstrains the first stage of long-distance movement. The question of whether exhaustivity is reflected in quantifiers (every, each) and *wh*-words needs to be elaborated in light of other domains of exhaustivity (cleft sentences) and implicatures.

Overall, Barriers to long distance rules have been a fixture of linguistic theorizing in theoretical linguistics for decades, and they have proved an extremely fruitful analytic instrument for child grammar.

Instead of focusing on the surprising obedience to barriers at a young age, we took a deeper look at the mechanism and argued that the child's grammar may be constrained by an idealization of the Strong Minimalist Thesis as an interface principle that combines syntax, phonology and semantics. The hypothesis that each Phase should be shipped off to interpretation leads to a unique and surprising prediction about acquisition. We put forward the theory that the child allows Total Reconstruction, essentially linking the initial wh-word to its trace in the lower clause from which it does not then escape before it is interpreted there. This, we argue, explains the pervasive facts of partial movement as a preferred option for child grammar, and children's initial inability to construe opaque complements as having a different Point of View than the speaker.

In the process, we have made a number of general claims that deserve exploration in other acquisition domains, each of which is a reflection of theoretical principles. We began with the Interface constraint, that children prefer represent a construction in a single module, to explain the possibility that children might begin with a merged Topic. We suggested that the acquisition process obeys constraint: Merge over Move. Finally we argue that Transfer occurs one Phase at a time in the child's grammar, following the SMT, giving an interpretive perspective on why partial movement exists in child language. The implications of these go beyond wh-questions, and may lead to challenges from exciting research in the next decade.

In our estimation, Wh-movement provides an unparalleled domain for examining UG, the implications of UG for acquisition, and for emerging perspectives on interfaces.

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