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Michael Tomasello
Max Planck Institute for Evolutionary Anthropology
Leipzig, Germany

The Acquisition of WH-Questions and the Mechanisms of Language Acquisition

Robert D. Van Valin, Jr.
State University of New York at Buffalo

1. INTRODUCTION[1]

It is no understatement to say that the central issue in the theory of language acquisition is whether children actually learn language and construct a grammar based on the data to which they are exposed, or whether they set the parameters of an autonomous language acquisition device (LAD), which is itself a theory of universal grammar (UG). Some of the arguments which have been taken to be the most compelling for the parameter-setting approach come from two types of cases; 1. the existence of a universal grammatical principle for which there seems to be no evidence available to children in the input, and 2. the production of forms during language development which have no direct model in the adult speech to which children are exposed but which are a possibility sanctioned by UG and which occur in other languages. WH-questions and their acquisition provide important examples of both types and have been cited in the literature as strong evidence in favor of the parameter-setting model (e.g., Chomsky, 1986; Crain, 1991; de Villiers & Roeper, 1991).

The first type of argument involves the principle of subjacency, which is proposed as a universal constraint on the formation of WH-questions and related constructions; it is illustrated in example 1.

1. a. Mulder believes that Scully hid the files.
   a'. What does Mulder believe that Scully hid?

b. Mulder believes the rumor that Scully hid the files.
b'. *What does Mulder believe the rumor that Scully hid?
c. Scully interviewed the witness who saw the alien spacecraft.
c'. *What did Scully interview the witness who saw?

Subjacency precludes the possibility of moving a WH-word out of an embedded clause which is part of a complex noun phrase (NP) (*the rumor* + clause), as in (1b'), or a restrictive relative clause (*the witness* [head noun] + clause), as in (1c'). It has long been argued that subjacency is a prime example of the argument from the poverty of the stimulus, because, it is claimed, there is no evidence available to the child regarding it in the input (Chomsky, 1986). The second type of argument involves the production by children learning English of long-distance WH-questions containing a medial WH-expression, as reported in Thornton (1990, 1995), and illustrated in example 2.

2. a. Who do you think who is in the box?
   b. Who do you think who the cat chased?
   c. What do you think what Cookie Monster likes?
   d. How do you think how Superman fixed the car?

English-speaking adults do not produce WH-questions like those in (2), but such constructions are grammatical in languages like German and Romani (McDaniel, Chiu, & Maxfield, 1995). The production of forms like those in (2) is interpreted as the child making use of an available option in UG which is, however, inappropriate for English. This is construed as evidence in favor of the parameter-setting model, since it seems to provide a ready account of why a child would produce forms found not in the language being acquired but in other languages.

In this chapter, these arguments are reexamined in light of a conception of syntax and acquisition rather different from the Chomskyan Principles and Parameters (P and P) model assumed in them. It is argued that the usual conclusions in favor of the parameter-setting approach do not necessarily follow and that there are alternative explanatory accounts which do not make the same assumptions about cognitive organization and about the mechanisms of language acquisition. The theoretical framework assumed is Role and Reference Grammar (RRG; Van Valin, 1993; Van Valin and LaPolla, 1997), a theory which posits a direct mapping between syntax and semantics in which discourse pragmatics plays an important role, but which does not postulate any covert syntactic representations or transformational-type rules. This chapter shows that a unified, motivated account of the phenomena in (1) and (2) can be given which does not involve an autonomous LAD/UG. This chapter does not argue against the correctness

or plausibility of models positing an autonomous, parameterized LAD/UG; no evidence or arguments are given to this effect. Rather, the point is that these phenomena can be accounted for without recourse to such models.

The discussion proceeds as follows. In section 2, the arguments for the parameter-setting model based on (1) and (2) are summarized. In section 3, the relevant features of RRG are presented. In section 4, the RRG account of subjacency presented in Van Valin (1991, 1993, 1995) is summarized and its implications for acquisition discussed. In section 5, the acquisition of WH-questions in both simple and complex sentences is investigated, with special attention paid to the structures in (2) in English as well as in other languages. Conclusions are presented in section 6.

2. THE PARAMETER-SETTING APPROACH

Within the P and P framework, language acquisition is a logical problem, in that the content of the LAD is deduced by means of the following formula:

3. Final knowledge state (= Adult grammatical competence)
   − Input from experience
   = Initial knowledge state (= LAD/UG)

Given a characterization of the final state of linguistic knowledge, i.e. adult grammatical competence, it is possible, it is argued, to determine the content of the initial knowledge state, i.e. the LAD/UG, by factoring out what is available to the child from experience. If there is some feature of adult grammatical competence which is not derivable from experience, then it must be a property of the LAD/UG. This is the well-known "argument from the poverty of the stimulus," and a paradigm case of it concerns the principle of subjacency, which was illustrated in (1). Subjacency restricts movement across so-called "bounding nodes," i.e. the nodes dominating certain important types of phrasal units: sentence (SN), clause (CL) and noun phrase (NP).[2] Only one bounding node can be crossed in a single movement. For English, the bounding nodes are NP and CL. The sentences in (1a') and (1b') are repeated below with bounding nodes and traces indicated.[3]

4. a. $[_{SN_1}$ What$_i$ does $[_{CL_1}$ Mulder believe $[_{SN_2}$ t_i that $[_{CL_2}$ Scully hid t_i]]]]
   b. *$[_{SN_1}$ What$_i$ does $[_{CL_1}$ Mulder believe $[_{NP}$ the rumor $[_{SN_2}$ t_i that $[_{CL_2}$ Scully hid t_i]]]]]

In (4a) *what* moves from its D-structure position as the internal argument (direct object) of *hide* to the special position for WH-words, which is outside

the clause but inside the sentence,[4] leaving a trace (t_i). This move crosses only one bounding node, CL_2. The second move to the matrix-sentence WH-position also crosses only one bounding node, in this case CL_1; SN is not a bounding node in English. Hence (4a) does not violate subjacency and is grammatical. The first step in the derivation of (4b) is the same as for (4a); the problem arises with the second step. The move from the embedded-sentence WH-position to the matrix-sentence WH-position necessarily crosses two bounding nodes, NP and CL_1, and consequently, the derivation violates subjacency, yielding an ungrammatical sentence. This constraint, as formulated in P and P theory, is purely structural and arbitrary; it is not motivated by any larger cognitive, communicative, or other considerations.

The standard argument regarding the acquisition of subjacency is that there is no conceivable evidence available to children regarding it. Children never hear sentences like (1a′), (1b′) or (1c′) and therefore, have no empirical basis for inducing the constraint. Moreover, it is argued, there is no semantic or other explanation for it. Hence, in terms of (3) it must be part of the initial knowledge state of the language acquirer; in other words, it must be part of the LAD/UG. This conclusion is apparently reinforced by the fact that in other languages, e.g. Chinese, Japanese, Lakhota, in which WH-words appear in situ,[5] subjacency still seems to be operative. Given that subjacency constrains the movement of elements across bounding nodes and there is no displacement of WH-words in these languages, Huang (1981) proposed that in these languages, subjacency applies not in the overt syntax, but at the abstract covert level of logical form. In these languages, subjacency constrains movement which is not overtly manifested, and it is difficult to imagine how children could learn a constraint on movement in a language which provides no overt evidence of movement in the first place. Thus, subjacency is argued to be a principle of the LAD/UG, based on the argument from the poverty of the stimulus. In terms of acquisition, the default settings of the parameters are "no overt movement" with respect to whether WH-movement is overt or covert and (NP, CL, SN) with respect to the choice of bounding nodes; this precludes movement out of embedded clauses completely. Encountering a sentence with a nonsubject WH-word at the beginning of the sentence, like *What do you want?*, tells the child that overt movement is a feature of the language, and upon hearing a sentence like, *What did Mommy say that Daddy brought?*, leads to the conclusion that either CL or SN is not a bounding node, since this sentence shows that movement out of embedded clauses is possible. The choice of (CL, NP; English) or (SN, NP; Italian) depends on further contrasts for which there is positive evidence in the input.

The second argument for the parameter-setting approach comes from cases in which children produce structures which are not found in the

language to which they are exposed but which are sanctioned by UG as a different setting of a parameter. In German, long-distance WH-movement of the kind exemplified in (1a′) is generally disfavored, whereas the following construction involving local WH-movement is grammatical;

5. a. Was glaubst Du, mit wem   Daniel spricht?
      what believe you with who.DAT   speaks
      "With whom do you believe Daniel is talking?"
      (McDaniel et al., 1995)
   b. Was hat er gesagt, wie er den Kuchen backen will?
      what has he said   how he the cake   bake   will
      "How did he say he will bake the cake?"
      (Weissenborn, Roeper, & de Villiers, 1991)
   c. Wie denkst Du, wie er das getan hat?
      how think you how he that done has
      "How do you think he did that?"
      (de Villiers, Roeper, & Vainikka, 1990)

In the construction in (5a) and (5b), the first WH-word, *was* 'what' is analyzed as indicating simply that the sentence is a WH-question, and the second WH-word, *wem* 'whom' in (5a) and *wie* 'how' in (5b), actually expresses the content of the question; it will be referred to as the "defining WH-expression" in the construction. In the (c) construction, a copy of the defining WH-word from the second clause occurs in sentence-initial position as well. These patterns are also found in Romani (McDaniel et al., 1995), Hungarian (Horvath, 1997), Croatian and Serbian.[6] What is of interest here is that despite the fact that English-speaking adults do not produce structures like those in (5), some children acquiring English do. Examples similar to (5c) were given in (2); examples similar to (5a,b) are given in (6), from Thornton (1995).

6. a. Which Smurf do you think who has roller skates on?
   a′. What do you think which Smurf really has roller skates?
   b. Which animal do you think what really says "woof woof"?
   b′. What do you think which animal says "woof woof"?

In (6a,b) the defining WH-expression occurs sentence initially with a nonreferential WH-word appearing medially, whereas the (a′, b′) sentences are the analogs of the German structures in (5a,b) with the defining WH-expression medially and *what* occurring in the matrix clause to mark the sentence as a question. The constructions in (6a,b) are not found in German or Romani, but they do have a possible analog in languages such as Irish (McCloskey, 1979) in which all of the complementizers in a sentence

with WH-movement show 'agreement' with the WH-element, as exemplified in (7).[7]

7. a. [$_{CL}$ Mheas mé [$_{SN}$ gurL   [$_{CL}$ dhúirt sé [$_{SN}$ gurL

            thought I   COMP[-WH]   said   he

        [$_{CL}$ thuig   sé an t-úrscéal.

        understood he the novel

        'I thought that he said that he understood the novel.'

  b. [$_{SN}$ Cén t-úrscéal$_i$ aL   [$_{CL}$ mheas mé [$_{SN}$ t_i aL

         novel which COMP[+WH]   thought I

        [$_{CL}$ dúirt sé [$_{SN}$ t_i aL [$_{CL}$ thuig sé t_i]]]]]]

        said he   understood he

        'Which novel did I think he said he understood?'

In the declarative sentence in (7a), the complementizer is *gurL*, which corresponds roughly to English *that*, whereas in (7b) the complementizer is *aL*, which is argued to be in agreement with the WH-expression or its trace. Note that even the matrix clause has a complementizer in (7b). Thornton (1995) argued that the medial WH-words in (6a,b) are complementizers that agree overtly with the WH-trace in their specifier position. Hence, these sentences are examples of complementizer WH-agreement analogous to that found in Irish.

Why would children learning English produce such structures, in the complete absence of any models for them in the speech to which they are exposed? Put another way, why would children learning English produce German-, Romani- or Irish-style WH-questions? The answer given by Thornton (1995), McDaniel et al. (1995), and others is that they are realizing one of the options made available by the LAD/UG, albeit an incorrect one for English. It is assumed that the only way that children would hit upon structures found in other languages in the absence of any empirical input is for the possibilities to be given in advance in the LAD/UG. Hence, sentences like those in (2) and (6), together with those concerning subjacency, are interpreted as strongly favoring the P and P concept of an autonomous parameterized LAD/UG and as showing that children do not simply generalize from the data to which they are exposed. As de Villiers and Roeper (1991) put it, "the evidence received by the child is small, sometimes contradictory, and clearly insufficient to account for the grammar unless a parametric system is assumed" (p. 1).

It is incumbent upon anyone proposing a model of language development which does not posit an autonomous LAD/UG to provide an explanation for these phenomena. In the RRG conception of language acquisition presented in Van Valin (1991), children construct the grammar of their language based on (a) their initial cognitive endowment, which does

not include an autonomous LAD/UG but which is nevertheless richly structured as suggested by Bruner (1983), Slobin (1973, 1985) or Braine (1992, 1994), and (b) the evidence to which they are exposed. In the remainder of this chapter, an RRG account of these phenomena is sketched, and the first step is a brief presentation of the essential features of the theory that are relevant to this discussion.

3. ESSENTIAL FEATURES OF ROLE AND REFERENCE GRAMMAR

The organization of RRG is given in Fig. 9.1. In this chapter, I concentrate on aspects of the syntactic representations and the role of discourse-pragmatics in the mapping between syntax and semantics, ignoring other facets of the theory not directly relevant to this discussion. The most comprehensive presentation of the theory is in Van Valin and LaPolla (1997).

Clause structure is not represented in RRG in terms of X-bar syntax or even traditional immediate constituency structure; rather, it is captured in a semantically based theory known as the "layered structure of the clause." The essential components of this model of the clause are (a) the *nucleus*, which contains the predicate, (b) the *core*, which contains the nucleus plus the arguments of the predicate in the nucleus, and (c) the *periphery*, which contains the adjunct modifiers of the core. The structure of a simple English clause is given in Fig. 9.2, and in Table 9.1 the semantic units underlying the layered structure of the clause are summarized.[8] In WH-questions in languages like English, the WH-expression occurs in a position called the precore slot, illustrated in Fig. 9.3. Note the lack of any empty syntactic positions or traces in the representation; in the linking from semantics to syntax, the WH-expression is mapped directly from its position in the semantic representation into the precore slot, and in the linking
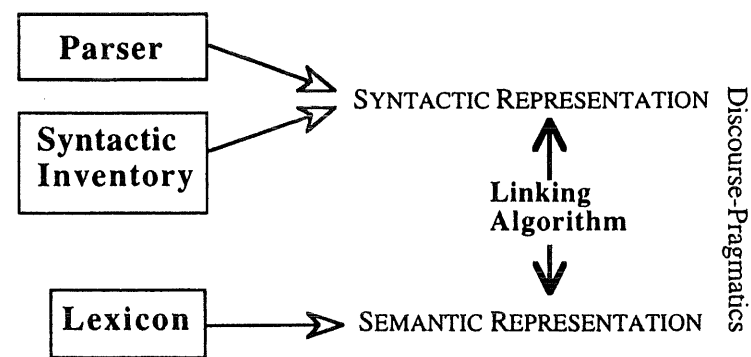

FIG. 9.1. Organization of RRG.

SENTENCE
|
CLAUSE
|
CORE<————————————PERIPHERY

ARG   NUC   ARG   ARG

PRED

NP   V   NP   PP   PP   ADV

Scully did not show the photo to Mulder at the office yesterday
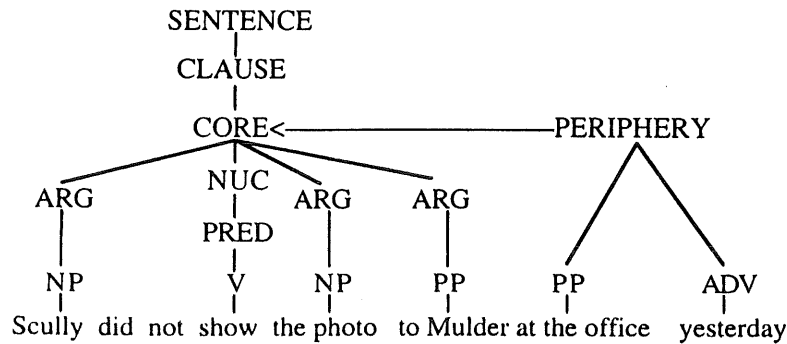
FIG. 9.2. Structure of a simple English clause according to RRG.

TABLE 9.1
Semantic Units Underlying the Syntactic
Units of the Layered Structure of the Clause

Semantic Element(s)	Syntactic Unit
Predicate	Nucleus
Argument in semantic representation of predicate	Core argument
Nonarguments	Periphery
Predicate + Arguments	Core
Predicate + Arguments + Nonarguments	Clause (= Core + Periphery)

SENTENCE
|
CLAUSE
|
CORE<————————————PERIPHERY

PrCS   NP   ARG   NUC   ARG   PP

PRED

NP   V   PP
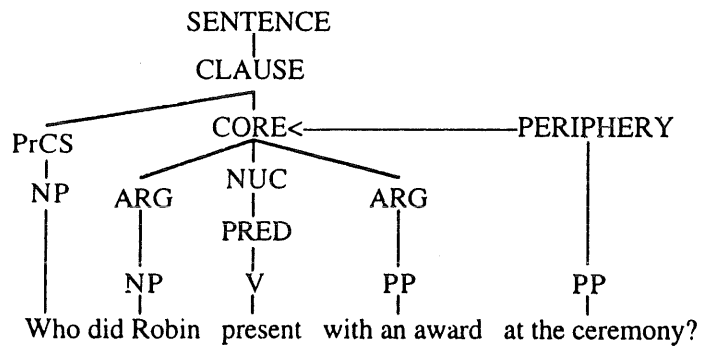
Who did Robin present with an award at the ceremony?

FIG. 9.3. Diagram of English WH-question with WH-expression in precore slot.

from syntax to semantics, it is mapped directly from the precore slot to its position in the semantic representation. The details of the RRG semantic representations are not given here, except to note that terms used for the semantic roles of the two primary arguments of a transitive verb are *actor* and *undergoer*, e.g. *Mary* [actor] *wrote the article* [undergoer], *The article* [undergoer] *was written by Mary* [actor].

The structure of the complex sentences such as (1a) is given in Fig. 9.4; (see Van Valin and LaPolla, 1997, section 8.4.1, and Foley and Van Valin, 1984, section 6.2.2, for justification for this structure). A complex NP like (1b), on the other hand, has roughly the structure given in Fig. 9.5; the internal structure of NPs is not represented in any of these figures.

The second aspect of RRG pertinent to this discussion is the theory of information structure, which is based on Lambrecht (1994). Two notions are especially relevant to the issue of WH-question formation, namely, narrow focus and focus domain. WH-questions are typically narrow focus,
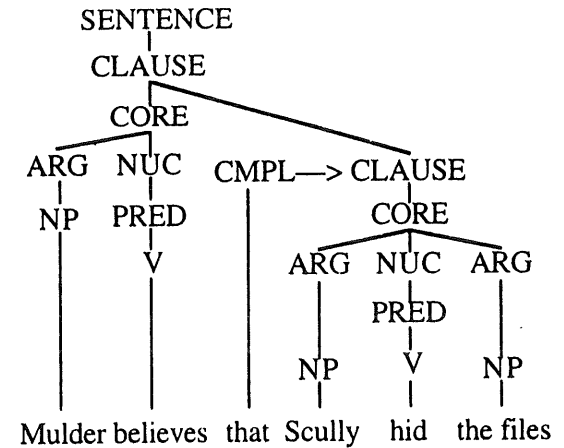
SENTENCE
|
CLAUSE
|
CORE

ARG   NUC   CMPL—> CLAUSE

NP   PRED   CORE

V   ARG   NUC   ARG

PRED

NP   V   NP

Mulder believes that Scully hid the files

FIG. 9.4. Structure of complex sentence in RRG terms.

SENTENCE
|
CLAUSE
|
CORE

ARG   NUC   ARG

NP   PRED   NP

V   NP   CMPL—> CLAUSE

CORE

ARG   NUC   ARG

PRED

NP   V   NP

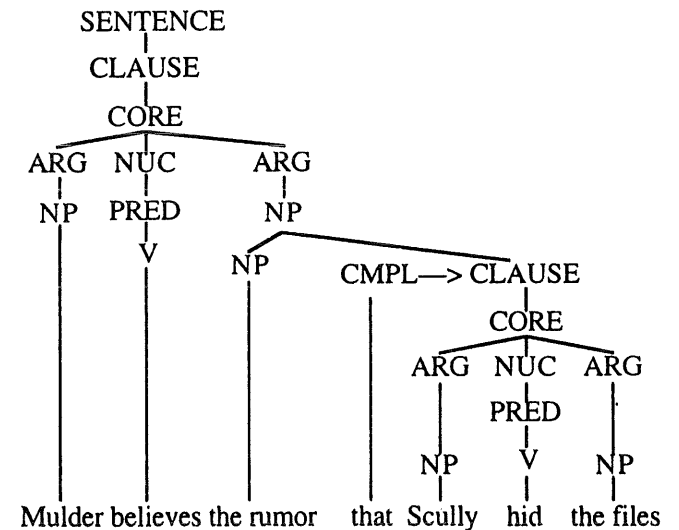Mulder believes the rumor that Scully hid the files

FIG. 9.5. Structure of a complex NP according to RRG.

in that the focus of the question is a single constituent represented by the WH-expression, e.g. *WHAT did Mary buy?*, and the answers to such WH-questions are also narrow focus constructions, e.g. *She bought A NEW CAR* (the focus element is in small caps). Yes–no questions may also be narrow focus, e.g. *Did Mary buy A NEW CAR?—No, she bought A NEW BOAT.* There is an important distinction between unmarked and marked narrow focus. All languages have an unmarked focus position in the clause; in English, it is the last constituent of the core, whereas in verb-final languages, it is the position immediately before the verb. Consider the following English sentence with different focal stress options.

8. a. Dana sent the package to LESLIE yesterday.
    b. Dana sent the package to Leslie YESTERDAY.
    c. Dana sent THE PACKAGE to Leslie yesterday.
    d. Dana SENT the package to Leslie yesterday.
    e. DANA sent the package to Leslie yesterday.

Focal stress on *Leslie* in (8a) is a case of unmarked narrow focus, whereas focal stress on any other constituent of the clause, as in (8b), yields marked narrow focus. The most marked narrow focus is on the subject, as in (8e).[9]

The other important notion is that of focus domain, which actually subsumes two distinct concepts, the potential focus domain and the actual focus domain. The potential focus domain is the part of the sentence in which a focal element may occur, whereas the actual focus domain is the element(s) actually in focus in a particular utterance. In English, simple sentences such as in (8), the entire clause is the potential focus domain, but the actual focus domain (indicated by small caps) is different in each example. The potential focus domain in complex sentences is constrained by the following principle, taken from Van Valin (1993).

9. The potential focus domain in complex sentences: A subordinate clause may be within the potential focus domain if it is a direct daughter of (a direct daughter of . . .) the clause node which is modified by the illocutionary force operator. (p. 121)

The matrix clause node is the one modified by the illocutionary force operator over the clause, and therefore according to the principle in 9, only an embedded clause which is a direct daughter (of a clause which is a direct daughter, etc.) of this clause node can be within the potential focus domain in a complex sentence. Comparing the diagrams in Figs. 9.4 and 9.5, we see that the embedded clause is a direct daughter of the matrix clause node in Fig. 9.4 but not in Fig. 9.5, and consequently, the embedded clause is in the potential focus domain in Fig. 9.4 but not in Fig. 9.5. This

distinction has important implications for the phenomena discussed in sections 1 and 2, as we see in the next two sections.

4. THE RRG ACCOUNT OF SUBJACENCY PHENOMENA

Because RRG does not posit the same type of clause structures as P and P or any kind of movement rules, movement across bounding nodes cannot be the explanation for subjacency phenomena in this theory. Rather, the explanation involves the interaction of information structure and syntactic structure. The detailed technical account is given in Van Valin (1993, 1995) and in Van Valin and LaPolla (1997); what is presented here is an informal summary.[10]

In the discussion in the previous section, it was noted that both yes–no and WH-questions are a kind of focus construction, often narrow focus, and accordingly, the focus of the yes–no question or the WH-expression must be interpreted as being within the actual focus domain. Since the actual focus domain must always be within the potential focus domain, it follows that the focus of the yes–no question or of the WH-expression must be interpreted as being within the potential focus domain. This leads to the following constraint on question formation, adapted from Van Valin (1994).

10. General restriction on question formation: The element questioned (the focus NP in a simple, direct yes–no question, or the WH-expression or the argument position with which a displaced WH-word is associated in a simple, direct WH-question) must be in a clause within the potential focus domain.

The application of the constraint to yes–no questions can be seen in (11) and (12).

11. a. After you left the party, did you take Mary to the movies?
     b. Yes.
        No. (= didn't take Mary, ≠ didn't leave the party).
        No, Bill did. (= Bill took Mary, ≠ Bill left the party).
        No, Susan.
        ?No, before. (Better: No, it was before we went to the party.)
        No, the park. (= went to the park, ≠ after you left the park).

12. a. Did Max return the papers which the secretary photocopied to the lawyer?

b. Yes.
   No. (= Max didn't return the papers, ≠ the secretary didn't pho-
   tocopy)
   No, Bill did. (= returned the papers, ≠ photocopied the papers)
   No, the envelopes.
   No, the IRS agent. (= to the IRS agent, ≠ that the IRS agent
   photocopied)

Neither the adverbial subordinate clause in (11) nor the relative clause in
(12) is within the potential focus domain, and according to (10) the focus
of the question cannot be interpreted as falling on an element within
either of them. This accounts for the possible interpretations of the answers
in (11) and (12); all of the impossible answers require the actual focus
domain to be within the embedded clause, whereas all of the possible
answers have the actual focus domain in the matrix clause. Contrast these
examples with (13).

13. a. Does Mulder believe that Scully hid the files?
    b. No, the photographs.

As we saw in Fig. 9.4, the structure in (13a) meets the condition in (9),
and therefore (10) predicts that it should be possible for the actual focus
domain to be in the embedded clause. The felicity of the possible answer
in (13b) shows that this is the case. One way of thinking about the moti-
vation for the constraint in (10) is as follows: Questions are requests for
information, and the focus of the question signals the information desired
by the speaker. It makes no sense, then, for the speaker to place the focus
of the question in a part of a sentence which is presupposed, i.e. which
contains information which the speaker knows and assumes that the hearer
knows or can deduce easily. The content of adverbial clauses and restrictive
relative clauses is normally presupposed, and consequently, constructing
questions with the focus in one of these structures generates a pragmatic
contradiction.

The interpretation of (10) with respect to WH-questions depends on
whether the WH-expression appears in situ or in the precore slot in simple,
direct WH-questions (i.e., not echo, rhetorical, or other types of questions).
In languages with WH in situ, the WH-expression must occur in the po-
tential focus domain. In languages with displaced WH-expressions, such
as English, it is obviously not the position of the WH-expression in the
matrix precore slot that is relevant; rather, it is the position it is interpreted
as filling in the semantic representation that is relevant. In (1a') and (1b'),
what is interpreted as the undergoer of *hide* in the embedded clause,
whereas in (1c') it is interpreted as the undergoer of *see* in the embedded

clause. According to (10), the questions should only be grammatical if the
clause in which the WH-word functions as (in these cases) the undergoer
is in the potential focus domain. How do we determine whether it is within
the potential focus domain? The principle in (9) constrains the potential
focus domain in complex sentences. Applying it to (1a), whose structure
is given in Fig. 9.4, we see that the embedded clause is a direct daughter
of the matrix clause node, and therefore the embedded clause is in the
potential focus domain. Accordingly, we would predict that a question like
(1a') should be grammatical, because it meets the condition in (10), and
this is correct. In (1b), on the other hand, the embedded clause is not a
direct daughter of the matrix clause node, as Fig. 9.5 clearly shows. Hence,
the embedded clause is not within the potential focus domain, and con-
sequently we would predict that a question like (1b') should be ungram-
matical, because it fails to meet the principle in (10). This is correct. The
structural representation for a relative clause was not given in section 3,
but it is very similar to Fig. 9.5 in its essential features, i.e. the embedded
clause is part of an NP with a head noun. Hence, the result of applying
the principles in (9) and (10) to the sentence in (1c) is the conclusion
that a question like that in (1c') should be ungrammatical, which it is.

It should be clear even from this brief, informal sketch that RRG provides
an account of subjacency phenomena which does not require movement
rules or multiple levels of syntactic representation for languages like Eng-
lish and which does not require postulating covert movement for WH-in-
situ languages like Chinese and Lakhota. Van Valin (1995) took the basic
analysis proposed for WH-question formation and extended it to account
for the same restrictions on other extraction phenomena such as topicali-
zation and relative clause formation.

This account has important implications for acquisition. As noted in
section 2, it is commonly asserted that the speech to which children are
exposed provides no evidence concerning constraints on WH-question
formation and related constructions, but there is in fact abundant evidence
with respect to the range of possible interpretations of yes–no questions
from their own interactions with caretakers and peers and from observing
the verbal interactions of others. It was discussed earlier that the focus of
yes–no questions must be within the potential focus domain, and thus,
these questions are subject to the same constraints as WH-questions and
related constructions (see Van Valin, 1994, for detailed exemplification).
It has never been argued that the source of a child's knowledge of the
principles governing the interpretation of yes–no questions is anything
other than the verbal interactions in which the child is involved, and this
suggests the following hypothesis regarding the acquisition of constraints
on WH-questions. Children learn the basic notions of topic and focus (e.g.,
Bates, 1976; Clancy, 1993; Greenfield & Smith, 1976; Ninio & Snow, 1996),

and on the basis of their verbal interactions with caregivers and others, together with some general principles of rational human behavior to be discussed later, they formulate the restriction in (10) with respect to yes–no questions. The constraint on yes–no questions is extended to other types of questions, in particular, WH-questions. Thus, the child's knowledge of restrictions on WH-question formation has its source in the acquired constraints on yes–no questions. Is there any empirical evidence that such an extension of syntacticopragmatic constraints could take place? A telling example of this transfer of restrictions can be found in Wilson and Peters' (1988) study of a 3-year-old blind child's production of WH-questions, which apparently violated extraction constraints; some of his deviant WH-questions are given in (14).

14. a. What are you cookin' on a hot __? [Answer: 'stove']
    b. What are we gonna go at (to) Auntie and __?
    c. What are we gonna look for some __ with Johnnie?

Wilson and Peters showed that the constructions had their origin in a question and answer game that the child engaged in with his primary caregiver. Examples are given in sentences 15(a) and (b).

15. a. Caregiver: What did you eat? Eggs and . . .
       Child: Mbacon.
    b. Caregiver: Oh, that's a . . .
       Child: Aleph.
       Caregiver: That's a aleph.

In this routine, the caregiver left a gap in his utterance which the child was expected to fill in. The child learned the game, and then the constraints on question formation derived from it were incorrectly taken to apply to movement WH-questions as well; when the child learned to make WH-questions in which the WH-word occurred in the precore slot, he applied these constraints to them, leading to the questions in (14). The account that Wilson and Peters gave of these questions provides evidence that children can in fact extend the constraint learned for one type of question to other types.

Does the RRG account of subjacency require a parameterized, autonomous LAD/UG? The answer is no. Van Valin (1986, 1993) argued that the principle in (10) is ultimately derivable from Grice's (1975) cooperative principle and the maxim of quantity. Kempson (1975) derived it from the maxim of quantity as follows:

The speaker believes the hearer knows (and knows that the speaker knows) a certain body of propositions (i.e., that there is a pragmatic universe of

discourse) and in making a certain utterance . . . he believes that the hearer, knowing the conventions of the language and hence the conditions for the truth of the proposition in question, will recognize a subset of those conditions as being part of that pragmatic universe of discourse and hence neither assertible, deniable or queriable (without violating the quantity maxim), and a second mutually exclusive subset of the conditions as being outside the pragmatic universe of discourse. This latter set, he will interpret as being asserted, denied, commanded or queried. (p. 190)

The syntactic expression of "this latter set" is what we have been calling the actual focus domain.

This Gricean foundation is very important: *These principles are considered to be general principles of rational behavior and are not strictly linguistic in nature.* In terms of the phenomena under discussion, it has never been claimed that constraints on the interpretation of yes–no questions are innate or even part of grammatical competence; they could be part of what Chomsky called "pragmatic competence," which he characterized as follows:

[Pragmatic competence] may include what Paul Grice has called a "logic of conversation." We might say that pragmatic competence places language in the institutional setting of its use, relating intentions and purposes to the linguistic means at hand. (Chomsky, 1980, pp. 224–225)

The Gricean nature of an important syntactic constraint like (10) has significant implications for the question of modularity (see Van Valin, 1986, 1991, for detailed discussion).

There are two major parts to the account we have sketched here, pragmatic constraints and syntactic structure, and both have their origins in general principles of cognition. We have just outlined the derivation of the principle in (10) from Gricean general principles of rational behavior. Braine (1992) showed how something like the theory of clause structure sketched in section 3 could be acquired on the basis of what he called the "natural logic" of cognition and the evidence to which the child is exposed; this natural logic is a general feature of human cognition and is not restricted to language. Thus, this account of subjacency phenomena does not presuppose an autonomous LAD/UG. In terms of the logical problem of language acquisition summarized in (3), one would conclude that knowledge of the principle in (10) is not part of the initial knowledge state of the child, if an account such as this one is correct.

5. THE ACQUISITION OF WH-QUESTIONS

We now turn to issues in the acquisition of WH-questions themselves. Although much attention has been paid to the order of acquisition of WH-expressions, little attention has been devoted to the order of acquisi-

tion of different question types, i.e. subject vs. object questions. The first question to be investigated, then, is the order of acquisition of different question types; in particular, do children learning English produce subject questions first, object questions first, or both types roughly simultaneously? This question is asked with respect to both simple and complex sentences. The second issue concerns the WH-questions in (2) and (6) which do not appear to be modeled on any structures that the children have been exposed to. These constructions are found in other languages, e.g. German, Romani, and Irish, and an account of them can shed light on the hypotheses made by children learning English.

The first issue, whether children produce subject or object questions first in simple sentences, might appear to have an obvious answer: Because subject questions do not involve subject-auxiliary inversion and look just like declarative sentences with the subject replaced by a WH-expression, they are syntactically simpler and should be produced first by children. Moreover, Gazdar (1981) claims that they are also the first type comprehended by children. Hence, if complexity were the primary factor in this aspect of acquisition, then one would expect that subject questions be produced and comprehended first. Interestingly enough, this is not what happens. Stromswold (1995) reported the results of an analysis of the early production of WH-questions by 12 children in the CHILDES database, and she also reviewed studies of comprehension. She found that with respect to *who*-questions, the overall pattern was that subject and object questions appear at roughly the same time; of the 11 children for which she had data, 6 produced object questions first, 4 produced subject questions first, and 1 produced them initially at the same age.[11] With respect to *what*- and *which*-questions, e.g. *What bit you?* (subject) vs. *What did you see?* (object) and *Which girl ran away?* (subject) vs. *Which girl did you see?* (object), on the other hand, the pattern strongly favored object questions first. Of 12 children, 7 produced object *what*-questions first, 4 produced the two types at the same time, and only 1 produced subject *what*-questions first. With respect to *which*-questions, there were complete data for only 6 children, of which 5 produced object questions first and 1 began to produce the two types at the same age. Despite the individual variation, the general pattern is that object WH-questions appear earlier in children's speech than subject WH-questions.[12] With respect to comprehension, Stromswold (1995) concluded that "contrary to Gazdar's (1981) claim, previous acquisition studies do not uniformly suggest that children acquire matrix subject questions before object questions" (p. 16).

This seems rather remarkable, especially in light of the fact that object WH-questions are more syntactically complex than subject questions. Why should this be the case?[13] Instead of looking at these questions from a

strictly syntactic point of view, let's look at them from a pragmatic perspective, i.e. in terms of information structure. In section 3, it was noted that WH-questions are normally narrow focus, i.e. *WHO brought the big dog?* or *WHAT did Dana give Kim?*, and moreover, it was pointed out that languages have an unmarked focus position in the clause. In English, this is the last position in the core, as illustrated in (8). Assuming that children's first questions involving multiple-argument verbs contain simple transitive rather than ditransitive verbs, object position correlates with the least marked narrow focus position and subject position with the most marked narrow focus position. Hence, object questions involve unmarked narrow focus, whereas subject questions involve marked narrow focus. The pattern observed by Stromswold correlates with the *pragmatic* markedness of the question type, not with syntactic markedness. Pragmatic and syntactic considerations lead to opposite conclusions with respect to the complexity of early WH-questions, and it is the pragmatic analysis that provides a natural account of why object WH-questions should emerge first. Moreover, since animacy is known to have discourse-pragmatic consequences, the possible effects of animacy on the emergence of *who*-questions discussed in note 12 make sense in this account.

Stromswold also investigated the emergence of long-distance questions in complex sentences, e.g. (1a'), and, as one would expect on both syntactic and pragmatic grounds, object questions emerge first. This is not surprising on syntactic grounds, because subject long-distance questions are more constrained that object questions because of the *that*-trace effect.[14] From a pragmatic perspective, in a sentence like (1a) the unmarked focus position is the final position in the core of the embedded clause, if it is in the potential focus domain following (9). Hence, long-distance object questions would be expected to appear before subject questions. We return to this issue below.

The second issue to be addressed is the medial-WH questions in (2) and (6). It will be useful to divide these sentences into three types; (a) those with the defining WH-expression medially, as in (6a', b'); (b) those in which the defining WH-expression is sentence-initial, as in (6a,b); and (c) those that are ambiguous between the first two possibilities, as in (2). The questions in (6a', b') resemble the German questions in (5a,b); they are repeated below.

16. a. What do you think which Smurf really has roller
       skates?   (=(6a'))
    b. What do you think which animal really says
       'woof woof'?   (=(6b'))

17. a. Was glaubst Du, mit wem   Daniel spricht?   (=(5a))
       what believe you with who.DAT   speaks
       'With whom do you believe Daniel is talking?'

b. Was hat er gesagt, wie er den Kuchen backen will?   (=(5b))
   what has he said   how he the cake   bake   will
   'How did he say he will bake the cake?'

Let's look at the German examples first. The initial WH-expression serves to mark the sentence as a WH-question; if it were missing, the sentence would be interpreted as a declarative utterance with an indirect question complement, e.g. *Er hat gesagt, wie er den Kuchen backen will* 'He said how he will bake the cake'. What is interesting about these German sentences is that although the whole sentence is in the potential focus domain, each clause is marked *separately and explicitly* as being within it. This can be seen most clearly in the following contrast between English and German.

18. a. When did he say that he will be leaving?
    b. Wann hat er gesagt, daß er abfahren wird?
       when has he said   that he leave   will
    b′. Was hat er gesagt, wann er abfahren wird?
       what has he said   when he leave   will

The English question in (18a) is ambiguous, as it could be answered *yesterday* meaning "he said it yesterday" or *next week* meaning "he will leave next week." The German questions could be given (18a) as a gloss, but they are not both ambiguous; (18b′) has only one of the readings of the English example in (a): in (b′) the actual focus domain is in the embedded clause and the question concerns when someone will leave, not when something is said. The sentence in (b) is ambiguous, like its English counterpart, but there is a preference for interpreting the question as being about the matrix clause. The choice of complementizer, *daß* 'that' vs. *wann* 'when', indicates whether the actual focus domain must be within the embedded clause or not. English has no morphosyntactic means of signaling this contrast; there are presumably prosodic contrasts to indicate it.

Learning the focus domains for the language being acquired is an important part of language learning from an RRG perspective, and an important question that arises for the child when a new distinction is mastered is, how is the relevant contrast signaled? Having figured out that the actual focus domain is sometimes in the matrix clause and sometimes in the embedded clause, the child must determine whether this contrast is indicated morphosyntactically, prosodically, or both.[15] German and Romani children come to the conclusion that it is morphosyntactically coded in their languages, and some English children apparently hypothesize this as well, even though adult English speakers do not mark it morphosyntactically. Because the actual focus domain can always be in the matrix clause, the crucial thing to be signaled is whether it is in the embedded clause.

This can be done by replacing *that* in the embedded clause with a WH-expression, as in all of the examples in (2) and (6). If the children follow what we may call the "German model," the defining WH-expression occurs in the embedded clause, with a nonspecific WH-word occurring in the matrix precore slot to indicate that the sentence is a WH-question. Given Grice's (1975) maxim of relevance, the occurrence of the defining WH-expression in the embedded clause is to be expected, because it is the possibility of the actual focus domain being in the embedded clause which is at issue.

There is, however, another strategy that some English children adopt; it is exemplified in (6a,b), repeated below.

19. a. Which Smurf do you think who has roller skates on?   (=(6a))
    b. Which animal do you think what really says "woof woof"?   (=(6b))

In these constructions, the defining WH-expression occurs in the matrix precore slot, and the medial WH-expression again serves to indicate that the actual focus domain is in the embedded clause. This is a more "English-like" structure than those in (16), since the defining WH-expression is sentence-initial, but it also serves to signal the location of the actual focus domain. This pattern could be construed as analogous to the Irish phenomena in (7b). In this construction, each clause following the WH-word is marked by a complementizer which indicates that the clause is in the potential focus domain, and the actual focus domain is in the last clause so marked.[16] In (7b), there are two embedded clauses, and the actual focus domain is in the most deeply embedded one. This system, like the one in German, yields unambiguous sentences where English would have ambiguous ones. The Irish sentences corresponding to the two readings of a sentence like (18a) are given in (20) (J. McCloskey, personal communication, March 28, 1997).

20. a. Cén fáth   aL   dhúirt Ciarán goN
       what reason COMP(+WH) said   COMP(–WH)
       mbeadh sé i láthair?
       would.be he present
       "Why did Ciarán say that he'd be present?"
    b. Cén fáth   aL   dhúirt Ciarán aL
       what reason COMP(+WH) said   COMP(+WH)
       mbeadh sé i láthair?
       would.be he present
       "Why did Ciarán say that he'd be present?"

The sentence in (20a) with the complementizer *goN* marking the embedded clause is preferentially interpreted with the actual focus domain

being the matrix clause, just like (18b) in German. In (20b), on the other hand, the complementizer *aL* on the embedded clause indicates that it is part of the potential focus domain, and because it is the most deeply embedded clause in the sentence, it is also the actual focus domain. Hence, this question must be interpreted as asking why Ciarán would be present, not why he said something.

The third group of questions, those in (2), involve identical WH-expressions in initial and medial positions in the sentence. Here again, the medial WH-expression explicitly indicates that the actual focus domain is in the embedded clause. Thornton (1995) noted a striking pattern with respect to these questions:

> [T]he medial-*wh* in children's questions initially appeared across the board, in subject, object and adjunct questions. . . . Longitudinal data from several children showed that before long, the medial-*wh* disappeared from the object and adjunct questions of these children. remaining only in their subject-extraction questions. At a given time, then, there will be children who always produce a medial-*wh*, irrespective of extraction site, and others, who only produce a medial-*wh* when extracting from subject position. (p. 147)

The disappearance of the medial WH-expressions begins with the recognition by the child that the language being acquired does not in fact indicate morphosyntactically that the actual focus domain is in an embedded clause, and the pattern described by Thornton follows the markedness of narrow focus in the different syntactic positions. In terms of the analysis of the sentences in (8), the medial WH-expression should first disappear from object questions, then adjunct questions, and finally subject questions. Subject extraction out of an embedded clause is doubly marked, in markedness terms, for the following reason. The default situation with respect to focus domains is for the actual focus domain to be in matrix clauses; hence, for it to be in embedded clauses is marked. Second, as we have noted several times, the unmarked position for narrow focus is the final core argument position, i.e. object position with a transitive verb, and the most marked position for it is subject position. Hence, subject extraction out of an embedded clause is marked narrow focus in a marked location for the actual focus domain. This is summarized in Table 9.2. Thus, if any "extraction site" were to be overtly signaled, it would be in a subject question out of an embedded clause. As noted earlier, subject questions out of an embedded clause appear much later than the corresponding object questions, and this too is a reflection of the markedness expressed in Table 9.2.

There is one additional observation in Thornton (1995) to be considered. She noted that for some children, when the defining WH-expression is referential, e.g. *which Smurf* or *which animal* as in (6a,b), the medial

TABLE 9.2
Markedness of WH-Question Formation

Type of Question	Position of Narrow Focus	Location of Actual Focus Domain
Object from main clause	−	−
Subject from main clause	+	−
Object from emb. clause	−	+
Subject from emb. clause	+	+

WH-expression is optional, whereas when the defining WH-expression is nonspecific or nonreferential, e.g. *who* or *what* as in (2a–c), then the medial WH-expression always seems to be present. Given that the function of the medial WH-expression is to signal that the actual focus domain is in the embedded clause, why should the referential specificity of the defining WH-expression reduce the need for the medial WH-expression? To see the answer to this question, we need to first step back and examine the usefulness of overtly indicating that the actual focus domain is in an embedded clause. As noted in section 3, WH-expressions are mapped directly from the matrix precore slot to an argument position in the semantic representation of the sentence in the RRG analysis, and in a complex sentence, it is necessary to determine, first of all, which clause's semantic representation is the one to which the WH-expression is to be linked. Overtly signaling the clause in which the actual focus domain occurs morphosyntactically, as German, Romani, and Irish do, is obviously extremely helpful. In terms of the principle in (9), each clause that is a direct daughter of (a direct daughter of) the clause node modified by the illocutionary force operator is overtly marked as to whether it is in the potential focus domain; the most deeply embedded clause in that sequence of clauses marked as being within the potential focus domain is the clause containing the actual focus domain. Following the principle in (10), the WH-expression must be linked to the semantic representation of the clause containing the actual focus domain. Hence, the utility of the medial WH-marking relates to the demands of linking in questions in complex sentences.

Another type of information that would facilitate the linking is the semantic content of the WH-expression itself. The basic idea is the more information about the referent of the WH-expression that is available, the easier it is to determine how it is to be linked in the sentence. *Who*, for example, must have an animate, normally human, interpretation, and, as pointed out in note 12, this makes it a very good candidate for interpretation as an actor. *What*, on the other hand, is compatible with virtually any verb in almost any function, but the fact that it is often used for inanimates means that it is more likely to be interpreted as undergoer

than as actor. In contrast, the range of possible interpretations for *which tire on your new car* is much, much smaller, and accordingly, the task of interpreting *which tire on your new car* is much easier than with *what*. The idea that the referential or descriptive content of WH-expressions aids the interpretive process in "extraction constructions" has been discussed by Comorovski (1989), Kroch (1989), Rizzi (1990), Cinque (1990), and Chung (1994), among others. With respect to WH-expressions, they may be ranked in terms of increasing specificity or referentiality; *what* < *who* < *which N*. *Who* is rated higher in referentiality than *what* because its referent must be animate and an individuated entity, whereas the referent of *what* is unmarked for animacy and need not be individuated; in grammatical terms, *who* must be replaced in the answer by a count noun, whereas *what* may be replaced by either a count or a mass noun. We now have two types of information which facilitate the linking in WH-questions in complex sentences, the referential content of the defining WH-expression and the occurrence of a medial WH-expression, and there appears to be an inverse correlation between the two: The greater the referential content of the defining WH-expression, the smaller the need for a medial WH-expression. When the referential content of the defining WH-expression is minimal, as with *what*, then the medial WH-expression is present. When the referential content of the defining WH-expression is substantial, as with *which Smurf*, then the medial WH-expression need not be present. This predicts that when children begin to abandon medial WH-expressions, they will drop them out of *who* questions before *what* questions, *ceteris paribus*.[17] Of the two types of information, the overt morphosyntactic marking of the clause containing the actual focus domain is more directly useful for the linking system, and consequently the need for it is not completely obviated by the increase in referential content of the defining WH-expression.

It has been argued that the motivation for the medial WH-elements in these long-distance questions is to indicate morphosyntactically that the actual focus domain is within an embedded clause, and that this facilitates the task of linking the WH-expression to the semantic representation of the appropriate clause. This syntax-to-semantics linking is part of the comprehension process, and accordingly, it would be useful to look briefly to see whether there are any parallels between children's early production and comprehension of long-distance WH-questions. de Villiers et al. (1990) reported on a series of comprehension experiments with children ages 3 to 6 years old, and the results are quite interesting within the context of this discussion. Their subjects fell generally into two groups: The 3- and 4-year-old subjects produced a greater number of long-distance interpretations of the test stimuli and fewer adultlike responses, whereas the 5- and 6-year-old subjects produced strikingly fewer long-distance interpretations of the test stimuli but more adultlike responses overall. That is, the

younger subjects were more likely to interpret the WH-expression as being related to the embedded clause than were the older subjects; in RRG terms, they were more likely to interpret the actual focus domain as being within the embedded clause. Moreover, the younger subjects often answered "the wrong questions," i.e. they responded to the medial WH-expression rather than to the one in the matrix precore slot; this is what was meant earlier by "fewer adultlike responses." For example, in answer to the test question *How did the boy say how he hurt himself?*, the younger subjects were just as likely to say "he fell off a chair" (embedded *how*-question) as "in a loud voice" (matrix *how*-question). This result is not so surprising, however, if, as argued earlier, some of the children are adopting a German- or Irish-like strategy of marking overtly the fact that the actual focus domain is within the embedded clause. As noted earlier, given Grice's maxim of relevance, the occurrence of the defining WH-expression in the embedded clause is to be expected, because it is the possibility of the actual focus domain being within the embedded clause which is at issue. de Villiers et al. (1990) did a follow-up experiment in which they gave children sentences like *How did the boy choose to eat what?* and found that children 4 years old and below were prone to answer just the final *what*. Does this correlate in any way with the production data reported in Thornton (1990, 1995)? All of the examples of medial-WH long-distance WH-questions cited in Thornton (1990, pp. 240–247) were from children in the 3–4-year-old age range; in Thornton (1995), she gave additional constructions of this type from a child 5 years, 4 months old. It thus appears that the ages at which children are most likely to answer the nonmatrix WH-word and to give embedded-clause answers to long-distance WH-questions are also the ages at which they are most likely to produce long-distance WH-questions containing a medial WH-expression.

de Villiers et al. (1990) noted the similarity to the German phenomena and made the following comment with respect to the behavior of the younger subjects:

> We argue then that the children treat the two wh-words as linked as if it were German. Now we can see why simply answering the *how* question [in *How did the boy choose to eat what?*–RVV] is inadequate: It leaves one question unaddressed. From the child's perspective then, the downstairs answer, with an upstairs copy, is a better answer. (p. 281)

But why is it a better answer? de Villiers et al. offer no explanation for this. The RRG account, on the other hand, does supply a reason for why the downstairs answer is the better answer. I have argued that the motivation for the medial WH-expression is to mark explicitly that the actual focus domain is within the embedded clause, and it appears that the

3-4-year-old children are very concerned with the location of the actual focus domain. They are, in effect, working out the principle in (9) and marking the important contrast morphosyntactically. Following Grice's maxim of relevance, they take the occurrence of an embedded WH-expression as a signal that the actual focus domain is within the embedded clause. At the same time, they are also working on the principle in (10) and the structure of complex sentences. Two things appear to happen at around age 5. First, the ones who marked the actual focus domain in embedded clauses overtly realize that this is not, in fact, a property of English and cease doing it, and second, children develop more sophisticated analyses of the structure of complex sentences. In particular, it is reasonable to assume that children start out by analyzing all clausal complements as if they have the structure given in Fig. 9.4, and that by the ages of 5 and 6, they have discovered that complements with a WH-complementizer have a rather different structure which interacts with the principle in (9) to preclude the possibility of the actual focus domain being within them.[18] If they overgeneralize this conclusion, it will lead to the comprehension behavior reported in de Villiers et al. (1990) for the older children. Thus, it appears that the results from comprehension studies complement nicely the production data, and the RRG analysis provides an account of why they should in fact complement each other the way they do; it also ties in with the account of subjacency given in the previous section.

6. CONCLUSION

This chapter has focused on issues relating to WH-questions and their acquisition, with the goal of showing that phenomena that have been cited as necessitating the positing of an autonomous, parameterized LAD/UG can in fact be accounted for without recourse to such a construct. Three phenomena were examined; restrictions on the formation of WH-questions and related constructions (subjacency phenomena), the order of emergence of subject and object WH-questions in the speech of children learning English, and long-distance WH-questions containing medial WH-expressions produced by children learning English. In each case, a Role and Reference Grammar account was proposed, and at no time was it necessary to postulate an autonomous LAD/UG with parameters as part of the account. The crucial explanatory construct in the RRG analyses is information structure, which, it was argued in Van Valin (1986, 1993), derives ultimately from the set of very general principles of rational human behavior, both linguistic and nonlinguistic, proposed in Grice (1975). Moreover, RRG assumes that children are born with a rich cognitive endowment of the

type sketched by Braine, Bruner, Slobin, and others, which makes language learning and other types of learning possible (see Van Valin & LaPolla, 1997, epilog). What is most striking about two of the three cases discussed is that they involve either learning a constraint or producing forms not directly modeled in the speech to which the child is exposed. Such cases have typically been cited as evidence for an autonomous, parameterized LAD/UG, but it has been shown in this chapter that alternative explanatory accounts are possible which do not postulate such a mechanism as underlying language acquisition.

Many language acquisition researchers who reject the parameter-setting approach also reject the idea of working within a well-defined theoretical framework, preferring to employ general linguistic concepts and cognitive notions and avoiding the analytic constraints imposed by a theory. The alternative account presented herein is not based on general linguistic notions like *topic* or *focus* and general cognitive notions like *complexity*; rather, it has been built on a theoretical foundation that not only defines and ties the relevant concepts together, but also provides the necessary conceptual edifice in which explanation is possible. Explanation is only achievable within a well-defined theoretical framework, and therefore, progress toward understanding complex acquisition phenomena such as those discussed in this chapter can only be made when researchers operate within a theory, such as Role and Reference Grammar.

NOTES

1. I would like to thank Jeri Jaeger, Jean-Pierre Koenig, and Lynn Santelmann for comments on an earlier draft, James McCloskey for providing insights and data regarding Irish, and Holger Dießel for sharing his intuitions about the German data. Abbreviations; ACC "accusative," ARG "argument," CMPL, COMP "complementizer," CP "complementizer phrase," DAT "dative," IP "inflection phrase" (= clause), NOM "nominative," NP "noun phrase," NUC "nucleus," PrCS "precore slot," PRED "predicate," PRES "present tense," PSTP "past participle."
2. The technical P and P terms for the first two units are "complementizer phrase" (CP) (= sentence) and "inflection phrase" (IP) (= clause).
3. In P and P and earlier versions of Chomskyan theory, when a constituent like a noun phrase is moved by a rule, its structural position in the phrase-structure tree remains, and the moved element and its original structural position are coindexed, so that the original position of the moved element can be recovered for semantic interpretation. These empty, coindexed structural positions are called "traces."
4. The technical term for this in P and P is "specifier of complementizer phrase" (SPEC, CP).
5. That is, the WH-words occur in the same place in the clause as the corresponding non-WH-words in statements and do not appear in the special initial WH-position, as in English *you want what?* This is the most common way of forming WH-questions in human language; the English-style "movement" WH-question is not the norm universally.

6. Romani, the language of the Gypsies, is a member of the Indo-Aryan branch of Indo-European.
7. The "L" segment in the complementizers indicates that these morphemes induce lenition in the initial consonant of the following word; it is not part of the phonemic or phonetic representation of the word.
8. It should be noted that the terms "sentence" and "clause" do not mean exactly the same thing in RRG that they do in P and P, i.e. RRG sentence ≠ P and P CP and RRG clause ≠ P and P IP. These differences do not, however, substantially affect the discussion in this chapter.
9. The default interpretation of the subject in English is as a topic, rather than as a focal element, hence the marked status of focal subjects in English. See Lambrecht (1984) and references cited therein for more discussion.
10. Other accounts which treat subjacency as involving syntactic and pragmatic factors include Erteschik-Shir (1973), Erteschik-Shir and Lappin (1979), Kluender (1992), and Kuno and Takami (1993).
11. When the relative frequency of the production of subject vs. object *who*-questions is taken into account, the results bolster the conclusion that object questions appear first. Stromswold (1995) noted

> even though the results of the initial analysis . . . indicated that the earlier acquisition of *who* object questions than *who* subject questions was likely to be the result of chance, once the greater frequency of *who* subject questions is taken into account, with some degree of confidence, we can reject the null hypothesis that chance alone accounted for the earlier acquisition of object questions than subject questions. (p. 32)

12. A possibly important factor involved in these differences is animacy: The referent of *who* is always animate, normally human, whereas the referents of *what* or *which* may or may not be animate. There is a tendency for subjects to be animate, as has often been noted, and this might influence the early appearance of *who* subject questions in contrast to *what* and *which* subject questions. However, it should be noted that the noun in *which* expressions could equally easily be animate (*which boy, which doggie*) as inanimate (*which block*), and yet the pattern with these expressions is strongly object questions first.
13. Stromswold offered an explanation in terms of the different ways subject and object traces are governed. Object traces are head-governed by the verb, whereas subject traces are antecedent-governed by the WH-word in specifier of COMP. She suggested that antecedent government may be more problematic for the child and therefore object traces (and therefore object questions) would appear first. In Chomsky (1992), however, this distinction is abandoned, and he claimed that all traces are antecedent governed; head-government is eliminated from the theory. In this version of P and P theory, this explanation would not be valid.
14. The *that*-trace effect, i.e. the grammaticality of *Who_i do you think t_i is leaving?* vs. the ungrammaticality of **Who_i do you think that t_i is leaving?*, is accounted for by the empty category principle in P and P theory. In Van Valin (1993) and Van Valin and LaPolla (1997), it was argued that these effects are related to the impossibility of marked narrow focus on the subject in certain syntactic environments (see also Table 9.2).
15. Whether the actual focus domain can occur within embedded clauses must be learned, because not all languages allow it. Hearing a question–answer pair like the one in (13) would be enough to tell the child that the actual focus domain can be within embedded clauses.
16. McCloskey (1979) argued that *aL* marks the binding domain of the "extracted" element, be it a WH-expression, the relative pronoun (or equivalent) of a relative clause, or a

topicalized phrase, and in Van Valin (1995), it was shown that this "binding domain" corresponds to the potential focus domain in RRG terms.
17. Thornton (1995) cited both the Irish examples in (7) and so-called "WH-agreement" in Chamorro (Chung, 1994) as analogs of medial WH-expressions in children's English. Chung argued that WH-agreement in Chamorro is obligatory if the extracted element is nonreferential but optional if it is referential, a striking parallel to the English facts which Thornton points out. Chung counted both *hafa* "what" and *hayi* "who" as nonreferential and therefore as requiring WH-agreement, but she noted that this was absolutely true only for *hafa* and not for *hayi*, as there are speakers who permit long-distance questions with *hayi* without WH-agreement (1994, pp. 17–18). This differential behavior is not surprising, given the differences in referential content between them.
18. For the structure of WH-complements, see Van Valin and LaPolla (1997, Section 8.6.3, Figure 8.33, p. 504).

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