Applied Psycholinguistics **29** (2008), 67–103
Printed in the United States of America
DOI: 10.1017/S0142716408080041

Answering hard questions: *Wh*-movement across dialects and disorder

JILL DE VILLIERS
Smith College

THOMAS ROEPER
University of Massachusetts

LINDA BLAND-STEWART
George Washington University

BARBARA PEARSON
University of Massachusetts

Received: March 8, 2006 Accepted for publication: January 20, 2007

ADDRESS FOR CORRESPONDENCE
Jill de Villiers, Department of Psychology, Smith College, Northampton, MA 01063.
E-mail: jdevil@smith.edu

ABSTRACT
A large-scale study of complex *wh*-questions with 1,000 subjects aged 4–9 years is reported. The subjects' dialects were Mainstream American English or African American English, and approximately one-third were language impaired. The study examined when children permit long distance *wh*-movement, and when they respect a variety of syntactic barriers to movement. Thirteen different structures were compared, and the results suggest that typically developing children and disordered children at all the ages studied are capable of long-distance movement and obedience to abstract barriers. In no case was dialect a significant factor in the children's linguistic performance on these tasks.

Wh-movement in questions is a central topic of contemporary syntax as well as theoretical approaches to language acquisition. Much work on the acquisition of *wh*-questions in the last decades has shown the adherence of children's developing grammars to abstract syntactic principles. The studies establishing these behaviors have been small scale, and have typically involved small samples of middle-class children speaking mainstream American English (MAE) or a handful of other languages. It is important to find out how robust are the facts on which the arguments are based. Will a larger, more diverse sample of children show similar

© 2008 Cambridge University Press 0142-7164/08 $15.00

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

knowledge of subtle grammatical properties? To what extent is this course of development susceptible to disruption in language impairment?

The current study presents data that can answer these questions. Using 13 different structures taken from previous studies by our research group and others, we examine when children permit long-distance (LD) movement in complex *wh*-questions, and when they respect a variety of syntactic "barriers" to that *wh*-movement. The children in the experimental groups differed according to age, dialect, and clinical status, as well as several control variables such as gender, socioeconomic status (SES) and geographic region. We examine children who speak MAE as well as African American English (AAE), a neglected variety.

Before discussing the study itself, it is necessary to give a brief background to two-clause *wh*-questions and consider why they are linguistically interesting for language acquisition research. The *wh*-phenomena are complex but principled, and hence, have the right properties to serve as a test of the ideas linking universal grammar (UG) and language acquisition. Given abstract, universal principles that appear difficult or impossible to acquire from the contexts of learning, then it is argued they should be part of the fundamental machinery of language acquisition in children, part of UG. If the principles are respected by children in their earliest experience with embedded clauses, then it will be evidence for the UG account. However, given the complexity of *wh*-questions, even within a UG framework, one would not expect all of their properties to be acquired at once.

Three characteristics of *wh*-questions make them particularly interesting from a syntactic point of view.

First, the *wh*-word can be considered to have two parts: a grammatical signal in the first sound *wh-* (cf. *qu* in French) and a second part that connects to other lexical items. For instance, one can analyze the words in Example 1 lexically as

1. who = wh + person
   what = wh + thing ("wh + that")
   where = wh + place ("wh + here")
   when = wh + time ("wh + then")
   why = wh + reason
   how = wh + manner

Therefore, one can explore whether factors affecting the acquisition of their syntactic behavior differ from those affecting the acquisition of their lexical properties.

Second, there are contrasts in the function of different *wh*-constructions that cause differences in the way *wh*-movement proceeds. The principal difference is between arguments and adjuncts within a sentence. Argument questions refer to "arguments of the verb": subjects and objects, and possibly indirect objects for verbs like *give*. These roles are obligatory: they must be filled in a sentence, as the sentence is incomplete without them. *Who* and *what* replace argument constituents of sentences. In contrast, adjunct *wh*-words focus the question on less central, or "oblique" roles of the verb: *how*, *why*, and *when* ask about constituents that tell the manner, the time, or the reason for some action or state. They give important

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

information, but they are not obligatory: the sentence could be grammatical without them. *Where* behaves sometimes as an argument, and sometimes as an adjunct, as some verbs require a place argument (e.g., *put*). *Wh*-words behave differently according to whether they play the role of an argument or an adjunct. A study of *wh*-question acquisition, therefore, should take this crucial distinction into account.

Third and finally, *wh*-questions are subject to movement rules, phenomena that are especially interesting to syntacticians. English (and many other languages) allows displacement of a question across more than a single clause. Consider a question such as the following:

2. When did she say she bought the car?

One can imagine circumstances in which the question would be ambiguous, for example, is it asking "when did she tell you about it*"* or "when did she buy the car?" The *wh*-question can thus originate in an embedded clause ("when did she buy") and move over an LD to the front of the sentence, or it can originate with the first or matrix verb ("when . . . say") and move only a *short distance* (SD).

THE SYNTACTIC MACHINERY FOR *wh*-MOVEMENT

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. For instance, 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 complementizer phrase (CP; Radford, 1988). Each clause in a sentence has the potential for such a position, although it is not always occupied. In Example 3, the CP position is marked for a *direct question feature*, which the *wh*-word must match:

3. What did the boy buy _____?
   CP [wh + direct Q]

In a multiclause sentence like Example 4, 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 Example 4, there is an open CP (CP_2) in the "bought" clause, but there is no matching feature, so the *wh*-word advances to CP_1, where it does match the feature.

4. What did the boy say he bought _____ ?
   [CP_1 [Wh + direct Q] [CP_2]]]

By contrast, an indirect question in Example 5 will move to a CP position with the right features to host an indirect question:

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

5. John knows how to play baseball
   [CP_1 (–Q)] [CP_2: +indirect Q]]

The *how* stays below in CP_2 because the word *know* "projects" (or creates the likelihood of) an 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 5 is an indirect question and so unlike a real question (Example 6), the *how* in Example 5 is not actually answered.

6. How does John know to play baseball?
   [CP_1 (+Q) [CP_2 (–Q)]]

What happens if the verb does not project a feature to satisfy? The sentence is actually ungrammatical:

7. *John pretended how Mary sang
8. *John thought where Bill sang

but the long moved, "real" question is fine:

9. How did John pretend Mary sang
10. Where did John think Bill sang

Verb by verb the properties of the complement clause are specified and they constitute a major challenge to the child, differing cross-linguistically.

Finally, Example 11 serves to demonstrate that LD movement is not always permitted in the adult grammar. Consider the context for the story in Example 2 again. The sentence could include a *wh*-word in the middle, or "medial" complementizer position, CP_2, as in Example 11,

11. *When* did she say *how* she bought the car?
    [CP_1 (+Q) [CP_2 (+indirect Q]]

The LD interpretation of the *wh*-question *when*, namely, "when she bought the car" 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 off the island." The principle is that the path, namely, each CP, must be open at every point for LD movement to be allowed. In the case of an island, the SD reading is still possible, namely, the one in which the *wh*-word originates next to the verb *say*, that is, "when she said it."

The phenomena of islands have been a central part of linguistic theorizing for the past 40 years, and their relevance for language acquisition research was recognized at least 25 years ago (Otsu, 1981). Until quite recently, unimpeded movement was seen as the norm, and "islands" to movement were the constraints that needed to be explained. However, new concepts that pertain to these phenomena were introduced in the most recent versions of minimalist theory (Chomsky, 2004). What

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

were regarded as islands for movement have come to be seen as the primary domain where syntax, phonology, and semantics combine, now called a "phase." Chomsky has argued 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. Chomsky (2004, p. 8) puts it this way:

> There are Transfer operations: one hands the SyntacticObject (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.

What this passage means is that, ideally, there is just a single phase: a *wh*-word will move to the head of a phase, and be pronounced and interpreted there. Thus, 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. According to Chomsky's account, it would follow that in a sentence with two phases, the grammar would prefer to *move*, *pronounce*, and *interpret* a *wh*-word at the boundary of the first phase, namely, CP_2, not in the sentence initial position where English speakers pronounce it. In English, as in Example 12, the *wh*-word continues on to the front of the sentence, to CP_1, and leaves an unpronounced trace at CP_2.

12. [CP_1 What did John say [CP_2 *trace* he bought *trace*]]

Thus, LD movement/displacement rules are a departure from the ideal. It is of interest that they are a significant part of the grammar of English, but they are not found in all languages. 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). Recent reports have distinguished several varieties of so-called partial movement in the world's languages and there are some important recent analyses of the adult data (Abdulkarim, 2001; Dayal, 2000; Fanselow, 2005; Oiry & Demirdache, 2006; Schulz, 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. How does an English-speaking child recognize which type of language she is learning?

The landscape of *wh*-phenomena that the child confronts is still more complex. Rizzi (1990) 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 LD movement possibilities of different

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

questions, this distinction becomes significant. Compare the adjunct question in Example 9a with the argument question in Example 9b where we can see exactly that a nonobligatory adjunct will block LD movement of an adjunct-*wh*, whereas the obligatory argument-*wh* is not blocked:

13. a. *When* did Mary ask how to help?
    b. *Who* did Mary ask how to help?

The answer to Example 13a should be unambiguous: the question is about when Mary asked the question, not when to help. However, the answer to Example 13b, with some thought, is ambiguous: it could be asking who Mary asked, or it could be asking who she wanted to *help*. In Example 13b, the LD reading of *who* is possible. It appears that the *wh*-word has circumvented the barrier and moved LD despite the intervening *how* question.[1]

A further set of structures forbid LD interpretation because there is no possible path for the *wh*-word to move. The argument/adjunct distinction here is between clause types. Argument or *complement* clauses allow paths for movement, but adjunct clauses such as purpose or temporal clauses do not: they are islands. In such cases movement out of an island is impossible not because the path is blocked; rather it is because there is *no movement path* at all. An example is an impossible question such as Example 14b based on Example 10a:

14. a. John laughed before Bill bought <something>.
    b. *What did John laugh before Bill bought [*trace*]?

There is no complement required by *laugh* and therefore no complementizer position is set up for the "before" clause through which the moved *what* could pass, so Example 14b is not a possible question. (This argument is slightly simplified. For details see, e.g., Radford, 1988.)

An important distinction has also been made between *complement* clauses and *relative* clauses. The latter are also adjuncts, in this case adjuncts to noun phrases instead of verb phrases as above, and they too block LD movement of a question. In fact, relative clauses were among the first islands, or linguistic units impervious to movement, identified by Ross (1967). For example, one cannot extract a question from a relative clause as in Example 15a, so Example 15b is impossible:

15. a. The car that had the CD player cost 15,000.
    b. *What did the car that had cost $15000? Ans: *CD player

Finally, another very subtle class of barriers occurs in a special set of forms where NP movement has occurred (Chomsky, 1977, 1982). In Example 16, "one" is obviously the object of the verb "wear" but it has moved, leaving an unpronounced trace, here [e] in its place.

16. Jim got one $_{CP}$[[OP] to wear [e] on the top of his head]

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

There seems to be an invisible barrier, called an Operator, which allows the object of the higher verb to be linked to the lower as if it were a relative clause:

17. John got one [which was] to wear on his head.

The CP for the "wear" clause is thus not open because it is occupied by this abstract operator.

Note that an abstract operator filling the CP position appears to block *wh*-movement through that CP, just as an overt operator would as in this example (Examples 13a and 13b) of an overt operator, for example, *how*, in the medial CP:

18. a. Jim said how to make the cake <somewhere>.
    b. *Where did Jim say how to make the cake [*trace*]?

This cannot mean "where did Jim make the cake," only "where did he say it." Another blocking by a trace occurs with the abstract operator in the medial CP in Example 19 (based on the structure in Example 16):

19. *Where did Jim get one $[OP]_{CP}$ to put on his head ?

This one cannot mean "where on his head did Jim put one?" It cannot come from "Jim put one on his head <somewhere>," only "Jim got one <somewhere>." In both questions, the SD or nearest verb reading of the *wh*-question is available but the LD reading is not.

In sum, studies of the movement of *wh*-questions have uncovered a rich array of phenomena of a highly abstract sort, in which the abstract configurational properties of their structure set limitations on which movements can take place or not, and hence, on what certain questions can mean. The island or barrier effects are highly abstract, and it has been claimed that they are both universal and unlearned, that is, they are part of what children know as part of UG (Chomsky, 1986; de Villiers, 1996). However, as we saw in Example 1, there are other "lexical" aspects of *wh*-words, such as what the individual *wh*-words "mean," whether they replace adjuncts or arguments, and whether they are selected by certain verbs to take embedded indirect questions. These facts are presumably learned the way specific words are learned as a function of exposure and language experience. So modern linguistic theory would predict that some aspects of *wh*-words are not learned and will be known by very young children, whereas other aspects are learned and will show a more protracted path of acquisition.

PREVIOUS STUDIES OF *wh*-QUESTIONS

How does existing acquisition work bear out these claims? Do children understand LD movement? LD movement is a fundamental fact of English *wh*-questions. There must be the possibility of this movement in the target grammar for there to be island effects or barriers to movement.

In early work, de Villiers, Roeper, and Vainikka (1990) showed that some children as young as age 3.5 years do allow LD movement of *wh*-questions.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Children heard stories followed by ambiguous questions that permitted the children a choice between two interpretations. For example, the following short story (Example 20, accompanied by pictures for the children) was used to test the movement possibilities introduced above in Example 2:

20. 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."
21. Question: When did she say she ripped her dress?

As we saw above, there are two possible interpretations of the question, depending on where the *wh*-question *when* originated. Both of them are designed to be possible in the story. Is *when* connected as an adjunct to *say,* or as an adjunct to *rip*?:

22. a. When$_i$ did she say [*trace*$_i$] she ripped her dress? OR
    b. When$_i$ did she say she ripped her dress [*trace*$_i$]?

The answer could be *at night* (if Example 22a), or *that afternoon* (if Example 22b): both are permissible. The 3- to 6-year-old children in the study provided both answers to questions like Example 21, usually alternating across questions Example 22a and Example 22b, suggesting that they do readily permit LD movement.

These facts allowed de Villiers et al. (1990) to go further and test whether children were able not only to *allow* LD interpretations but also to *block* them where adults would. They tested whether children would appropriately resist LD interpretations in sentences with medial *wh*-complementizers, and whether they were more likely to allow movement when the medial CP came in the path of movement of an argument compared to an adjunct *wh*-question. Consider question Example 23 with a medial adjunct (similar to Example 7 above):

23. *When* did she say *how* she ripped her dress?
    [CP Q *when*] [CP2 indirect Q *how*]

Here the answer "that afternoon" is blocked. The data from a small study of 3- to 6-year-olds confirm that children obey these barriers to LD movement. In a later study, de Villiers and Roeper (1995b) followed a small group of children throughout a preschool year, testing them every 3 or 4 months, and again found that barriers were obeyed (see also de Villiers & Roeper, 1995a, for a review of other studies). It is important to note that the obedience to barriers reveals that the children are not just using cognitive inferences to arrive at a suitable answer to the questions based on the story. It is argued that their answers are instead linguistically constrained. Children allow movement across clauses when appropriate, and they do not allow movement in the presence of syntactic barriers.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

OTHER BARRIERS

Several studies have asked whether children are sensitive to other islands such as adjunct temporal or purpose clauses. These are islands because there is *no connection* at all between the higher verb and an adjunct clause. Because this is a universal property of adjuncts (i.e., part of UG), children should obey them from the outset. Goodluck, Foley, and Sedivy (1992) showed that preschool children did block movement from true adjunct clauses such as temporal adjuncts, like "before helping" in Example 24:

24. *Who did the elephant ask before helping [$trace_i$]?

de Villiers, de Villiers, and Roeper (2007) showed that children do not allow *wh*-movement from purpose clauses. For example, in the purpose clause:

25. Where did the boy get the money to fly?

an LD answer such as "to Florida" is not available from the adjunct clause, but the SD answer "from his Grandma," that is, attaching *where* to the matrix verb *get,* is fine. The studies that have been done suggest that even by age 4 or so, children make a ready distinction between adjunct and complement clauses.

Another barrier of interest is the one formed by relative clauses. These were among the first barriers investigated experimentally with young children. Otsu (1981) tested whether preschool children would allow a *wh*-question to come from inside a relative clause and used stories that made the blocked interpretation salient, for example,

26. 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?

Notice the answer for adults can only be "a blue brush." It cannot be "pink feathers," because that latter question would link the *wh*-question inside the relative clause, "the bird that had long wings." Children did respect the relative clause barrier, although the performance was not perfect until children showed evidence that they could comprehend relative clauses.

In later work with relative clauses, de Villiers and Roeper (1995b) used adjunct questions instead of arguments, and their 3- to 5-year-old subjects were very good at avoiding LD readings with relative clauses. This study also manipulated the placement of the relative in the sentence so that sometimes the nearest clause was the relative clause:

27. How did *the dog that barked* climb the tree?

and sometimes not:

28. How did *the woman* knit *who was swimming*?

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Despite the variation, children correctly identified the matrix clause in answering the question and respected the barrier it presented.

Finally, Vainikka and Roeper (1995) investigated "empty operator" sentences as in Example 19 and found that 3- to 6-year-olds interpreted such sentences like adults 98% of the time.

THE IMPORTANCE OF THE MEDIAL "ERROR"

Despite children's success with barriers, a few notable error types are widely attested. One significant departure from the adult grammar has a direct connection to modern theory: It is relatively common for children to treat the *medial* question in *wh*-complements as if it were a *real* question, rather than an indirect question. Thus, for Example 23 above ("when did she say how she ripped her dress"), children age 4 or so will say "with the wire on the fence," that is, how she ripped her dress. They are answering the medial *how*. One possible explanation is that the children mark the lower CP as [+Question] instead of [+Indirect Question]. Then their grammar will require that the question be answered. Alternately, the child's lexicon might "underspecify" a position under a particular verb and so the child would not immediately see the [+Indirect] property.

Evidence for nonadult interpretations of the complement position also comes from children's production. Researchers have reported that children at the same stage produced extra medial *wh*-forms in elicited production tasks as in Example 29 (Thornton, 1991).

29. *What* does he say *what* he wants?

Then, it is not surprising that the children who produced them then judged them to be grammatical in judgment tasks (McDaniel, Chiu, & Maxfield, 1995),

The important feature of this error is that it is grammar driven: in English, direct questions are not possible in the medial position, but it is not unreasonable that children should entertain the possibility for them to exist. Hence, it appears that this option in UG is making its appearance (at least temporarily) in the grammars of children speaking languages where it does not appear in the adult language. Although this fact has been known for some time, it has never been clear why English-speaking children so readily adopt an analysis from languages like Hindi or German. However, if children are biased to fulfill the idealization of locality whenever they can, by using and interpreting medial *wh* as a real question alternative they will handle the *wh*-movement one phase at a time, that is within the single (lower) phase.

OTHER ERROR TYPES

Other error types are also seen. One example is when there is an argument question with *think* or *say*, as in Example 30:

30. What did John say he found [*trace*]?

Then, an LD answer is *obligatory*: the question can only be linked to the lower verb *found*. However, the question word is said to be under the scope of both verbs:

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

that is, both must be taken into consideration to correctly interpret the sentence. This fact is only noticeable if John speaks *falsely*, for example, he said he bought one thing, but in fact we know he bought something else. Children below the age of 4 or 5 often answer with the truth, rather than what John *said* he found. de Villiers (1999, 2005) has argued that this is an error that should be attributed to the grammar. Children fail to recognize that the embedded clause under such a verb can be false. It is still unclear how this error relates to the developing syntax of the construction. It is possible that this discovery about the interconnectedness of the clauses, namely, that the *wh* is under the scope of both verbs, is the trigger for the phase transfer requirement discussed above. That is, when the child discovers that the answer to "what did John say he found?' is not *always* just "what did he find," she must reject the inherent locality bias to complete phases as soon as possible and consider the kind of displacement/LD movement required in English.

Another common error type that does not seem to be *syntactic* in nature appears in the literature. Children frequently answered adjunct questions of all types, but especially *how*-questions, with a *because* clause. *Why*-questions fall into something of a special class in that they call for more than a constituent to answer them. With *when, where,* or *how*, a constituent phrase can be the answer: *in the morning, on the shelf, with a hammer.* However, *why* questions typically entail a whole sentence: *because he wanted to catch it, because his mother told him, because the road was wet*. *Why* questions are odd in several other ways (Blank, 1976; de Villiers, 1991); nevertheless, children at 3–5 years seem primed to answer with forms beginning with *because* even when it is not appropriate:

31. How was the dog running?
    —Because he wanted the bone.

Clearly, English-speaking children have some trouble mapping the semantic space that *because* occupies. One possible source of the difficulty is the prominent question in informal English, namely, *how come,* that maps onto some of the meanings of *why*, but has other distinctive properties (e.g., no auxiliary inversion). Also, there are languages such as Korean that have no *why/how* distinction. This error may be a consequence of the lexical difficulty posed by the *wh*-words.

In sum, small-scale studies of typically developing children, mostly speaking standard English, have suggested that children as young as 4 years are capable of LD movement, obey certain barriers to movement, and are sensitive to grammatical distinctions such as that between adjuncts and arguments. In addition, they show clear understanding of the conditions in which movement paths are structurally unavailable. However other aspects of *wh*-movement are not completely controlled at 4 or 5 years, such as the status of the indirect question, and semantic distinctions among adjuncts themselves.

LIMITATIONS OF PREVIOUS STUDIES: RESTRICTIONS OF SIZE, DIALECT, AND CLINICAL STATUS

Size

Given this array of phenomena and results, it is important to ask whether the small sample sizes in these studies represent what most children do at these ages. This is necessary before we can explore the possibility of using such materials with

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

wider populations or language disordered children. We do not know how far these results are generalizable beyond the small samples of mostly middle-class children (often from university day care centers and preschools) who have constituted the subjects in almost all studies to date. At what age do children in general show LD movement and sensitivity to barriers of all these subtle types? At what age do the common error types such as answering the medial question, and answering globally with a reason, disappear? The focus of previous studies in this area has been limited to one or two *wh*-question constructions. Is the picture the same when one compares the different types across the grammar of the same children?

Different dialects of English

The phenomena discussed have so far been studied only in speakers of Mainstream American English. AAE-learning children have been largely neglected in the larger experimental work on language acquisition. From a survey of existing work on AAE in adults (e.g., Green, 2002; Mufwene, 1998), we note that arguments and adjuncts behave the same in the two dialects, and there are no reports that barriers are different. Thus, there is nothing in AAE grammar of *wh*-questions per se that should make a difference across these sentence and story types. However, there are several differences in complementation between the dialects, and those differences might have an effect on how AAE speakers process *wh*-questions that include those structures.

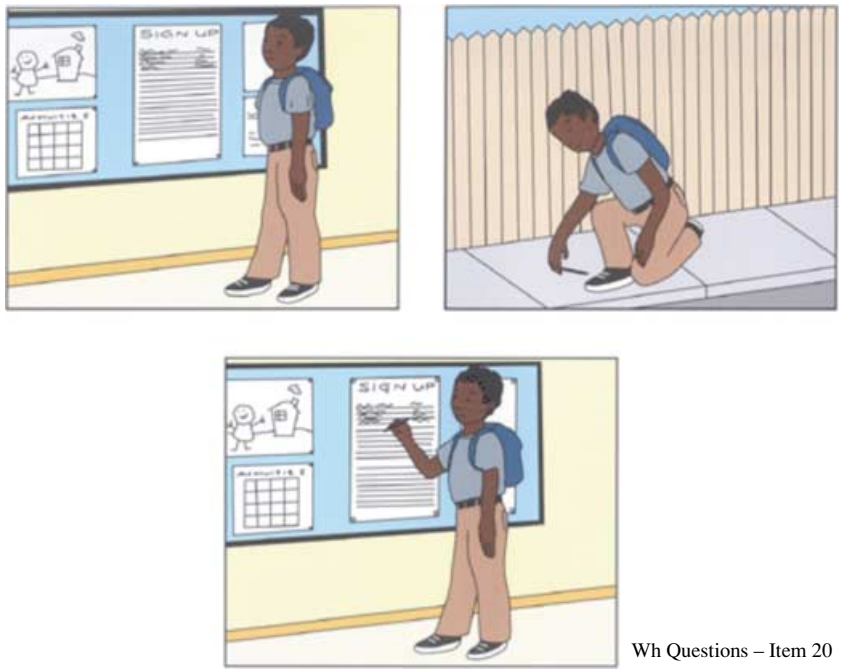
For example, relative clauses in AAE have more optionality in their relative pronouns (Green, 2002). In many contexts, AAE uses the relative pronoun just as in MAE, but the subject relative pronoun can be dropped in certain existential contexts such as that in Example 32.

32. There's a man (who) came to see me.

Other differences in complementation in AAE have to do with whether inversion is allowed in an indirect question, such as "He asked can she come." For comparison purposes, it might be important to avoid sentences in which dialect variation could make a difference in interpretation, so for example, choosing infinitival complements. However, some authors (e.g., Craig & Washington, 1994) have observed that AAE drops the infinitival *to* especially with particular common verbs: "you wan' go to the store?" and the new "auxiliaries" such as *fit'na*, *I'm'na*. Although we have not observed it in our own samples, the possibility exists that the interpretation of the complement may be changed when *to* is dropped.

A number of recent studies (Craig, Connor, & Washington, 2003; Craig & Washington, 2000, 2002; Craig, Washington, & Thompson, 1998, 2005) have examined *wh*-comprehension in AAE-speaking children. The battery these investigators developed to test for language impairment in AAE-speaking children includes a set of 12 single-clause *wh*-questions for each of two pictures. Craig et al. (1998) report on the responses of 64 children, ages 4 to 7, to 12 single-clause questions, presented by an AAE-speaking clinician in dialect, such as "What this (is)?" "Who (object) this?" "How many (objects) in the picture?" "Where this?" "How long will it take to (perform action)?" "Why he (perform action)?" "How far he (perform action)?" and "When this happenin'?" (Note that the change from MAE is the reduced forms of the auxiliary and copula *be*.)

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press



Stimulus: This boy was leaving school one day when he saw a sign about a special art class. He really wanted to go, but he had to sign his name on the sheet, and he didn't have a pen. When he was walking home he saw a pen lying on the sidewalk. He ran back to school and signed up for the art class. (*Pause for 1–2 seconds.*) Where did the boy *pick up* the pen to *sign* his name?

Figure 1. An example *wh*-question (Item 20) from the Dialect Sensitive Language Test. From *Dialect Sensitive Language Test: Pilot Edition*, by H. N. Seymour, T. Roeper, and J. G. de Villiers, 2000, San Antonio, TX: The Psychological Corporation. Copyright 2000 The Psychological Corporation. Adapted with permission. [A color version of this figure can be viewed online at www.journals.cambridge.org]

The children are reported to make many errors particularly at 4 and 5 years. From what is provided in the several papers using this task, the errors look familiar: a child, for example, answers a *how* question with "because. . . ." Examiner: "How often they barbecue?" Student: "Because they hungry" (Craig et al., 2003, p. 35). The table provided in Craig et al. (1998; Figure 1) shows a very high percentage of 4- to 6-year-old children making errors on both probes of each type of adjunct question: for example, 72% of kindergartners got both *when* questions wrong, and 50% got *how* wrong each time, but there is no evidence that the depth of the children's AAE dialect had any impact on their scores.

The question remains about *wh*-questions that entail *complex grammatical* operations that might have different properties in AAE. Craig et al. (2005) introduced seven longer, more complex probes, which were chosen because they required "processing of more advanced cognitive relationships that included comparatives, predictions, and explanations" (p. 122). The new probes were questions such as "What do you think will happen when the man/woman (action + object)?" "How

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

is this like this?" (comparative) and "How would you describe this person/these people?" The emphasis was on more complex language, but the focus was not on exploring the grammar systematically. The questions were harder for the children, but it is not clear which aspects of the complex forms might have been responsible for children's errors at different ages. Given that vocabulary correlated highly with success, the likelihood is that some of the difficulty was semantic/conceptual.

Only one small-scale study of AAE examined structures involving LD movement and barriers as described above (Bland, de Villiers, Roeper, Champion, & Seymour, 1992; Roeper & Seymour, 1994), and the data did not reveal any unusual properties of the grammar of *wh*-questions in children who spoke AAE. However, like the studies reported in Table 1, the findings of the small-scale study need to be replicated in a larger group.

Language impairment

Finally, there is a lack of evidence about *wh*-questions in language impairment. The acquisition of *wh*-questions by language-impaired children is in dispute. In 1995, de Villiers claimed that no theory of specific language impairment (SLI) treated it as a disorder affecting UG. In other words, no child with SLI was assumed to have a disorder so deep that it ruled out the appearance of universal features of human grammars, such as hierarchical phrases, movement rules, structure dependence, and so forth. In early work on this question, Bland et al. (1992) presented evidence that older children (aged 6 to 12 years) identified as having significant language delays still were capable of LD *wh*-movement, barrier effects, and the argument/adjunct distinction.

However, van der Lely and Battell (2003) presented evidence that at least a subset of older children with SLI, called *grammatically impaired* SLI (GSLI), have profound grammatical impairments that impact *wh*-question production, particularly with object questions that entail movement. Their subjects were matched to two different groups of typically developing children on vocabulary and grammatical tests, and their deficits showed up in a game designed to elicit both object and subject *wh*-questions, primarily *what, who,* and *which* questions. Van der Lely (1998, 2003) contends that this population of children suffers from a deficit in movement rules across complex structures, arguing for a deficit she labels representational deficit for referential relations (RDRR). The fundamental problem these children are argued to have is that they consider movement rules to be optional rather than obligatory. It is claimed that they lack an economy principle that makes movement, including *wh*-movement, compulsory. What the children did not do, however, was leave the "wh-" *in situ*. Van der Lely does not report comprehension data on these children, and it is not completely clear what the RDRR hypothesis would predict about comprehension, given that the GSLI children's grammars do not lack the movement rule altogether. However, a computational deficit of this sort would be presumed to create difficulties in keeping track of LD dependencies.

Deevy and Leonard (2004) explored exactly this hypothesis in a study of what they refer to as "short" and "long" *wh*-movement questions. In their study the "LD" was created not by two clauses but by insertion of adjectival material in the subject noun phrase, for example, "Who is *the happy brown dog* washing?" to create a

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 1. *Summary of questions used in the study*

Number	Sentence	Barrier	Type Clause 1	Type Clause 2	Answer(s)
1[a]	What did the mother say she bought?	No	Argument	Argument (false)	Obligatory long distance: must be what she *said* she *bought*.
2[b]	Who did the police woman help to call?	No	Argument	Na	Either long distance or short distance: the wh could be the object of *help* or *call*.
3[b]	How did the boy say he hurt himself?	No	Adjunct	Argument	Either long distance or short distance: the wh could be the adjunct of *say* or *hurt*.
4[b]	Who did the little sister ask how to see?	No	Argument	Adjunct	Either long distance or short distance: the wh could be the object of *ask* or *see*.
5[b]	Who did the boy ask what to bring?	Yes	Argument	Argument	Only short distance movement, i.e., only possible answer is as object of *ask*.
6[b]	How did the mom learn what to bake?	Yes	Adjunct	Argument	Only short distance movement, i.e., only possible answer is as adjunct of *learn*.
7[b]	How did the girl ask where to ride?	Yes	Adjunct	Adjunct	Only short distance movement, i.e., only possible answer is as adjunct of *ask*.
8[c]	What did the boy fix the cat that was lying on the table with?	Yes	Argument	Relative	Only answer from matrix clause = object of "fix with."
9[d]	How did the boy who sneezed drink the milk?	Yes	Adjunct	Relative	Only answer from matrix clause = adjunct of *drink*.
10[e]	What did he drive to hunt?	Yes	Argument	Adjunct/ purpose clause	Only answer from matrix clause = object of *drive*.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 1 (*cont.*)

Number	Sentence	Barrier	Type Clause 1	Type Clause 2	Answer(s)
11[e]	Where did the boy pick up the pen to sign his name?	Yes	Adjunct	Adjunct/ purpose clause	Only answer from matrix clause = adjunct of *pick up*.
12[f]	Where did the girl buy the hamburger to eat with a spoon?	Yes	Adjunct	Empty operator	Only answer from matrix = adjunct of *buy*.
13[f]	Where did the boy get the lemonade to splash on his face?	Yes	Adjunct	Empty operator	Only answer from matrix = adjunct of *get*.

[a]de Villiers and Pyers (2002).
[b]de Villiers, Roeper, and Vainikka (1990); Bland, de Villiers, Roeper, Champion, and Seymour (1992); Roeper and Seymour (1994); and McDaniel, Chiu, and Maxfield (1995).
[c]Otsu (1981); and de Villiers, and Roeper (1995b).
[d]de Villiers, and Roeper (1995b); Coles-White, de Villiers, and Roeper (2004).
[e]de Villiers (unpublished).
[f]From Vainikka and Roeper (1995).

longer distance from *wh*-word to its trace. Their subjects with SLI (perhaps not as specific a subset as Van der Lely's GSLI older group) showed more difficulty as this distance varied, suggesting they did have computational problems with movement. Deevy and Leonard tested whether the processing problem was specific to movement, or whether there would be length effects on comprehension even if no movement was involved, by comparing object and subject questions. Because SLI subjects showed no impairment relative to typically developing children on subject questions with extra material, they argue that it is the object *wh*-movement that creates the difficulty.

Craig and Washington (2000, 2002) have found that their battery of simple *wh*-questions captures the problems of AAE-speaking children previously identified as having a language impairment. Despite the high percentage of errors made by typically developing children, the impaired AAE speakers apparently make even more errors. However, complex *wh*-forms were not explored.

There is thus some evidence for a parsing problem with *wh*-movement in SLI, which may or may not be in addition to a possible representational deficit involving the obligatory nature of *wh*-movement. As a result, it is possible that a large sample of language impaired children would turn up at least a subsample (like Van der Lely's GSLI children) who have profound enough deficits in grammar to fail to get LD readings. Or, they may be able to use inferences from context to answer questions. However, inferences alone would not allow them to detect the structural conditions under which certain interpretations are ruled out. The prediction would then be that at least some children should fail to respect barriers to LD movement.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

GOALS OF THE CURRENT STUDY

The present study explores a range of *wh*-questions with a cross-sectional sample of children ages 4 to 9, allowing exploration of how LD movement emerges, which barriers are respected, and whether there are dialect differences or differences according to clinical status (typically developing or language impaired). Based on the previous research we made the following predictions: (a) children will be able to interpret questions involving LD movement from age 4 years; (b) children will respect barrier effects of several types, restricting their interpretations accordingly; (c) children will adopt a partial movement analysis when possible and answer medial complementizers as if they were questions; (d) children will have difficulty with questions that contain false complements until around age 6 at least; (e) children will have difficulty distinguishing the meanings of adjunct questions, in particular confusing *how* for *why;* (f) no dialect effects are expected in these phenomena if we avoid areas of dialect difference mentioned above; (g) we predict that children with language disorders will obey linguistic barriers but show a prolonged likelihood of partial movement, difficulty with false complements, and confusions among adjunct *wh*-questions, because these depend on learning.

DESIGN

The focus of interest was complex *wh*-questions. The items were designed to span the range of constructions discussed above. They included four two-clause sentences with no barriers, to test if the children from any group had difficulty with "LD" movement. The remaining questions were designed to test whether children were sensitive to the barrier effects of (a) *wh*-complements, (b) relative clauses, (c) adjunct "in order to" clauses, and (d) adjunct "empty operator" clauses.

Two examples of each were used. In the case of (a), the possible differential effects of adjunct and argument questions were also explored, for a total of five examples. In the case of (b) and (c), there was also one argument and one adjunct question. Type (d) does not allow this variation, so both were adjunct questions.

Table 1 provides a summary of the forms, a description of each, the predictions from adult grammatical treatments, and a citation for any acquisition work that has been done prior to this study. In every case, the items had been tested before in conditions that ensured that the story allowed both interpretations, as in de Villiers et al. (1990). That is, the same story had been tested against two different questions, for example, one with and one without a medial barrier (see also de Villiers & Roeper, 1996, for a detailed discussion of this paradigm).

METHOD

Subjects

The current study presents data from the field testing of the Dialect Sensitive Language Test (DSLT; Seymour, Roeper, & de Villiers, 2000).[2] One thousand children aged 4 to 9 years were chosen on the basis that their data from all of the language subtests from the DSLT were available, they were reported by the testing clinicians as having normal vision and hearing, and as testing within the normal

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 2. *Number of children in each age group by a priori dialect and clinical status*

Dialect	Clinical Status	Total Sample	4	5	6	7	8	9	Mean (*SD*) Age
AAE	Language impaired	175	26	43	48	16	28	14	6.55 (1.52)
	Typically developing	453	109	129	140	15	33	27	6.05 (1.42)
MAE	Language impaired	122	21	29	33	8	19	12	6.61 (1.63)
	Typically developing	250	60	61	73	16	20	20	6.20 (1.52)
Total		1000	216	262	294	55	100	73	6.24 (1.45)
AAE (%)		62.8	62.5	65.6	63.9	56.4	61.0	56.2	

range on standard tests of intelligence. The participating clinicians categorized the children a priori as MAE speakers or AAE speakers based on the child's family and community background as well as their own judgment of the child's speech. As a partial check, a certified speech–language pathologist at The Psychological Corporation confirmed the children's dialect status by looking for the presence or absence of distinctive morphological, phonological, syntactic, and semantic features in the children's verbatim responses to DSLT items as recorded by the testing clinicians.

Of the 1,000 children in the present study, 628 (62.8%) were categorized as AAE speakers and 372 (37.2%) as MAE speakers. The clinicians also classified the children as typically developing or language impaired based on their standard practices of assessment before the test. All of the language-impaired children were receiving intervention services for language impairment, and most of them had recently been given norm-referenced tests of language skills, although these varied widely by state and across individual clinicians. About 30% of each dialect group were classified by the clinicians as language impaired a priori.

Table 2 shows the age distribution of the four groups of children in the study. There was a larger sample in the 4-, 5-, and 6-year-old age groups. The percentage of children categorized as AAE speakers was roughly the same in each age group.

For each of the children the parental education level (PED) of at least one and where possible both parents was obtained. For each child the PED level of the primary caregiver (usually the mother) was categorized on a 5-point scale based on years of education: 1 = *0–8*, 2 = *9–11*, 3 = *12*, 4 = *13–15*, and 5 = *16+*. The entire range of levels from 1 to 5 was represented across the sample, but the lower PED levels were over sampled because the use of AAE varies inversely with PED level in the US African American population (Washington & Craig, 1998). As far as possible, The Psychological Corporation tried to match the caregivers' PED levels of the MAE children to those of the AAE children across the full DSLT field-testing sample. However, as Table 3 indicates, in the present sample of 1000

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 3. *Mean PED level and gender distribution for the four experimental groups*

Dialect	Clinical Status	PED Level		Number of	
		Mean	Range	Girls	Boys
AAE	Language impaired	2.91	1–4	68	107
	Typically developing	2.97	1–5	246	207
MAE	Language impaired	3.02	1–5	40	82
	Typically developing	3.11	1–5	146	104
Total sample		3.00	1–5	500	500

children the average PED level of the MAE children tended to be slightly higher than that of the AAE speakers. The mean and modal PED level across the sample was 3.0, that is, a high school education.

The two dialect groups were exactly matched for gender, with 314 girls and 314 boys in the AAE group and 186 girls and 186 boys in the MAE group. However, there were more girls than boys in the typically developing groups and more boys than girls in the language-impaired groups, reflecting demographics on language impairment (Tomblin et al., 1997). Table 3 includes the gender distribution for the four experimental groups.

Although all of the AAE speakers were African American, the MAE group was a mixture of ethnicities: 77.2% Caucasian, 15.1% Hispanic, 5.9% African American, and 2% other. The distribution across regions was designed to approximately match that of the distribution of the African American population of the United States: the south (58.1%) and north central states (27.7%), with fewer from the northeast (7.0%) and the west (7.2%).

Procedure

The children were tested individually by certified speech–language pathologists recruited for the field testing. The *wh*-subsection of the DSLT was the first subtest in the syntax section following a section on morphology. As a whole, the *wh*-comprehension subtest on the DSLT had 22 items, the first 9 of which tapped semantic aspects of *wh*-questions discussed elsewhere (Roeper, 2004). The remaining 13 questions involved two-clause sentences and these constitute the data for the analyses discussed here.

After a set of warm-up items to get the child answering simple questions, the child was in each instance shown a pictured story of approximately three scenes, and read a short story about them. The story terminated in a *wh*-question that asked for information provided in both the story and the pictures, but which required grammatical processing to answer (see Figure 1).

The child was encouraged to speak the answer to ensure coding accuracy. The speech–language pathologist wrote the answer verbatim on the score sheets, and then coders at The Psychological Corporation were trained with supervision from the researchers to classify the answer into several possible types. Any unclear

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

responses were discussed with the researchers until agreement was reached about the classification.

Coding

The coding varied according to the type of question. For Item 1, an obligatory LD answer was required, in which both verbs take scope over the object. An alternative answer is for the child to only answer the *wh*-question with respect to the lower verb, that is, "what did she buy?"

In Items 2–4, there were two major types of answer possible: an SD answer in which the question links to the main verb, and an LD, in which the question is construed as embedded in the lower clause and under the scope of both verbs.

For Items 5–7, the additional possibility for the child is to answer the medial-*wh* (ME), even though for adults that is not a question but a complementizer.

For the adjunct barrier cases, Items 8–13, the choice is between a matrix clause (MA) answer or an answer from within the relative clause or adjunct, a barrier violation.

In addition, it is important to note that for all these questions the child might answer "I don't know," coded as 88, or answer the wrong *wh*-question (WW), "where did he go?" with "because he didn't want to get hot," or something "other" than what was asked (OT). This was the code if the child gave an answer beyond the possibilities listed above. Sometimes a child answered by repeating some piece of the story that was not an answer to the question asked, such as: "he fixed the cat's leg," "because he drank all the milk."

The correct answer in each case was scored as one point, and the remaining codes were scored as zero. For Items 2–4 where the options are either SD or LD, either one was given one point.

RESULTS

Overall results

The first question concerned whether children identified as language disordered would score less well than typically developing children, regardless of dialect, and throughout the age range of 4–9 years. A univariate analysis of variance (ANOVA) was performed with the dependent variable being the overall score out of 13. The independent variables were dialect (MAE vs. AAE), clinical status (language impaired vs. typically developing), age (4–9 years), and gender (male vs. female). PED level was treated as a covariate. The means and standard deviations are given in Table 4. The major effects are the child's clinical status, $F\ (1,\ 951) = 69.3$, $p < .001$, $\eta^2 = .068$, and age, $F\ (5,\ 951) = 59.1$, $p < .001$, $\eta^2 = .237$. Dialect, PED level, and gender account for no significant variance, neither alone nor in interaction with any other variable.

Item analyses

There were four major types of items, with variations within types. Item 1 represents the first type: obligatory LD movement. Then the second type, Items 2–4,

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 4. *Wh-scores (of 13) by dialect, age, clinical status, gender, and PED level*

Dialect	Clinical Status	Total Sample	4	5	6	7	8	9	Ave.
AAE	Language impaired	175	6.23 (2.6)	7.47 (3.2)	8.46 (3.2)	9.81 (2.8)	10.29 (2.5)	10.43 (1.6)	8.46 (3.2)
	Typically developing	453	6.86 (3.1)	9.56 (2.5)	10.8 (2)	11.2 (2)	12.2 (1.1)	12.3 (0.9)	9.69 (2.9)
MAE	Language impaired	122	4.48 (3.3)	6.93 (2.1)	8.85 (3)	9.88 (1.1)	10 (1.6)	10.83 (1.5)	8.08 (3.2)
	Typically developing	250	8.12 (3.2)	9.82 (2.5)	11.1 (2)	10.9 (1.9)	11.25 (2.7)	12.5 (0.7)	10.19 (2.4)
Gender									
M		500	6.29 (3.4)	8.83 (2.8)	9.93 (2.7)	10.9 (1.7)	10.8 (2.3)	11.65 (1.5)	9.13 (3.2)
F		500	7.5 (3.1)	9.15 (2.9)	10.5 (2.4)	9.6 (2.9)	11.3 (2.1)	11.87 (1.3)	9.68 (3)
PED Level			1	2	3	4	5		
AAE			10.9	8.61	9.6	9.6	8.1		9.35
MAE			10.8	8.9	9.6	9.5	9.7		9.5
N			19	191	584	187	25		1000

can be answered either LD or SD. The third type, Items 5–7, is obligatory SD. They have a *wh*-complement with a medial complementizer that is a barrier to LD movement and can potentially attract answers to the medial question word. The fourth type is various sorts of clauses that forbid *wh*-movement from inside the clause. These include relative clauses (Items 8 and 9), purpose clauses (Items 10 and 11), and empty operator clauses (Items 12 and 13).

LD movement

Considering Items 1–4 we asked the following: (a) Is LD movement, namely, LD interpretation, available generally to children as young as 4 years? (b) Are there any dialect differences between AAE and MAE? (c) Are there any signs that disordered children lack LD interpretation?

The case of Item 1 is important as it is an obligatory LD movement, but things can still go wrong if the child fails to consider the *wh*-word under the scope of both verbs (de Villiers & Pyers, 2002). As in earlier work, young children (4 and 5 years old) of both dialects had difficulty providing the appropriate answer when

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 5. *Long distance wh-responses (where optional, of 3) by dialect, clinical status, and age*

Dialect	Clinical Status	Total Sample	4	5	6	7	8	9	Ave.
AAE	Language impaired	175	1.65 (1.2)	1.95 (1.1)	2.31 (1)	2.75 (0.7)	2.61 (0.9)	2.64 (0.6)	2.24 (1.1)
	Typically developing	453	1.76 (1.2)	2.38 (0.9)	2.6 (0.8)	2.93 (0.3)	2.97 (0.2)	3 (0)	2.4 (0.9)
MAE	Language impaired	122	1.48 (1.2)	1.72 (1.1)	2.21 (1.1)	2.63 (0.7)	2.37 (1)	3 (0)	2.1 (1.1)
	Typically developing	250	2 (1.2)	2.3 (1.1)	2.74 (0.8)	2.56 (1)	2.6 (1)	2.8 (0.5)	2.44 (1)

the lower clause involved a false statement, with about 33% answering the second clause only, answering "what the mother bought," not "what she said she bought." Children with language disorder behaved like younger children in this respect, with 25% still making this error at age 6 and 7. No dialect effect was evident, Pearson χ^2 (1) = .00, but there was a highly significant effect of age, Pearson χ^2 (5) = 57.7, $p < .001$, and a significant effect of clinical status, Pearson χ^2 (1) = 3.8, $p < .05$. A fuller analysis of Item 1, connecting failure to other indices of the children's theory of mind development, is provided in de Villiers, Burns, and Pearson (2003).

However, Item 1 does not directly address the answer of LD movement because there is no "SD" alternative. More direct evidence comes from the three ambiguous items, Items 2, 3, and 4. A summed score (0–3) was derived for each child across Items 2–4 (see Table 5). An ANOVA was performed with this score as the dependent variable, and clinical status, dialect, age group, and gender as independent variables with PED level as a covariate. Only clinical status, F (1, 951) = 7.51, $p < .01$, $\eta^2 = .008$, and age, F (5, 951) = 21.7, $p < .001$, $\eta^2 = .102$, have significant effects on this score.

Figures 2 and 3 show the percentage of LD answers for Items 1 to 4 broken down by clinical status and age. One can see that it is not the case that 4-year-olds avoid LD movement. If anything, they prefer it for Item 3. An ANOVA was also conducted looking at preference for *SD* answers on Items 2 and 3, and the results revealed that taking the option of a SD answer increased with age, F (5, 951) = 5.3, $p < .001$, $\eta^2 = .026$, and was more prevalent in typical than in language disordered children, F (1, 951) = 9.86, $p < .002$, $\eta^2 = .010$. No other significant effects were observed.

A further inspection of the data reveals that there is *no* subgroup of language disordered children who fail to get LD interpretations where they are permitted. There are 20 disordered children who never choose a LD answer for Items 2

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

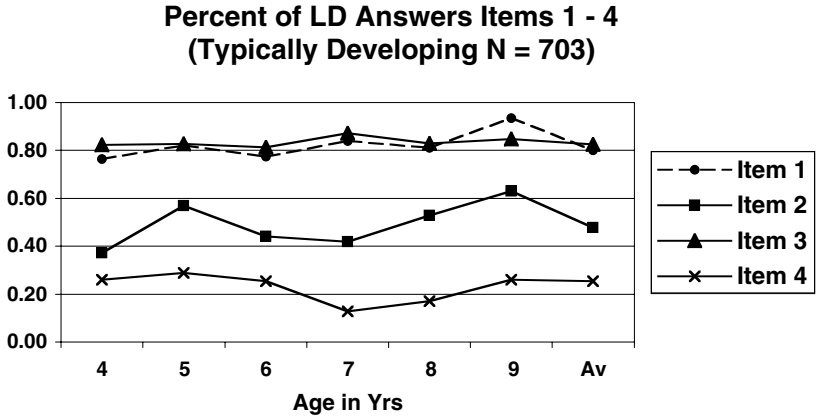


Figure 2. Long distance responses (where optional) by age: typically developing children.

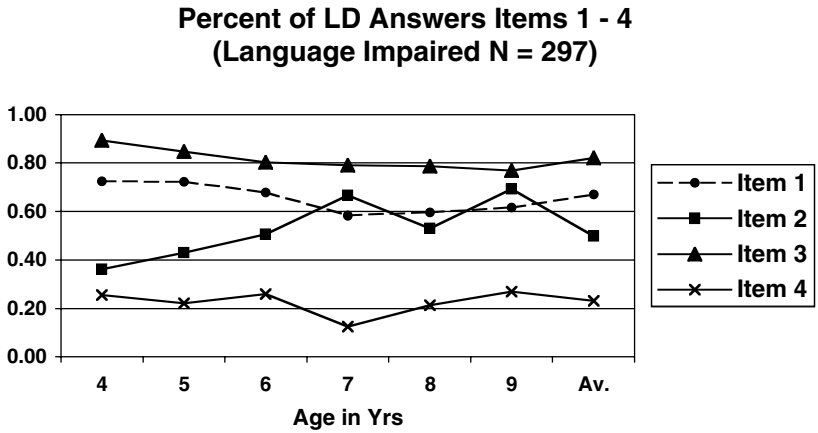


Figure 3. Long distance responses (where optional) by age: language impaired children.

or 3 or 4, but 15 of these do answer Item 1 correctly, which shows they can interpret the LD relationship when it is obligatory. One can compare this with the 57 typically developing children who also do not choose an LD answer for Items 2 to 4, of which 45 answer Item 1 correctly. The percentages of children who give no LD answers are tiny for both typical and disordered groups (1.7 and 1.6%, respectively).

In sum, these data imply that 4-year-olds easily get LD interpretations, there are no dialect effects, and disordered children get the readings as easily as typically developing children. However, without considering the barrier cases, it is impossible to be sure that the children are not using inference or guessing rather than grammar-based interpretations. Barrier cases are considered next.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 6. *Complement barrier wh-scores (of 3) by clinical status and age*

Clinical Status	Total Sample	4	5	6	7	8	9	Ave.
Typically developing	703	0.89 (1)	1.6 (1)	2.03 (0.9)	2.2 (0.9)	2.5 (0.6)	2.64 (0.7)	1.74 (1.1)
Language impaired	297	0.55 (0.7)	0.86 (1)	1.38 (1)	1.5 (0.9)	1.63 (0.9)	1.85 (0.9)	1.2 (1)

Table 7. *Average number of medial errors (of 3) by clinical status and age*

Clinical Status	Total Sample	4	5	6	7	8	9	Ave.
Typically developing	703	1.38	0.95	0.61	0.35	0.16	0.21	0.83
Language impaired	297	1.44	1.61	1.12	0.75	0.87	0.77	1.18

Wh-complement barriers

To be certain that the LD interpretations are grammatically based, it is important to see whether children from all groups appropriately limit LD movement in the presence of a medial *wh*, that is, with a *wh*-complement. The scores for Items 5–7 were combined (shown in Table 6) to form the dependent measure for the ANOVA shown in Table 9. Again, the only significant variables were clinical status, $F\,(1, 951) = 68.46$, $p < .001$, $\eta^2 = .067$, and age group, $F\,(5, 951) = 36.67$, $p < .001$, $\eta^2 = .159$.

Two further analyses were undertaken. In one, the dependent measure was the number of illegal LD responses on these items. Although rare, were they more likely in the clinical group? Figure 4 provides the answer: illegal LD answers were more likely in the clinical group, and also declined with age. However, as the figure shows, they are very unlikely errors.

Finally, the medial answers were tallied across these items and an ANOVA explored these responses. The means in Table 7 and the ANOVA reveal that there is a strong effect of clinical status, $F\,(1, 951) = 26.8$, $p < .001$, $\eta^2 = .057$, and age, $F\,(5, 951) = 18.2$, $p < .001$, $\eta^2 = .087$, but in this case also of dialect, $F\,(1, 951) = 4.04$, $p < .04$, $\eta^2 = .004$. Inspection of the means by dialect (in Figure 5) reveals that the dialect effect is a product of the higher likelihood of the medial error in the MAE-speaking children. We see also that the medial errors decline rapidly at age 5 in typically developing children of both dialect groups, being very rare after age 7, but persist in language disordered children, regardless of dialect. Especially at ages 4 and 5 years, MAE speakers are more likely than AAE speakers to answer the medial question. The clinical groups persist in the error through 9 years of age.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

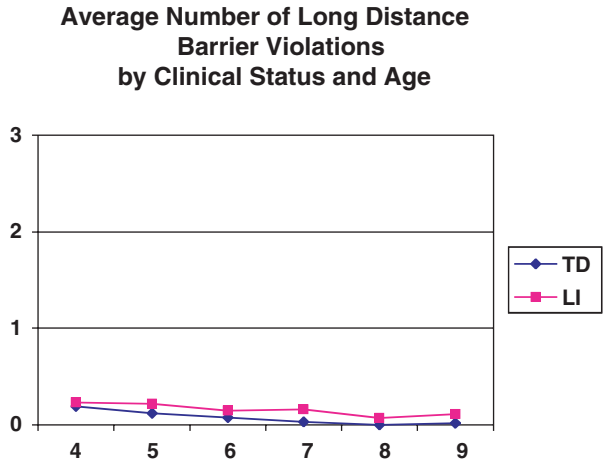


Figure 4. Illegal long distance responses by clinical status and age. [A color version of this figure can be viewed online at www.journals.cambridge.org]

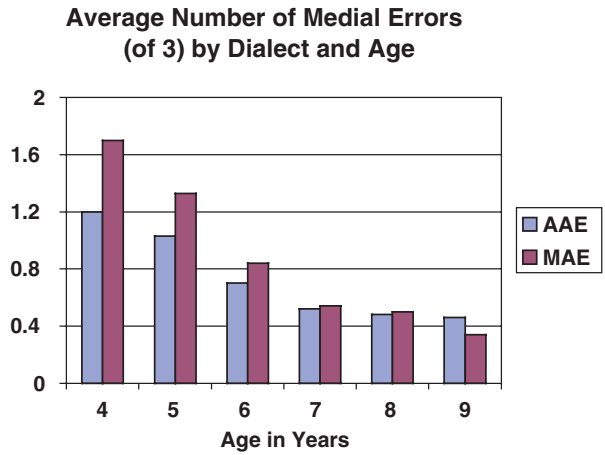


Figure 5. Medial errors by dialect and age. [A color version of this figure can be viewed online at www.journals.cambridge.org]

Individual item comparisons

Tables 8 and 9 report the critical results from a series of chi-square tests for the specific comparisons.

Set a: Tests of barriers versus no barriers. The critical cases explored by de Villiers et al. (1990) were Items 5, 6, and 7, which disallow LD movement. In this study it was possible to conduct a series of chi squares pitting those cases against the corresponding items without a medial: Item 2 compares to Item 5, Item 3 to 6, and Item 3 to 7.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 8. *Long distance answers compared by type of question: Typically developing children*

Sentence	Compared to	Prediction From Adults	Means	Significant McNemar Results[a] ($df = 1, N = 703$)
		Tests of Barriers Versus No Barriers		
2. Who did the police woman help to call?	5. Who did the boy ask what to bring?	LD is optional in #2 with no medial complementizer.	#2 = 0.48 #5 = 0.04	$p < .0001$
3. How did the boy say he hurt himself?	6. How did the mother learn what to bake?	LD is optional in #3 with no medial but blocked by argument medial in #6.	#3 = 0.82 #6 = 0.03	$p < .0001$
3. How did the boy say he hurt himself?	7. How did the girl ask where to ride?	LD is optional in #3 but blocked by adjunct medial in #7.	#3 = 0.82 #7 = 0.04	$p < .0001$
		Tests of Argument Versus Adjunct Movement		
2. Who did the police woman help to call?	4. Who did the girl ask how to see?	LD is optional in #2 and possible in #4 but argument may circumvent barrier.	#2 = 0.47 #4 = 0.25	$p < .0001$ #4: mean of 0.25 significantly lower than 0.47 (one-sample $t = -14.9, p < .0001$) but significantly higher than 0.10 ($t = 9.35, p < .0001$)
4. Who did the girl ask how to see?	5. Who did the boy ask what to buy?	LD is blocked in #5 but allowed in #4.	#4 = 0.25 #5 = 0.04	$p < .0001$ #5: mean of 0.038 is significantly lower than 0.10 (one-sample $t = -8.49, p < .0001$)

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

4. Who did the little sister ask how to see?	7. How did the girl ask where to ride?	LD of the adjunct is blocked in #7, but LD argument in #4 may circumvent barrier.	#4 = 0.25 #7 = 0.04	$p < .0001$
		Tests of No Difference		
5. Who did the boy ask what to buy?	6. How did the mother learn what to bake?	There is no expected difference as both block LD; compare LD.	#5 = 0.04 #6 = 0.03	$p = .78$, *ns* Both means are significantly below 0.10 (one-sample *t* for #5, above; #6, $t = -9.6$, $p < .0001$)
6. How did the mother learn what to bake?	7. How did the girl ask where to ride?	There is no expected difference as both block LD; compare LD.	#6 = 0.03 #7 = 0.04	No significant effects #6 and #7: means are significantly lower than 0.10 (one-sample *t* for #6 above; #7, $t = -7.83$, $p < .0001$)

[a]Column 1 versus column 2.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Table 9 . *Long distance answers compared by type of question: Language disordered children*

Sentence	Compared to	Prediction From Adults	Means	Significant McNemar Results[a] ($df = 1, N = 297$)
		Tests of Barriers Versus No Barriers		
2. Who did the police woman help to call?	5. Who did the boy ask what to bring?	LD is optional in #2 with no medial complementizer.	#2 = 0.50 #5 = 0.05	$p < .0001$
3. How did the boy say he hurt himself?	6. How did the mother learn what to bake?	LD is optional in #3 with no medial but blocked by argument medial in #6.	#3 = 0.82 #6 = 0.05	$p < .0001$
3. How did the boy say he hurt himself?	7. How did the girl ask where to ride?	LD is optional in #3 but blocked by adjunct medial in #7.	#3 = 0.82 #7 = 0.06	$p < .0001$
		Tests of Argument Versus Adjunct Movement		
2. Who did the police woman help to call?	4. Who did the girl ask how to see?	LD is optional in #2 and possible in #4 but argument may circumvent barrier.	#2 = 0.50 #4 = 0.23	$p < .0001$ #4: mean of 0.23 significantly lower than 0.50 (one-sample $t = -14.9, p < .0001$) but significantly higher than 0.10 ($t = 9.35$, $p < .0001$)
4. Who did the girl ask how to see?	5. Who did the boy ask what to buy?	LD is blocked in #5 but allowed in #4; compare LD.	#4 = 0.23 #5 = 0.05	$p < .0001$ #5: mean of 0.05 is significantly lower than 0.10 (one-sample $t = -8.49, p < .0001$)

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

4. Who did the little sister ask how to see?	7. How did the girl ask where to ride?	LD of the adjunct is blocked in #7, but LD argument in #4 may circumvent barrier.	#4 = 0.23 #7 = 0.06	$p < .0001$
		Tests of No Difference		
5. Who did the boy ask what to buy?	6. How did the mother learn what to bake?	There is no expected difference as both block LD; compare LD.	#5 = 0.05 #6 = 0.05	$p = .78$, *ns* Both means are significantly below 0.10 (one-sample t for #5, above; #6, $t = -9.6$, $p < .0001$)
6. How did the mother learn what to bake?	7. How did the girl ask where to ride?	There is no expected difference as both block LD; compare LD.	#6 = 0.05 #7 = 0.06	No significant effects #6 and #7: means are significantly lower than 0.10 (one-sample t for #6 above; #7, $t = -7.83$, $p < .0001$)

[a]Column 1 versus column 2.

Table 10. *Average adjunct score (of 6) by clinical status and age*

Clinical Status	Total Sample	4	5	6	7	8	9	Ave.
Typically developing	703	3.8	4.7	5.3	5.2	5.5	5.8	5.1
Language impaired	297	2.4	3.8	4.2	4.9	4.9	5.1	4.1

Set b: Tests of argument versus adjunct movement. With Items 4, 5, and 7 we tested whether the different constraints on arguments and adjuncts are operative: will a medial *adjunct* in fact *not* block LD movement of an argument *wh*? We tested Item 4 against Item 2, with no medial, and predict *no* difference in LD. We tested Item 4 against Item 7 and predicted that the barrier in Item 7 would be stronger than the barrier in Item 4. We also tested Item 4 against Item 5, where a medial *argument* blocks movement. In addition to the chi-square comparisons between them, we asked via one-sample *t* tests whether the overall means obtained were significantly higher than chance (0.50), or a 10% error rate (0.10).

Set c: Tests of no difference. We also compared cases where LD is equally blocked by medial barriers, and therefore we predict no difference in the LD answers: Item 6 versus Item 7, where an adjunct is blocked by either type of medial, and Item 5 versus Item 6, where a medial argument blocks both argument and adjunct movement.

To allow more precise interpretation, the analyses were run first for typically developing children (Table 8), then for the disordered group (Table 9), as the questions being asked are different. The typically developing children allow a test of the theories with a broader sample of children and dialects of English than previous studies. The disordered children allow a test of the idea that their development is governed by the same or different factors.

The tests of barriers in Table 8 reveal that typically developing children block LD movement in the three critical cases, and as seen in Figure 2, they do so even at age 4. This confirms in a much larger population the basic results of the smaller studies, and lends credence to the grammatical rather than inferential basis of the children's LD interpretations.

In terms of a test of the difference between adjunct and argument movement (Table 9), it is clear from the means that children do in fact allow LD movement with an argument moving across an adjunct medial question (Item 4). Although they do not prefer it compared to the no-barrier case, the percentage of LD movement (25%) is significantly higher than for an LD adjunct, and significantly above the 10% error rate that is characteristic of the barrier cases. Finally, in the comparison among the barrier cases there are no meaningful differences in the percentages of LD movement, as predicted. The significant differences that occur are minute: 4% compared to 3% among the typically developing children.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

What happens with the disordered children? Table 9 and Figure 3 reveal that they also both allow LD movement and then restrict it appropriately in the barrier cases, to the same extent as typically developing children even from age 4 years. As to the argument/adjunct difference, the mean differences are the same magnitude as for the typically developing children. Tested against the value of 10%, there is significantly more LD movement on Item 4 than on true barrier cases. *There is no evidence at all that these children fail to obey wh-barriers*.

Other adjunct barriers

Answers to the adjunct cases Items 8–13 were combined into a single score (0–6) as shown in Table 10. The ANOVA results show strong effects of clinical status, $F\ (1,\ 951) = 56.3$, $p < .001$, $\eta^2 = .046$, and age, $F\ (5,\ 951) = 41.4$, $p < .001$, $\eta^2 = .179$, but no dialect or other effects or interactions.

What kinds of errors occurred here? The two relative clause items (Items 8 and 9) have higher levels of barrier violations than the other adjunct clauses. The incidence of barrier violations was higher in the case of the adjunct question (19.6%) than for the argument question (8.5%), but the variance is so great that the difference is not statistically significant.

The relative clause complementizer *who* in Item 9 could be compared to the medial *wh*-complementizer, but children treat them quite differently. To Item 9, there were 34 answers of the medial *who*, for example, "the small boy," or 3.4%. There was no difference by dialect but a slightly greater prevalence among disordered than typically developing children (5.4 compared to 2.6%), and virtually no such responses after age 7 years. These findings confirm earlier results with typically developing children (de Villiers & Roeper, 1995b) and suggest that the medial answer so prevalent above with *wh*-complements is a grammatical rather than a lexical option.

In terms of the errors made on adjunct forms, the other errors were usually WW or OT, as described in coding above. All such errors were noticeably greater in language disordered children than typically developing children, but not qualitatively different in kind. Errors of this kind are especially prevalent among 4-year-olds where they reached around 30% for the adjunct relative clause case. The language disordered children persisted with the error up until age 9, whereas it became rare for typically developing children after age 7. Nevertheless, this level of error is considerably higher, and more persistent, than with the *wh*-complement barriers (and found by Coles-White, de Villiers, & Roeper, 2004, with *why*-question extraction out of relative clauses).

The prediction theoretically is that Items 12 and 13 should not differ, as they both present barriers. With respect to the difference between the empty category case and the purpose clause, one might predict that the empty operator case in Item 12 would represent a greater difficulty than the purpose clause in Item 13, because the trace and thus the "machinery" of barrierhood is invisible. Combining the scores on Items 10 and 11 gave a score of 0–2 on "purpose" clauses versus the combined score of Items 12 and 13 (0–2) for "empty operator" sentences. An ANOVA using these scores as the repeated measures revealed a significant effect of clinical status, $F\ (1, 976) = 16.4$, $p < .001$, $\eta^2 = .016$, and age, $F\ (5, 976) = 5.8$,

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

$p < .001$, $\eta^2 = .029$, and no dialect effects. The ANOVA also a revealed significant effect of type of clause, with purpose clauses being *more* likely to lead to a violation than empty operator cases, F (1, 976) = 6.4, $p < .01$, $\eta^2 = .007$. There is no evidence then that invisible barriers are harder than visible ones.

DISCUSSION

In sum, the results suggest the following. Taking the *wh*-questions as a whole and giving each child a score based on their adultlike responses, we find that there are significant age differences, as expected. However, children in the two dialect groups do not differ in their responses to the items. Neither is parent education level ever a significant variable. These results may surprise researchers who usually expect children of low SES to fail language tasks more frequently, but the *wh*-questions tap core grammatical operations that are shared in common across dialects and environments, at least after the age of 4 years.

The *wh*-questions individually test specific hypotheses about the nature of child grammars, and the item analyses provide rich confirmation that the results of earlier small-scale studies hold up with a much more diverse sample of the US population.

1. It is confirmed that children as young as age 4 years can give LD interpretations of questions, and there is no dialect difference. In fact, LD interpretations are preferred and diminish with age.
2. It is confirmed that children are sensitive from an early age to barrier effects, indicating that their interpretations go beyond inference strategies.
3. Children were found to answer the medial complementizer as a real question, a response particularly prevalent in younger ages and clinical groups.
4. Four- and 5-year-old children had difficulty with the false clause case, and this error was prolonged in the clinical groups.
5. Children respected the distinction in how adjunct versus argument *wh*-question words were allowed to move.
6. Children persisted in answering *how* questions as if they meant *why*, a process prolonged in the language disordered group.
7. No dialect effects were significant except for one: AAE speakers were *less* likely than MAE speakers to make the medial answer error.
8. The groups of language disordered children allowed LD movement and obeyed barrier effects, but perseverated across time on all the other error types that typically developing children make.

How can it be simultaneously true that children get better with age, but respect barriers from an early age? The answer lies in their nonadult errors that nevertheless do not violate barriers. For instance, we find pervasive answers to the medial question, confirming many previous small-scale studies. However, the study establishes that these errors are much rarer after age 6, even in this diverse sample of typically developing children. In addition, we find answers that "miss the mark" by answering something that was not asked. It is possible that some

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

portion of these represent the child's misunderstanding of the lexical meaning of a *wh*-word, so that we simply cannot recognize what it is in answer to. The clearest case is one for which we were prepared by previous work, namely, the child answering with "because" to a wider variety of adjunct questions than "why."

In terms of disordered children, we explored the possibility that at least some subset of language impaired children should show marked difficulties in obeying constraints on the interpretation of questions, if they have fundamental difficulty with movement rules (Van der Lely, 2003). We specifically explored whether (a) children with language impairment should have problems with LD when it is optional or (b) children with language impairment should have problems with barriers.

Even if children with language impairment appear to have intact grammars, it could be argued that they might have serious processing difficulties that would get in the way of complex sentence interpretation. If disordered children are more likely to guess an answer under the strain of processing, we might expect that they would show a greater likelihood of barrier violations. They might also, for instance, answer the medial complementizer in a relative clause, and be insensitive to the distinction between adjuncts and complements in their movement possibilities.

In fact, none of these turned out to be the case. Language-impaired children showed LD movement, and respected barriers of all types, as well as the adjunct/argument distinction. A detailed analysis of individual responses revealed no child who could be characterized as impaired in this way. Nonetheless, we may have missed the small percentage of children whom Van der Lely has characterized as GSLI, if they are as rare as she contends. That is, it is still possible that some children with language impairment would show these difficulties, although we did not find them in this sample.

Language-impaired children still more often failed to give the right answer. Their errors are typical of young typically developing children: namely, they answer the medial questions for a much longer time, and they answer "how" or even "where" with "because." More often than typically developing children they avoid answering by giving a global response or saying "I don't know." As a result, we find no evidence that language impaired children fail to observe principles of UG. Rather, the properties that characterize differences across languages, such as the medial *wh* as an indirect versus real question, and whether the language makes a distinction between lexical items for *how* and *why*, are the greatest sources of error for typically developing and disordered children. We assume that the learning processes that allow typically developing children to resolve these alternatives must operate less effectively in language disordered children, so that the distinctions take longer to make. If we understood what the crucial triggering evidence was, the design of effective intervention would be clear. In the case of AAE, there appears to be some other feature in the grammar that allows AAE-speaking children to more often avoid the medial error, and we are actively exploring that question (de Villiers et al., 2007).

In conclusion, we will try to place our results in the larger framework of linguistic theory. Two features are at the heart of modern work in syntax over the last half-century: "displacement" and "locality." As we saw above, displacement is where an element is interpreted at a position different from where it is pronounced.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

We see it in sentences with topicalization (in Example 33) and *wh*-movement (Example 34):

33. Foreign movies I like _____.
34. What did you buy _____?

where the fronted nounphrase is interpreted as the object of the verb in its classical "deep structure" position, but appears at the front. In contrast, "locality" is the claim that all operations happen within a specific clause. The strongest evidence of locality feels like common sense: we cannot move a *wh*-word from one sentence into a prior one:

35. *What did yesterday it rain. She bought _____?

A pair of utterances like Example 35 is incomprehensible: no child or adult ever forms questions like that, and no known language allows it. They automatically obey this locality constraint and produce two different sentences:

36. Yesterday it rained. What did she buy _____?

Chomsky has suggested that locality applies in a much narrower way in principle, within a phase although it is overruled by displacement in very narrowly defined ways in some, not all, languages of the world. That is, every clause with a tense marker *should* be the outer boundary of movement, although it is not actually so:

37. What did John say [she bought _____?]

Under strict locality, one should not be able to move the *what* beyond the lowest clause:

38. John said it was [what she bought _____?]

Instead, in languages like English, displacement overrides the locality constraint.

If this strong claim is true, then it predicts that children will spontaneously seek to honor locality. This perspective was obscure until recently, because our first assumption was that children would show a parsing preference to connect the *wh*-word to its nearest possible trace, foregoing the need to handle LD movement by giving SD answers. We have found instead that from an early age that children easily allow LD movement, but that might reflect the bias toward locality:[3] resolve the interpretation of the *wh*-word with respect to the lower clause. This is not a blind preference, but one sensitive to grammar: barriers and adjuncts block it completely. When there is a medial complementizer we find the clearest evidence of a bias toward locality—"compute, pronounce, and interpret all elements" (Chomsky, 2004) within a clause—or a phase, in modern terms. The fact that "barriers" exist is just the adult reflection of this restriction. Instead of referring to "barriers to movement," we could speak of "required transfer to interpretation." In fact, the best index of whether a child is capable of *genuine* LD interpretation, not a locality

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

preference, may be cases such as Item 1 (*What did the mother say she bought?*). Recall that the young children respond by *answering* such a question only with respect to the lower clause. When the child solves the problem of suspending that interpretation until the second phase, the problem still remains for cases in which there is an overt medial *wh*-word, not merely a trace. Answering this medial wh with respect to the lower phase remains a problem after children solve the type in Item 1. Understanding the mechanism by which a verb subcategorizes for an indirect question seems to be at the heart of the matter. Chomsky (2004) puts it this way: "resistance to extraction of the complement of C is traceable to the requirement of feature-inheritance from the selecting Phase Head." If children do not recognize that a medial *wh*-word is a subcategorized indirect question, then they will treat it as a real question. As yet we do not know how children arrive at this solution, and if it is lexical, it may be piecemeal and protracted. These findings pertain to children with language disorders as well as typically developing children from a wide spectrum of English learners. Understanding how children determine when locality can be "breached" is a major next question for acquisition research, and the findings here suggest that the grammars of children who speak AAE might provide some clues in this regard.

ACKNOWLEDGMENTS

Thanks to The Psychological Corporation staff who made these data available to us and gave us such stalwart assistance, particularly Lois Ciolli, Gay Lamey, Chuck Wilkins, Robert Carlson, and Carol Waryas. We thank the numerous speech–language pathologists who collected the data, the many children who were tested, and their parents for their consent. We benefited from the wise advice of many individuals, especially Harry Seymour and Peter de Villiers. Several audiences have given useful feedback, particularly the Linguistics Faculty and students at the University of Delaware, in several ASHA talks, and participants in the 2005 Royaumont Conference on Language Disorders.

NOTES

1. Even though their explanation with the current frameworks is less clear, these facts still stand.
2. The DSLT was the pilot edition of the Diagnostic Evaluation of Language Variation Screening Test and Norm-Reference (Seymour, Roeper, & de Villiers, 2003, 2005), whose development is detailed in Seymour and Pearson (2004). The original field testing of 1,450 children included approximately 200 speakers of dialects other than AAE or MAE and 250 children ages 10–12, whose data are not included here.
3. We thank an anonymous reviewer for helping us to see the result this way.

REFERENCES

Abdulkarim, L. (2001). *Complex wh-questions and Universal Grammars: New evidence from the acquisition of negative barriers*. Unpublished PhD thesis, University of Massachusetts, Amherst.

Bland, L. M., de Villiers, J. G., Roeper, T., Champion, T., & Seymour, H. N. (1992, November). *Wh-movement in children of divergent language backgrounds*. Presented at the American Speech–Language–Hearing Association Annual Meeting, San Antonio, TX.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

Blank, M. (1976). Mastering the intangible through language. *Annals of the New York Academy of Sciences, 263*, 44–58.
Chomsky, N. (1977). On wh-movement. In P. W. Culicover, T. Wasow, & A. Akmajian (Eds.), *Formal syntax* (pp. 71–132). New York: Academic Press.
Chomsky, N. (1982). *Some concepts and consequences of the theory of government and binding*. Cambridge, MA: MIT Press.
Chomsky, N. (1986). *Barriers*. Cambridge, MA: MIT Press.
Chomsky, N. (1995). *The minimalist program*. Cambridge, MA: MIT Press.
Chomsky, N. (2004). *On phases*. Accessed October 1, 2006 from http://dmtr.ru/blog/omniling/
Coles-White, D.J., de Villiers, J. G., & Roeper, T. (2004). The emergence of barriers to *wh*-movement, negative concord and quantification. In A. Brugos, L. Micciulla, & C. Smith (Eds.), *The proceedings of the 28th annual Boston University Conference on Language Development* (pp. 98–107). Somerville, MA: Cascadilla Press.
Craig, H. K., Connor, C. A., & Washington, J. A. (2003). Early positive predictors of later reading comprehension for African American students: A preliminary investigation. *Language, Speech, and Hearing Services in Schools, 34*, 31–34.
Craig, H. K., & Washington, J. A. (1994). The complex syntax skills of poor, urban African American preschoolers at school entry. *Language, Speech, and Hearing Services in Schools, 25*, 181–190.
Craig, H. K., & Washington, J. A. (2000). An assessment battery for identifying language impairments in African American children. *Journal of Speech, Language, and Hearing Research, 43*, 366–379.
Craig, H. K., & Washington, J. A. (2002). Oral language expectations for African American preschoolers and kindergartners. *American Journal of Speech–Language Pathology, 11*, 59–70.
Craig, H. K., Washington, J. A., & Thompson, C. A. (1998). Performances of young African American children on two comprehension tasks. *Journal of Speech, Language, and Hearing Research, 41*, 445–457.
Craig, H. K., Washington, J. A., & Thompson, C. A. (2005). Oral language expectations for African American children in grades 1 through 5. *American Journal of Speech–Language Pathology, 14*, 119–130.
Dayal, V. (2000). Scope marking: Cross-linguistic variation in indirect dependency. In U. Lutz, G. Muller, & A. Von Stechow (Eds.), *Wh-scope marking* (pp. 157–193). Amsterdam: John Benjamins.
Deevy, P., & Leonard, L. (2004). The comprehension of wh-questions in children with Specific Language Impairment. *Journal of Speech, Language, and Hearing Research, 47*, 802–815.
de Villiers, J. G. (1991). Why questions? In B. Plunkett & T. Maxfield (Eds.), *The acquisition of Wh*. Amherst, MA: UMOP.
de Villiers, J. G. (1996). Defining the open and closed program for acquisition: The case of wh-questions. In M. Rice (Ed.), *Towards a genetics of language* (pp. 145–184). Hillsdale, NJ: Erlbaum.
de Villiers, J. G. (1999). On acquiring the structural representations for false complements. In B. Hollebrandse (Ed.), *New perspectives on language acquisition*. Amherst, MA: UMOP.
de Villiers, J. G. (2005). Can language acquisition give children a point of view? In J. Astington & J. Baird (Eds.), *Why language matters for theory of mind*. Oxford: Oxford University Press.
de Villiers, J. G., de Villiers, P. A., & Roeper, T. (2007). *How is partial movement resolved?* Unpublished manuscript.
de Villiers, J. G., & Pyers, J. (2002). Complements to cognition: A longitudinal study of the relationship between complex syntax and false-belief understanding. *Cognitive Development, 17*, 1037–1060.
de Villiers, J., & Roeper, T. (1995a). Barriers, binding, and acquisition of the DP–NP distinction. *Language Acquisition, 4*, 73–104.
de Villiers, J. G., & Roeper, T. (1995b). Relative clauses are barriers to wh-movement for young children. *Journal of Child Language, 22*, 389–404.
de Villiers, J. G., & Roeper, T. (1996). Questions after stories: On supplying context and removing it as a variable. In D. McDaniel, H. Cairns, & C. McKee (Eds.), *Methods for assessing children's syntax* (pp. 163–188). Cambridge, MA: MIT Press.
de Villiers, J., Roeper, T., & Vainikka, A. (1990). The acquisition of long-distance rules. In L. Frazier & J. de Villiers (Eds.), *Language processing and language acquisition* (pp. 257–297). Boston: Kluwer Academic.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press

de Villiers, P. A., Burns, F. A., & Pearson, B. Z. (2003). The role of language in Theory of Mind development in language impaired children: Complementing theories. In B. Beachley, A. Brown, & F. Conlin (Eds.), *Proceedings of the 27th annual Boston University Language Development Conference* (pp. 232–242). Somerville, MA: Cascadilla Press.

Fanselow, G. (2005). Partial wh-movement. In M. Everaert & H. van Riemsdijk (Eds.), *The Blackwell companion to syntax* (Vol. 3). Oxford: Blackwell.

Goodluck, H., Foley, M., & Sedivy, J. (1992). Adjunct islands and acquisition. In H. Goodluck & M. Rochemont (Eds.), *Island constraints* (pp. 181–194). Dordrecht: Kluwer.

Green, L. (2002). *African American English: A linguistic introduction*. Cambridge: Cambridge University Press.

McDaniel, D. (1989). Partial and multiple *wh*-movement. *Natural Language and Linguistic Theory, 7*, 565–604.

McDaniel, D., Chiu, B., & Maxfield, T. (1995). Parameters for wh-movement types: Evidence from child language. *Natural Language and Linguistic Theory, 13*, 709–753.

Mufwene, S. S. (Ed.). (1998). *African-American English: Structure, history, and use*. London: Routledge.

Oiry, M., & Demirdache, H. (2006). *Evidence from L1 acquisition for the syntax of wh-scope marking in French*. Unpublished manuscript, University of Nantes.

Otsu, Y. (1981). *Universal grammar and syntactic development in children: Toward a theory of syntactic development*. Unpublished doctoral dissertation, MIT.

Radford, A. (1988). *Transformational grammar*. Cambridge: Cambridge University Press.

Rizzi, L. (1991). *Relativized minimality*. Cambridge, MA: MIT Press.

Roeper, T., & de Villiers, J. G. (2006). *Partial movement in SLI*. Paper presented at the Latsis Colloquium, University of Geneva, January 2006.

Roeper, T. (2004). Diagnosing language variations: Underlying principles for syntactic assessment. *Seminars in Speech and Language, 25*, 41–56.

Roeper, T., & Seymour, H. N. (1994). The place of linguistic theory in the theory of language acquisition and language impairment. In Y. Levy (Ed.), *Other children, other languages: Issues in the theory of language acquisition* (pp. 305–330). Hillsdale, NJ: Erlbaum.

Ross, J. R. (1967). *Constraints on variables in syntax*. Unpublished doctoral dissertation, MIT.

Schulz, B. (2004). *A Minimalist account of partial wh-movement*. Unpublished manuscript, University of Hawaii.

Seymour, H. N., & Pearson, B. Z. (Guest Eds.). (2004). Evaluating language variation: Distinguishing development and dialect from disorder [Special Issue]. *Seminars in Speech and Language,* 25.

Seymour, H. N., Roeper, T., & de Villiers, J. G. (2000). *Dialect Sensitive Language Test: Pilot edition*. San Antonio, TX: Psychological Corporation.

Seymour, H. N., Roeper, T., & de Villiers, J. G. (2003). *Diagnostic Evaluation of Language Variation—Screening Test (DELV-ST)*. San Antonio, TX: Psychological Corporation.

Seymour, H. N., Roeper, T., & de Villiers, J. G. (2005). *Diagnostic Evaluation of Language Variation—Norm Referenced (DELV-NR)*. San Antonio, TX: Psychological Corporation.

Thornton, R. (1991). *Adventures in long distance moving: The acquisition of wh-questions*. Unpublished doctoral dissertation, University of Connecticut.

Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research, 40*, 1245–1260.

Vainikka, A., & Roeper, T. (1995). Abstract operators in early acquisition. *Linguistic Review, 12*, 275–310.

van der Lely, H. K. J. (1998). SLI in children: Movement, economy and deficits in the computational–syntactic system. *Language Acquisition, 7*, 161–192.

van der Lely, H. K. J. (2003). Do heterogeneous SLI deficits need heterogeneous theories? SLI subgroups, G-SLI and the RDDR hypothesis. In Y. Levy & J. Schaeffer (Eds.), *Toward a definition of specific language impairment* (pp. 109–134). Hillsdale, NJ: Erlbaum.

van der Lely, H. K. J., & Battell, J. (2003). Wh-movement in children with grammatical SLI: A test of the RDDR hypothesis. *Language, 79*, 153–181.

Washington, J. A., & Craig, H. K. (1994). Dialectal forms during discourse of urban, African American preschoolers living in poverty. *Journal of Speech, Language, and Hearing Research, 37*, 816–823.

Washington, J. A., & Craig, H. K. (1998). Socio-economic status and gender influences on children's dialectal variations. *Journal of Speech, Language, and Hearing Research, 41*, 618–626.

https://doi.org/10.1017/S0142716408080041 Published online by Cambridge University Press