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**PSYCHOLOGICAL PERSPECTIVES  
ON DEAFNESS**

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## *Deaf Readers and Universal Grammar*

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In this chapter, I raise some general questions about how language is learned and apply some proposed theories to the issue of how deaf children learn English. Studying how deaf children learn English within the broader context of language acquisition as a whole leads to an approach that is very different from those associated with other perspectives. It is an approach that can supplement these perspectives, as it can shed a new light on a process that is important theoretically as well as practically. In the following section, I overview the normal course of language acquisition and discuss a theoretical approach that accounts for this process. In the subsequent sections, I examine the application of this theoretical approach to studying how deaf children learn English.

### **LANGUAGE ACQUISITION AND THE THEORY OF UNIVERSAL GRAMMAR**

In the usual circumstances language acquisition is accomplished in the following way. A child is exposed to his or her native language daily, in the home, from birth on. As early as 6 months, the child begins babbling, using the sounds (or sign pieces) of the language to form meaningless syllables (Lenneberg, 1967; Locke, 1983; Petitto & Marentette, 1991; Vihman, Macken, Miller, Simmons, & Miller, 1985). After about a year of input and output, the child begins using words (whether spoken or signed) in a systematic, meaningful way. Later, the child combines words into phrases and short sentences, beginning at around

18 months (Bloom, 1970; Brown, 1973; deVilliers & deVilliers, 1986; Newport & Meier, 1990). Although these early utterances are short and often devoid of grammatical morphemes, they display a consistent word order that represents various grammatical relations.

By around the age of 3 years, the child uses sentences of many types to describe a vast array of experiences and feelings. It is important to consider the child's progress in language acquisition in three ways: (a) those constructions that the child uses correctly; (b) the errors that the child makes; and (c) the errors that the child does not make. As we consider the course of language acquisition, we will see that the utterances that are *not* made are just as important as the utterances that are made.

Some of the constructions that have been successfully elicited from or comprehended by children as young as 3 years old include passives (Crain, Thornton, & Murasugi, 1987), relative clauses (Hamburger & Crain, 1982), short- and long-distance *wh*-questions (Sarma, 1991; Thornton, 1990), backwards anaphora (Crain & McKee, 1986), and other complex syntactic structures. Although 3-year-old children do not frequently use sentences as complex as these in their spontaneous utterances, because they can be elicited in experimental conditions they provide evidence of the remarkable success that children achieve in first language acquisition in a comparatively short period of time.

Children of this age range make several types of errors. Children frequently produce morphological overgeneralizations, such as *goed* and *foots*; these error types often persist for a long period of development. Other errors can be related to structures that are possible in some languages but not in the target language. This means that children might entertain hypotheses about their language that are indeed incorrect for the language they are learning—but their hypotheses could be correct for another language. Examples of such structures will be given below. Although children may make such incorrect hypotheses, they recover from these errors and attain the correct grammar in a relatively short period of time. As will be seen, children generally do not make errors that reflect structures not found in any human language.

The hypothesis that all children's grammars are possible adult grammars is known as the continuity hypothesis. Many developmental psycholinguists support this strong position (e.g., Hyams, 1987; Pinker, 1984; but cf. Lebeaux, 1987), which states that the range of grammars a child entertains is narrowed by the limits of human languages. Grammars that are conceivable—perhaps even used in machine languages, for example—will not be entertained by children if they represent grammars not possible for human language. It is an empirical question, but the data to date do indicate that children's possible grammars always appear to be a possible adult grammar.

Thus, by around the age of 3 children's language acquisition has already come quite a long way. Although a child's linguistic *performance* is usually unsophisticated, many researchers claim that the linguistic *competence* available to the child

at this age approaches the adult level. By this time, the child has available the syntactic constructions used in his or her language, although vocabulary and the various ways in which the child implements these constructions will still continue to develop (cf. Crain & Fodor, 1992). Reading and writing come later, of course, as do the abilities to use language in mature ways (although even 5-year-olds understand many pragmatic issues, such as the difference between talking to an adult or a peer compared to a younger child (e.g., Shatz & Gelman, 1973).

Under this view, language acquisition is the relatively quick development of the underlying rules required to generate the syntactic structures of a language. A theory of language acquisition thus must account for this process in terms that are general enough to apply to all languages yet specific enough to enable this rapid course of events. The theory that many linguists consider closest to achieving this goal makes crucial reference to a component of the human mind called Universal Grammar (UG). UG contains principles that all languages share and parameters by which languages differ; hence, it is often called the *Principles and Parameters* theory. It is a theory of linguistic structure as well as a theory of language acquisition (see Chomsky, 1981; Chomsky, 1986; Hornstein & Lightfoot, 1981; Roeper & Williams, 1987).

According to the theory of UG, as instantiated with universal principles and parameters, all the languages of the world share certain abstract properties in regard to syntactic structure. Syntactic variation between languages is captured by parameters, which are set in one of a limited range of choices. Applied to language acquisition, this would imply that children are born with an innate knowledge of these universal principles. Language acquisition consists of learning phonology and lexicon (the areas in which languages show the most variation) and setting the syntactic parameters. Although this process still requires some years, it is made manageable by the rich innate endowment. This endowment allows certain kinds of errors to be made in the course of language acquisition, but other kinds of errors that would be possible under other accounts are predicted not to occur.

Under the parameter-setting theory, it is often hypothesized that parameters have unmarked initial settings. According to this hypothesis, children will first entertain the unmarked setting for each parameter. If this is not the correct setting for the language they are learning, then children will have to change their parameter setting on the basis of their linguistic input. Thus, children will universally begin with the same parameter setting. It is usually assumed that for target languages with another setting, positive evidence (in the form of sentences grammatical in the target language) will be available to inform the child of the need to change this initial parameter setting. Thus, evidence for this hypothesis of unmarked initial parameter settings would come if it was found that children universally make the same first hypothesis with respect to a particular construction. Then, only those children whose target

language makes use of a different setting on that parameter would need to change their hypothesis.

This theory thus makes specific claims about the course of first language acquisition. Many of these claims have been tested; often the tests lead to refinements of the theory as well as support for it. The acquisition of English has been the most extensive testing ground (e.g., Hyams, 1986; Lust, 1986, 1987; Roeper & Williams, 1987), and the theory has also received support from studies of the acquisition of other languages, including American Sign Language (Lillo-Martin, 1991). It is thus a viable candidate for a theory of language acquisition.

Under this theory, the acquisition of a first language should proceed relatively rapidly and uniformly. Certain hypotheses need never be considered, because they would be ruled out by the universal principles. For example, one universal principle is structure dependence. According to this principle, all linguistic processes apply to structured hierarchical representations, not to ordered strings of words. For the child, the principle of structure dependence means that some hypotheses that might be consistent with the input data need not be considered. An example of how this works in language acquisition can be seen by considering the formation of yes/no questions. Consider the sentences in (1)–(4).

- (1) The girl is happy.
- (2) Is the girl happy?
- (3) The boy will go.
- (4) Will the boy go?

The rule that relates yes/no questions and declaratives is Subject Auxiliary Inversion (SAI). The simplest formulation of this rule works perfectly well for the examples given above. It would say, “move the first auxiliary to the beginning of the sentence.” Since this formulation of the rule refers to the linear order of words rather than their hierarchical structure, it is structure independent. A model of language acquisition based on a trial-and-error matching procedure would prefer this hypothesis to a structure-dependent one, because it is simple in its formation. This formulation of the rule would result in the correct form of the yes/no questions in (2) and (4) related to the declaratives in (1) and (3).

However, this formulation of the rule would create the wrong result for the declarative in (5). If the first auxiliary in (5), which is italicized, is the element that moves, the resulting sentence would be the ungrammatical (6). This formulation of the rule is therefore clearly incorrect.<sup>1</sup>

<sup>1</sup>The asterisk appearing before example (6) and other example sentences indicates that it is considered ungrammatical. Similarly, a question mark appearing before an example sentence indicates that the sentence is considered marginally acceptable.

- (5) The girl who *is* tall is happy.
- (6) \*Is the girl who tall is happy?

The correct form of the rule is structure dependent; it says “invert the subject noun phrase and the root auxiliary.” Because this rule involves structural notions, such as “subject noun phrase” and “root auxiliary,” it is clearly structure dependent, unlike the first rule. Under this formulation of the rule, the affected auxiliary in sentence (5) is the second one, italicized in example (7). Moving this element results in the grammatical yes/no question given in (8).

- (7) The girl who is tall *is* happy.
- (8) Is the girl who is tall happy?

The structure-dependent version of SAI is the more complex, yet it is the grammatically correct one. If a child’s language input consists mainly of simple sentences, then the data that informs him or her that the correct version of SAI is structure dependent will not be abundant in the input. Hence, he or she might be initially expected to try erroneously the structure-independent hypothesis. However, according to the theory of Universal Grammar, the principle of structure dependence is innately given; hence, the child will never try the incorrect structure-independent hypothesis.

This prediction of the theory has been tested by Crain and Nakayama (1987). They elicited yes/no questions with subject relative clauses like the one given in (8), from young children ages 3–5 years old. For example, they found that children could produce sentences such as (9).

- (9) Is the boy who is unhappy watching Mickey Mouse?

This sentence reflects the correct application of the SAI rule, even with the complex relative clause subject. Many of the children’s responses were correct questions, showing this adherence to the principle of structure dependence.

Children did make errors in this task; for example, a common error type involved two auxiliary verbs, as in (10).

- (10) \*Is the boy who is being kissed by his mother is happy?

This error fails to provide evidence of whether or not children are adhering to the principle of structure dependence. This is because one cannot tell whether this error was produced by a structure dependent rule (such as “copy the root auxiliary at the beginning of the sentence”) or a structure independent rule (such as “copy the first auxiliary verb at the beginning of the sentence”). Thus, this particular error type is considered consistent with structure dependence, although it does not provide conclusive evidence supporting the principle.

Other errors, such as (11), provided further confirmation of the principle of structure dependence. Although (11) is an error, it shows adherence to structure dependence, because the rule needed to generate (11) is a structure-dependent rule. In this case, the rule of copying must refer to the root auxiliary; although copying is not the correct procedure for English, the error shows adherence to structure dependence.

(11) \*Can the boy who is being kissed by his mother can go?

Crucially, the children did not make errors that are clearly structure independent, such as (12). Errors like (12) would seem to be produced via a structure-independent rule, like the rule discussed for deriving (6): move the *first* auxiliary to the front of the sentence.

(12) \*Is the boy that watching Mickey Mouse is happy?

Crain and Nakayama found that the children never produced sentences like the ungrammatical (6) or (12). Although the children did produce some errors, their errors were not indicative of a structure-independent hypothesis. All of the children's utterances were consistent with the principle of structure dependence. Both the errors made and the errors not made thus provide information about the course of language acquisition. The errors did not show evidence of violating the principle of structure dependence. Because this principle is proposed as a part of UG, this is, then, one example of how the Universal Grammar theory is a viable theory of language acquisition.

The Principles and Parameters theory also makes predictions about the course of language acquisition with respect to setting the language-particular parameters. Under this theory, for some parameters all children should begin with the same hypothesis regardless of the target language setting. As mentioned above, this will happen with parameters that have an initial unmarked setting. This initial setting will be required in the case of parameter settings that form a subset relationship. If the language generated by a grammar with one parameter setting (call it  $P_1$ ) is a subset of the language generated by another setting on this same parameter (call it  $P_2$ ), then  $P_1$  will be the first hypothesis. Sentences in the superset that are not in the subset will provide evidence for the learner to change the parameter setting to  $P_2$  for target languages with this setting. Until the child has received, analyzed, and incorporated these data, he or she might remain at parameter setting  $P_1$  long enough for this to be an observable stage of acquisition. Even if the languages do not fall into a subset relationship, one setting might well be the initial hypothesis cross-linguistically. (See Berwick, 1985; Dell, 1981; and Lasnik, 1989, for more discussion.)

By examining children's productions in languages with different parameter settings, the predictions of the parameter-setting model can be tested (see Hyams, 1986; Wexler & Manzini, 1987). For example, it has often been ob-

served that young children produce subjectless sentences such as (13) at an early stage of language acquisition.

(13) Read bear book.

Hyams (1986) argued that such sentences can be analyzed as a result of a syntactic parameter setting. Some of the world's languages (such as Italian and ASL) allow sentences without subjects, whereas others (such as English) do not. Thus, the availability of subjectless sentences is controlled by a parameter within UG. Simplifying, this parameter provides the following two choices: (a) subjectless, tensed sentences are allowed in the language; (b) subjectless, tensed sentences are not allowed in the language. This parameter is called the Null Subject Parameter (cf. Jaeggli & Safir, 1989).

The fact that English-speaking children use subjectless sentences can then be attributed to the hypothesis that setting (a) is the unmarked initial setting on the Null Subject Parameter. Because the available evidence indicates that children in all linguistic environments choose (a) as their first setting, this evidence supports the parameter-setting hypothesis. Under this hypothesis, UG provides both an initial parameter setting and an alternative to be chosen if the first does not account for the full range of data in the input. English-speaking children will have to change to setting (b) on the basis of sentences in the linguistic environment, but until they do, they will utter subjectless sentences that are generated by setting (a).

There are, of course, other ways of accounting for children's subjectless sentences. For example, Bloom (1990) argued that they arise from a processing limitation in young children's speech that limits their sentences to a small number of words. Hyams and Wexler (1991) argued against Bloom's alternative by showing that the overall pattern of children's early utterances is best accounted for by the grammatical parameter. The important point is that the UG theory can provide an explanation for these sentences, and it is not contradicted by the fact that young children use them. By further exploration of the issues involved, explicit arguments for the UG approach can be evaluated.

Under this theory, the most variation will be found between languages and between language learners in the areas of the lexicon and morphology. The words of languages are different, so each word needs to be learned individually. The morphological paradigms from one language to the next can be very different. Although some general principles can apply to the lexicon and morphology, it is here that linguistic variation finds its source (cf. Borer, 1983; Wexler & Manzini, 1987). Therefore, children might well take a long time in learning aspects of the morphology and lexicon. In fact, mastering lexical and morphological exceptions (such as *feet* instead of *foots*) is a process that extends over a period of years (cf. Ullman, Pinker, Hollander, Prince, & Rosen, 1989).

In contrast to the UG theory, a theory without a systematic syntactic com-

ponent could find the most variation in ordering words into sentences. Although this is an oversimplification, it is easy to see that very few restrictions on the range of possible syntactic structures would be found in a theory using response chaining to provide a first-order approximation to English. In such a theory, the lack of a hierarchical structure would lead to unrestrained numbers of combinations of words—certainly far from the appropriate characterization of syntactic structure. On the other hand, the UG theory allows only a very limited number of possible syntactic structures.

Hence, the process of first-language acquisition, as seen through the hypotheses of UG, consists of time-consuming learning of phonology, lexicon, and morphology; choosing among a limited set of parametric options; and consistently following the universal principles. Although the full range of principles and parameters has not yet been discovered, cross-linguistic work on language structure and acquisition is revealing the variation found among languages, and theoretical analyses are pursuing the best formulation of the rules needed to account for these structures.

The theory of Universal Grammar has also been applied to studies of the acquisition of a second language (L2) (Flynn, 1987; Flynn & O'Neil, 1988; Phinney, 1987; Thomas, 1991; White, 1987, 1989). Some of these researchers have found evidence that second-language learners apply the principles of UG in the acquisition of their L2. For example, they argue that second-language learners use the universal principles, including the parameter settings that are not used in their first language. Others have argued that principles of UG are not available to adult L2 learners, perhaps because of a critical period (Clahsen & Muysken, 1989; Johnson & Newport, 1989). According to this evidence, the later one learns a second language (especially postpuberty), the less chance there is that the parameter settings of Universal Grammar not used in the first language will be available. Even with the possibility that adults do not have full access to UG, for young second-language learners, there is good evidence that the principles of UG play a role in L2 acquisition.

Among those who argue for the influence of UG on L2 acquisition, a further unresolved question remains concerning the nature of the learner's first hypotheses with respect to parameter settings. If the native language has the marked setting on a parameter, what setting will the second language learner use first? Does the second language learner apply the (marked) settings from his or her first language, or do the parameter settings begin again at the unmarked state in the course of learning a second language? Although these questions have not yet been resolved, there is enough evidence available to consider seriously the possibility that UG effects can be seen in second language acquisition.

Evidence specifically for the influence of UG in L2 acquisition would take the following form. Such evidence would involve constructions which are governed by the principles of UG, but manifested differently between the target language

and the native language. For example, Thomas (1991) examined the acquisition of English by learners whose native language is Japanese or Spanish, and the acquisition of Japanese by learners whose native language is English or Chinese. She tested subjects on the interpretation of reflexives (such as *himself* in English), because these four languages show different patterns regarding possible antecedents of reflexives. She found that the learners did display evidence of utilizing the principles of UG in their second language acquisition, even though "they could not have derived [this knowledge] solely from inspection of the input data, nor from the treatment of anaphors in their native language" (p. 211). This is clear evidence for the functioning of UG in L2 acquisition.

Additional evidence consistent with the hypothesis that UG is involved in L2 acquisition would show that universal principles such as structure dependence are not violated. However, this type of evidence would not rule out all alternative hypotheses because it could be argued that such principles were derived from the learner's L1. Similarly, evidence that L2 learners choose a parameter setting that is given by UG, even if it is not correct for the target language, is consistent with the UG hypothesis. Evidence that learners' errors are due to errors in morphological development would also be consistent with UG. If it was clear that the learners could not have derived their L2 grammars by the input given in language instruction or by the properties of their first language, such evidence would support UG exclusively. Otherwise, this evidence would rule out some, but not all alternatives to the UG theory. Even so, it would show the viability of the hypothesis and suggest that further testing of it is warranted.

The type of evidence that would contradict the UG hypothesis would consist of evidence showing that L2 learners fail to respect universal principles of UG. If L2 learners had grammars unlike any of the possible grammars allowed by UG, this would show that UG did not guide the course of second language acquisition for these learners.

Given this picture of the course of first and second language acquisition, one can consider how this theory can be applied to the study of the acquisition of written English by deaf individuals. In particular, it appears possible that the acquisition of English by deaf children is like second-language acquisition. There are differences between the acquisition of written English by deaf children and the usual case of L2 acquisition, as discussed in the next section. However, there are similarities as well, and they are sufficient to pursue the possibility that the acquisition of English proceeds at least somewhat like L2 acquisition for deaf children.

If this is so, it might be expected that the principles of UG will apply to deaf children's acquisition of English. In the next section, I discuss this possibility. My point here is to show the feasibility of this hypothesis. It makes specific predictions about the types of errors that will and those that will not be found in the development of English. In fact, the theory makes very explicit predictions that can be tested directly. However, I am not presenting such direct tests

here (although my colleagues and I are in the process of undertaking such tests). Rather, I show that the data available in the literature are consistent with this hypothesis and, thus, that further testing of it is warranted. For the moment I am pursuing the second type of evidence discussed above: evidence that is consistent with the UG theory. Conclusive evidence must await further testing.

### DEAF CHILDREN'S ACQUISITION OF ENGLISH AND THE THEORY OF UG

There are several reasons to explore the possibility that deaf children acquiring English do so with the aid of the principles of UG. First, many (though not all) studies of adult second-language learning have found evidence for UG operating in L2 acquisition (e.g., Flynn, 1987). Second, at least some of the arguments against the operation of UG in L2 acquisition cite critical period effects; that is, they find less evidence of UG in later learners than in earlier learners (e.g., Johnson & Newport, 1989). Because deaf children are first exposed to English at a relatively early age, critical period effects should not enter into their acquisition process.

There are some caveats, however. Many deaf children who are learning English as a second language have not had full regular experience with a first language. I take American Sign Language (ASL) to be the first language of deaf children who are exposed to it. Considering the usual circumstances of first-language acquisition to involve regular input from birth, only 5% to 10% of deaf children, those with deaf, signing parents, are in the "usual" circumstances with respect to first language acquisition. The vast majority of deaf children do not receive input in ASL until some years after birth, when they are exposed to it at school, or in some cases during in-home preschool programs. (Many deaf children do not experience any signed input; I am not including these children in this discussion.) Thus, for many deaf children, input in English as a second language is occurring while the first language is still being formed. It is not clear what effects this special situation would have on language acquisition, in addition to the other special circumstances of deaf children learning English.

Another caveat about the process of deaf children learning English as a second language concerns the modality of expression. Deaf children are often exposed to some form of signed English or manually coded English. However, my main concern here is the acquisition of written English. Learning to read requires learning several processes that are independent of spoken or signed English. These processes include decoding the written string and storing this information long enough to process it linguistically (see Brady, Shankweiler, & Mann, 1983; Liberman, Shankweiler, Liberman, Fowler, & Fischer, 1977). It is well-known that even for hearing children, learning to read is above and beyond the requirements of learning to speak. Thus, for the deaf child, learning

English is a process of learning to read combined with a process of learning a new language, oftentimes without the foundation of a solid first language to fall back on. For any of these reasons, it might take a different form from second language acquisition by adult hearing learners.

Even with these not-insignificant caveats, I would like to consider the possibility that deaf children come to the task of learning written English with UG at their side. If this is the case, then some deaf children might be successful at learning English, provided they are able to overcome the processing requirements for reading and they have sufficient input about the grammatical structures. The presence of the principles of UG would help to make a very difficult task somewhat more manageable. Although most deaf children do not do very well at the task of learning to read English, some do succeed. The average reading level for profoundly deaf high-school graduates is only second to third grade (Karchmer, Milone, & Wolk, 1979). However, some profoundly deaf students do achieve success reading at or above grade level. In studies with successful deaf college-aged readers, Hanson (1982, 1989, in press) has found that deaf students can and do use many of the coding and memory processes involved in successful reading for hearing students (see Leybaert, chapter 12, this volume, for more evidence). These students show evidence of conquering the demands of reading that go beyond language acquisition. Perhaps they have also been able to use the principles of UG in acquiring English.

As one test of this possibility, I have examined some reports in the literature that give details about the nature of deaf students' syntactic difficulties. In the next section, I discuss these reports and what my examination of them revealed concerning deaf readers and UG.

### SYNTACTIC ABILITIES IN DEAF READERS

An extensive test of deaf readers' syntactic abilities was carried out by Quigley and his associates (Quigley, Montanelli, & Wilbur, 1976; Quigley, Smith, & Wilbur, 1974; Quigley, Wilbur, & Montanelli, 1974, 1976; Wilbur, Montanelli, & Quigley, 1976; Wilbur, Quigley, & Montanelli, 1975).<sup>2</sup> In these studies, deaf students were given a battery of tests of English syntax, called the Test of Syntactic Ability (TSA). These tests used written comprehension, judgment, and production tasks across English syntactic structures, which included the following:

<sup>2</sup>Additional studies using a different format were conducted by Wilbur and her colleagues (Wilbur & Goodhart, 1985; Wilbur, Goodhart, & Fuller, 1989; Wilbur, Goodhart, & Montandon, 1983). These studies have presented detailed information regarding deaf students' facility with additional syntactic structures. However, these studies did not test hearing control subjects on the same protocols. Because of the nature of the studies and reporting, a comparison of UG predictions with the results of these studies is not possible, so I do not discuss them here.

- conjunction
- determiners
- complementation
- negation
- pronominalization
- question formation
- reflexivization
- verb deletion
- verbal auxiliaries
- relativization

Four hundred fifty prelingually profoundly deaf children across the United States, from the age of 10 through 18 years, took part in this study, as did 60 hearing control subjects, ages 8 through 10 years. From the published articles resulting from this study, data are available on children's knowledge of these syntactic structures. Although this study was not undertaken with the goal of examining whether deaf children acquire English using the principles of UG, some evidence addressing this question can be gleaned from the reports. As over-viewed earlier, at this point I am looking for evidence of consistency, rather than conclusive support of the UG hypothesis.

In asking whether deaf children use UG in acquiring English, I have examined the reports of the TSA for the following indications. First, I have looked for any evidence that deaf children violate universal principles. Such evidence would consist of structure-independent productions, for example. Second, I have analyzed the most frequent errors made by the deaf students, as reported by Quigley and his co-authors. I have asked whether these errors might indicate an incorrect parameter setting. Finally, I have examined deaf students' mastery of English lexical and morphological idiosyncrasies. This is an area that can take an especially long time to develop in hearing children, so I expected it to be the source of many of the deaf students' difficulties in English.

I have been able to come to some tentative conclusions from my examination of the reports of the TSA. I cannot say anything decisive, because I am limited in two respects. First, the TSA was not designed to test the hypothesis I am evaluating, so many issues of crucial concern to the UG hypothesis are simply unavailable for evaluation. Second, I am limited in the data I can review even in those areas that were tested, because I am examining published reports, not raw data. There could have been errors in the raw data that were collapsed together with other errors into categories that are sensible given the aims of the TSA. However, since my aims are different, these categories might collapse over important differences for the UG theory. With these restrictions in mind, I report the results of my review.

### Relativization

Quigley, Smith, and Wilbur (1974) reported on the results of the TSA with respect to the comprehension, judgment, and production of sentences with relative clauses. They found that overall the deaf subjects did much poorer on these tests than the hearing subjects did, even though the deaf participants were much older. This is a common finding across subtests of the TSA. For our purposes, the most important comparison concerns the nature of the errors the deaf children made. As Quigley and co-authors asked, "Do deaf individuals generate the same syntactic structures as hearing individuals but at a retarded rate, or do they generate some structures which never appear in the language of hearing persons?" (pp. 326-327).

The answer that they provided is that all of the errors that deaf students made were also made by at least some hearing students. Such a result would support the UG hypothesis and the idea that for deaf students learning English is a process of second language acquisition, which is in many ways similar to the process of first language acquisition. Recall the continuity hypothesis, which claims that every child grammar is a possible adult grammar (Hyams, 1987; Pinker, 1984). Given this hypothesis, children's "errors" are still possible languages. Thus, if the deaf students make the same kinds of errors as the hearing students, their "errors" too would be possible human languages and, thus, consistent with UG. Let us explore the nature of the errors made by deaf and hearing students.

First, with respect to the overall comprehension of sentences with relative clauses, Quigley, Smith, and Wilbur found a parallel pattern across the two groups. For both deaf and hearing students, the highest number of correct scores was obtained on sentences with relative clauses modifying the object (in final position) in which the gap in the relative clause is in the object position, as illustrated in (14). The next highest scores were on relative clauses modifying the object, with an embedded subject gap, as illustrated in (15). Next came relative clauses modifying the subject (in medial position), with subject gaps (as in (16)), and, finally, subject relatives with object gaps (as in (17)).

(14) I saw the boy whom the dog chased.

(15) I saw the boy who went home.

(16) The boy who went home is my friend.

(17) The boy whom I saw is John.

A parallel pattern of performance between the hearing and the deaf students, even with the deaf performing much lower overall, is an indication that the two groups have similar grammatical competence. Crain and Shankweiler (1987) discussed exactly this kind of pattern in the comprehension of English relative



clauses by hearing children who are good or poor readers. Lillo-Martin, Hanson, and Smith (1991, 1992) also found parallel patterns of performance on English relative clauses by good and poor deaf readers. This evidence indicates that both deaf and hearing children are using similar structures in their acquisition of English relative clauses. This is predicted by the UG theory, if both groups are guided by the same principles during the course of language acquisition.

There are four types of specific errors made by the deaf and hearing students that Quigley, Smith, and Wilbur (1974) discussed. These types of sentences were included in the test because the authors had found in earlier work that deaf respondents often produce sentences with such errors. First I describe the error types, then I provide an account of these errors in terms of the UG theory.

Three of these error types were included in the TSA's embedding test. In this test, subjects see two single-clause sentences, and are asked to choose which of four possible multi-clause sentences correctly combines the first two. The error types are object-subject deletion, in which students accepted (19) as a combination of (18a) and (18b); and object-object deletion, in which students accepted (21) as a combination of (20a) and (20b).

(18a) The dog chased the girl.

(18b) The girl had on a red dress.

(19) \*The dog chased the girl had on a red dress.

(20a) John chased the girl.

(20b) He scared the girl.

(21) \*John chased the girl and he scared.

Also found on the embedding test were errors involving the incorrect form of the possessive. When combining sentences (22a) and (22b), some subjects accepted (23) and some accepted (24).

(22a) I helped the boy.

(22b) The boy's mother was sick.

(23) \*I helped the boy mother was sick.

(24) \*I helped the boy's mother was sick.

The fourth error type was tested in the TSA's copying test. In this test, respondents are to judge the grammaticality of sentences, and provide the correct version of some of the sentences they deem ungrammatical. Ungrammatical sentences such as (25) were accepted by some subjects.

(25) \*The girl who the girl found the ball played in the park.

Quigley, Smith, and Wilbur (1974) stated that all four of these error types were found in both deaf and hearing students, although the deaf students made more errors overall, and the hearing students improved on some sentence types that the deaf students did not improve on. How are these errors to be related to the theory of UG?

The first three error types can all be instances of incorrect knowledge of English relative pronouns. If the appropriate relative pronoun (*who*, *whom*, or *whose*) is added to or substituted in these sentences, they will all become grammatical. Quigley et al. analyzed the first two error types in terms of an incorrect deletion rule. Although these sentences could display the effects of an incorrect deletion rule if they are considered as conjoined sentences (a plausible analysis, because sentence (21) contains the word *and*), a relative clause analysis is also possible (replace *and* with *who(m)*). Under this analysis, the errors made by the deaf students are lexical errors, rather than structural errors; this is consistent with the UG theory.

The UG theory permits a range of lexical errors, since lexical learning is not governed by UG. However, many fewer types of structural errors are predicted by the theory, because these structures are governed by UG. The possibility of explaining the deaf (and hearing) students' errors as lexical errors is thus expected under the UG proposal.

The fourth error type could reflect a parametric missetting. In this kind of error, the head of the relative clause (*the girl* in (25)) is repeated in the relative clause itself (*who the girl found the ball*). Many languages allow pronouns in the position that is usually empty in standard English relative clauses; these pronouns are called resumptive pronouns, and are found in ASL (Lillo-Martin, 1986), Swedish (Engdahl, 1986), and other languages. In English, such resumptive pronouns are marginally acceptable in certain structures, such as the *he* in (26).

(26) ?That's the guy who I never know what he's talking about.

The difference between the resumptive pronouns in Swedish and other languages and the structures used by the deaf and hearing students is that the students used full noun phrases (NPs) rather than simple pronouns. I do not know of any languages that allow full resumptive NPs rather than pronouns, so it is possible that this comparison is too stretched. However, no principle of UG specifically rules out a full NP rather than a pronoun. Although this particular structure needs further consideration, it is possible that the error made by the students reflects this parametric option and is, thus, consistent with UG. It is important that the same error was made by both the hearing students and the deaf students, as this indicates that the deaf students' grammars are no more deviant than those of the hearing students.

In sum, although deaf readers make a number of errors in relative clause structures, they do not violate any universal principles, they may be showing

evidence of a non-English parameter setting, and they clearly have some problems with English lexical items, particularly relative pronouns. These results are consistent with the UG theory and support further testing of it.

### Question Formation

Quigley, Wilbur, and Montanelli (1974) examined deaf students' comprehension, judgment, and production of three types of questions: yes/no, tag, and wh-questions. Again, they found overall lower levels of performance by the deaf students, yet parallel patterns between the groups. Furthermore, the apparent stages in the acquisition of the question types were similar to the stages found in the acquisition of spoken English by other researchers. As before, these results are consistent with the UG hypothesis. As long as the deaf students' responses (and the hearing students' responses) reflect possible adult grammars, the theory of UG is not violated.

There were some differences between the deaf students and the hearing students in their ability to detect movement ungrammaticalities in questions. When presented with ungrammatical sentences such as (27)–(28), deaf subjects were better able to detect the ungrammaticality than were hearing students. Quigley et al. suggested that this may be because some sentences of these types are acceptable in spoken language, although not in written ((27) can be uttered as an echo question). In this case, the difference between deaf and hearing students does not reflect different structural knowledge. Rather, it reflects different experiences in that the hearing students are exposed to greater input in spoken, rather than written, English.

(27) \*The dog chased who?

(28) \*Who you gave a ball?

Both hearing and deaf students were better able to detect the ungrammaticality of noninverted wh-questions as in (29) compared to noninverted yes/no questions as in (30). This difference can be related to the fact that yes/no questions with rising intonation are sometimes produced even without inversion; although this is more common in speech, it also occurs in written English.

(29) \*Who the baby did love?

(30) \*The dog is brown?

There are similarities between the groups with respect to the use of *do* as an auxiliary in questions (*do*-support), as well. At the younger ages, both groups were able to detect ungrammaticalities with missing *do*-support better in yes/no questions (as in (31)) than in wh-questions (as in (32)). However,

for the deaf students, this ability increased for wh-questions but not for yes/no questions.

(31) \*The boys play football?

(32) \*When the boys play football?

The lack of an increase in ability to detect ungrammatical yes/no questions without *do*-support can be related to these questions' acceptability (although again, such questions are more generally used in speech, with a rising intonation pattern). As Quigley et al. (1974) pointed out, the wh-questions with missing *do*-support can also be mistaken for another structure, that is, adverbial clauses. Hence the (younger) children's tendency to overlook this error might reflect their experience with this structure in another construction.

An explanation for the difficulties both groups had with inversion and *do*-support could come from studies of Universal Grammar. Young hearing children acquiring English frequently have difficulty integrating inversion and *do*-support in their early questions. Several authors have made proposals incorporating the principles of UG in order to account for these stages (e.g., Sarma, 1991; Weinberg, 1990). By examining these structures both in English and cross-linguistically, the range of parameters involved is currently being investigated. Although a review of the proposals made would be too involved for the current purposes, it is possible that such proposals will directly apply to explain the pattern illustrated here. Let me simply point out that similar errors are found for the acquisition of spoken English to the errors made by both deaf and hearing readers; thus, under the continuity hypothesis, an analysis consistent with the principles of UG will be sought.

One further error type in the question formation tests was copying. Like the copying found in the relative clause test, copying in wh-questions results in a resumptive NP, in which there is no gap corresponding to the question word. Just as some languages allow resumptive pronouns in relative clauses, some also allow resumptive pronouns in wh-questions, so the resumptive-NP explanation might be offered for the acceptance of copying found in the wh-questions test as well as that found in relative clauses. This kind of construction is illustrated in (33).

(33) \*Who did the dog bite the girl?

As in the results of the relative clause tests, both deaf and hearing students accepted some sentences with copying. In the case of questions, however, Quigley et al. pointed out that copying was not observed in the written questions of deaf students. Because the copying strategy with questions requires the student to know the answer to the question, it is pragmatically reasonable that it is found only in the judgment task, and not in production. In relative clauses, no such difference would be expected.

## Conjunction

Wilbur, Quigley, and Montanelli (1975) reported on the results of the TSA with respect to two subtests dealing with conjunction. In this case, comparison of the patterns of the two groups in the various types of conjunction does not immediately reveal parallels. In some cases, this is because the various types had very similar levels of success, so that it is not possible to judge whether the deaf and hearing students had parallel patterns. However, in other cases there were error types found in deaf students that were not found in hearing students. One error type was common to both groups, which I discuss first.

Both hearing and deaf students accepted conjoined sentences with *and* omitted, as illustrated in (34).

(34) \*A man kicked a dog hurt it.

For both groups, the incidence of acceptance of *and*-deletion declined over the age range. Furthermore, Wilbur et al. cited studies showing that *and* deletion occurs in the productions of hearing children learning English. Although discussions of the parameters of UG have not included this option, it must be available, because some languages do use it (such as ASL). Hence, there should be a parameter in UG that allows conjoined clauses not to display an overt conjunction. Given such a parameter, the deaf and hearing students' use of these structures is consistent with the UG theory.

An alternative possible account for the apparent *and*-deletion in (34) comes from comparing it to the sentences with a deleted relative pronoun, such as (19) above. Both of these errors might reflect the same kind of misanalysis, by which function words such as *who* and *and* can be nonovert. Both relative clauses and conjoined clauses have this option in ASL.

Deaf students did produce two types of errors that were rare in the hearing students. These are object-object deletion and object-subject deletion. Children were presented with two sentences and asked to combine them into one. Errors on this task revealing object-object deletion and object-subject deletion are illustrated in (36) and (38) respectively, produced from the two sentences given in (35a,b) and (37a,b).

(35a) John threw the ball.

(35b) Mary dropped the ball.

(36) \*John threw the ball and Mary dropped.

(37a) The boy saw the turtles.

(37b) The turtles ate the fish.

(38) \*The boy saw the turtles and ate the fish.

The deaf students used fewer object-object deletions with increasing age, but object-subject deletions did not similarly decline. Although these errors were not generally found with the hearing children, their appearance can be attributed to parameters of Universal Grammar. As in some cases cited above, these errors can be explained by claiming that the deaf students use a parameter setting that is given by UG but not manifested in the target language. The deaf students seemed to take a much longer time to reset this parameter than the hearing students did. In this case, the parameter setting allows objects (as in (36)) or subjects (as in (38)) to be nonovert. Although the hearing children did not show evidence for this parameter setting in this test, much previous work has provided evidence that younger hearing children do choose this parameter setting in the acquisition of English (e.g., Bloom, 1970; Hyams, 1986; and other references cited earlier). Hence, whereas the hearing children have already discarded this parameter setting in the acquisition of English, perhaps the deaf students have continued using it.

The parameter setting in question is related to so-called "null arguments," that is, subjects and objects that are phonologically unexpressed. A simplified version of this parameter was discussed previously; there it was called the null subject parameter. Some languages allow these null arguments rather generally; for example, Italian allows null subjects (Rizzi, 1986), and ASL allows both null subjects and null objects (Lillo-Martin, 1986). As mentioned previously, it has been argued by several authors that the initial setting on the parameter controlling null arguments is the setting that allows null subjects freely, because young children learning English and other non-null-subject languages nevertheless frequently omit the subject (e.g., Hyams, 1986). Perhaps the deaf students were omitting the object and subject in examples such as (36) and (38) because of an erroneous analysis of English as a language that allows such null arguments (as does ASL). Wilbur et al. (1973) considered the possibility that the deletions produced by the deaf children are a result of overapplying a redundancy-reducing process such as pronominalization. This is very similar in spirit to the analysis suggested here.

The UG theory can thus account for the errors made by the deaf students. The explanation offered by Wilbur et al. is not invalidated by this observation. I have merely shown how their account can be incorporated into this theory.

## Pronominalization

Wilbur, Montanelli, and Quigley (1976) discussed deaf students' productions of appropriate English pronouns in TSA. The majority of the discussion concerns deaf students' abilities to choose the correct morphological form (e.g., first person singular nominative *I*, third person plural accusative *them*, etc.). As predicted by the theory of UG, such forms take some time to develop and

appear to be acquired a single form at a time. A similar result was found for the hearing children. Although the order of the acquisition of these forms was not exactly parallel across the groups, this is not inconsistent with UG, since these are largely idiosyncratic forms that must be learned item by item. The UG theory does not make specific predictions with respect to the acquisition of specific lexical items; because they will be learned without UG principles, there can be wider variation between learners in the process of acquisition.

One characteristic of pronominalization about which the UG theory has much to say concerns the syntactic distribution of personal pronouns compared to reflexives. Although this particular topic was not investigated by Wilbur et al. (1976), they provided two pieces of information relevant to it.

First, the use of the reflexive pronoun was examined, and both hearing and deaf students were found to have difficulties with it. According to the UG theory, children should know the syntactic environment for reflexives as opposed to nonreflexive pronouns at an early age. Evidence that this is so comes from several studies of children's spoken language acquisition (cf. Wexler & Chien, 1990). The low performance of students on this test might suggest counterevidence to this prediction. However, it is not possible to tell whether children's errors involved using the wrong reflexive pronoun, such as *herself* for *himself*, or using a nonreflexive form, such as *him*, in a reflexive environment. The difference between these two kinds of errors is illustrated in (39)–(41). In (40), the wrong form of the reflexive is used. In (41), if we assume that the sentence should mean what (39) means, then a nonreflexive form has been used in a reflexive environment.

- (39) Stephanie saw herself.  
 (40) \*Stephanie saw himself.  
 (41) \*Stephanie saw her.

The UG theory predicts that errors like the one in (41) should not persist, although errors like the one in (40) might. It was this type of construction that was tested by Thomas (1991) in her work on second-language acquisition, over-viewed earlier. Further work in this area would be a useful test of the UG hypothesis with respect to deaf students' acquisition of English.

Second, with respect to the use of nonreflexive personal pronouns, Wilbur et al. (1976) showed that deaf students do pronominalize correctly in 75%–90% of appropriate environments in their written productions. These are conditions under which pronominalization is what they characterize as "relatively obligatory," that is, a noun phrase with a coreferential noun phrase preceding it in the same sentence (but a different clause). An example of this environment is given in (42).

- (42) John bought that record for me  
 but Mary paid John/him for it.

In (42), the repetition of the NP *John* is not strictly ungrammatical, but the pronoun *him* is strongly preferred. The deaf students' appropriate use of pronouns in such environments indicates that they have mastered the conditions governing these relatively obligatory pronouns.

As with the reflexive pronouns, further tests of deaf children's use of pronouns in additional environments could serve to directly test the predictions of the UG theory. For example, principles of UG require the use of a pronoun rather than the name in (43).

- (43) John thinks that John/he is intelligent.

Because explicit predictions have been made by the UG theory, and several studies of the acquisition of reflexives and pronouns have been made in spoken English (e.g., Wexler & Chien, 1990), this is a domain in which extensive further work could be highly beneficial. For example, by testing children's use of pronouns versus reflexives in environments that require or reject them, the UG principles governing pronominalization can be directly tested.

### Verb Systems

Quigley, Montanelli, and Wilbur (1976) discussed deaf students' use of several aspects of the English verb system. They examined auxiliary verbs, tense, the use of the copula, and verb deletions. These are all domains in which the UG theory would predict possible slow acquisition with many errors, because there are many idiosyncrasies and exceptions in these areas.

Quigley et al. indeed found that "deaf subjects have considerable difficulty with the verb system of English" (p. 547). They reported pronounced difficulties in auxiliary verbs, tense sequencing, and the use of *be* versus *have*, but not in verb placement (i.e., order of the verb with respect to other constituents). The more difficult areas are clearly the ones with the most idiosyncrasies, as they involve lexical and morphological knowledge, whereas verb placement is a structural issue.

One area that seemed to be much more of a problem for deaf children than for hearing children was in the use of *be* versus *have*. Deaf children were not as skilled as hearing children in detecting incorrect *have* and *be* substitutions, illustrated in (44)–(45).

- (44) \*The man is a coat.  
 (45) \*The baby has happy.

This particular ungrammaticality is not predicted by the UG theory to present any more difficulties than others. Although the deaf students' errors did not

violate any universal principles, and thus were not inconsistent with the UG theory, I do not have an explanation for this error.

Despite the considerable difficulties that the deaf students had, Quigley, Montanelli, and Wilbur (1976) found that their error patterns were still, in general, parallel to those of the hearing subjects. They stated that the order of difficulty of the various verb forms for the deaf students mirrored their formal and cognitive complexity. This would be expected under the item-by-item learning required for these forms. For example, perfective verb forms as illustrated in (46) involve an auxiliary and a suffix; they are more difficult for the students than simple past forms that involve a suffix only, as illustrated in (47). Quigley et al. pointed out that the perfective is formally more complex than the simple past and also conceptually more complex (cf. Slobin, 1971).

(46) The man *has* opened the door.

(47) The man *opened* the door.

## SUMMARY AND CONCLUSION

In this review of the reported syntactic problems that deaf readers exhibit, it was shown that universal principles of language are not violated despite overall lower levels of success compared to hearing subjects in tests of written English. It was shown that in many cases the errors exhibited by deaf children are similar to the errors of hearing children; overall, the patterning of the two groups is remarkably similar. This evidence suggests that deaf readers do not display structural deficiencies in the areas of English syntax that are governed by universal principles.

In some cases, deaf students' errors might reflect parametric missettings. For example, deaf children appear to use null arguments in some environments, even though they are not allowed in English. This could be due to an incorrect parameter setting, because many languages, unlike English, do allow null arguments. Hence, again, the evidence from deaf readers is consistent with the hypothesis that their acquisition of English is constrained by UG.

The majority of deaf readers' problems with English are due to lexical and morphological properties of specific words and paradigms, which must be learned individually. Because linguistic variation is primarily located in these domains, it is not surprising to see such errors persist. Even here, however, the patterns of errors and development are often parallel to the patterns found in hearing children, although the problems persist for a much longer time in the deaf children. This too is consistent with the UG theory.

As discussed in an earlier section, these data cannot be taken as conclusive support for the UG hypothesis. Other models of language acquisition might be able to account for the findings presented here, although certain other

approaches, such as trial-and-error learning, would not predict these findings. I put the UG hypothesis forward as one that has achieved considerable success in explaining cross-linguistic variation and first-language acquisition; by examining these data from the literature I have argued that the UG hypothesis is viable and should be seriously tested. The most appropriate tests of the UG hypothesis would involve syntactic constructions governed by UG found in the target language but not in the native language. By examining deaf students' performance on these structures, stronger tests of the UG theory can be made.

Evidence to contradict the UG hypothesis could show violations of purported universal principles, such as structure dependence. In fact, it has been claimed that deaf readers do violate structure dependence in the acquisition of English (Bochner, 1978). However, I have not found evidence to support this, and in current work I am testing this explicitly. Evidence that the principles of UG are not at work in L2 acquisition might also appear when a parameter resetting needs to be made, but the alternative setting appears not to be available. In general, parallel patterns of performance across deaf and hearing students (even when the deaf children are much older than the hearing children) and across tests of the written language compared to tests of the spoken language (when again, the written language tests are with older children) support the UG hypothesis. Nonparallel performance requires further consideration; when the deaf students show evidence of a parameter mis-setting or incorrect lexical knowledge, this is still consistent with UG. However, if deaf readers show evidence of grammatical hypotheses that violate the principles of UG, this would provide counterevidence.

What practical consequences would the proof of this theory entail? I believe that this theory does have implications for the education of deaf children. It suggests areas of language teaching that could be emphasized (the language-particular aspects of English, such as verbal morphology) and areas that need not be addressed (the universal principles, which will automatically enter into the course of language acquisition). This suggestion is compatible with approaches that also stress the use of language in various contexts. For example, Wilbur (1977) presented an overview of deaf children's error patterns on the TSA and argued that educators placed undue emphasis on sentence patterns without regard to the pragmatic contexts for linguistic performance. My proposal, that deaf students' linguistic competence is constrained by UG, also reduces the emphasis on teaching particular syntactic structures.

This theory entails further an approach to language education which considers the learning of English in deaf children to be a process of second-language acquisition. This puts focus on the establishment of a solid first-language base (ASL) and suggests that early exposure to much linguistic input is essential. This is consistent with the common observation that children with a strong first language before entering school (typically, deaf children with deaf, signing parents) outperform their peers who don't have the language background in academic

and social areas (see review in Wilbur, 1987). The critical-period effects also indicate that instruction in English as a second language should begin relatively early (at least, before puberty). In fact, critical period effects are also found in the acquisition of ASL, strongly suggesting that exposure to ASL should also begin early (e.g., Mayberry & Eichen, 1991; Newport, 1990). Other factors necessary for the special circumstances of learning to read, such as decoding processes and the special nature of the linguistic input (a secondary representation), must also be considered.

In this chapter, I have given several reasons to suppose that the hypothesis that UG guides the acquisition of English in deaf children is a viable hypothesis, and I have reviewed some evidence that is consistent with it. I hope to stimulate interest in this possibility and to motivate research that directly addresses this question so that a more definite conclusion can be drawn.

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