



First language acquisition

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This article reviews current approaches to first language acquisition, arguing in favor of the theory that attributes to the child an innate knowledge of universal grammar. Such knowledge can accommodate the systematic nature of children's non-adult linguistic behaviors. The relationships between performance devices (mechanisms for comprehension and production of speech), non-linguistic aspects of cognition, and child grammars are also discussed. © 2010 John Wiley & Sons, Ltd.

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THE MODERN STUDY OF CHILD LANGUAGE ACQUISITION

Language acquisition has been a thriving research area for 40 years or more. The late 1960s and the early 1970s saw the beginnings of systematic study of children's early grammatical development, followed by extensive work on particular areas of grammatical knowledge. Much of this work has been made possible by analyses and discoveries in linguistic theory. The human mental capacity that enables the child to learn language remains controversial; the view that is central to the work summarized below is that humans achieve knowledge of their native language by virtue of an innate knowledge of the boundaries that define what shape a human language can take. For reasons of space, this article will focus largely on syntactic development; however, I believe that many of the general points made below concerning the process of acquisition can also be made with respect to phonological and morphological acquisition.^{1–3}

EARLY DISCOVERIES

Studies in the 1960s and 1970s provided clear evidence of the systematic nature of children's early linguistic development.^{4,5} Brown⁵ studied the speech of three English-speaking children. He demonstrated that although the pace of language development varied from child to child, the general pattern of growth was similar. Brown tracked 14 grammatical functors (including prepositions, past and present tense marking, and auxiliary verbs), finding that they were acquired in a very similar order by the three

children. The child's age did not predict their mastery of a particular form, but another measure Brown developed—their mean length of utterance (MLU) in morphemes—did. Today, MLU continues to be a tool for measuring levels of development, although recent research has argued that MLU may underestimate children's knowledge.^{6,7}

Pinker⁸ provides an analysis of the linguistic development of Adam, one of the children studied by Brown, which illustrates two important points: First, children's errors at the earliest early stages are largely errors of omission, not commission. Child utterances such as 'I don't want to sit seat' can be 'corrected' by inserting articles and prepositions ('I don't want to sit *on the* seat'). Children very rarely violate the basic word order of their language. Second, between about 18 months and 3 years, the child's range of linguistic structures explodes—Pinker shows the child Adam moving from two–three word utterances at age 2 years and 3 months to producing a range of complex syntax, including complements to verbs, relative clauses, and temporal and causal adverbial clauses at age 3 years and 2 months.

Bowerman complemented early studies of syntax with an analysis of the systematic semantic patterns revealed in early child speech—the use of noun (phrases) to express a range of semantic roles, including agent, patient, and location. Bowerman's work also broke new ground by including cross-linguistic comparison of children learning English, Finnish, Samoan, and Luo.⁹

THE CHOMSKYAN TURN

In the mid-20th century, American psychology was dominated by behaviorist (stimulus–response) approaches to learning. The application of such procedures to language acquisition was dealt a major

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(many, including myself, would say fatal) blow by the linguist Noam Chomsky's review of B. F. Skinner's book *Verbal Behavior*.¹⁰ Nonetheless, foundational studies of child language such as those cited above were mainly carried out by psychologists. Two later works by Chomsky had a profound effect on the field, inspiring linguists to turn to child language research. The first of these was *Aspects of the Theory of Syntax*.¹¹ In the first section of that book, Chomsky laid out the view that the acquisition of language was achieved by virtue of the child's innate knowledge of principles of grammar, specifically principles of universal grammar (UG), which define the boundaries of language structure. UG is effectively a blueprint for what a possible human language can be. The second was Chomsky's book *Lectures on Government and Binding*.¹² In that work, Chomsky sketched a framework for an account of the observed variation in human languages. It was proposed that principles of UG allow *parameters* of variation—for example, languages vary as to whether they permit sentences with no overt subject (English requires the subject to be overt, Italian does not). And languages vary as to whether question formation is subject to certain structural constraints. In English, a question such as (1) is not grammatical, but in other languages (such as Akan) its equivalent is permitted:

1. *What did you see a man that ate?
(cf. You saw a man that ate a hamburger).

On this view of grammar, a crucial part of language acquisition is the setting of parameters to the correct value for the ambient language.

A CASE STUDY: PRONOMINAL REFERENCE

The 1970s and 1980s saw a surge of research that tested young children's sensitivity to structural principles and parameters proposed in linguistic analyses. One of the most thoroughly studied areas was pronominal reference. (A text by Guasti provides summaries of children's grammatical knowledge in a range of other areas.¹³)

The distribution of definite pronouns (such as English *she*, *he*, *her*, etc.) and reflexive pronouns (such as *herself* and *himself*) was characterized in Chomsky's 1981 Binding Theory.¹² The basic goal of the Binding Theory was to explain in structural terms why, inter alia, *she* and *Sue* can refer to the same person in 2(a) and (c) but not 2(b) and (d), and why

himself cannot refer to *Geoff* in (3), but must refer to *Alan*:

- 2(a) Sue said that she had broken a glass.
 - 2(b) She said that Sue had broken a glass.
 - 2(c) When she turned around, Sue broke a glass.
 - 2(d) She turned around when Sue broke a glass.
3. Geoff wants Alan to shave himself.

For a basic exposition of the structural conditions involved, see Lidz.¹⁴ Such restrictions are subject to parametric variation—for example, Japanese and Chinese allow 'long distance' reflexives, permitting the reading of the equivalent of (3) in which 'Geoff' and 'himself' do corefer.

Early experimental studies in the late 1970s and the 1980s argued that children as young as 4 were aware of these restrictions of pronoun interpretation.^{15–17} Children's comprehension of pronouns was shown to be structurally based, rather than dependent on linear order. Thus, for example, children will correctly interpret the reflexive pronoun in 4(a) and (b) as referring to 'brother', which in the first case is the noun closer to the reflexive and in the second is the farther:

- 4(a) John's brother washed himself.
- 4(b) The brother of John washed himself.

Performance was not always at an equivalent level for reflexive and definite pronouns. A number of studies showed poorer performance on definite pronouns than on reflexives, a finding that spawned a range of competing and/or complementary accounts.^{18–20} However, recent work by Conroy et al.²¹ has challenged the claim that definite pronouns offer particular difficulty for the child, largely on the basis of procedural flaws in the experiments.

Although Asian languages have figured prominently in theoretical discussions of the Binding Theory, with some exceptions²² this has not been followed up to any great extent in studies of child language. But there have been acquisition studies of pronominal reference in European languages, including Danish, French, and Italian.^{20,23}

ALTERNATIVE APPROACHES TO FIRST LANGUAGE ACQUISITION

Work in generative grammar has underpinned research in first language acquisition in two ways.

First, it has provided a rationale in the form of UG for the sheer fact of language acquisition. The apparent ease with which children come to grips with their language is accounted for by the child having an innate set of principles that limit the hypotheses she can make about the nature of the input. Second, it has provided detailed theoretical accounts and descriptive observations that have grounded the analysis of children's language. However, this general approach to first language acquisition continues to be challenged.

Connectionist Modeling

A 1996 book by Elman et al. is entitled *Rethinking Innateness*.²⁴ The general thesis of the book is that computational modeling of neural networks can lead to an account of the development of language, as well as other human cognitive abilities. On this view, the human brain receives linguistic input and processes it in such a way that generalizations (ultimately rules) emerge, without their being pre-programmed by innate knowledge. Three criticisms can be made of this approach as an explanation of first language acquisition. First, the range of linguistic structures whose acquisition has been modeled in this way is extremely limited.²⁵ Second, the networks 'learn' in effect what they are told to learn—the input is manipulated in such a way, by rewarding correct analyses, that its structure is determined by the researcher's prior knowledge. Third, and most seriously, such modeling provides a picture of human language acquisition that is too powerful. The basic concept of UG is the definition of limits on what a human language can be like—no language, for example, forms relative clauses by inserting a relative marker after the third word in the relative. Yet it would be perfectly possible for a connectionist network to learn such a rule.²⁶ That given, the connectionist approach to first language acquisition loses all explanatory power as an account of why human languages are restricted in the way they are.

Neo-empiricism

The 1970s saw attempts to account for language development in terms of special speech forms used by caregivers when talking to children.²⁷ On a variety of grounds such research proved inadequate to account for the facts of language acquisition.²⁸ A similar, more recent challenge to the concept of an innate UG is usage-based accounts of language acquisition. This approach is well exemplified by Tomasello's book *Constructing a Language: A Usage-Based Theory of Language Acquisition*.²⁹ Usage-based

acquisition research is now commonly presented as an alternative to UG-based theory. As the name implies, the basic claim of usage-based accounts of acquisition is that over time children develop grammatical representations, forming generalizations by an analysis of the speech they hear using non-task specific mechanisms of analogy and distributional analysis, that is, without the benefit of categories and rule types encoded in UG.

Before looking at problems for this type of acquisition research, it is worth noting that the challenge to UG is often based on a misunderstanding of that term. For example, Tomasello²⁹ notes that many languages 'simply do not have one or more of what are conventionally called relative clauses, auxiliary verbs, passive constructions, grammatical markers for tense, grammatical markers of evidentiality, prepositions, topic markers, a copula (*to be*), case marking of grammatical roles, subjunctive mood, definite and indefinite articles, incorporated nouns, plural markers, conjunctions, adverbs, complementizers, and on and on' (p. 17). Tomasello goes on 'For sure, we can force all languages into one abstract mold, which mostly means forcing the grammatical entities of non-European languages into European categories'. The concept of UG in no way implies that all languages share the same structures and categories. It merely states that there are a range of categories, and there are constraints on the shape of a possible human language. The fact that we are as well-informed now, as opposed to 30 or 40 years ago, about all the phenomena which Tomasello lists in the first quotation is due largely to the work of generative grammarians.

An obvious prediction of usage-based theory is that a child's grammatical development will track closely the properties of the input (lexical content, relative frequency of structures). This is indeed the case, as many studies have shown. Note that this is not in any way a problem for UG-based accounts, which do not deny the importance of input—a child has to be exposed to a language to start the process of setting the parameters of her grammar. Where UG-based accounts of acquisition have a crucial advantage over usage-based accounts is in the explanation of cases in which the learner innovates forms not found in the ambient language. Such innovation extends far beyond obvious examples of overgeneralization, such as the use of 'goed' (not 'went') as the past tense of 'go'. This sort of innovation can be dealt with usage-based accounts in terms of the relative frequency of regular past tense in the input. Harder for a usage-based account to accommodate is cases such as that reported by Clark.³⁰ Clark observed the child she studied innovating adjective forms at around two and

a half years by the addition of *-y* or *-ed*. Examples are given in (5):

- 5(a) It isn't crumby [=full of crumbs, speaking of amarettini biscuits].
 5(b) My foot is all crumbed [=bottom covered in crumbs].

The child's use of *-y* versus *-ed* was not random. Rather the child used *-y* for permanent properties of objects and *-ed* for temporary states. As Clark observes, although English does not grammatically mark such a distinction, other languages do.

As another example, consider non-adult relative clauses. Murasugi³¹ reports examples such as (6) from Japanese speaking children:

6. *toomorokosi tabeteru no buta-san
 corn is-eating *NO pig
 'the pig that is eating the corn'

The complementizer *no* is used by the child to mark the relative clause boundary. This is ungrammatical in the adult language. Similar innovations are found for relative clause production in a range of languages. For example, *go* (an invariant complementizer equivalent to English 'that') has been shown to be used by some Irish speaking children, contrary to the facts of the adult language.³² And while Serbian permits the complementizer *što* to be used to introduce relative clauses, it is an option less preferred than a relative pronoun (e.g., *koji*, 'who') in the adult language; yet children use *što* with greater frequency than adults do.³³ A usage-based account does not predict or explain such patterns. An UG account is available in terms of the availability in UG of two different syntactic mechanisms for forming relative clauses, one of which may be computationally easier for children.³³

The problem of innovation for usage-based accounts is vividly illustrated by creolization. Creole languages are languages that develop from pidgins—basic communication systems used where mutually unintelligible languages come into contact. They are created by child speakers of the pidgins and display complex grammatical properties not present in the base pidgin. The fact that the children can create a fully fledged grammar without the input of such a grammar argues that they have biologically available something like UG. Tomasello²⁹ (pp. 287–289) attempts to deal with the creation of creoles by suggesting that the child pidgin speakers may in fact have had exposure to the fully fledged native language of their parents.

However, Bickerton³⁴ points out that the grammars of creole languages share striking similarities, in particular, in their systems of tense and aspect. As Bickerton notes, drawing on published research from the 1960s, these properties cannot have derived from the native languages of the parents nor from contact between the creoles themselves.

UG-BASED ACQUISITION: CONTINUITY AND MATURATION

We have seen various examples of non-adult-like behavior in previous sections—children innovate non-adult adjective forms, relative clause types, and they invent creoles. An ongoing debate within the generative tradition of child language research is whether children's grammars are always possible adult languages, albeit deviant from the language being learned. A positive answer to this question is known as *continuity*. *Maturation* is the view that some principles of grammar become available to the child over the course of development, but are not present at the outset. Chapters in Ritchie and Bhatia provide various views on the continuity versus maturation debate.³⁵ Overall, I think it is accurate to say that continuity is the most popular view in the literature. Cases that appeared to favor maturation have fallen to continuity with more research and cross-linguistic data. For example, a characteristic of early child speech in some languages is the use of 'root infinitives'—the use of an infinitival form in main clauses, as in the Dutch example below:

7. Papa schoenen wassen
 Daddy shoes wash-inf

Because main clauses are always tensed in the languages in which children innovate root infinitives (a few cases of special usage aside), the use of root infinitives looked like a candidate for a child grammar that fell outside the bounds of what is a possible human language. But it has been shown both that the child's selection of an infinitive form is not random, but rather was limited, *inter alia*, to certain verb types and intended meanings³⁶ and that there exist languages in which parallels to the child's root infinitives are found in the adult system.³⁷

CAPACITY LIMITATIONS

An area which in my opinion has been relatively neglected in child language research is the relationship between children's performance and non-adult

grammatical representations and their quantitative ability to produce and parse sentences. Processing limitations as an explanation of child errors is not, as Tomasello²⁹ (p. 186) has claimed, a fudge factor, provided the proposed limitations are situated within articulated models of the comprehension and production devices. Pronoun interpretation and relative clause comprehension and production are both areas where such appeal to capacity limitations has seen some success. As noted above, recent research by Conroy et al. has argued that the higher error rates for interpreting definite as opposed to reflexive pronouns in child language studies may be largely artifactual.²¹ But it is also the case that their literature survey suggests that children have less difficulty with pronouns in sentences such as 8(a) than with pronouns in sentences such as 8(b):

8(a) She washed Mama Bear

8(b) Mama bear washed her

[In both examples, coreference between the pronoun (*she/her*) and *Mama Bear* is blocked]. Conroy et al. observe this may derive from the fact that in 8(a) the linear order is pronoun...noun, whereas in 8(b) it is noun...pronoun. They point out that adult sentence-processing studies have shown that in the latter sentence type, the sentence processor may briefly entertain the possibility of the illegitimate coreference. What is for an adult a fleeting processing effect may become for children a fully fledged error of interpretation, because of the child's quantitatively limited processing capacity. Similarly, lesser processing capacity in combination with parsing procedures used by adults has been used to explain child errors in comprehending relative clauses.^{38–40}

LANGUAGE AND MIND

An area of language acquisition research that has expanded and thrived in recent years is the study of the relation between knowledge of grammar and other aspects of cognition. The existence of developed language abilities in persons with mental retardation provides evidence in favor of a modular view of the human language capacity: language is not dependent on, or an outgrowth of, other aspects of our cognitive makeup. This point is brought home both by cases of 'savant' knowledge and by particular syndromes. Smith and Tsimpli report the abilities of a severely cognitively impaired young man who nonetheless has a remarkable ability to learn foreign languages.⁴¹

Rondal reports the case of a young woman with Down Syndrome whose grammar appeared in every respect tested to be perfectly normal.⁴² Persons with Williams Syndrome display highly fluent and syntactically complex speech, yet are cognitively impaired in other areas, including problem solving and arithmetical skills. Such facts have not gone unchallenged as evidence for the modular view of language, but I concur with Rondal, who points out that if in general non-linguistic measures of cognitive functioning predicted the linguistic achievements of persons with mental retardation, then the general performance of such persons (other than savants and individuals with Williams Syndrome) should be much higher than what is typically observed.⁴³

Theory of Mind tests are measures of an individual's ability to take into account the mental states and knowledge of others. For example, if a person puts a key in a box and the key is subsequently removed (unbeknownst to the person who put it there), an adult will say that the person will look in the box for the key. A 3-year-old child, by contrast, will say that the person will look for the key in its new location. De Villiers and de Villiers have found that knowledge of the factive/non-factive status of verbs (a verb such as *know* presupposes the truth of its complement, whereas a verb such as *think* does not) was a predictor of whether a child passed Theory of Mind tests, whereas the opposite was not true.⁴⁴ Intriguingly, this suggests that language development may drive other aspects of mental development. On the other hand, Drodz argues that children's non-adult interpretations of the scope of quantifiers such as *all* and *every* may be rooted in immature mental representations of numerosity,⁴⁵ a case of grammar waiting on another aspect of cognitive ability. These examples argue that the relationship between cognitive development and linguistic development is a two-way street.

CONCLUSION

The study of first language acquisition has made great strides in the last few decades. We now have clear evidence concerning the development of specific parts of the linguistic system, and clear evidence of children's creativity, within the bounds of what the biological endowment for language permits. Some of children's non-adult behaviors are plausibly due to capacity limitations that will be better understood when the field of language acquisition engages more vigorously with the study of adult sentence production and processing. Despite vocal claims to the contrary,

I think that there is little of substance to oppose the view that language acquisition is the result of an innate UG. The interaction between the development

of grammar and that of other cognitive abilities is an area currently at the forefront of language acquisition research.

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FURTHER READING

First Language, *Journal of Child Language*, and *Language Acquisition* are journals devoted to language acquisition. *Cognition* also regularly carries important articles on acquisition, as do several linguistic journals, most prominently *Language*, *Linguistic Inquiry*, and *Lingua*. For those who wish to pursue the development of phonetics and phonology, several chapters in Hoff and Schatz provide overviews,⁴⁶ as do chapters by Dresher¹ and Demuth.⁴⁷ Slobin has edited a series of collections under the general title *The Cross-linguistic Study of Language Acquisition*.⁴⁸ Although many of the literature reviews therein are no longer up-to-date, they provide a way into the literature on various languages and language families. Roeper and Williams⁴⁹ is

an early collection of papers in the principles and parameters framework. A volume edited by Lust et al.⁵⁰ is a somewhat more up to date collection. The development of pragmatic abilities has been a recent growth area in the study of child language, well illustrated by the papers in Krämer.⁵¹ Those interested in practical work on language acquisition can consult McDaniel et al. on experimental methodology⁵² and Snyder on the analysis of naturalistic speech.⁵³ Corpora of such speech are available on the CHILDES data base.⁵⁴