

# First Language Acquisition, Linguistic Theory of

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## Abstract

Chomsky's theory of Universal Grammar (UG) is introduced to explain children's rapid convergence on the grammar of their local language. A system of innate principles and parameters guides children's acquisition of language. Children are shown to misset certain parameters causing them to hypothesize properties not observed in the language of the community. Children's temporary missteps are put aright with input from the surrounding language. The misset parameters are predicted by the theory of UG but not anticipated by usage-based theories of language acquisition.

## Introduction

Every parent is fascinated by their child's rapid and seemingly effortless acquisition of their first language. The rapid strides children take in acquiring language seem particularly impressive when considered alongside other cognitive skills such as getting dressed, hopping, counting, and so on – skills that appear to take much more conscious practice. This article examines how children's acquisition of language is accounted for by Chomsky's theory of Universal Grammar (UG). Chomsky's theory of UG is a linguistic theory that posits an innate language faculty and, for this reason, is often referred to as a 'nativist' account (e.g., Chomsky, 1986, 1995). On this account, UG has a role to play in guiding children's rapid path to acquisition of their local language. Using UG as a guide, children have to identify various syntactic and semantic properties of their target language in the linguistic input and incorporate these into their grammar. At the same time, children must learn the lexicon of their language from their caretakers, and map this onto the structures made available by UG.

With UG in place, any typically developing child across the globe is ready to tackle acquiring the language of their community. As we will demonstrate, however, there are times when UG appears to initially steer children to flout the linguistic input that surrounds them. It is worth exploring these data, since a path that deviates from the surrounding linguistic input is not anticipated by alternative 'usage-based' accounts of language acquisition. Usage-based accounts of language acquisition expect children to attempt to follow the model provided by adults (Ambridge and Lieven, 2011; Goldberg, 2003, 2006; Tomasello, 2000, 2003). Usage-based linguists place a much heavier burden on the linguistic input, since the child has no advance linguistic knowledge. Not only do children learn the lexicon from the input, they must rely on the input to learn syntactic categories (such as 'noun phrase' or 'verb phrase'), to learn sentence structure, and to learn which structures and meanings for sentences are permissible and which are excluded from the language. On this view, children draw on the general learning mechanisms used to gain other kinds of cognitive knowledge and apply them to the task of acquiring language. We will demonstrate that the UG approach to language acquisition can explain data that is a challenge for usage-based approaches.

## Chomsky's Theory of UG

Chomsky has argued that linguistic knowledge is part of our genetic endowment as human beings. The proposal is that children are born with a 'UG,' a domain-specific computational mechanism that is part of the language faculty. This mechanism supports language acquisition to ensure that it takes place in a rapid, effortless, and relatively error-free manner, despite considerable latitude in children's experience. In the following sections, we illustrate the predictions of the theory of UG for cross-linguistic acquisition. We first address the system of parameters that comprise part of the language acquisition device. Parameters are designed to address the rich diversity observed in the languages of the world.

## Parameters

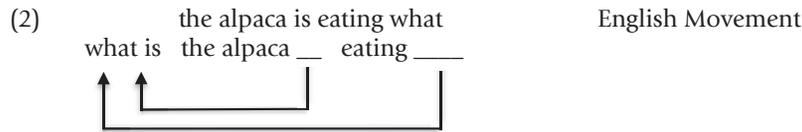
According to Baker (2001), "A parameter is simply a choice point in the general recipe for a human language." Continuing with the analogy to baking, Baker (2001) states: "A parameter is an ingredient that can be added in order to make one kind of language or left out in order to make another kind. A parameter could also be a combining procedure that can be done in two or three ways to give two or three different kinds of languages. If you take the generic ingredients of language, add spice B, and shake, you get English. If you take the same basic ingredients of language, but instead of spice B you add flavorings D and E and stir, you get Navajo" (Baker, 2001, p. 57). The human language recipe makes clear that languages that have most of the same basic elements, but one different property could make the language look very different on the surface.

There are a number of models of parameters currently under debate (cf Thornton and Crain, 2013). One point of debate is the scale of the proposed parameters. Some researchers propose that there are 'macroparameters,' large-scale typological parameters that have wide-reaching effects, while recent research tends to favor 'microparameters,' which account for small-scale variation. Baker (2001) envisages a large-scale hierarchy of parameters. The first parameter encountered by the learner at the top of the hierarchy designates the language as polysynthetic or not. Polysynthetic languages are ones which have very complex long words that, if translated into English, might be expressed as a full sentence. If the learner

chooses the setting for a polysynthetic language, decisions relevant only for polysynthetic languages follow. If the learner chose the nonpolysynthetic parameter setting, a host of different decisions follow. Current models of parameters also can be distinguished by whether learners encounter parameters in a specific order, or whether order is unimportant. Another point of debate is the amount of input required to set a parameter. Does abundant input result in swifter setting of the parameter? Do children need a fixed amount of input before a parameter is set, or is just witnessing a particular type of data in the positive input sufficient? Does the learner initially begin with one particular

This parameter captures a two-pronged cross-linguistic difference in the position in which question words (*wh*-words, e.g., who, where, what) are pronounced. In languages like Chinese and Japanese, question words are produced ‘in situ,’ in the position of the phrase that is being questioned. This can be illustrated in (1), where it can be seen that in Mandarin Chinese, the question word for what ‘shenme’ is positioned after ‘eat’ as in ‘The alpaca is eating what?’

1. Yangtuo zai chi **shenme**?                      Mandarin Chinese  
 Alpaca be eat what  
 ‘What is the alpaca eating?’



setting of the parameter, and are they free to choose between two options, or do they engage both settings of the parameter until the input data resolve which one correctly matches the linguistic input? All of these issues make for lively debate. Despite the debate, there is, nevertheless, agreement in the generative linguistics field that parameters sit at the heart of cross-linguistic variation.

From the perspective of first language acquisition, parameters accelerate the learner’s path to the adult grammar of the language of the environment, whatever it happens to be. All the learner need to do is fill out the menu of choices in consultation with the local language. The benefit is that the learner is kept ‘on track’ to converge on the adult grammar without mistaken hypotheses that would slow acquisition. The next section illustrates how parameters work with some examples from the empirical literature.

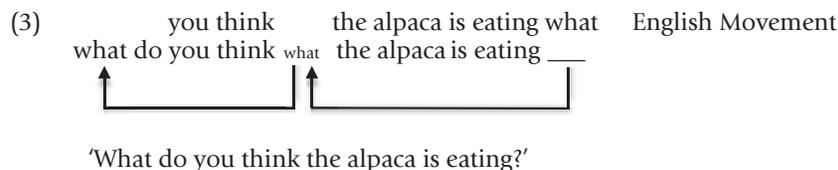
**Parameters and Cross-Linguistic Acquisition**

Parameters assist in guiding children’s acquisition of syntactic and semantic properties. Those parameters that guide very basic properties of language such as word order are likely to be set early in the course of acquisition (Wexler, 1998). Indeed, there is little evidence from children’s productions that they make word order errors. Other properties of languages can take more time to settle on. We will see one example from semantics where children are slower to map their initial hypothesis for a parameter onto the local language.

Let us begin with examination of the parameter known as the *wh*-parameter, originally proposed by Huang (1982).

In English and other Romance and Germanic languages, the question word originates in the base position in which it is pronounced in Chinese or Japanese. It is then assumed to move to the highest position in the hierarchical sentence representation, where it is pronounced. In English, the auxiliary verb (*is* in (2)) also moves to achieve the correct word order. Children use the language input to decide if their language is the Chinese type or the English type, and set the parameter accordingly. Assuming that the data that children need to set the parameter is abundant, children can be predicted to set the parameter early. In this case, word order is also implicated, which is perhaps another reason to expect early mastery of the position of the question word. At any rate, cross-linguistic reports suggest children do not misplace the question word. Of course, one might be tempted to say there is no parameter – children simply copy what they hear in the language input. This would be a reasonable hypothesis for the position of question words, but it will not work for some other cases we will consider.

Let us turn to another kind of question, in which the question word originates in an embedded clause; these are known as ‘long-distance questions.’ In English long-distance questions, the question word is pronounced, as before, in initial position, as shown in (3). Syntactic theory proposes that the question word must move in a local fashion, passing through the position between clauses on its way to the highest position in the main clause. In (3), it can be seen that the question word originates in the embedded clause after ‘eating.’ It then moves between clauses, which is shown by ‘what’ in small print, and finally to sentence initial position.



It is interesting that some languages and language dialects including German and Dutch dialects, Frisian, Afrikaans, Romani, and Passamaquoddy, record the passage of movement of the question word in a position between clauses as well as sentence-initially. In some German dialects, for example 'who' (*wen*, which is the accusative form of the question word) can be copied, as in (4):

4. *Wen glaubst du, wen das Alpaka küsst?*  
 Who think you who the alpaca kisses  
 'Who do you think the alpaca is kissing?'

Turning to children's productions of long-distance questions, children acquiring English (Thornton, 1990; Crain and Thornton, 1998) and also Dutch (Van Kampen, 1997), French (Jakubowicz and Strik, 2008), Basque, and Spanish (Gutiérrez, 2004, 2006) have been found to pronounce the question word between clauses, even though the adult grammar of these languages does not permit the copy of the question word between clauses. Thornton's (1990) finding for English using elicited production techniques was that just some children produce these 'wh-copying' structures. Wh-copying questions in children's productions are shown for a range of languages in (5). (It is important to distinguish questions with a copy of the question word (wh-copying structures) from questions in which a scope marker is in the highest position and the true question word is positioned between clauses. In English, this would amount to a question like 'What do you think who is under there?' to mean 'Who do you think is under there?' This is known as 'partial movement.' It is a very productive structure in many languages, and also appears as a nonadult structure in child language in a number of languages, but it is not the structure under discussion here.)

5. a. English, Thornton 1990  
*Who do you think who's under there?*  
*Who do you think who jumped over the can?*
- b. Dutch, Van Kampen, 1997  
*Wat denk je wat ik zie*  
 what think you what I see  
 'What do you think I see?'
- c. Basque, Gutiérrez, 2004  
*Nor uste duzu nor bizi dela etxe horretan?*  
 who think aux-2SG who lives aux-comp house that-in  
 'Who do you think lives in that house?'
- d. Spanish, Gutiérrez Mangado, 2006  
*Dónde crees dónde ha ido el niño?*  
 where think-2sg where has gone the child  
 'Where do you think the child has gone?'
- e. French, Jakubowicz and Strik, 2008, p. 120  
*Où Lala a dit où le poisson nage?*  
 where Lala has said where the fish is swimming?  
 'Where did Lala say that the fish is swimming?'

The possibility of pronouncing the copy of the question word between clauses varies cross-linguistically, so this can be termed a parameter. As Rizzi (2009) proposes, some parameters focus on such differences in pronunciation, while others target structural properties.

The empirical facts from languages studied to date show that children from a variety of languages produce the wh-copying

structure, despite the fact that it is not part of their language input. These facts would be puzzling on a usage-based theory of language acquisition. There is no reason to expect children from diverse language groups to produce questions with a wh-copy between clauses in the absence of any evidence in the language input. The facts are unsurprising on the theory of UG, however, since the parameter simply presents the option of pronouncing the intermediate copy of the question word or not. There still remains the question of why children do not immediately set the parameter in accordance with the input produced by adults in their environment, however. Most likely, children have little experience with long-distance questions. In most circumstances, a simple question is sufficient to fulfill communicative requirements. Once placed in a context that specifically calls for a long-distance question (such as asking a puppet what he thinks or believes in an experimental context), it could be that children simply guess which parameter setting is correct for their language. This explanation would explain why some children produce long-distance questions with a copy and others produce adultlike question from the start. For those children who guess the non-English parameter setting, positive evidence from the language will provide evidence for the alternative 'menu' choice.

Language acquisition researchers working within a usage-based framework have responded to the empirical findings from English. The proposal is that children attempt to be creative by merging familiar question structures (Dabrowska et al., 2009). Children are claimed to overlay the templates *What do you think?* and *What the alpaca is eating?* The first question is a direct question and the second one, *What the alpaca is eating?* is 'cut' from an indirect question such as *I know what the alpaca is eating* and 'pasted' together with *What do you think?* to form the child's copying structure *What do you think what the alpaca is eating?* The problem with the 'cut and paste' strategy is that without advance knowledge of which combinations of questions yield grammatical complex questions, children potentially could create many ungrammatical combinations. For example, indirect questions can be nonfinite as in *I know what to eat*, so the child could paste *what to eat* together with *What do you think?* to form *What do you think what to eat?* Such questions are not attested in languages that allow wh-copying and neither have children been found to use a wh-copy in questions with infinitival clauses (see Thornton, 1990; Crain and Thornton, 1998). The same is true for complex question phrases such as 'which boy.' Questions with a copy of a complex wh-phrase are not attested in languages that allow a wh-copy, and neither are they found in children's copying productions. It is not clear how these would be excluded by Dabrowska et al.'s proposal that children overlay templates. These ungrammatical question forms would be difficult to recover from without 'negative evidence.' For further discussion of these data and further facts that align with this parameter, see Crain and Thornton (2011).

Children may also initially hypothesize a parameter setting that is not reflected in the local language for learnability reasons. This can be illustrated with a parameter that encodes scope relations between logical expressions. This parameter was proposed originally in work by Goro (2004) and explored in subsequent research by Crain and colleagues (see e.g., Crain et al., 2006; Crain, 2012).

Scope ambiguities typically arise when two logical operators appear in the same clause. One example is sentences with negation and disjunction. In negated disjunctions in English, negation takes scope over disjunction, so disjunction yields a conjunctive entailment. For example, (6) entails that Ted didn't order pasta and Ted didn't order sushi. This shows that English negative statements with disjunction correspond to one of de Morgan's Laws of propositional logic:  $(A \vee B) \Rightarrow A \wedge B$ .

6. Ted didn't order pasta or sushi.

Other languages, including Japanese and Mandarin Chinese, assign the opposite scope relations. In (7), the Mandarin disjunction word for 'or,' *huozhe*, appears with negation, *meiyou*. Although the surface order of negation and disjunction are the same in Mandarin as in English, adult speakers of Mandarin judge (7) to mean that Ted didn't order sushi or Ted didn't order pasta. Adult speakers of Mandarin accept (7) in three circumstances, where (i) Ted ordered pasta, but not sushi, (ii) Ted ordered sushi, but not pasta, and (iii) Ted ordered neither pasta nor sushi. In logic, the corresponding formula for the interpretation of (7) in Mandarin is  $(A \vee B)$ , which does not entail  $(A \wedge B)$ .

7. (*Wo cai*) *Ted meiyou dian yidalimianshi huozhe shousi*.  
(I guess) Ted not order pasta or sushi  
'It's either pasta or sushi that Ted did not order'

The different interpretations across languages are attributed to a parameter, called the disjunction parameter. In one class of languages, disjunction takes scope over negation in simple negative sentences. Let us call this the (OR > NEG) value of the parameter. In the second class of languages, negation takes scope over disjunction, so this is the (NEG > OR) value. Another difference across languages is the interpretation that is assigned to negated conjunctions, as in *Ted didn't order both sushi and pasta*, but we will restrict our attention to disjunction here.

It has been proposed that children's initial settings of scope parameters are constrained by a learning principle called the semantic subset principle (Crain et al., 1994) that is part of UG. If we apply this to the disjunction parameter, it is easily verified that the circumstances in which sentences are true on the (OR > NEG) value comprise a superset of those circumstances that make sentences true on the (NEG > OR) value. In other words, the binary values of the parameter are in a subset/superset relation. To see this, note that the NEG > OR value yields a 'neither' reading, whereas the OR > NEG value yields a 'not both' reading. Clearly, the statement *neither A nor B* is true in a subset of the circumstances corresponding to the statement *not both A and B*. When parameter values are in a subset/superset relation, a principle of learning dictates that children acquiring all languages must initially select the subset value. In this case, they can use positive evidence to add the extra interpretations. If they chose the superset value, there would not be positive evidence available for them to reset the parameter to the correct value.

Adopting the semantic subset principle, Goro (2004) predicted that children learning languages like Mandarin and Japanese (which Goro studied) would initially interpret (6) in the same way as English-speaking children and adults interpret

*Ted did not order pasta or sushi*. That is, children acquiring Mandarin were predicted to initially set the parameter to (NEG > OR), which would be different from adults. If so, then children should generate a conjunctive entailment for (6), whereas adult speakers do not. In short, the commonality that is predicted is between Mandarin child language and English rather than between Mandarin child language and Mandarin adult language.

The prediction, then, is that children learning Mandarin and Japanese would initially speak a fragment of a foreign language, in this case a class of languages that includes English. This prediction was first confirmed in an experimental study of Japanese-speaking children, reported by Goro and Akiba (2004), and has been replicated in Mandarin-speaking children by Jing et al. (2005). Children acquiring both languages generate a conjunctive entailment for disjunction when it appears in the scope of negation, whereas adult speakers of both languages do not. See Crain (2012) for further contexts where similar cross-linguistic differences emerge.

The interpretations assigned by children are evidence that children acquiring both English, Japanese and Mandarin favor the subset value of the relevant parameters. Children hear the further interpretations that are possible in the language of adults, and use these data to reset the parameter to the correct value. This guarantees that children will converge on a grammar that is equivalent to those of adults in the same linguistic community. So, this view explains why some children deviate from the adult language of their community, while at the same time, children learning other languages conform. On usage-based accounts of language acquisition, however, the initial mismatch with adults that we have observed is not anticipated, and would be difficult to explain, since children are not acting in concert with the linguistic data in their environment. Another puzzle for usage-based accounts would be why the nonadult interpretations that children hypothesize are observed in children acquiring a range of typologically unrelated languages. In the next section, we consider how universal principles of UG put their mark on cross-linguistic language acquisition.

### Universal Principles and Acquisition

Children harness UG as they engage with linguistic input from parents and caretakers. The principles that are part of UG constrain children's hypothesis space, eliminating hypotheses that would permit sentence forms and sentence interpretations that are not part of the adult grammar. The theory posits universal principles, in part, as a solution to empirical findings from Brown and Hanlon (1970) among others, that parents and caretakers tend not to correct children's productions for ungrammaticality. Instead, parents respond to the truthfulness of their children's utterances. For this reason, parents are said not to provide 'negative evidence' – that is, correction for ill-formed strings of words or for meanings that are not permissible. Without parental guidance about what sentences are not grammatical or what is not a legitimate meaning for a sentence, children would have difficulty learning the bounds of the adult grammar from positive evidence alone.

One universal principle that has been widely discussed in the literature is 'structure dependence.' This principle limits children to operations or rules that are based on hierarchical

representations for sentences. In effect, children should not hypothesize rules that are based on the linear order of words. This is true, no matter what language is being acquired. One characteristic of cross-linguistic acquisition, then, will be the absence of rules in children's language that could be said to violate structure dependence. More broadly, children's productions will never feature properties ruled out by principles, and children will never give sentence interpretations that are prohibited by universal principles. As far as cross-linguistic acquisition is concerned, then, universal principles are identifiable by the absence of the phenomena they prohibit. Here we will examine a particular example from English that has been debated at length in the literature. This concerns children's hypotheses about the relationship between ordinary sentences and their question counterparts.

In generative linguistic theory, ordinary declarative sentences are related to their yes/no question counterparts via a movement rule. Children need to observe declaratives and yes/no questions in the linguistic input and formulate a movement rule that works more generally. Imagine the child is faced with the following mini-set of data in (8). All of these sentences and questions are 'simple' sentences, and we can assume these make up the majority of the input data.

8. a. Alpacas are cute                      Are alpacas cute?  
 b. The alpaca is eating                Is the alpaca eating?  
 c. The cute alpaca can run fast      Can the cute alpaca run fast?

Children could, in principle, come up with various hypotheses about how yes/no questions are derived. If children were able to entertain linear hypotheses, based on the order of words in the sentences, they could potentially come up with the rule in (9). This rule refers to notions like 'first,' so this would entail counting from left to right to identify the auxiliary verb that is to be moved.

9. Move the first auxiliary verb/modal to sentence initial position

This linear hypothesis would, nevertheless, correctly predict all the grammatical yes/no questions in the right hand column in (8). It would incorrectly predict the form of a more complex question, as in (10), in which the noun phrase that is the subject of the sentence is modified by a relative clause. That is, 'alpaca' is modified by 'that is eating.' In (10), the first auxiliary verb that you come to when encountering the string of words from left to right is 'is,' inside the relative clause.

10. The alpaca that is eating can run fast? \*Is the alpaca that eating can run fast?  
 eating can run fast                      ↗ Can the alpaca that is eating run fast?

The universal principle of structure dependence should not permit children to hypothesize a rule like (9). Instead, their knowledge that movement rules are formulated in terms of elements in a hierarchical structure would guide them to use notions like 'auxiliary verb in the main clause,' as in (11) which would correctly target 'can' for movement:

11. Move the auxiliary verb in the main clause to sentence initial position

The example from yes/no question formation applies to English but structure dependence has broad application to all languages. No child learning any language should test linear hypotheses.

Usage-based theories of linguistics deny that our hypotheses are guided by linguistic principles specific to the language faculty. Ambridge et al. (in press) for example, claim that more general cognitive conceptual structure maps onto relevant linguistic units. The idea is that a noun phrase modified by a relative clause as in *The alpaca that is eating* is the same kind of functional unit as *the alpaca*, or *the cute alpaca* and therefore these functional units will map onto linguistic units in children's questions. One might question whether this is a tendency or an absolute prohibition like a universal principle. Either way, the empirical findings from child language reported in Crain and Nakayama (1987) are that children are not found to consider hypotheses that would cause them to ask structure dependence violating questions like *Is the alpaca that eating can run fast?*

This concludes our short tour of the theory of UG and its explanation of children's acquisition of language. We have seen that biological endowment of principles and parameters, for the most part, speeds children's path to convergence on the adult grammar. Occasionally, children misset parameters. This may be because their initial guess is incorrect, or because they are guided by a learnability principle. The result is that children temporarily hypothesize properties that are not matched in the grammars of adults around them. Such cases are important for two reasons. They cause us to question the common sense notion that children learn everything about language from their parents. Second, they present empirical data that can adjudicate between current theories of language acquisition.

**See also:** Dependency in Language; Language Acquisition; Language Development, Theories of; Language Development: Emergentist Theories; Movement Theory and Constraints in Syntax; Second Language Acquisition.

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