Universal Grammar and Language Development

The existence of Universal Grammar (UG) is a foundational thesis of most current research in generative linguistics, and is strongly associated with the writings of Noam Chomsky, although it has historical antecedents as far back as the work of Descartes and his followers in the 1600s. In contemporary research, UG refers to grammatical properties of human language that follow from innate, biological characteristics of the human species. The UG thesis makes predictions for, and draws considerable support from, the characteristics of language development in children.

1. The Nature of UG

The contemporary scientific view on cognitive capacities such as vision and auditory perception is that they have a strong basis in the human genome, and in the mechanisms of neurodevelopment. In the case of vision for example, there can be effects of the environment on the developmental time course, but there is no sense in which the child "learns" vision from the surrounding community, through the application of general reasoning skills. The UG thesis is that humans' capacity for language is quite similar: For both language and vision, the endpoint of development is a complex information-processing system, involving computational procedures that are almost entirely unconscious. In both cases the vast majority of children arrive at the endstate rapidly and successfully, without exerting any obvious effort, and regardless of their general intelligence.

The central project of generative grammar can be understood as an investigation of UG: What precisely is the "content" of UG, and how does that content interact with the environment during development to yield the grammatical competence, in some particular language, that we observe in adult native speakers? Put differently, the project is to give a precise, explicit characterization of <u>what</u> you know when you know the grammar of your native language, and of <u>how</u> you came to know it.

Let's consider a concrete example. Imagine that two people 'A' and 'B' are having a conversation in English. Speaker A says, "Carol thinks of herself as smart, and Susan thinks of herself as smart too, but *Carol* thinks Susan is *really* smart." Speaker B might reply as follows:

> Speaker B: "I'm confused. *Who* thinks she's smart?"

At this point in the conversation, most native speakers of English would find either of the following answers reasonable:

> Possible answer #1: "*Carol* is the one who thinks Susan is *really* smart."
> Possible answer #2: "Carol and Susan *both* think they're smart."

Now suppose that Speaker B instead says the following:

> Speaker B: I'm confused. *Who* does she think is smart?

At this point, most native speakers of English would find the first of the following answers reasonable, but would be extremely surprised by the second answer:

Possible answer: *Susan* is the one who Carol thinks is *really* smart.
Not possible: * Susan and Carol *both* think they're smart.

In other words, it is extremely difficult, if not impossible, to interpret the English question "Who does she think is smart?" as meaning "Who thinks of herself as smart?" But why should this be so?

Viewed from the perspective of formal logic, the answer is far from obvious. The questions "Who thinks she is smart?" and "Who does she think is smart?" should both be able to mean 'Who is the person X, such that X thinks X is smart?' In the first version of the question, the pronoun *she* is interpreted as a logical variable (X), bound by the question word *Who*. Why should this suddenly be impossible in the second version?

This curious property of English turns out to be very widespread. In fact, to date no one has found a clear example of a "natural" language that lacks it, although it is overwhelmingly absent from the "artificial" languages of mathematical logic and computer programming, for example.

For generative linguists, the explanation lies in UG. The proposal is that UG includes only a few options for the portion of a grammar that interprets noun phrases, and that all of the options share a property known in the generative literature as the prohibition on 'strong crossover'.

A question word like *Who* needs to be related to a gap in one of the positions where an argument (e.g. a subject or a direct object) can appear. Thus, in "Who __ thinks she is smart?" the word *Who* is related to a gap corresponding to the subject of the verb *thinks*, as evidenced by an answer like "Sue thinks she is smart," where the gap is filled by the subject *Sue*.

Applying the same idea to the question "Who does she think __ is smart?", we again find a gap where the answer might include a name, as in "She thinks Sue is smart." Yet in this version of the question, the pronoun *she* appears in a position (namely the subject position for the verb *think*) that intervenes between the question word and its associated gap. If the intervening pronoun *she* is interpreted as referring to the same person as the interrogative pronoun *Who*, the result is a 'strong crossover violation'.

The example of strong crossover is just one among many where generative linguists have discovered that native speakers of a given language (in this case, English) are all unconsciously obeying an extremely subtle, and somewhat arbitrary, grammatical constraint. What would lead children to acquire a grammar that prohibits strong crossover?

Clearly parents cannot teach the constraint to their children explicitly, because the vast majority of parents are completely unaware of it. Another logical possibility is that children limit themselves quite strictly to the sentences they have encountered in the speech of adults, but this idea is also untenable. To explain adults' judgement that strong-crossover violations are unacceptable, it would have to be the case that adults are permanently restricted to the specific sentences they heard as children, and view all other sentences as unacceptable. As soon as one allows any form of generalization from those sentences encountered in childhood, one needs to explain why no one generalizes in a way that yields strong crossover violations. For example, if a

learner made the simple generalization that the English pronoun *she* can refer to any female individual under discussion, without restriction, then strong crossover violations would automatically be judged fully acceptable.

Still another logical possibility is that all young children at some point produce sentences that violate the prohibition on strong crossover, and they are reliably corrected by their parents, or at least given some kind of implicit indication that they have made an error. A rich body of evidence shows that this cannot be correct. First, the vast majority of the grammatical errors in children's speech take the form of omitting obligatory material, rather than combining words in ways that are grammatically impossible in the target language. If the child does not produce the error, she cannot be corrected.

Second, parental correction of grammatical errors is extremely unreliable. In many cases parents ignore the grammatical form (be it correct or incorrect) of the child's utterance, and instead respond to the accuracy or inaccuracy of the idea that it expresses. In still other cases parents fail to respond in any way at all, and this can be for a wide variety of reasons. The learner cannot safely conclude anything from it.

Finally, even if the child does utter a sentence violating the prohibition on strong crossover, and even if the child has a parent who is willing and able to correct every single grammatical error the child ever produces, this will still not be enough. When the child produces a strong crossover violation (e.g. *Who does she think is smart?*), the sentence will always be completely well-formed, as long as the pronoun (*she*) is understood as someone distinct from the person whose name is being requested. The child cannot know whether the parent chose that interpretation because the strong-crossover reading was prohibited, or simply because it was the first interpretation that came to mind. The in-principle difficulty, if not impossibility, of learning a constraint like this one directly from the evidence available to children is what leads most generative linguists to believe UG must be playing a central role in language development.

UG can be thought of as the initial state of the language learner, prior to linguistic input from the environment. According to the UG thesis, this initial state imposes severe restrictions on the types of grammars that a child can even consider (i.e. the child's 'hypothesis space'). The initial state also includes some kind of abstract procedure (known as the 'language acquisition device', or 'LAD') that will guide the child to one particular option, as a function of the 'primary linguistic data' ('PLD'; i.e. the samples of language use produced by parents and other caretakers in the presence of the child).

In order to specify a language learner's hypothesis space, the 'Principles and Parameters' (P&P) framework has been the dominant paradigm in generative linguistics (especially in syntactic research) from the late 1970s up to the present, at least if one adopts a broad definition of 'principle' and 'parameter'. In broad terms, a principle is any characteristic that is necessarily true of all natural languages (i.e. the languages that a child can acquire naturally, through the usual process of first-language acquisition). A parameter is a point of permitted variation across those languages.

Given children's overwhelming success at language acquisition, many researchers expect that the parameters of variation in UG will turn out to be quite restrictive, so that there are relatively few

options that a child needs to consider. Researchers also expect the parameters to be highly abstract, for example much more abstract than a simple list of the numerous surface forms that a grammar effectively permits. This abstractness means that there will be many different kinds of utterances in the PLD that can serve to guide the child to the correct grammar for the target language.

Within this broad P&P framework, parametric proposals have sometimes taken the form of a set of two or three options inside the statement of a grammatical constraint (e.g. 'The head of a phrase must {precede / follow} its complement'). These are sometimes called 'switchbox parameters'.

In recent years, however, many linguists investigating cross-linguistic variation in syntax have instead proposed parameters that take the form of a small set of morphosyntactic 'features', each of which does, or does not, occur with a particular 'functional head', like 'Complementizer' (C). This approach is especially well-suited to cases like variation in whether interrogative words do, or do not, move to the edge of a question. For example, in the English question *What did the student see __?*, the interrogative pronoun *What* corresponds to the direct object of the verb *see*, yet it appears at the left edge of the clause. In Japanese, the equivalent sentence is *Gakusee-ga nani-o mita-ka?*, literally 'Student what see?'. The interrogative pronoun *nani-o* 'what' occurs in the same position, immediately preceding the verb, where a non-interrogative direct object would appear in Japanese.

This point of variation in the position of interrogative pronouns can be captured in terms of the presence or absence, in a given language, of an abstract feature on the interrogative C that "attracts" an interrogative pronoun to its structural location. The proposal is that all languages have a C on the "edge" of (i.e. immediately preceding, or immediately following) an interrogative clause. In some languages C is pronounced as a separate morpheme (e.g. the Japanese verbal suffix *-ka*). In other languages, like English, interrogative C is usually silent, but it has an audible effect on the position of a word like *What*. The idea that all the parameters of syntactic variation might take the form of abstract features on functional heads is known as the 'Functional Parameterization Hypothesis'.

Still another P&P approach, adopted most frequently in phonology but also found in syntax and semantics, is known as 'Optimality Theory' (OT). This approach posits a universal set of 'violable constraints' (e.g. 'Syllables must not include a coda', 'Surface forms must correspond directly to lexical representations'), and parameterization takes the form of ranking these constraints relative to one another. The proposal is that speakers of a given language favor the forms that minimize violations of the constraints that are ranked highly in their particular language. The points of variation in OT, as in switchbox and functional-parameterization models, can be highly abstract (not tied to specific surface forms) and can also be quite restrictive, in the sense that most of the logically possible grammatical systems will be excluded altogether from the learner's hypothesis space.

2. Connections to language development

The UG thesis has tremendous implications for the nature of language development in children, and has had a great deal of success in accounting for otherwise mysterious properties of language

development. One such property is the incredible rapidity with which children acquire their first language. By the fifth birthday, the vast majority of children have acquired the core grammatical properties of their parents' language (or languages), but they usually cannot solve even a simple algebra problem.

The contrast between grammar and algebra is directly relevant in a case like the prohibition on strong crossover. For a child to even express this constraint consciously (let alone discover it) would require considerable facility with algebraic systems, in the form of constraints on the values of variables (interrogative and non-interrogative pronouns) ranging over different possible values (the different individuals under discussion in a discourse). According to the UG thesis, however, there is no need for a child to discover the prohibition, or even to reason about it, because it is "built into" the child in the same way as the computations performed by the visual system.

Another such property is the near-uniformity of success. In the vast majority of cases, different children in a given speech community converge on essentially the same grammar (as evidenced by consistent judgements on what clearly is, and clearly is not, an acceptable <sentence, meaning> pair). This is true even though children are exposed to different actual sentences, uttered in different circumstances and in an unpredictable order. Moreover, it holds true even though children are not reliably corrected for grammatical errors (as was discussed above). If the children were "learning" their language, in the usual sense of the term, we should see much greater variability in the outcomes.

In the same vein, the UG thesis enables us to account for the uniformity of ease with which children acquire any of the world's languages (whether English or Samoan, Russian or Navaho). On the surface, from the perspective of the average adult, these languages differ dramatically in the grammatical challenges they pose. From the perspective of a P&P account, however, each grammar corresponds to a different set of choices from the same, UG-provided "menu" of parametric options.

This last point brings us to the phenomenon of developmental changes. The uniformity of ease and success found in typically developing children does not persist into adulthood. While it is possible for an adult to become proficient in a foreign language, adults exhibit highly variable degrees of success, and in most cases they need to make a conscious intellectual effort to master the grammar of a new language. While there is not yet a consensus on the degree to which adults may still have some form of access to UG, the general pattern – that is, an obvious difference in both the procedure and the outcomes when language acquisition begins in late childhood or after the onset of puberty – is taken by generative linguists to reflect a maturationally timed change in one's access to UG, understood as a specialized cognitive system for language acquisition.

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See Also: Syntactic development: Generative grammar perspective; Principles-and-parameters framework; Critical period in language development.

Further Readings

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