

# Universal grammar and the innateness hypothesis.

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## ABSTRACT

A critical study of the arguments for and against the hypothesis that human beings are born with an innate universal grammar, with some brief discussions of alternative theories.

## 1 Introduction

The issues of whether, and to what extent, language may be innate in humans, and if there are any universal features underlying the bewildering multitude of human languages, have always been debated among the students of language. A few decades ago, a more coherent and explicit version of the innateness hypothesis was proposed, with Noam Chomsky as the principal spokesman. This hypothesis postulates the existence in the human brain of a “Language Acquisition Device”, equipped from birth with the set of linguistic rules that form the “Universal Grammar”, grammatical rules which are common to all human languages.

The innateness hypothesis is still highly controversial among linguists, with some echoes of the “nature vs. nurture” debates that have plagued other branches of human sciences. In this essay, I will attempt to critically study some of the arguments for and against innateness.

## 2 Universal grammar

There are two main approaches to the question of language universals — either in-depth studies of one or a few languages, which is basically Chomsky’s method, or wide-range typological comparisons of a large number of languages, a method favoured by, among others, Greenberg.

Quite naturally, the two approaches have a tendency to generate different types of universal rules. Greenbergian rules are often on the form “If a language has feature A, then it is likely to have also feature B.” Chomskian rules are of a more abstract and structural character, and are claimed to be strictly universal, rather than just tendencies. Since the innateness hypothesis is intimately connected with the Chomskian paradigm, only this category of universals will be further discussed here.

Chomsky himself has written many books on this topic, such as (1978), (Chomsky, 1978; Chomsky, 1986; Chomsky, 1982). This presentation is, however, based not so much on Chomsky’s own writings as on the introduction to his work written by Cook (Cook, 1988) (containing another 20 Chomsky references for those who are interested).

Universal grammar is defined by Chomsky as “*the system of principles, conditions, and rules that are elements or properties of all human languages. . . the essence of human language*” (Chomsky, 1978).

Cook gives a few examples of rules that supposedly belong to this universal grammar :

- **Structure dependency.** All operations on sentences are defined in terms of phrase structure, rather than e.g. linear sequence. This is probably the least controversial of all the proposed rules of universal grammar, being strongly supported both by all available data, and by most people’s linguistic intuition.

- **The Head parameter.** Each phrase contains a “head” (main word), and all phrases in a given language have the head in the same position. The head position is, however, different from language to language, which introduces the important concept of a parameter-governed rule. Unfortunately it is not too difficult to find exceptions to this rule — for example, the two English noun phrases “high court” and “court martial” have the heads at opposite ends — weakening the case for including it in a universal grammar.
- **The Projection principle.** Properties of lexical entries project onto the structure of the phrases of which they are the head. This rule ensures e.g. that a verb gets the appropriate number and type of objects. The universality of this rule is far from self-evident — it is strongly dependent upon a particular grammatical theory (Government & Binding), in which the lexicon carries much of the linguistic information that could otherwise be expressed as phrase structure rules. *Some* equivalent of the projection principle may be needed, but it might look completely different if another theory of grammar were used.

There are several more universal-grammar rules proposed by Chomsky, and presumably the full set of rules required by the innateness hypothesis is rather large. But it would take us too far to go into more detail here.

### 3 The innateness hypothesis

At one level, it is self-evident that there has to be *some* innate component in our language acquisition — other animals normally don’t acquire language, and the difference between them and us is to a large extent innate.

But the Chomskian innateness hypothesis is more specific. It postulates not only a general ability in humans to acquire language, but also that this our ability comes from a specific language-acquisition device in the brain, equipped already at birth with specific grammatical rules and principles.

The main arguments in favour of the innateness hypothesis are :

- Language acquisition would be difficult or even impossible without an innate grammar: “How do we come to have such rich and specific knowledge, or such intricate systems of belief and understanding, when the evidence available to us is so meager ?” (Chomsky, quoted in (Cook, 1988).)
- The mere existence of language universals support the hypothesis that these are innate.
- Essentially all humans acquire language, and no other animals do.

## 4 Language acquisition — some other models.

The innateness hypothesis is far from the only available explanation of language acquisition. A multitude of different hypotheses have been proposed at one time or another; Cruttenden (Cruttenden, 1979) classifies them in four main categories :

- Behaviourist
- Innatist
- Cognitive
- Sociological

The innatist models were discussed in the preceding section, the others will be briefly touched upon below.

### 4.1 Behaviourist models

Behaviourism is a prominent school within general psychology, and some of its proponents, notably Skinner (Skinner, 1957), have attempted to set up behaviourist models for language acquisition, based on operant conditioning (stimulus and response). These models have difficulties accounting for many features of human language, such as understanding structure and meaning, and have not met with any great enthusiasm among linguists : “Verbal behaviour is equated with rat behaviour. . .”(Chomsky, 1959).

### 4.2 Cognitive models

The name Piaget is as intimately connected with cognitive models as Chomsky with innateness. Piaget’s detailed empirical studies of the cognitive development of children have been invaluable for our understanding of child psychology.

Cognitive models for language acquisition are based on the premise that language is dependent on cognition, but cognition is not dependent on language. The idea is that acquisition of the language to describe some concept follows, by some unspecified mechanism, from the cognitive acquisition of the concept. It is discussed in terms like “isomorphism between syntactical categories and psychological events and processes.”(Cruttenden, 1979).

The computational models, typified by the “schemas” of Arbib and Hill (Arbib & Hill, 1988) can be regarded as a subclass of the cognitive models. Cognition is also here the basis of language acquisition, but in a rather different sense; language does not “automatically follow” from cognitive development, but instead the child uses its cognitive capacity to deduce the rules of the language it hears — precisely the task which innatists reject as impossible, and the impossibility of which they invoke as proof of the necessity of the innateness hypothesis.

Arbib and Hill have produced an explicit algorithm for a small part of the language acquisition task, and have shown that the algorithm does indeed reproduce interesting features of a child’s language acquisition, given typical input from adult (presumably “motherese”) speech.

### 4.3 Sociological models

The sociological models of language acquisition, like the cognitive models, do not regard language as an autonomous system, but as subordinate to, and dependent upon, the child’s development in other areas. But what is of primary interest in sociological models is not cognitive development, but social development, the child’s growing need to communicate and interact with other beings. Language is regarded simply as means to an end, a tool developed by the child to solve its communicative needs.

## 5 Possible tests of the innateness hypothesis.

If the idea of an innate grammar is to have any merit as a scientific hypothesis, it must be possible to conceive of experiments that could, at least in principle, falsify it. Experimental studies of language acquisition, however, labour under severe ethical constraints — any interference with a child’s language acquisition may do it life-long harm.

A classical — possibly mythical — experiment in this area is the one allegedly performed by a king in Egypt (?), who set two children to be raised without any contact with human language, in order to determine which, if any, language they would speak with each other. This would indeed be a critical test of any specific set of universal-grammar principles, but of course it is absolutely out of the question to repeat it<sup>1</sup>.

### 5.1 Monolingual versus bilingual acquisition.

Another possible test of the whole concept of an innate grammar, which has occurred to me but which I haven’t seen stated in this form in the literature, is a study of the language acquisition of bilingual children, comparing the time it takes to acquire two languages, with the time it takes for monolinguals to acquire their single language. In a simplistic form, the argument could be stated like this, using the following symbols :

- $t_a$  : Time for a child to acquire his(her) native language(s).
- $t_{a1}$  :  $t_a$  for a monolingual child.
- $t_{a2}$  :  $t_a$  for a bilingual child.

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<sup>1</sup>There are a few tragic cases of *single* children growing up without contact with language, notably “Genie”, whose case is discussed at length in (de Villiers & de Villiers, 1978). These isolated children *don’t* develop language.

- $t_{UG}$  : The part of  $t_a$  spent in acquiring Universal Grammar, the core common to all languages.
- $t_\ell$  : The time it takes to acquire language-specific features (lexicon, language-specific rules and parameter-settings) of a single language. It is probably a fair approximation to assume that  $t_\ell$  is the same for all languages.

It then follows that

$$t_{a1} = t_{UG} + t_\ell \tag{1}$$

$$t_{a2} = t_{UG} + t_{\ell1} + t_{\ell2} = t_{UG} + 2t_\ell \tag{2}$$

If the innateness hypothesis is true, then  $t_{UG} = 0$ , from which follows that  $t_{a2} = 2t_{a1}$ . If the innateness hypothesis is false, then the expected result is that  $t_{a2}$  is only slightly larger than  $t_{a1}$  (assuming  $t_{UG}$  is large compared to  $t_\ell$ , a reasonable assumption considering the view of innatists that UG cannot possibly be acquired in the time available to a child.)

There exists a fair number of studies of rates of language acquisition in bilingual children (see e.g. (Romaine, 1989; Harding & Riley, 1986) and references therein). The variations between individual children are very large (as is also the case for monolingual language acquisition), but the consensus that I extract is that  $t_{a2}$  is indeed somewhat larger than  $t_{a1}$ , but by no means twice as large : “In very general statistical terms, bilingual infants and children start speaking slightly later than monolinguals, but they still remain well within the degrees of variation for monolingual children.”(Harding & Riley, 1986), and “Even when the onset of acquisition is delayed in the bilingual, children apparently make up for the time lost, . . .”(Romaine, 1989).

Romaine (Romaine, 1989) discusses another aspect of bilingual acquisition, namely the pattern of acquisition : “. . . bilingual children seem to pass through the same developmental milestones in much the same order and the same way in both their languages as monolinguals do in their respective languages, . . .”. She takes this as evidence in favour of the innateness hypothesis, but the reasons for this are not evident — to me it implies rather that language acquisition is either some kind of maturation process, or controlled by non-linguistic development, as in the cognitive models.

## 5.2 Pidgins and creoles.

Pidgins are languages which have been developed as means of communication by people with mutually unintelligible languages who are brought together in situations where they need to communicate. A pidgin will contain simplified lexical and morphological items from the parent languages, but often it also has its own special grammar, in no obvious way derived from the parent languages.

A creole may be defined as a “second-generation pidgin”, with at least some speakers having it as native language.

What makes pidgins and creoles interesting in this context is that the grammars of different pidgins, evolved independently from different parent languages, often contain very similar features. This might be interpreted as echoes of

the rules of Universal Grammar, (presumably with default parameter settings), which come to the surface when a new language develops in this way.

### 5.3 Can language be acquired without an innate grammar?

Much of the efforts of innatists such as Hoekstra & Kooij (Hoekstra & Kooij, 1988) are spent on showing examples of subtle grammatical judgements and asking rhetorically “How can a poor child *possibly* learn this grammatical rule from the available evidence ?” and concluding “It *must* be innate!”. Personally, I am not terribly impressed by this kind of implausibility arguments. To begin with, many of the examples given are of judgements that require *adult* knowledge of language — no child of five will correctly handle all the examples of (Hoekstra & Kooij, 1988) — based on many years of complex high-level linguistic input. It is not at all obvious that the rules cannot have been deduced from the enormous volume of material that a young adult has encountered. Furthermore, it remains to be shown that the judgements given are actually based on Universal-Grammar rules, and not on language-specific idiosyncracies, in which latter case the whole argument falls. E.g. example 1 in (Hoekstra & Kooij, 1988) would not be valid in languages in which copula verbs can be omitted.

A more interesting approach to this question of the necessity of an innate grammar is that of the computational models, as mentioned in section 4.2 above. If it could be explicitly demonstrated that basic principles of grammar *could* be deduced from the material available to a child, then the foundations of the innateness hypothesis would be demolished. Arbib & Hill (Arbib & Hill, 1988) are apparently making some progress in this direction, which I find very interesting.

### 5.4 Does universality imply innateness ?

Linguists who search for universals in language will generally find what they are looking for. But what conclusions can be drawn from this ? Here is a list of some conceivable ways of explaining language universals without innate grammar:

- When complex sets of data are studied and analysed, spurious structures and correlations can often be found even when in reality there are none whatever, particularly if the researchers *want*<sup>2</sup> to find structure. As a physics student, I was frequently reminded of the danger of over-interpreting meager data, but I haven’t heard it mentioned in linguistics — is this problem excluded in the search for Universal Grammar ?
- Many similarities between languages are adequately explained by their having a common origin. It appears quite likely that *all* human languages have a common origin, if one goes far enough back in time — otherwise

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<sup>2</sup>This in no way implies any dishonest or unethical behaviour — the worst accusation that needs to be made is “wishful thinking”.

one would have to assume that language was independently developed by several distinct groups of proto-humans. Now, this is certainly possible, but the evolution of a *single* innate universal grammar, common for all mankind, actually *requires* that all languages have a common origin, in order to be compatible with standard Darwinism. And if a common origin has to be postulated anyway, why not let this common origin explain the universal features — to introduce innateness at this point would seem to go against Occam’s razor.

- In order to be a useful instrument for communication, a language has to meet certain basic criteria. Is it possible that some principles of Universal Grammar can be explained by their being, logically or pragmatically, *necessary* features of a language ?
- Can the rules of Universal Grammar be derived from our general (non-linguistic) cognitive structures, along the lines of the cognitive models mentioned above. This would mean that the innate structure, if any, which gives rise to Universal Grammar, would not be specifically linguistic.

## 5.5 Is language really uniquely human ?

One component of the innateness hypothesis appears to me to be both unnecessary, and unnecessarily controversial, and that is the postulate that language is uniquely human. Innatists defend this almost as an article of faith (Chomsky, 1978; Hoekstra & Kooij, 1988), but to me it seems the equivalent of the parallelity axiom of Euclidean geometry — the rest of the theory is perfectly coherent without it, and would be just as consistent with its negation. So why this vehement reaction to what is really a minor side issue in the language acquisition debate ? Am I the only one to wonder if this is an emotional reaction to the idea that we humans are just like the other animals, a notion that since Darwin has won general acceptance in biology, but apparently not universally so in the humanities<sup>3</sup>.

Several experimenters have attempted to teach language to non-human apes (chimpanzees<sup>4</sup> mostly, but also gorillas and orangutangs), with some measure of success (de Luce & Wilder, 1983). Chomsky (Chomsky, 1978) denies that any progress is possible; Hoekstra & Kooij, writing ten years later, grudgingly admit that some progress has been made, but still claim that what the apes have learnt is not language, that a vital feature of human language (recursivity) is still missing. But is this really fair to the apes — we call children’s talk “language”, long before they start using recursivity.

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<sup>3</sup>Lewin, a prominent paleoanthropologist, presents in (Lewin, 1987) a very interesting discussion of the emotional sensitivity of this issue in connection with the research into our evolutionary past.

<sup>4</sup>One group of scientists, with a sense of humor, named their simian student “Nim Chimsky”, in honour of a certain well-known linguist and proponent of the uniquely-human hypothesis.

## 6 Conclusions

On the basis of the available evidence, is it very hard to draw any firm conclusions in this field. Several theories exist which are compatible with what is known about language acquisition and universals, none of which is clearly preferable. It appears likely that no single theory contains the whole truth, but that many theories have some grains of it. Personally, I like the approach of the computational models, where an attempt is made to set up explicit models of language acquisition.

The concept of *some* kind of innate language acquisition device is appealing, but the best that can be said about the strong, Chomskian, form of the innateness hypothesis is that it is not in gross conflict with observations. It still remains very far from being the proven fact that some of its proponents seem to take it for — alternative explanations exist.

## References

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If the term "Universal Grammar" comes to mean simply "the innate endowment for language" or comes to be equated with any version of the "innateness hypothesis" without regard for its content or character, its central thesis becomes a virtual truism—surely not the original intent of the nativist program for language. The purpose of emergentism is not to refute nativism; it is to devise a better version of the innateness hypothesis. (It's no accident that the title of Elman et al.'s pioneering work is Rethinking Innateness, not Rejecting Innateness.) That enterprise encompasses many different possibilities, and it is perhaps premature to take a hard position on anything at this time. The innateness hypothesis is the idea that this Universal Grammar is present in all healthy human minds as a result of biological inheritance (in other words, grammar is innate). Related Questions. Asked in School Subjects. What is the connection between the innateness hypothesis and the idea of a universal grammar? the connect between innateness hypothesis and universal grammar is to speak we need innate hypothesis and this hypothesis not enough to speak well so we need something else which called universal grammar. Asked in Authors, Poets, and Playwrights. What has the author Ray Jackendof