An Invitation to Cognitive Science
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Language

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Volume 1

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Chapter 1

The Invention of Language by Children: Environmental and Biological Influences on the Acquisition of Language

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Human children grow up in cultural settings of enormous diversity. This differentiation sometimes leads us to overlook those aspects of development that are highly similar, even universal to our species. For example, under widely varying environmental circumstances, while learning different languages within different cultures and under different conditions of child rearing, with different motivations and talents, all normal children acquire their native tongue to a high level of proficiency within a narrow developmental time frame. Evidence from the study of the language learning process suggests that this constancy of outcome, despite variation in environment, has its explanation in biology. Language is universal in the species just because the capacity to learn it is innately given. In Descartes's (1662/1911) words: "It is a very remarkable fact that there are none ... without even excepting idiots, that they cannot arrange different words together, forming of them a statement by which they make known their thoughts; while on the other hand, there is no other animal, however perfect and fortunately circumstanced it may be, which can do the same."

In other words, some part of the capacity to learn languages must be "innate." At the same time, it is equally clear that language is "learned." There are about five thousand different languages now in use on the earth, and the speakers of one cannot understand the speakers of the next. Moreover, specific exposure conditions strikingly influence how each of these is acquired: there is a massive correlation between being born in England and coming to speak English and being born in France and speaking French. This immediately shows that the language function is heavily affected by specific environmental stimulation.

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How can both of these claims (language is innate, and it is learned from the environment) be true? Like many developmental processes that have been studied in animals, *language acquisition in humans seems to involve a type of learning that is heavily constrained, or predisposed to follow certain limited courses, by our biology*. Clearly, no specific language is innate; the particular languages we come to speak must be learned. Yet, the commonalities among human languages are, upon careful study, far more striking than the differences among them. Every human language is organized in terms of a hierarchy of structures, composed of speech sounds that lawfully combine into morphemes and words, which in turn combine into phrases and sentences. Every human language has the wherewithal to express approximately the same meanings (that is, they are intertranslatable). Apparently, human children are in some sense prepared by nature to learn only languages that have just these formal and substantive properties, and to learn such languages relatively effortlessly during the natural course of maturation.

This chapter reviews two kinds of evidence for the claim that there is an important biological endowment in humans that supports and shapes language acquisition: (1) language learning proceeds uniformly within and across linguistic communities despite extensive variability of the input provided to individuals; (2) the child acquires many linguistic generalizations that experience could not have made available.

1.1 Uniformity of Learning

1.1.1 Milestones of Normal Development

Language learning follows the same course in all of the many languages that have been investigated. Isolated words appear at about one year of age. These are mainly nouns that describe simple objects and a few social words such as "bye-bye". Sometime during the second year of life, there is a sudden spurt of vocabulary growth accompanied by the appearance of rudimentary sentences. At first these are limited to two or three words; for example, "Throw ball," "Kiss teddy," and the like. These early sentences display considerable structure despite their brevity. Roughly speaking, there is a place for the noun and a place for the verb; moreover, the subject and object noun are positioned differently within the sentence. Thus, though the young learner never says long sentences like "Mommy should promptly throw that ball," the distinction between subject and object will show up in such foreshortened attempts as "Mommy throw" (the subject precedes the verb) versus "Throw ball" (the direct object follows the verb). As soon as children begin to combine words at all, they reserve structurally determined positions for subjects and direct objects.

This ability to hone in on such a crucial and fundamentally linguistic distinction forms a kind of skeletal base of language learning; this shows up early and in much the same way in two-year-olds all over the world.

Language use by the child in normal learning settings undergoes considerable elaboration between the ages of 2 and 5. Complex (multiclausal) sentences appear, and the function morphemes (prepositions, articles, bound morphemes like *-ed*, and so forth) make their appearance. By age 5 or before, youngsters sound essentially adult.

Lenneberg (1967) argued that these uniformities in the course of learning for children exposed to different languages are indicators that language learning has a significant biological basis. Like the regularities of physical and motor development (the appearance of teeth, or of walking), they suggest that language learning is controlled, at least in part, by some underlying maturational timetable. He provided some normative evidence that the achievement of basic milestones in language learning can be predicted from the child's age and seem, in fact, to be intercalated tightly with the aspects of physical development that are known to be maturationally dependent. For instance, youngsters utter first words just when they stand, two-word sentences just when they walk, and elaborate sentence structures just when they jump.

These findings alone, however, cannot prove the position that Lenneberg proposed, for they are consistent as well with other quite different conjectures about the processes that underlie language learning. Possibly, children move from talking childishly to speaking with great sophistication because of the maturation of their brains; but, on the other hand, they may go through these regular stages because such stages are the only logical way to learn, through time and exposure, all the detailed facts about the language that they are hearing from adults around them. (After all, foreign adults first arriving in a new linguistic community will also say things like "Throw ball" and later speak in longer and more complex sentences; but this is surely not because they are biologically changing from a primitive to a more advanced maturational state.)

A stronger way to test this view is somehow to disentangle the environmental exposure from the maturation of the learner. We will therefore next consider these two aspects separately, looking first at how language learning proceeds when the learning environment is changed, and second at how language learning proceeds when the maturational status of the learners themselves is changed. As we will show, while languages are in some sense certainly learned from the environment, alterations in the environment over a very large range do not change the fundamental character of acquisition. In contrast, changing the learner's maturational status has substantial effects on the nature and success of acquisition.