

Major Theories of Language Acquisition

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Almost every human child succeeds in learning language {Lenneberg, 1967 #2504}. As a result, people often tend to take the process of language learning for granted. To many, language seems like a basic instinct, as simple as breathing or blinking. But language is not simple at all; in fact it is the most complex skill that a human being will ever master. The fact that all people succeed in learning this complex skill demonstrates how well language has adapted to human nature. In a very real sense, language is complete expression of what it means to be human.

Linguists in the Chomskyan tradition {Pinker, 1994 #6622} tend to think of language as having a universal core from which individual languages select out a particular configuration of features, parameters, and settings {Chomsky, 1982 #5729}. As a result, they see language as an instinct driven by specifically human evolutionary adaptations. In their view, language resides in a unique mental organ that has been given as a Special Gift to the human species. This mental organ contains rules, constraints, and other structures that can be specified by linguistic analysis.

Psychologists {Fletcher, 1995 #6792} and those linguists who reject the Chomskyan approach often view language learning from a very different perspective. To the psychologist, language acquisition is a window on the operation of the human mind. The patterns of language emerge not from a unique instinct, but from the operation of general processes of evolution and cognition. For researchers who accept this emergentist approach, the goal of language acquisition studies is to understand how regularities in linguistic form emerge from the operation of low-level physical, neural, and social processes. Before considering the current state of the dialog between the view of language as a hard-wired instinct and the view of language as an emergent process, let us review a few basic facts about the shape of language acquisition and some of the methods used to study it.

The Basic Components of Human Language

Human language involves both receptive and productive use. Receptive language use occurs during the comprehension or understanding of words and sentences. Productive language use involves idea generation and the articulation of words in speech. Both reception and production utilize the four basic structural components of language: phonology, semantics, grammar, and pragmatics.

1. Phonology is the system of the sound segments that we use to build up words. Each language has a different set of these segments or phonemes and children quickly come to recognize and then produce the speech segments that are characteristic of their native language.
2. Semantics is the system of meanings that are expressed by words and phrases. In order to serve as a means of communication between people, words must have a shared or conventional meaning. Picking out the correct meaning for each new word is a major learning task for the child.
3. Grammar is the system of rules by which words and phrases are arranged to make meaningful statements. Children need to learn how to use the ordering of words to mark grammatical functions such as subject or direct object.
4. Pragmatics is the system of patterns that determine how we can use language in particular social settings for particular conversational purposes. Children learn that conversations customarily begin with a greeting, require turn taking, and concern a shared topic. They come to adjust the content of their communications to match their listener's interests, knowledge, and language ability.

These four basic systems can be extended and elaborated when we use language for special purposes, such as for poetry, song, legal documents, or scientific discourse. The literate control of language constructs additional complex social, cognitive, and linguistic structures that are built on top of the four basic structural components.

Methods for Study Language Acquisition

The methods used to study language development are mostly quite straightforward. The primary method involves simply recording and transcribing what children say {MacWhinney, 2000 #9098}. This method can be applied even from birth. However, tape recordings become particularly interesting when the child begins systematic babbling and the first productions of words. Using videotape, we can link up the child's use of verbal means with their use of gesture and nonlinguistic cries to draw attention to their desires and interests.

Methods for studying comprehension are a bit more complicated. During the first year, we can habituate the infant to some pattern of sounds and then suddenly change that pattern to see if the infant notices the difference. From about 9 months onward, we can show pictures and toys to children along with their names and measure whether they prefer these pictures to some unnamed distracter pictures. Later on, we can ask children to answer questions, repeat sentences, or make grammaticality judgments. We can also study children by asking their parents to report about them. Parents can record the times when their children first use a given sound or word and some basic types of child errors. Each of these methods has different goals, and each also has unique possibilities and pitfalls associated with it. Having obtained a set of data from children or their parents, we next need to group these data into measures of particular types of language skills, such as vocabulary, sentences, concepts, or conversational abilities.

Phases in Language Development

William James {, 1890 #9055} described the world of the newborn as a "blooming, buzzing confusion." However, we now know that, on the auditory level at least, the newborn's world is remarkably well structured. The cochlea and auditory nerve provide extensive pre-processing of signals for pitch and intensity. In the 1970s and 1980s, researchers {Aslin, 1981 #135} discovered that human infants were specifically adapted at birth to perceive contrasts such as that

between /p/ and /b/, as in *pit* and *bit*. Subsequent research showed that even chinchillas are capable of making this distinction. This suggests that much of the basic structure of the infant's auditory world can be attributed to fundamental processes in the mammalian ear. Moreover, there is evidence that some of these early perceptual abilities are lost as the infant begins to acquire the distinctions actually used by the native language {Werker, 1995 #8620}. Beyond this basic level of auditory processing, it appears that infants have a remarkable capacity to record and store sequences of auditory events {Saffran, 1996 #7493}. It is as if the infant has a taperecorder in the auditory cortex that records input sounds, replays them, and accustoms the ear to their patterns.

Children tend to produce their first words sometime between 9 and 12 months. One-year-olds have about 5 words in their vocabulary on average, although individual children may have none or as many as 30; by 2 years, average vocabulary size is more than 150 words, with a range among individual children from as few as 10 to as many as 450 words. Children possess a vocabulary of about 14,000 words by 6 years of age {Templin, 1957 #5276}; adults have an estimated average of 40,000 words in their working vocabulary at age 40 {McCarthy, 1954 #2838}. In order to achieve such a vocabulary, a child must learn to say at least new words each day from birth.

One of the best predictors of a child's vocabulary development is the amount and diversity of input the child receives {Huttenlocher, 1991 #5032}. We know that verbal input can be as great as three times more available in educated families {Hart, 1995 #9090} than in less educated families. These facts have led educators to suspect that basic and pervasive differences in the level of social support for language learning lie at the root of many learning problems in the later school years. Social interaction (quality of attachment, parent responsiveness, involvement, sensitivity, control style) and general intellectual climate (providing enriching toys, reading books, encouraging attention to surroundings) predict developing language competence in children as well {van Ijzendoorn, 1995 #9264}. Relatively uneducated and economically

disadvantaged mothers talk less frequently to their children compared with more educated and affluent mothers, and correspondingly, children of less educated and less affluent mothers produce less speech. SES relates to both child vocabulary and to maternal vocabulary {Fenson, 1994 #7037}. Middle-class mothers expose their children to a richer vocabulary, with longer sentences, and a greater number of word roots.

Whereas vocabulary development is marked by spectacular individual variation, the development of grammatical and syntactic skills is highly stable across children. Children's early one-word utterances do not yet trigger the need for syntactic patterns, because they are still only one word long. By the middle of the second year, when children's vocabularies grow to between 50 and 100 words, they begin to combine words in what has been termed "telegraphic speech". Utterances typical of this period include forms such as "where Mommy", "my shoe", "dolly chair", and "allgone banana."

At this same time, children are busy learning to adjust their language to suit their audience and the situation. Learning the pragmatic social skills related to language is an ongoing process. Parents go to great efforts to teach their children to say "please" and "thank you" when needed, to be deferential in speaking to adults, to remember to issue an appropriate greeting when they meet someone, and not to interrupt when others are speaking. Children fine tune their language skills to maintain conversations, tell stories, argue for favors, tattle on their classmates or ask for favors. Early on, they also begin to acquire the metalinguistic skills involved in thinking and making judgments about language.

As children move on to higher stages of language development and the acquisition of literacy, they depend increasingly on broader social institutions. They depend on Sunday School teachers for knowledge about Biblical language, prophets, and the geography of the Holy Land. They attend to science teachers to gain vocabulary and understandings about friction, molecular structures, the circulatory system, and DNA {Keil, 1989 #6842}. They will rely on peers to understand the language of the streets, verbal dueling, and the use of language for courtship.

They will rely on the media for role models, fantasies, and stereotypes. When they enter the workplace, they will rely on their co-workers to develop a literate understanding of work procedures, union rules, and methods for furthering their status. By reading to their children, telling stories, and engaging in supportive dialogs, parents set the stage for their child's entry into the world of literature and schooling. Here, again, the parent and teacher must teach by displaying examples of the execution and generation of a wide variety of detailed literate practices, ranging from learning to write through outlines to taking notes in lectures.

Special Gift or Emergence?

Having briefly covered the methods used to study language acquisition and the basic phases in development, we are ready to return to the question with which we began. Is language development best characterized as the utilization of a Special Gift or as an emergent result of various cognitive, neural, physiological, and social pressures? There are good arguments in favor of each position.

The Special Gift position views language as an instinct. We all recognize that often we are overpowered by the "urge to speak." Young children must feel this urge when they interact with others and have not yet learned how to use words correctly. However, it is important to recognize that crickets, birds, snakes, and many other species can be possessed by a similar urge to produce audible chirps, songs, and rattling. In themselves, these urges do not amount to a Special Gift for language learning. Better evidence for the Special Gift comes from the study of children who have been cut off from communication by cruel parents, ancient Pharoahs, or accidents of nature. The Special Gift position holds that, if the special gift for language is not exercised by some early age, perhaps 6 or 7, it will be lost forever. However, none of the isolation experiments that have been conducted can be viewed as good evidence for this claim. In many cases, the children are isolated because they are brain-injured. In other cases, the isolation itself produces brain injury. In a few cases, children as old as 6-8 years of age have successfully

acquired language even after isolation. Thus, the most we can say from these experiments is that it is unlikely that the Special Gift expires before age 8.

The second form of evidence in favor of the notion of a Special Gift comes from the fact that children are able to learn some grammatical structures without apparent guidance from the input. The argumentation involved here is sometimes rather subtle. For example, Chomsky {Piatelli-Palmarini, 1980 #3303} notes that children would never produce “Is the boy who next in line is tall?” as a question deriving from the sentence “The boy who is next in line is tall.” Instead, they will inevitably produce the question as, “Is the boy who is next in line tall?” The fact that children always know which of the forms of the verb “is” to move to the front of the sentence, even without ever having heard such a sentence from their parents, indicates to Chomsky that language must be a Special Gift.

Although the details of Chomsky’s argument are controversial, his basic insight here seems solid. There are some aspects of language that seem so fundamental that we hardly need to learn them. However, the specific structures examined by linguistic theory involve only a small set of core grammatical features. When we look more generally at the full shape of the systems of lexicon, phonology, pragmatics, and discourse, we see much greater individual variation in terms of overall language proficiency.

To explain these differences, we need to view language learning as emerging from multiple sources of support. One source of support is the universal concept we all have about what language can be. A second source of support is input from parents and peers. This input is most effective when it directly elaborates or expands on things the child has already said. For example, if the child says “Mommy go store,” the parent can expand the child’s production by saying “Yes, Mommy is going to the store.” From expansions of this type, children can learn a wide variety of grammatical and lexical patterns. A third source of support is the brain itself. Through elaborate connections between auditory, vocal, relational, and memory areas, we are able to store linguistic patterns and experiences for later processing. A fourth source of support

is the generalization that we each produce when we systematize and extend language patterns. Recognizing that English verbs tend to produce their past tense by adding the suffix –ed, children can produce overgeneralizations such as “goed” or “runned.” Although these overgeneralizations are errors, they represent the productive use of linguistic creativity.

Individual children will vary markedly in the extent to which they can rely on these additional sources of support. Children of immigrant families will be forced to acquire the language of the new country not from their parents, but from others. Children with hearing impairments or the temporary impairments brought on by otitis media will have relatively less support for language learning from clear auditory input. Blind children will have good auditory support, but relatively less support from visual cues. Children with differing patterns of brain lesions may have preserved auditory abilities, but impaired ability to control speech. Alternatively, other children will have only a few minor impairments to their short-term memory that affect the learning of new words.

Because language is based on such a wide variety of alternative cognitive skills, children can often compensate for deficits in one area by emphasizing their skills in another area. The case of Helen Keller is perhaps the best such example of compensation. Although Helen had lost both her hearing and her vision, she was able to learn words by observing how her guardian traced out patterns of letters in her hand. In this way, even when some of the normal supports are removed, children can still learn language. The basic uses of language are heavily overdetermined by this rich system of multiple supports. As the children moves away from the basic uses of language into the more refined areas of literacy and specific genres, progress can slow. In these later periods, language is still supported by multiple sources, however each of the supports grows weaker and progress toward the full competency required in the modern workplace is less inevitable.

REFERENCES

- Aslin, R. N., Pisoni, D. B., Hennessey, B. L., & Perey, A. J. (1981). Discrimination of voice onset time by human infants: New findings and implications for the effects of early experience. *Child Development*, 52, 1135-1145.
- Chomsky, N. (1982). *Some concepts and consequences of the theory of government and binding*. Cambridge, MA: MIT Press.
- Fenson, L., Dale, P. S., Reznick, J. S., Bates, E., Thal, D. J., & Hartung, J. (1994). Variability in early communication development. *Monographs of the Society for Research in Child Development*, 59, serial no. 242.
- Fletcher, P., & MacWhinney, B. (Eds.). (1995). *The handbook of child language*. Oxford: Blackwell.
- Hart, B., & Risley, T. R. (1995). *Meaningful differences in the everyday experience of young American children*. Baltimore: Paul H. Brookes.
- Huttenlocher, J., Haight, W., Bryk, A., Seltzer, M., & Lyons, T. (1991). Early vocabulary growth: Relation to language input and gender. *Developmental Psychology*, 27(2), 236-248.
- James, W. (1890). *The principles of psychology*. New York: Holt, Rinehart, and Winston.
- Keil, F. C. (1989). *Concepts, kinds, and cognitive development*. Cambridge, MA: MIT Press.
- Lenneberg, E. H. (1967). *Biological foundations of language*. New York: Wiley.
- MacWhinney, B. (2000). *The CHILDES Project: Tools for Analyzing Talk*. Mahwah, NJ: Lawrence Erlbaum Associates.
- McCarthy, D. (1954). Manual of child psychology. In L. Carmichael (Ed.), *Language development in children*. New York: Wiley.
- Piatelli-Palmarini, M. (1980). *Language and learning: the debate between Jean Piaget and Noam Chomsky*. Cambridge MA: Harvard University Press.
- Pinker, S. (1994). *The language instinct*. New York: William Morrow.
- Saffran, J., Aslin, R., & Newport, E. (1996). Statistical learning by 8-month-old infants. *Science*, 274, 1926-1928.
- Templin, M. (1957). *Certain language skills in children*. Minneapolis, MN: University of Minnesota Press.
- van Ijzendoorn, M. H., Dijkstra, J., & Bus, A. G. (1995). Attachment, intelligence, and language: A meta-analysis. *Social Development*, 4, 115-128.
- Werker, J. F. (1995). Exploring developmental changes in cross-language speech perception. In L. Gleitman & M. Liberman (Eds.), *An Invitation to Cognitive Science. Language Volume 1* (pp. 87-106). Cambridge, MA: MIT Press.