INTRODUCTION

For centuries parents, scholars, and teachers have been fascinated and amazed by the phenomenon of language acquisition in children. How are we to account for the fact that virtually every child, without special training, exposed to surface structures of language in many interaction contexts, builds for himself—in a short period of time and at an early stage in his cognitive development—a deep-level, abstract, and highly complex system of linguistic structure and use. And that is only the beginning. In addition to acquiring the structure of the language of his community, the child acquires the complex underlying rule system governing its use: how and when to say what to whom. Let's think a minute about our italicized sentence above.

_Virtually every child . . ._

Except for those physical and cognitive skills which are clearly biological in their base, it is very difficult to think of abilities that all humans develop. It is "given" in our biological inheritance as members of the species "human" that (almost) all of us eventually develop the ability to walk on two legs, to grasp objects with thumb and fingers juxtaposed, to make associations between events. But only some of us will learn to play an instrument, to multiply, to turn cartwheels, to whistle, to sail. You probably know some young people or adults who cannot drive, swim, or play chess, but how many do you know who cannot understand and use language? Even when we look at the disabled members of the population (those with intellectual, physical, or emotional handicaps), we still find that most of them understand and use some form of language for communication. It appears that acquiring a language is a basic part of our human-ness: More and less intelligent children acquire language, more and less economically fortunate children acquire language, more and less physically able children acquire language, more and less emotionally healthy children acquire
language. Whether a child grows up in a "traditional" society or in a "technological" one; whether in a large extended family or in a small nuclear one; whether on a Pacific island, in an urban ghetto, or in a tribal farm compound; whether in a villa, a straw hut, an apartment, or a tent; whether with or without formal schooling; whether in a wet, dry, hot, or cold climate—the child will acquire the language of his community. Humans vary in which languages and dialects they acquire, in how rapidly they acquire them, in how many languages and dialects they acquire, in how talkative they are, in what they use language for, and in how effectively they express themselves in speech and/or writing. But virtually all of them acquire at least one linguistic system for relating meanings and overt expressive symbols (usually verbal sounds).

Further, there is striking similarity in how all learn children learn their language. Naturally the specifics of the learning differ depending on characteristics of the language being learned, as well as on some other environmental factors. But it is possible to sketch a predictable general sequence of stages that children follow in acquiring language, as well as to describe certain cognitive processes that children seem to use as they figure out how the verbal sounds they hear relate to the meanings they understand. Researchers speak with greater confidence about the "how" of sequence than about the "how" of process in language acquisition, and it is easy enough to see why. Describing a developmental sequence involves observing children's language behaviors and making generalizations about those observed behaviors. But positing mental processes the child is using involves inferring from the observed behavior, that is, conjecturing about what might be going on in the child's thinking that would account for the observed behavior. This is necessarily a more tenative endeavor. But even though our statements about process are very cautious and couched in phrases like "the child appears to be operating according to a principle like X" or "the child behaves as if he is using a rule such as A," still the similarities across children are impressive.

The idea of being able to sketch a general developmental sequence of stages for some area of children's growth is probably not new to you. Piaget has been a leader in suggesting a sequence of stages children move through in their cognitive growth. We are all aware of a sequence of stages in children's physical development as well—we recognize that children hold their heads up before they sit up unaided, and that they stand alone before they walk alone. The suggested physical and cognitive development sequences are the result of careful observations of many children in a variety of both structured and naturalistic settings. And so it is in language acquisition. Though formal study of children's language as a separate discipline is more recent than formal study of children's physical and cognitive development, still the basis of the suggested developmental sequence is the same: It is a set of generalizations based on observations of what many children of various ages and backgrounds do and say as they learn language.

On reflection, the possibility of sketching a general sequence of stages of language acquisition for "all" children should be no more surprising than the possibility of sketching general developmental sequences for phys-
ical or cognitive growth for "all" children. Language acquisition involves a language and a learner. Human languages, however diverse they are in their surface details, are all remarkably similar in their basic elements and organizational schemes. For example, similar syntactic devices (affixes, word order) signal relationships in many languages; the same sentence types—statements, questions, negatives, commands—occur in many languages; similar sound features and combinations occur in the verbal expression systems of many languages, and so on.

As there are deep-level similarities across diverse human languages, so there are deep-level similarities across the diverse humans who acquire them. Similar physical and cognitive structures are part of the makeup of all of us, whatever kind of environment we happen to be born into and raised in. Clearly, language acquisition is deeply rooted in the physical and cognitive structures and possibilities all humans share. Thus it should not be too surprising that we note a similar general developmental sequence and similar general learning processes at work across virtually all children acquiring language.

\[... \text{without special training} \ldots\]

In many areas of children's learning, a goal is set and activities are provided to assure its attainment. We typically (1) divide the learning into "chunks" (such as subskills and basic concepts); (2) sequence the subskills or concepts in a simple-to-complex set of steps; (3) present them to the children and provide practice activities so that they will attain mastery of the concepts, skills, or processes; (4) test periodically to check for mastery and to guide subsequent learning activity. If we wanted a child to be able to add and subtract numbers up to six and to understand addition and subtraction as inverse processes, some of the sublearnings included might be the notion of each number up to six, the notion of set, the notion of set combination, the notion of subsets. We would sequence the sublearnings in some reasonable order and would give the child many opportunities to work with objects in different amounts and to combine, uncombine, and recombine them. We would give him tasks to perform that would inform us of his progress toward mastery of the learnings, and we would use this feedback to guide our subsequent instruction.\(^1\)

It is possible, though strange, to conceive of ways we could provide this kind of direct instruction for young children learning language. It would be possible to divide the language to be learned into basic parts—"parts of speech," types of sentences, types of sounds, labels from categories of things in the child's environment. We could sequence these in some logical simple-to-complex series and provide opportunities for the children to practice each. We could periodically test for mastery as we went along. It would be possible in theory (but probably not in practice) to do this. But we do not do this, and it would probably be disastrous if we did! John Holt

\(^1\)This is not to deny, of course, that much of the learning that occurs in our culture and in other cultures does not follow this pattern. People often learn by observation, modeling, trial and error, and so on.
speculates about the absurdity and the disastrous outcome of such a procedure.

Bill Hull once said to me, "If we taught children to speak, they'd never learn." I thought at first he was joking. By now I realize that it was a very important truth. Suppose we decided that we had to "teach" children to speak. How would we go about it? First, some committee of experts would analyze speech and break it down into a number of separate "speech skills." We would probably say that, since speech is made up of sounds, a child must be taught to make all the sounds of his language before he can be taught to speak the language itself. Doubtless we would list these sounds, easiest and commonest ones first, harder and rarer ones next. Then we would begin to teach infants these sounds, working our way down the list. Perhaps, in order not to "confuse" the child... we would not let the child hear much ordinary speech, but would only expose him to the sounds we were trying to teach.

Along with our sound list, we would have a syllable list and a word list. When the child had learned to make all the sounds on the sound list, we would begin to teach him to combine the sounds into syllables. When he could say all the syllables on the syllable list, we would begin to teach him the words on our word list. At the same time, we would teach him the rules of grammar, by means of which he could combine these newly-learned words into sentences. Everything would be planned with nothing left to chance; there would be plenty of drill, review, and tests, to make sure that he had not forgotten anything.

Suppose we tried to do this; what would happen? What would happen, quite simply, is that most children, before they got very far, would become baffled, discouraged, humiliated, and fearful, and would quit trying to do what we asked them. (Holt 1967, p. 56)

We know that the most important people in the young child's language environment, his family members and caregivers, do not provide him with a rigorous language-learning "curriculum." Rather, they engage with him and with each other (in his presence) in real communication in a wide range of contexts and situations. These interactions typically involve linguistic structure far more complex than the child controls. Much of the language of his environment is not directed to him. But for many children, much of it is—people explain to him, scold him, describe things to him, tell him anecdotes, wonder and speculate aloud with and for him, play with him, warn him, coax him, threaten him, answer him. Always there is language, verbal (or written) expression living in contexts which provide clues to the cognitive and social meanings the expression conveys.

... exposed to surface structures of language in many interaction contexts, builds a deep-level system of linguistic structure and use.

An infant is exposed to a wide range of sounds—birds singing, objects falling, airplanes roaring, water running, people sneezing, people whistling, people talking. One wonders how the infant sorts out the sounds that convey language meanings from the sounds that do not. But consider the diversity within just the verbal strings. The child is exposed to a language "sample" including language addressed to him and language addressed to
others, sentences which constitute well-formed (grammatical) strings and sentences which do not, sentences which involve linguistic structure he has mastered and sentences which are beyond his developing system, and strings spoken by a wide range of individuals in a wide range of contexts. But one thing is common to them all: Each verbal string is an expression of some meaning. How does the child, every child, sort out which strings are well formed (grammatical) and which are not? How does he figure out how the noise strings are broken into meaning hunks? How does he figure out the principles according to which the strings of elements are organized? Above all, how does he figure out how those verbal strings relate to particular meanings?

The child’s language environment includes a set of specific sentences, but it is not this set of specific sentences that he acquires. Rather, he deduces from these particular sentences an underlying set of organizational principles and sound-meaning relationships. He seems to understand that specific sentences are particular examples of basic principles, and it is those principles he works on. Children, even as young as two, do not talk to us by simply using the specific sentences that they have heard, but rather by constructing sentences according to their own early version of organizational principles underlying the specific sentences they have heard. The child’s early linguistic system is different from the adult’s and thus results in sentences like Why you play with that? I not like it, and He gived it to me.

The child will continue to revise his system as he interacts with other language users in many different social situations. Over time his sentences will become more adultlike. But what is noteworthy about these early sentences is that they are not simple repetitions of the specific sentences he has heard, but are rule-governed constructions of his own created according to the underlying principles he has deduced. Every child is exposed to surface structures in interaction—particular expression sequences used in particular communication events. From this experience, he builds a system relating that expression to meaning, though he is never directly exposed to that abstract system of expression-meaning relations. This deep and abstract system is one which he... builds for himself...

Many adults believe that children learn language because adults teach it to them. I vividly recall an informal conversation I had several years ago with an acquaintance who is a sociology professor and the father of three children. It went something like this:

ME: It’s interesting, isn’t it, that we don’t really “teach” a child his language. He learns it for himself.

DR. X: (annoyed) What do you mean he learns it for himself? I taught my children their language, and that’s how they learned it.

ME: Oh? And how did you do that?

said, "Table. Say it. Table. Table." And he said it. That's how my kids learned English.

ME: Oh.

This parent far underestimates the complex system that a language is. Like many adults, he is mistaking a limited set of verbal labels for language, the endless creation of sentences according to a finite set of structural principles. He also far underestimates his children's abilities for language learning. But though there is a sense in which he overestimates his contribution to his children's language acquisition, there is also an important sense in which he underestimates his contribution. He has doubtless been far more important to his children's learning of language than he has ever dreamed, though not at all in the way that he supposes. He has been an important source of rich and varied language examples for his children; he has interacted with them verbally and nonverbally in various contexts and situations; he has provided opportunities for them to explore and "mess about" with their world and thus build the meanings basic to language; he has responded to and encouraged their communicative attempts. He may, as he claims, have taught his children some labels. Most parents do. But how minor that contribution is in comparison to his role as a rich language provider and interactant in communication with his children.

The young child learning language is sometimes called "a little linguist." This metaphor is helpful because it focuses on the child as the active party in learning a language. The young child is seen as a field linguist trying to figure out a language which is new to him. He hears unfamiliar verbal strings in particular contexts. The child, like the linguist, attends to the unfamiliar verbal expressions and the contexts in which they occur, and builds "hypotheses" (hunches?) about the sound-meaning relationships present. He "tests" his hypotheses, or hunches, by further observation, or by producing new sentences, trying them out, and seeing "how they fly." He is constantly getting feedback relating to his hypotheses, and also further exposure and interaction, both of which lead him to revise his hypotheses. This "little linguist" analogy does not mean that the child is aware of what he is doing (as the linguist is); rather, it offers an interactive model of the child and his environment which eventually results in the development of a complex abstract system of linguistic structure which moves steadily toward a closer match with the adult's. It is the child himself who processes the sounds of speech in his community so as to derive underlying structure. We expose the child to language and interact with him through language, but he acquires linguistic structure through his own cognitive and social activity.

... in a short period of time...

We are not surprised to find that entering kindergarteners are able to ask a variety of questions, to tell about things they've done and seen and things they like and don't like, to request things they want, and to direct others to do things. In short, though there is a range in rates of develop-
ment across children and a range in styles and purposes for which they have used language in the preschool years, five-year-olds typically can use complex and varied language structures to serve a variety of purposes in their lives. Their language growth is still in process, but they generally have substantial control of language structure and use. Attaining this high level of control in such a short time is remarkable, given the complex system that a language is, and the fact that the child begins life as an infant immersed in a sea of undifferentiated sensations. Is there any other area of our lives where we accomplish something so complex so quickly? The kindergartner's language abilities don't surprise us; maybe they should.

... at an early stage in his cognitive development ...

A great deal of a child's acquisition of linguistic structure occurs during the first five years of life. This is the period when he is most active in discerning a set of underlying organizational principles of language from the expression that surrounds him. It is puzzling that one so young is able to engage successfully in activity that seems to demand so much abstracting from direct experience. All instances of language that the child encounters are contextualized; that is, they are particular spoken or written words in particular sequences and used for particular purposes in particular settings. The child must somehow extract from this wide array of particular examples the underlying principles—the unifying design—that accounts for all the instances. The principles are, of course, not directly observable; only the specific instances of language in use are observable. Thus the child must derive the unobservable from the observable. This is not to suggest that the child does this in any conscious, reflective way. However, it is to suggest that this seems a Herculean task for one so young, and a task that is cognitively complex, involving abstracting, relating, synthesizing, and integrating at an impressive cognitive level. This is a type of mental activity that children are not often given credit for in psychologists' descriptions of young children's thinking.

Let's end this introduction where we began it—with our initial italicized sentence. That sentence probably seemed innocuous enough at first, but you may now be aware that it raises fascinating and powerful questions about the incredible phenomenon of language acquisition:

Virtually every child, without special training, exposed to surface structures of language in many interaction contexts, builds for himself—in a short period of time and at an early stage in his cognitive development—a deep-level, abstract, and highly complex system of linguistic structure.

PERSPECTIVES ON LANGUAGE ACQUISITION

The Behaviorist View

Through the first half of this century, there was a prevalent view that language learning, like other kinds of learning, occurs as the result of the environment shaping an individual born with a given IQ (an innate general
learning potential). This "behaviorist" position held that an individual is reinforced (positively or negatively) for responses to various stimuli. By administering positive reinforcement (praising, smiling) when a desired behavior occurs and administering negative reinforcement (scolding, correcting) when an undesired behavior occurs, one presumably strengthens the desired behavior and makes it more likely that that behavior will recur. Let's take a classic hypothetical example involving infants and language. Suppose a baby is lying on his back, happily babbling in his crib. Mother appears and begins to play with him. In the course of his babblings, the baby hits on the syllables "ma-ma" (an occurrence which, given the fairly predictable sequence of phonological development in infants, is quite likely). He gets a very positive response from his mother, as any mother knows only too well. He is hugged, cuddled, and nuzzled, perhaps, all to the accompaniment of the mother's delighted squeals and chattering. Surely any baby worth his salt will in time come to produce the sounds ma-ma in the presence of his mother and cause a repeat of the pleasurable "aftermath." This view of language learning maintains that as a child grows older, reinforcement becomes progressively more contingent on how nearly the child's language matches the adult's. That is, whereas ma-ma is positively reinforced as an appropriate response in an infant, it is likely that a mother will positively reinforce only utterances that are considerably more complex and adultlike when the child is three or four. Thus, as positive reinforcement is employed only for progressively more adultlike utterances, the child moves steadily toward a more complex adult language system.

This description of the behaviorist view of language acquisition is somewhat simplistic and general. It does not do justice to the range of specific positions held within this school. Some behaviorists emphasize one aspect, some another, and certainly they elaborate the details of this general position differently, one from another. However, there is an area of common ground that justifies our speaking, at a general level, of "the behaviorist position." This common ground includes the belief that (1) children are born with a general learning potential which is part of their genetic inheritance (but without any specific learning abilities, such as a special innate capacity for acquiring language); (2) learning (including the learning of language) occurs entirely through the action of the environment shaping the individual's behavior; (3) behavior (including language) is shaped through the reinforcement of particular responses emitted in the presence of particular stimuli; (4) in the shaping of very complex behavior such as language, there is a progressive selection or narrowing of responses which are positively reinforced; although more simple and general responses receive positive reinforcement initially, such reinforcement is later given for responses which are more complex and which more nearly match the ultimate behavioral goal.²

At first glance this view is very persuasive. It squares with some of our own informal observations and intuitions about what children are and how

²For additional reading relating to this view see Skinner 1957, N. Chomsky 1959, and Staats 1971.
they grow. Those of us who work with children doubtless feel that children
do differ in their general learning abilities; that regardless of their environ­
ments, some are simply born with greater learning potential than others.
Further, this view tells us that the environment plays a crucial part in one's
learning, and that, too, is something we all feel is true. And no one would
deny that important people in the child's world—parents, teachers,
friends—do positively reinforce some behaviors (with smiles, hugs, praise,
increased allowance, special privileges) and negatively reinforce other
behaviors, and that they reward and punish different behaviors in seven­
year-olds and in two-year-olds. And finally, children do learn language,
and this view tells us that they will.

Is the Behaviorist View Adequate?

Over the past several decades, scholars have gained richer insights
into the complexity and creativity of human language, the language
acquirer, and the processes of language acquisition. These insights have
raised crucial questions that the behaviorist view has difficulty answering.

First, it is difficult for the behaviorist view to account for the unifor­
mity of language acquisition throughout the human species—virtually all
children acquire a language, and they do so in some strikingly similar ways.
(This is what people mean when they say that language acquisition is “spe­
cies uniform.”) If language acquisition were simply the result of an innate
general learning capacity plus a shaping environment, we would expect
differences in language acquisition to reflect the wide range of IQ dif­
fferences and environmental differences of young children. In fact, we
would expect some children not to acquire language at all. Yet we see that
even many mentally retarded children acquire language, though they do
not learn some other things. And though there are many specific dif­
ferences from child to child in the learning of language, those differences
are not nearly so vast as a behaviorist theory would predict. If language
acquisition were simply a matter of environment shaping the child's
language, the resulting shapes and sequence and processes leading to those
resulting shapes would be far more diverse than they in fact are.

Second, there is the other side of this “species uniform” coin, the
“species specific” argument. The behaviorist position would predict that
intelligent beings other than humans could acquire language too. If
language acquisition is a function of innate IQ plus environmental shaping,
we should be able to take intelligent chimps, put them in a language shap­
ing environment, and end up with chimps that communicate through
humanlike languages.

A number of researchers tried to do just this. The question was not,
“Do chimps have a system of communication they use for conveying mes­
sages to one another?” It was well known that members of other species do
communicate among themselves. The crucial question concerned the type
of communication involved. The accepted view was that the communica­
tion systems of other species involved a limited set of messages, each of
which was signaled always and only in the same way. This system would, of
course, be quite different from the human system with its unlimited set of messages, each of which can be expressed in many ways. This is the difference between a closed expression system and an infinite expression system. It had been asserted that an infinitely generative type of language system was the distinct province of humans. But if chimps could be taught a human type language, then it would seem that human language was not species specific and behaviorist notions of general-IQ-plus-shaping-environment could perhaps account for language acquisition after all.

Notice that the question was not, "Can chimps learn to talk?" It was recognized that the vocal apparatus of chimps is different from that of humans and is not adapted to produce the sounds of human speech. But many humans do not speak either, yet they develop a human language. Many individuals who are deaf and/or mute communicate by means of hand signs. So, why not try to teach chimps the sign language of the deaf as the expressive means? And this is what some researchers did. Others taught chimps to arrange small objects on a magnetic board, and still others taught chimps to type geometric designs. Whatever the expressive means, however, the question was the same: Can other species learn a language system in which the user creates (produces and understands) novel messages governed by a finite system of rules; or are other species limited to a specific set of messages, each one expressed by a particular signal?

At first the efforts with chimps seemed very promising. It was reported that some chimps responded appropriately to complex commands such as “Sarah” (chimp’s name) “insert apricot red dish, grape (and) banana green dish” (Fleming 1974, p. 35) and that they responded differently to “Roger tickle Lucy” (chimp’s name) and “Lucy tickle Roger” (p. 46), demonstrating a grasp of underlying organizational relations. Some chimps were reported to invent “words.” One, seeing a duck for the first time, signed “water bird” (p. 38); another, who had used the sign “food” for radish, finally tasted a radish and thereafter signed it either “cry hurt food” or “hurt food” or “cry food” (pp. 44, 46). Researchers reported that their chimps generalized labels learned in particular contexts to new contexts. For example, after learning “more” in the context of tickling, one chimp started using the “more” sign when she wanted more of a variety of actions and objects (p. 32). Some chimps were reported to string “words” (signs or manipulable tokens) together into combinations they had not been taught so as to express new meanings.

But serious objections began to be raised about this line of research, perhaps the most persuasive objections coming from a researcher who had himself engaged in this kind of work for five years (Terrace 1979). He had started working with his chimp (Nim Chimpsky), confident that chimps could be taught a human type language. He had “hoped to demonstrate that apes can, indeed, form sentences . . . and show that grammatical rules are needed to describe many of an ape’s utterances” (p. 65). In short, he was a believer. However, “after analyzing videotapes of Nim’s ‘conversations’ with his teachers, I discovered that the sequences were subtle imitations of the teacher’s sequences. I could find no evidence confirming an ape’s grammatical competence, either in my own data or those of others, that could not be explained by simpler processes” (p. 67).
Close examination of photos and videotapes of various apes with their trainers revealed that the trainers, quite inadvertently, were giving subtle, nonverbal cues to the chimps that influenced the animals' performance. This is the well-known "Clever Hans phenomenon," so named after a horse that supposedly could count to high numbers by tapping his foot but, in fact, was found to be cueing on signs from the trainer; for example, the tension in the trainer's body until Hans reached the correct number and then the trainer's visible relaxing, at which point Hans would stop his tapping. It was the trainer, not Hans, that was counting. This subtle cueing was discovered to explain Hans's "counting" only after a careful study which began when it was found that Hans "counted" correctly only when his trainer was visible. Examination of the ape photos and videotapes revealed many nonverbal cues (including specific gestures, small versions of the desired signs, body postures, and facial expressions). Also, the chimps have been found to perform differently with different trainers, and significantly worse with outsiders, further suggesting that the chimps' performance depends on signals from the trainer.

The trainers cue in another way, also, one which is built into the procedure itself. The trainer typically prompts the chimp to give a response and in the prompt uses both the required signs and the required sequence. Thus, the chimp can often respond correctly by imitating the trainer's prompt. It seems more reasonable to explain the chimp's correct responses in terms of imitation than in terms of an understanding of syntax. In Nim's case, 20,000 sign combinations that were not imitations were examined. Every one of them either made no sense or else could be "adequately explained by simpler, nonlinguistic processes..." (Sebeok and Umiker-Sebeok 1980, p. 21).

Critics of the chimp research have pointed out that much of the chimp behavior goes unreported. The research reports often describe selected anecdotes (typically from only "prize pupils"), rather than accounting for all the relevant behaviors of all the ape subjects. Critics assert that the choice anecdotes offer good examples of overinterpretation by the researchers, a problem critics feel is pervasive in this work. Take the "water bird" example. The trainer signs the question, "What's that?" in the direction of water with a duck swimming in it. The chimps signs "water" and then signs "bird." Terrace argues that there is no external evidence that the chimp was expressing an adjective-noun relationship ("water bird") rather than two unrelated signs: "Water." "Bird." Without some independent evidence—at least some pervasive pattern of such expressions in the entire body of data—it is not justifiable to make such an interpretation. It is the researcher who is making a syntactic relation here, not the chimp.

There is overinterpretation of another kind as well. Researchers/trainers tend to assume that the chimps' spontaneous signs (that is, signs not in response to the trainers' prompts) are intentional rather than random, and then they go on to provide (create?) meanings for the possibly random signs. But this might be more a test of the trainers' ingenuity than of the chimps' meaningful expression. What is the basis for the original assumption that the chimp intends to convey some specific meaning?
In some of the ape research the researchers have interpreted the ape’s unexpected responses as “jokes” or “lies” or “insults” or “teases” or “metaphors.” You can see the problem here: If every accurate response is considered correct and every inaccurate response is also considered correct (being explained as “lying” or “joking” or “teasing”), then the researcher has set up a situation in which there is no possibility of the ape being incorrect. This is hardly an objective scientific procedure.

Terrace points out some further striking differences in the process of language development in chimps and in children over time. Both chimp and child increase their vocabularies, but only the young child moves steadily from producing shorter sentences to producing longer ones that are elaborations of the earlier versions (for example, going from sentences like “Dat dolly” to sentences like “That’s my dolly.”). Over time the chimps accumulate labels to use to get rewards, but they do not seem to develop syntax. Also, whereas for a child the proportion of creative utterances increases and the proportion of imitated utterances decreases over time, for Nim the reverse was true: The proportion of imitated sentences increased while the proportion of nonimitated sentences decreased.

The debate is not over. But the species-specific argument holds strong. Human language does appear to be special (specific) to our species, especially in the domain of syntax. This means that IQ, some overall general intelligence potential, plus a shaping environment cannot adequately account for language acquisition as behaviorists would claim. There must be something more or other than this. If it were not so, chimps would be able to learn a human type language, and thus far it has not been demonstrated that they can.

Third, the behaviorists’ heavy reliance on stimulus-response-reinforcement learning poses serious problems. Children eventually come to use full adult forms of language, forms produced in accordance with an underlying system of structural principles like the system of the adult. Yet in the natural communicative interaction that forms the basis for the child’s language learning, very rarely is he verbally reinforced positively or negatively for the forms he uses. The early work of Brown and his colleagues demonstrates that parents verbally reinforce their children according to the truth value of what they say, rather than for the forms they use. One study took language samples of three children who were observed extensively in their homes, and

contrast(ed) the syntactic correctness of the population of utterances followed by a sign of approval—That’s right, Very good, or just Yes—with the population

See, especially, the work of Francine Patterson. One readable description of this work is F. G. Patterson, “Conversations with a Gorilla,” National Geographic, 154, no.4 (1978), 438–65.

I am focusing here only on the linguistic differences between Nim’s language and the child’s. However, Terrace identifies some additional conversational differences, for example, the fact that Nim failed to follow turn-taking patterns in conversation and the fact that Nim (and other chimps) use “language” for only one purpose: to get specific rewards. The young child, in striking contrast, early (even prelinguistically) develops a turn-taking pattern in interactions with others and even in a one-word stage uses language for a variety of purposes.
of utterances followed by a sign of disapproval—*That’s wrong* or *No*. The results are simply stated: there is not a shred of evidence that approval and disapproval are contingent on syntactic correctness. (Brown, Cazden, and Bellugi-Klima 1971, p. 409)

The parents of the three children did give verbal signs of approval and disapproval for what the children said, but the approval and disapproval were contingent on the truth value of the child’s utterance, not on the form. Two examples of utterances given verbal approval by the mother are “He a girl” (spoken in reference to the mother) and “Her curl my hair” (spoken while the mother was curling the child’s hair). Two examples of utterances given verbal disapproval are “There’s the animal farmhouse” (spoken of a lighthouse) and “Walt Disney comes on, on Tuesday” (the program came on on a different day). Brown, Cazden, and Bellugi-Klima conclude:

It seems, then, to be truth value rather than syntactic well-formedness that chiefly governs explicit verbal reinforcement by parents—which renders mildly paradoxical the fact that the usual product of such a training schedule is an adult whose speech is highly grammatical but not notably truthful. (1971, p. 410)

The behaviorist position claims that correct (adultlike) structures come to prevail as immature forms drop out due to the reinforcement they receive. But this claim does not square with systematic observations of parents actually reinforcing their children’s utterances. Children’s language forms become steadily more adultlike, despite the fact that children are not specifically reinforced for form.

Occasionally a child is corrected for using a form, however. The following two well-known examples demonstrate the difficulty a child has recognizing what, specifically, he is being corrected for.

*CHILD:* Nobody don’t like me.

*MOTHER:* No, say “nobody likes me.”

*CHILD:* Nobody don’t like me.

(eight repetitions of this dialogue)

*MOTHER:* No, now listen carefully, say “nobody likes me”.

*CHILD:* Oh! Nobody don’t likes me. (McNeill 1966, p. 69)

“Want other one spoon, Daddy”—“You mean, you want THE OTHER SPOON.”—“Yes, I want other one spoon, please, Daddy.”—“Can you say ‘the other spoon?’”—“Other . . . one . . . spoon.”—“Say . . . ‘other.’”—“Other.”—“Spoon.”—“Spoon.”—“Other . . . spoon.”—“Other . . . spoon. Now give me other one spoon?” (Braine 1971, pp. 160-61)

According to the behaviorist view, reinforcement is contingent on specific behavior. It is difficult to see how negative reinforcement could be playing an important role in the child’s learning of form, for when it is
given (and remember, it very rarely is), it is very general; it is given in response to a form that has many elements, any one or several of which could be wrong. How could the child make use of this global negative reinforcement to increase the likelihood of his using more mature forms? This kind of reinforcement lacks the specificity that most behaviorists would claim is important.

Also, as a child learns a language, we see many earlier adult forms drop out, only to be replaced by less adult forms, which are in turn eventually replaced by the original adult forms. For example, early in his development a child uses adult irregular verb and noun forms (came, went, ran, men, feet) but then replaces them with overregularizations (comed, goed, runed, mans, foots) and eventually goes back to the appropriate irregular forms (Ervin 1964). Surely the child was not negatively reinforced for his earlier adultlike irregular forms and positively reinforced for the nonadult regular forms. Yet his earlier adult forms are replaced by nonadult ones. A view of language learning that sees developmental changes in form as the result of reinforcement is hard put to explain this very predictable sequence in children learning English.

Fourth, as mentioned previously, the child is exposed to many particular sentences, yet what he learns is not those specific sentences, but the organizational principles underlying them. What young children say is in the main not sentences that are repetitions of those they have heard, but rather sentences they have created according to their own rule system. It is difficult to see in what sense the young child is being—or could be—reinforced here. He utters specific sentences that he has created. If positively reinforced, how could he know that that reinforcement is contingent, not upon the specific sentences themselves, but on the principles underlying them? If the child is unable, when corrected, to recognize what in his sentence the correction applies to, how can we expect him to take the enormous abstract leap of linking reinforcement to his building of a deep-level system of linguistic structure?

Fifth, how could the child learn a system so complex in such a relatively short period of time if he begins at level zero, with nothing given but a general learning capacity? There are other, far less complex learnings that he masters less well despite rigorous stimulus-response-reinforcement training schedules. It seems incredible that given only general intelligence as a starting point, language acquisition could occur in such a short time.

The final problem also concerns the behaviorist notion of general intelligence capacity as the only mental ability present at birth: It is the young age at which children engage in language acquisition. It seems quite remarkable that virtually all children, whatever the language they are learning and whatever the environment in which they are learning it, are so universally successful in deriving the unobservable from the observable, but this is what happens: Out of their direct experience of language in use, they figure out the underlying structure of the system itself. Many young children falter on figuring out far less complex and abstract matters than language, yet they are invariably successful in this complex business during the very years when they are cognitively the least mature. How can general intelligence and a shaping environment alone account for this?
In summary, many child language scholars have found the behaviorist account of language acquisition untenable, as it is unable to account for (1) the species uniformity of language acquisition, (2) the species specificity of language acquisition, (3) the independence of language development from reinforcement for form, (4) children's inferring of deep-structure from an exposure to surface structure, (5) the relatively short period of time, and (6) the early stage in children's lives, during which they acquire so much of a complex linguistic system.

**The Innatist View**

Partly in response to these apparent inadequacies in the behaviorist view, another view of language acquisition gained ground, called the "innatist" position because it gives increased importance to innate factors in language acquisition.

Pendulums swing in the field of language acquisition no less than in other disciplines. Thus, the earliest shapers of and spokesmen for the innatist view (particularly Noam Chomsky) articulated a strong version of this position, perhaps partly as a reaction to the strongly prevalent behaviorist view of the time. Chomsky maintained that every child is born with universals of linguistic structure "wired in." That is, the child does not have to learn those features common to the structure of all human languages, for he is born with the skeletal framework of linguistic structure innately specified; the semantic, syntactic, and phonological possibilities of human language are already present. According to this view, the child presumably does not have to learn, for example, that the verbal strings he hears relate to meanings; that those strings affirm, negate, question, command; and what the basic syntactic elements of language are. These features are common to all languages and thus relate in some way to shared physical and mental characteristics of all humans. Being a human, the child already has a start on "knowing" what kind of system a language is in its basic design. He has a start on cracking the particular linguistic code of his speech community because he already "knows" what kind of system the code must be. His job, then, is to figure out how the particular language system of his community actualizes linguistic universals. He does not have to learn that one can ask information questions in his language, but rather how one asks information questions in his language: Does one use question words? What are they? Does one rearrange sentence elements? How? He does not have to learn that one expresses meanings through verbal expression, but rather what the particular set of distinctive sounds are (of all the possible ones) that his linguistic community uses. Which basic sounds are used? How do they combine? How do they modify each other in combination? In short, he knows what kind of system human language can be, and his job is to discover which particular subset of the semantic, syntactic, and phonological possibilities his language community happens to use.

This strong version of the innatist position received support from biologically based research relating to language development. Lenneberger (1964) drew attention to some important ways in which language acquisition is more akin to genetically determined skills (such as walking on tw
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legs) than to culturally transmitted ones which are the result of training. Using language, like walking on two legs, is a behavior which shows (1) limited variation within the species (wide individual variation in the specifics of its execution but striking similarity in its basic design throughout the species); (2) no beginning point for the behavior within the evolutionary history of the species (we cannot find a point in the history of our species when humans began to walk on two legs or began to use language as we know it); (3) "evidence for inherited predisposition" (Lenneberg 1964, p. 584)—humans are "biologically constituted" for a certain type of locomotion and for symbolic communication through language; (4) apparent existence of organic correlates (language acquisition, like walking, follows a predictable course of maturational development, more than a course predicted primarily by type or amount of training).

Lenneberg pointed out some correlations between stages in language development and stages in physical maturation (for example, motor coordination, structural and biochemical changes in the brain). In studying language recovery in adults and children who had incurred brain injury, Lenneberg found the prognosis to be "directly related to the age at which insult to the brain is incurred" (Lenneberg 1967, p. 142). If the injury to the language area of the brain occurs in the early years, the brain is still "plastic" enough that another area can take over the function of language acquisition. However, this does not seem to be the case after puberty, the time of life at which the brain has stabilized. Lenneberg posited a "critical period" for language acquisition, ending at puberty, by which time the brain has matured (structurally, biochemically, neurophysiologically), and after which time "automatic acquisition from mere exposure to a given language seems to disappear . . . and foreign languages have to be taught and learned through a conscious and labored effort" (Lenneberg 1967, p. 176).

Thus, Lenneberg's work linking language acquisition to biological maturation supported the innatist claim that genetic inheritance for mental abilities was not simply a general ability to learn but, rather, that it included a specific predisposition for language acquisition.

Notice, however, that Lenneberg at no time claimed that language acquisition was an entirely inherited phenomenon.

The appearance of language may be thought to be due to an innately mapped-in program for behavior, the exact realization of the program being dependent upon the peculiarities of the (speech) environment. As long as the child is surrounded at all by a speaking environment, speech will develop in an automatic way, with a rigid developmental history, a highly specific mode for generalization behavior, and a relative dependence upon the maturational history of the child. (Lenneberg 1964, p. 600)

According to Lenneberg, exposure to language in the environment is a necessary and sufficient condition for language acquisition in children. But

5For more recent research relating to Lenneberg's ideas, see Krashen 1973, whose study suggests that brain lateralization occurs much earlier than Lenneberg proposed, possibly by around age five.
in drawing attention to the characteristics of language acquisition that are biologically based, rooted in our species membership. Lenneberg's work supported the view that children are born with an innate predisposition for language acquisition, a special capacity apart from general IQ.

Obviously, human language crucially involves the brain and the speech organs. Both of these show special evolutionary adaptations particularly well suited to human language, adaptations that do set us apart from other primates. When we speak, we use mouth, tongue, lips, breath passing from the diaphragm, and so on. Other animals have these same body parts, but they are not "designed" to produce the sounds of speech as ours are.

In the case of Homo sapiens, it can be shown that our oral and respiratory systems did not just evolve to serve functions of eating and noisemaking, but to serve the particular functions of producing articulate speech. Chimpanzees . . . cannot learn to speak because they are not built to do so. This suggests that, a very long time ago, there were selection pressures for hominids who could voluntarily produce strings of distinctly different sounds in rapid sequence.6 (Slobin 1979, pp. 114-15)

Not only have we as a species evolved physical structures adapted for producing this type of speech, we have also evolved brains that can process such speech and also can regulate the production of such speech. In humans, large areas of the brain are involved in controlling the speech organs, whereas in monkeys, larger areas of the brain are involved in controlling hands and feet (and tail) and relatively less brain area is devoted to control of the mouth. Further, the human brain, unlike the brains of other species, is asymmetrical. This asymmetry appears to be directly related to language. Though both hemispheres are concerned with language functions, they control different aspects of language, with the larger left hemisphere being more crucially involved, especially in analyzing and interpreting sequences of information units. Thus, our brains have larger areas devoted to language and more specialization within these areas than is the case with other species. Both anatomically and neurologically, then, our species is specifically adapted to produce and process temporal sequences of distinct speech sounds. Biological evidence strongly supports the notion of an innate capacity specifically for language in human beings. Slobin summarizes it this way:

Special features of our brain and our articulatory apparatus make it clear that the language capacity has a distinct biological foundation in our species. Species-specific behavior, accompanied by distinct neural and anatomical structures, is good evidence for the special evolution of those capacities, preserved in the genetic code which makes us mature into speaking creatures. The uniquely human biological foundations of language thus support the

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6For discussion of specific anatomical differences between humans and other primates, see Slobin 1979, Chapter 5.
theoretical and empirical arguments for inborn language capacities in human beings. . . . (Slobin 1979, p. 114)

Clearly, biological evidence attests to the presence of a special innate capacity for language in humans. However, it does not suggest what the specific nature of such a capacity might be. Chomsky, speaking from within a purely theoretical framework, argued that that special innate capacity was content, that is, a body of unconscious knowledge of language universals already "wired in." When a child was exposed to the language of his community, his "language acquisition device" would be "triggered" and would proceed along a largely predetermined course resulting in the child's becoming a speaker of the particular language of his community.

But the accumulating data from direct and intensive observations of children learning language over time in natural settings suggests an active, figuring-out child more than a triggered "language acquisition device." The special capacity of children for acquiring language may be special processing abilities for figuring out how language works. Slobin contrasted this "process approach" with the Chomskyean "content approach."

It seems to me that the child is born not with a set of linguistic categories but with some sort of process mechanism—a set of procedures and inference rules, if you will—that he uses to process linguistic data. These mechanisms are such that, applying them to the input data, the child ends up with something which is a member of the class of human languages. The linguistic universals, then, are the result of an innate cognitive competence rather than the content of such a competence. The universals may thus be a derivative consequence of, say, the application of certain inference rules rather than constitute the actual initial information in terms of which the child processes linguistic input. (Slobin 1966, pp. 87–88)

Some developmental psychologists, considering children's language development from the larger perspective of overall cognitive development, have contributed a somewhat different idea about children's language learning. They located children's ability to figure out language within a larger, more general ability to "'make sense' of things, and above all make sense of what people do, which of course includes what people say" (Donaldson 1978, p. 33). These psychologists suggest that children have a general capacity for inference. This is the crucial capacity, rather than a specific capacity for language per se. "... the child's ability to interpret situations ... makes it possible for him, through active processes of

Further interesting research support for a strong innate base for language acquisition comes from the study of language development and, especially, language invention, by deaf children. Young deaf children have been observed to use novel signs for new toys and other objects, and also to use specific multisign phrases before their mothers used these sign combinations in communicating with the children. It seems that handicapped humans invent human language naturally, while specially trained chimps do not. For a readable introduction to this work on deaf children, see S. Goldin-Meadow and H. Feldman, "The Development of Language-Like Communication without a Language Model," *Science*, 197 (1977), 401–3.
hypothesis-testing and inference, to arrive at a knowledge of language" (Donaldson 1978, p. 33).

And so the debate goes on. Notice, though, that the debate does not center on whether or not there is an innate capacity in humans that enables almost all members of the species to be successful in this incredible feat of learning a language. Rather, the discussion centers on the nature of this innate ability. Is it some sort of advance knowledge that is activated by language exposure? Is it processing abilities? If it is processing ability rather than content, is it an ability specific to language or is it a more general sense-making ability? Or are both a more general and a more specific ability involved in language learning?

Does the child have strategies which were specifically evolved for the task of language acquisition, or can one account for this process on the basis of more general human cognitive capacities (which also have their own innate bases)? . . . I suspect that both general cognitive principles and principles specific to language are at play in the child's construction of his native language. (Slobin 1979, p. 100)

We can only speculate about how human language originated, but surely human language was the creation of human intelligence. The only kind of language system that humans could create is one that human intelligence can process and learn. In an important sense, human language is created anew by every human child. As members of the human species, we clearly have an “in."

The Interactionist View

Behaviorist and innatist views of language acquisition focus on cognitive aspects of the learner and his language-learning activity. The role of environment is variously seen as shaping language learning through the reinforcement of selected responses, as “triggering” the child's language acquisition device, or as providing “data” from which the child can discern underlying rules. But ongoing systematic observations of children learning language in natural settings, have forced us to locate language acquisition more squarely within a social framework. The child is indeed a cognitive being, making sense out of his world, including the world of language. But the child is just as deeply a social being, and his learning of language both reflects and uses his social self. The innatist view, especially in its process version, sees the language-learning child as a cognitive activist; but we have come to see the language-learning child increasingly as a social activist as well.

This perspective on language acquisition that brings social aspects of the learning into prominence is called by some the “interactionist” view (Genishe and Dyson 1984). It is a helpful term. Think about it: action which is inter, that is, an active child well endowed for learning language, in active engagement with his physical and social world. Every instance of language that the young child encounters is contextualized. That is, it occurs in some real situation for some real communication purpose. It is an example of
how particular meaning is expressed, but clearly the meaning is social as well as propositional. Thus, every instance of language provides an example of how language is used to express certain propositions in particular social settings and for particular communication purposes—of persuading someone, perhaps, or of entertaining with language or of sympathizing or complaining or complimenting or arguing or challenging or daring or greeting or . . . you can think of many more. The interactionist view brings into sharper focus the social nature of the learning of language. In fact, the suggestion is gaining ground that the child’s sense of people’s social intentions—his own and other’s—enables him to work out the propositional meanings that are expressed. For example, his understanding that a particular situation is one in which someone is trying to get another person to do something enables him to attend to how a request is expressed; his understanding that a particular situation is one in which someone is trying to get information from another person enables him to attend to how an inquiry is expressed; and so on. The child learning language is actively engaged in a social world of language in use.

IN CONCLUSION

In the 1960s, Chomsky denounced the behaviorist characterization of language and how it is learned by children. Chomsky’s assertion was that humans have a special innate capacity for human language. From the sixties on, child-language researchers have systematically observed children learning language in natural settings in order to gain a clearer picture of just what kind of process language acquisition is. This fact of ongoing systematic observations of children is important. The innatist view (stressing the importance of an innate capacity for human language) and the interactionist view (characterizing the child’s language learning as an ongoing interaction between the innately endowed child and his social world) were not dreamt up out of the blue to thwart behaviorists. They grew out of insightful observations of many real children in diverse settings learning and using language. It is not simply convenient to say that language acquisition is species uniform and species specific; rather, it has been noted by many observers of children that they all learn language and do so in a variety of natural settings by following an impressively similar general course, and that members of other species do not naturally acquire a communication system that allows for endless creativity within a finite set of organizational principles. It is not simply convenient to say that reinforcement for form is not crucial to acquiring a complex linguistic system. Rather, extensive research has provided ample evidence that children are not typically reinforced for form, and that on those rare occasions when they are, they are unable to make use of the reinforcement. It is not simply convenient to say that children devise a deep-level system for relating expression to propositional and social meanings on the basis of the contextualized language samples that people around them use. Rather, researchers say this based on their observations of children across a wide
range of diverse settings, learning and using language. Further, it is sometimes claimed that while the behaviorists rely on empirical evidence, basing their conclusions entirely on actually observed behavior, the innatists and interactionists are "mentalistic," relying heavily on unfounded conjectures about what is going on in children's minds. But in fact all three views of language acquisition are rooted in actually observed behavior. The difference among them is a difference in how to interpret the behavior that is observed. Is this observed behavior the result of innate general IQ plus reinforcement for responses to stimuli, or is it the result of special innate processing abilities plus constant interaction with the environment?

Continuing study of children learning language in different contexts and settings will further our understanding, of course. For now, however we are left with some inescapable assumptions about language acquisition and these will provide the framework in the next two chapters for our study of the sequence and processes of language acquisition:

The child is the active party in the learning process.
The child, as a member of the human species, is well endowed for learning human language.
The child is a cognitive being and his language learning involves active sense making, that is, the building of a deep-level system relating expression and propositional meaning.
The child is a social being and his language learning involves his active observation of and participation in interaction with others, from which experience he constructs a system relating expression and social meaning.
The environment in which language is learned is purposeful (purpose-full) the child encounters language in use for various purposes and in various specific contexts.

Chapters 6 and 7 focus on the sequence and processes of language acquisition, and Chapter 8 focuses on classroom implications that the knowledge of language acquisition has for us. As you study the sequence and processes of language learning in children (chaps. 6 and 7) you might want to keep in mind the key question of Chapter 8: How can our knowledge of children's language acquisition help us as teachers to contribute to this healthy, active, powerful development in children?