We do not inherit the earth from our parents; we borrow it from our children.

For

Jon and Lea

citizens of the world
Introduction

Only human beings have language in the sense of a system of signs that allows them to express communicative intentions in an unlimited variation. Both biological and environmental factors play a role in acquiring a language. However, the exact balance of nature and nurture, especially which biological features are relevant for language acquisition, has been hotly debated. In studying language acquisition cross-linguistically, we learn about the range of capacities required for language learning. Children can learn any language even though languages vary extremely in their structures. Every normally developing child will learn the language or, as is the case in most cultures of the world, the languages of their community in the first years of their lives, including children brought up with a sign language. How do children learn such complex and variable systems? In all of the languages studied, children follow approximately the same timetable in the major landmarks of development such as babbling, first words, and first complex utterances. But how do children learn the structures of their languages and is there uniformity in the strategies they use even if they are learning languages with completely different structures? To assess the task of the language learner and discover the strategies children employ, it is important to study the acquisition of as wide a range of languages as possible and to conduct systematic cross-linguistic comparisons of acquisition strategies.

In this chapter, we first consider some historical and demographic issues in cross-linguistic developmental research. In the next section, we point out that a central problem in this field is that only a tiny number of languages and of linguistic features have been studied for how children learn them; this severely limits the conclusions that can be drawn about language learning. We then turn to a consideration of the major theoretical divide in the field, namely between those who think that an innate specifically linguistic, universal grammar must exist to account for language learning and those who, although accepting that language is unique to humans, think that grammar can be built out of more general human cognitive capacities. One important aspect of this section is the structure of the language environment and how this interacts with children's learning. Next follows a section covering the key classical and modern studies in cross-linguistic research on language acquisition; here we consider precursors to language development in the first year of life, major cross-linguistic studies that have been carried out, the relationship between language and cognition, approaches that compare closely related languages, and finally, the learning of the major argument roles of verbs. Before the concluding section, we raise a number of practical issues.

In this chapter, we confine the discussion to what is known about monolingual first language acquisition, but it is important to remember that many children in the world grow up learning more than one language.
Historical and Demographic Issues in Cross-Linguistic Developmental Research

An interest in how children can learn language goes back many centuries. The private teacher of Louis XIII noted the language development of his pupil in a diary. However, language acquisition became a systematic field of research only in the late nineteenth century. At that time, researchers of various European languages began to record extensive diaries about the development of their children (e.g., for German: Leopold, 1948; Lindner, 1885; Preyer, 1863; Stern and Stern, 1928/1965; for Russian: Gvozdev, 1949; for French: Gregoire, 1937, and for Polish: Zarebska, 1965). These diaries gave major insights into the overall course of these children’s language development. The diary method, however, is only really feasible in the early stages of language acquisition, and researchers can apply it only very selectively at later, more complex stages of development because the child simply talks too much and in sentences that are too complex. It is thus impossible to note down verbatim what is said if the diary is not restricted to very specific questions (e.g., the development of personal pronouns or a particular type of complex sentence structure).

With the rise of behaviorism and the use of empirical methods in psychology in the first half of the twentieth century, the data sources for language acquisition studies changed radically. Researchers collected large samples of data from a great number of children in specific age bands, largely with a view to working out norms for milestones of language acquisition. Naturalistic studies also became more systematic, and experiments began to address specific issues in language development.

The use of experiments in cross-linguistic research is constrained by a number of factors. There is the problem general to cross-cultural comparisons—the fact that the whole context of experiments derives from a particular cultural background—and therefore, it is very difficult to know what factors are responsible when different outcomes are obtained in different cultures. The more technologically advanced and similar to urban Western culture, the more likely it is that experiments can be run and the results treated as comparable, even if the comparisons are being made across widely different typological families (e.g., children learning English and Japanese).

The other main data source employed in modern studies of language acquisition is systematic recordings of the development of individual children over an extended period. The goal of such longitudinal recordings is to obtain a representative sample of the child’s speech and the speech addressed to the child. However, this data source only became possible in the second half of the twentieth century with the development of technology that is necessary for such recordings. In these studies, children were audiotaped and, later in the century, also videotaped at regular intervals over an extended period, often several years. The data were then transcribed and systematically coded and analyzed.

Currently, there are longitudinal studies on approximately 28 languages available that are openly accessible to the research community through the Child Language Data Exchange System (CHILDES) project (http://childes.tau.ac.il/) initiated by MacWhinney and Snow. CHILDES is the major resource for child language research. It also provides tools to transcribe and analyze language corpora.

If we take all the acquisition studies together (experiments and longitudinal studies), we know something about the acquisition of approximately 70 to 80 languages (i.e., approximately 1% of all the languages spoken today). This 1% includes languages for which only one modality has been described (e.g., for instance, the use of word order, subject and object case marking, or the development of the passive). Given the fact that there are approximately 7,000 languages in the world with approximately 460 language families, this is a rather small sample (www.ethnologue.com). Languages do not only differ widely in structure, but they are also spoken in a huge variety of different cultures with different traditions of parenting. However, most of the studies available are on the major Indo-European languages of Northwestern Europe, such as English, German, French, and Spanish. This geographical area is known to be typologically very unusual with rare features such as interrogative word order in questions requiring "yes" or "no" as an answer, relative pronouns in subject relative clauses (e.g. "The man who is walking down the street is nice"), and so forth (Cysouw, 2002; Dahl, 1990; Haspelmath, 2001).

There are mostly practical reasons for the bias to this one geographic area. To conduct a study of language acquisition, considerable resources of time and labor are necessary. Therefore, it is easier for researchers to study acquisition as close as possible to home. Furthermore, undertaking language acquisition research in a range of different cultures and languages requires a major interdisciplinary effort, using methods from psychology, linguistics, and social anthropology, at the least. Researchers need to have an unusual combination of expertise and considerable funding to conduct such a study. For instance, the authors are involved in a project documenting the learning of Chimant, an endangered Sino-Tibetan language of Eastern Nepal. To carry out this project, preliminary work in the culture by a team that includes three linguists, two anthropologists, and two developmental psycholinguists together with a large team of local research assistants was essential (www.mpi.nl/DOBES/projects/chimant).

However, if we want to make cross-linguistic comparisons that cover all kinds of different variables found in the languages of the world, we have a serious sampling problem because we know very little about languages of other families and even less about endangered languages or languages spoken by rather few people. These can sometimes reveal features that have been deemed impossible for a human language on theoretical grounds. An example of such a feature is the recent discovery that certain prefixes on the verb can be freely ordered in Chimant, without any consequence for meaning (Bickel et al., 2007). In all of the languages previously studied, the ordering of prefixes is fixed; this was thought to be a linguistic universal.

Given these sampling issues, it is currently very difficult to make general statements about child language acquisition. At best, we can make claims about the acquisition of individual languages or features within closely related languages (e.g., within a language family within or across subbranches).

Central Issues in Cross-Linguistic Developmental Research

One of the central reasons why language acquisition is studied from a cross-linguistic perspective is that, if we want to make claims about language acquisition in general and not only about an individual language, we need to find out first what learners have to be able to master in learning different languages. Because languages differ so widely in their phonological, morphological, and syntactic structure, what has to be learned will vary considerably, and we might expect differences in acquisition strategies as a result of the specific linguistic variables languages exhibit.

This variation can occur on all linguistic levels. We illustrate just a few examples here. If we take the sound systems of languages, learners are confronted with very different tasks. Rotokas (West Bougainville), a language of Papua New Guinea, has only 6 consonants, whereas Xkóy, a Southern Khoisan language spoken in Botswana and Namibia, has 122 consonants, which include a large number of clicks (Maddieson, 2005a). The most typical consonant inventories have approximately 22 consonants. Thus, English with 24 consonants is about average. Variation in vowels is much smaller and ranges from 2 to 14 (Maddieson, 2005b); the average number of vowels is 6. Structural diversity is also very prominent in word formation, and we find big differences across languages. Some languages are analytic, which means that syntactic units—words—contain only few meaning units (i.e., the ratio of morphemes per word is very low). The fewer morphemes per word, the more analytic a language is (e.g., Vietnamese is an extremely
analytic language, with no productive affixes or other morphological units combining with words. Other languages (called synthetic) exhibit the opposite pattern. They express a lot of grammaticalised information per word unit, such as Turkish, so the ratio of morphemes per word is very high. The most extremely synthetic languages are sometimes called "polysynthetic" and can be exemplified by such languages as Kossatada (Bickel and Nichols, 2003). Languages vary considerably not only in the structure of words but also in how words are combined. Most languages show a preferred word order pattern, that is, an ordering of subject (S), verb (V), and object (O). For instance, in some languages, word order is predominantly SVO, and in others, it is SOV. Some languages, however, do not show such a preferred pattern at all; for example, in Nunggubuyu (Gaminyaungu, northern Australia; Heath, 1984), all word order patterns are possible and common. In many cases, however, even if word order is flexible, there is a correlation between, for example, discourse patterns, length of constituent, and word order patterns. In addition to this formal variation in grammar, there is also diversity in what kind of world knowledge the use of these grammatical markers presupposes. This means that children cannot use the markers productively until they have acquired the relevant world knowledge. For instance, Martuthunira, an Australian language, has verb suffixes registering the kinship relations of the people involved in an event. Children learning this language have to learn that there is a distinction in grammatical marking when talking about somebody of the same generation (i.e., brother, sister, grandfather) versus about somebody in an alternating generation (father, mother, great grandmother) (Dench, 1987; Evans, 2003). Thus, in this language, children need to acquire the relevant world knowledge before they can become fully competent in even simple sentences. These are only a few examples from the huge range of features by which languages differ in their conceptual and formal complexities. The question then arises whether some of these features are more difficult to learn than others and whether the strategies children employ in learning them are the same across languages.

Theories in Language and Cross-Linguistic Developmental Research

The major controversy in language acquisition studies has been about what is innate to a child to learn a language. First, we briefly review some aspects of different theoretical approaches because they are relevant to cross-linguistic variation. Then, we address how these approaches interact with ideas about the nature of the child's language learning environment.

Nativist-Linguistic Theory

Nativist-linguistic theories hold that there are innate, universal principles that constitute universal grammar (UG; e.g., Chomsky, 1965, 1981). These are principles that apply to every language, and these principles constitute the so-called core grammar. The core grammar is taken to be a system for operating on abstract entities in an essentially algebraic way. Children's task is to use UG in interaction with what they hear to work out fundamental aspects of how the grammar of their language works. Within nativist-linguistic approaches, one solution to the issue of how children use the hypothesised UG to work out the syntactic particularities of their input language is to suggest that they have to set a range of parameters as the result of having a small number of utterances in the target language (the Principles and Parameters [P&P] theory, Hyams, 1994). An example is the "head direction parameter," which determines how children identify the input language as being "left or right branching" (i.e., the order of words in noun phrases and prepositional phrases together with the order of verb and object). Once this is set, children should know how to order words and constituents across a range of structures. The success of the P&P approach in its own terms depends on the number of parameters being relatively small and on agreement among researchers as to how the specified settings can account for the range of relevant phenomena in language development (Fodor, 2001; Valian, 1991).

Another approach arising from nativist-linguistic theories is to hypothesise that, if UG is innate, some parts of the system are on a later maturational timetable, and this can account for some of the early error patterns shown by children. Two well-known accounts that use this approach are Bowerman and Waxler's (1987) attempt to explain the late use of full preverbal passives by English-speaking children and Waxler's Agreement-Tense Omission Model (ATOM; Waxler, 1995). In the first, the authors suggest that children are late with preverbal passives (e.g., "The horse was kicked by the dog") because "argument-linking chains" are a late biological maturation. This theory, however, cannot account for the fact that full passives emerge early in some languages (e.g., Demuth, 1990; Pye and Quirk, 1998). Here is an example of how the study of a wider range of languages can have a major impact on either falsifying a theory or providing supportive evidence for it.

The ATOM model is intended to account for patterns of incorrect finiteness marking found in young children's speech across a range of languages (e.g., saying "It go there" instead of "It goes there"). Waxler (1998) argues that, because they are in a pre-maturational stage, children are subject to "the unique checking constraint" and will only be able to check either for tense or for agreement and thus will sometimes fail to mark for finiteness in languages for which subjects are present that also require agreement with the verb. However, it seems that a simple learning model that operates from the ends of utterances in child-directed speech (CDS) can model these cross-linguistic differences equally well, making unnecessary the postulate that children know about tense and agreement innate (Freudenthal, Pine, Agudo-Cere, and Gobet, 2007).

Emergentist and Usage-Based Theories

The opposing position, which has become known as usage-based and constructivist ( Tomasello, 2003) or emergentist (Elman et al., 1997), argues that language acquisition can be explained by other more general human cognitive abilities. According to this view, children learn the use of symbols with the help of innate abilities, which emerge in human ontogeny around 9 to 12 months of age (see section on "Sociocognitive Development"). Unlike the algorithmic, UG approach, these approaches assume that there is no clear break between rules and other more idiosyncratic constructions, and that the child needs to learn is a set of constructions that map form to meaning. Abstraction arises through processes of pattern finding and analogy. Because constructions vary significantly across languages, one of the goals of the usage-based account is to work out the different strategies children use in learning these constructions. The implications of this approach is that children learn language by identifying patterns in what they hear and mapping those patterns to meaning. For instance, a child might have abstracted a schema, "Where's X gone?", but have no representation for the underlying syntax of wh-questions, of auxiliary syntax (e.g., "has"). Or, tense marking. The meaning abstracted may also be limited. In a usage-based approach, the form-meaning mappings become more complex (i.e., gain more parts) and more abstract (i.e., have less concrete form) over time. Emergentist and usage-based approaches are therefore concerned with the details of how much input children hear and what the relative type and token frequencies of different forms are in this input. These, in turn, lead to predictions about how different cues to form-meaning mappings may be more or less available to the language learning child. Both of these issues are taken up in somewhat more detail later.

Cross-linguistic research is an extremely important testing ground for these different theoretical approaches. On the one hand, applying the theory to a new language requires almost always much more careful specification of the proposals being made. On the other hand, cross-linguistic research can actually falsify a well-specified proposal.

The Structure of Language Environment

Because languages vary so widely and children's utterances reflect many language-specific features from the very beginning, it is obvious that children learn their language or languages from
their environment. Beyond this, there are very different views of how important the environment is. All acknowledge the importance of learning for morphology and the lexicon, but at one extreme, theorists suggest that only a small number of sentences in the input are enough to guide the development of language-specific syntax because, in the main, the syntax of any individual language is derived from an innate UG. An alternative perspective claims that children learn entirely from what they hear, using their sociocognitive knowledge to match form to meaning and subsequently to build up the more abstract representations of the grammar they are learning. To the nativist-linguists, if all children learn to talk on roughly the same timescale under very different environmental conditions, this is support for the limited role of the language environment in the development of syntax. For constructivists, it is important to show that the language environment affords learning in terms of salience, frequency, and the presentation of relatively accessible form-meaning mappings. In the limits, constructivists must accept that, if there are relevant differences in the language environment, children should learn differently either qualitatively or quantitatively (I.e., faster or slower). Thus, everything comes down to what is a “relevant difference.”

The cultural backgrounds in which children are reared clearly vary widely. The children usually studied in research on first language acquisition seem to spend a lot of time alone. In other cultures, such as many rural societies, children are surrounded and cared for by many more people including siblings, extended families, other children, and adults (see Levine, 1994, for an overview). Factors like climate may also be relevant; in a more moderate climate where people spend most of their day outside, interlocutors may vary more than in a cold climate where one does not leave the house much.

We do not have to go far to find that quantitative and qualitative differences in the ways that adults talk to children affect children's language development. There are numerous studies showing that the amount of CDS is correlated with rate of language learning (Barnes, Gutfreund, Satterly, and Wells, 1983; Hart and Risley, 1995). In addition, there are correlations between the rate of noun use in CDS and the relative proportions of nouns in children's own vocabularies (Pine, 1992) and between the proportion of utterances with complex syntax used by children's parents and teachers and those children's own use of complex syntax (Huttenlocher, Vasilyeva, Cymerman, and Levine, 2003).

However, one could argue that the cultural differences documented in these studies are not so great and that we have to sample much wider variation to safely assess the role of the environment. Unfortunately, with very few exceptions, the further away that the research conducted is from the technological, urban environments in which most children have been studied, the more anecdotal and hard to assess the data become. There are good reasons for this. Researchers in these circumstances are often anthropologists or linguists working with more qualitative than quantitative methodologies; it is not at all easy to set up the kind of longitudinal recording studies that allow quantitative assessment of development to be made. It is harder still to conduct experiments with children and adults for whom the idea of playing these sorts of games, let alone being tested, is entirely alien. Therefore, we still know rather little about the structure and the amount of input children receive in most cultures and whether there are significant cross-cultural differences.

On the one hand, many studies have shown that speech addressed to children shows similar characteristics across a number of different cultures. One such observation is the use of higher pitch and the use of wider intonation contours in CDS (see Clark, 2000; Ferguson, 1964; Fernald et al., 1989). Across many cultures, CDS also consists of shorter, clearer, more repetitive, more grammatical utterances than utterances in speech between adults. CDS also tends to be highly repetitive and very largely located in the “here and now.” Furthermore, the speech addressed to young infants has more and longer pauses, and it is more grammatical with fewer false starts than adult to adult speech (Snow, 1995). A major further issue is the repetitions typically found in CDS (Brown, 1980). It has been shown for English (Campos, Faulkner, Lieven, and Tomasello, 2003) and also for German and Russian that there is a lot of repetition at the beginning of utterances in CDS (even though, as we would expect from their grammatical structure, they show less than English) (Stoll, Abbott-Smith, and Lieven, 2009). Most of these features probably derive from the attempt by competent speakers to communicate with less competent ones, and therefore, we cannot assume that they are deliberately adapted to teach language, but they may nonetheless serve as a useful basis for making generalizations on which to build up a grammar of the language.

However, there are reports of cultures that do not show some of these features of CDS. In a study of children's acquisition of Quiche Mayan, Ratner and Pye (1984) reported that small infants are not spoken to with the prosodically higher pitch that characterizes CDS found elsewhere. Thus, on the one hand, exaggerated contours in the speech that children hear may help them segment aspects of the speech stream, but on the other hand, it seems not to be the case that this type of speech characterizes speech to children the world over from birth.

There are also some reports of cultures in which adults do not seem to talk to infants much, if at all. Schiefelin (1985) reported that Kaluli of Papua New Guinea believe that children have to be weaned away from babbling and baby talk because it reflects their nearness and vulnerability to the animistic world. Thus, only when children start to talk themselves do adults start talking to them, and when they do so, they try to teach them what to say. Heath (1985) also reported that for one of three groups in her study located in the Piedmont Carolinas of the United States—the group she called “Tracton”—adults did not tend to talk to infants and young children. Here, there was a strong ideology that children had to learn for themselves and that adults should not be addressing them with CDS. Children made their own way in conversation initially by “forcing their way in.” Status hierarchies in Samoa mean, according to Ochs (1982), that the idea of adjusting speech to the child (in the form of CDS) is alien because it would mean someone of higher status adjusting to someone of lower status. Thus, adults tend to tell older children how to deal with infants, and it is these other children who largely do the talking to the infants.

One interesting point that arises from all these studies is that the way in which adults think children should be spoken to is, not surprisingly, closely linked to their ideologies of childrearing. It seems almost certain to be true that, compared to the one-on-one mother-child dyads who are the usual participants in child language research, most children in the world are spending more time in mixed groups of adults and children and are being looked after and therefore spoken to more by other children. However, from the point of language development, the important question is what the outcome is in terms of what children actually hear and how they build their language from it.

Because all children must make mappings between the forms they hear and meaning, with or without assistance from innate linguistic or cognitive universals, the question is how this is done if the amount or type of CDS varies so widely. Of course, one possibility is that these differences are not as extreme as the previously mentioned studies would suggest and that the researchers are picking up on only one small part of the child's life. De León (1998) pointed out that children in the Totonac culture engage in dyadic conversational exchanges similar to those documented in previous studies of CDS (often with their grandparents rather than with their busy mothers) but that these conversations rarely go on outside the house in the presence of the researcher. Certainly, in many of these nontechnological cultures, spaces will exist in which adults and children interact that are unlikely to be observable by a researcher from another world. A second possibility is that, as a result of rather more mixed input, children may learn to talk on a somewhat slower timetable. This is certainly supported by the correlations reported earlier between the amount of talk addressed to children and their speech of vocabulary and syntax acquisition (Hart and Risley, 1995; Huttenlocher et al., 2002). It might, in fact, be better
to describe middle-class children in technological societies as learning to talk ahead of a more natural cultural timetable.

Finally, we should note that just because the ways in which children are spoken to in other cultures does not mean that the children are in receipt of an almost unparsable input. There are a limited number of ways in which one can interact with a small child, and there is likely to be a high degree of repetitiveness associated with these event schemas. In addition, when people speak to young children, they are almost always monitoring the infants' attentional gaze. In both cases, then, utterances do not come "out of the blue." An example is Schieffelin's (1986) reports of the "elama" strategy that Ka'lli mothers use to teach their children how to behave communicatively. The mother holds up the child facing toward the interlocutor, and then she tells the child what to say with the always same construction *elama* "Say X." However, she does this when she sees that the child has something to communicate about, for instance, when the baby is protesting about stolen food. Thus, the utterance is being taught in close conjunction with the child's focus of attention.

Imperatives are reported to be used extensively to children by both adult and child caregivers in cultures where they seem to be less dyadic and child-centred CDS (Nwokah, 1987; Oths, 1982). In fact, the reliance of imperatives to rate of language learning in technological cultures is quite complex. Early studies suggested a negative correlation between imperatives and rate of language development and a positive one for child-contingent speech (in the sense of elaborations of what the child said; Cross, 1977). However, a number of these studies conflated the form of the utterance and its pragmatic use. When imperatives per se were separated from noncontingent speech (i.e., speech that did not follow the child's focus of attention), there were studies that suggested that child-contingent imperatives to young children were also correlated with early language advance (Barnes et al., 1983; Pine, 1994). Imperatives are often relatively syntactically simple, and they can be formed with minimal reference to what the infant is currently doing (i.e., his or her attentional state).

This example indicates the complexity of the task of assessing what aspects of CDS are important in language learning and how frequent they need to be. We have to analyze the form of the utterance, its relation to the critical features of the language that children learn first, and also the developmental stage of the child. Imperatives may be helpful at early stages when the child is not producing much speech; they may be less helpful later as the child is able to put more into the utterance itself, affording adults the opportunity to say more that is contingent on what the child has actually said. Finally, we have to try to collect quantitative data that are sensitive to the cultural framework in which children are learning to talk.

**Key Classical and Modern Studies in Cross-Linguistic Developmental Research**

**Developmental Prequisites for Language Acquisition**

To learn a language, a child needs to have some general abilities that are not likely innate. Obviously, infants must have adequate hearing or sight (for learning a signed language). There is a clear path of development during the first 12 to 18 months of life; as children's experience with language develops, so do their segmentation, word recognition, and pattern recognition skills. Research of the last decades has made clear that children are sensitive very early on to the language(s) of their environment. Studies with newborns hearing different languages have shown that infants are able to distinguish their language from a language that is foreign to them 4 days after birth (Mehler et al., 1988). Infants' ability to discriminate the sounds of languages other than those they are hearing reduces over the first year of life (Werker and Trehub, 1985), an interesting example of how the environment can shape the child's linguistic skills. Infants with English, Japanese, and French infants ages 6 to 10 months have shown that they can discriminate words that they have heard before from those that they have not heard even when the words were embedded in speech (Fey et al., 1987). Finally, using experiments with simple artificial languages, studies have shown that, depending on the structure of the artificial grammar, infants between 7 to 12 months of age are able to recognize patterns in strings of repeated syllables with the same ordering rules but with different "vocabulary" after a short exposure (Gomez and Gerken, 1999; Marcus, Vijayan, Bandi Rao, and Vishton, 1999). They should do this by relying on the pattern of repeating and alternating "words" in the input strings. We should note that, although these skills are central to the child's ability to parse the input, they depend on the infant discriminating one stimulus from another. Children do not have to understand or use the stimuli in communication or even recognize anything in any meaning in the environment. The linking of identifiable sequences in the input to meaning, which starts from approximately 9 months, is almost certainly related to the development of sociocognitive skills.

**Early Production**

Children start babbling at approximately 6 months and can start to produce their first word any time from 10 months on, although much depends on how a "word" is defined and word production usually starts later. There is a complex interaction between the age of the infant's articulatory apparatus and the characteristics of the ambient language, particularly in terms of consonant-vowel sequencing and the syllable length of words.

Vihman and Croft (2000) report that, although the ambient language influences the sounds that infants produce in babbling and their first words, there is considerable cross-linguistic similarity in early productions as a result of the physical constraints on infants' articulators. They argue that at these early stages similar first words are produced in different languages. Infants start to match the syllable pattern of their language and develop individual templates to which they assimilate their perception of the world. This pattern accounts for the difficulty in distinguishing children's early words from each other and for the fact that children themselves may hear the difference between two words without being able to produce it.

**Sociocognitive Development**

Infants make huge developmental strides in their cognitive and social development during the first 12 months of life. Cognitively, infants (probably from birth) have clear expectations about the ways in which objects will behave, and these develop in sophistication over the first year of life. From 3 months, they can form perceptual categories of objects, and by 7 to 11 months, they show evidence of categorization at the level of superordinate categories (Mandler, 2000). By 11 to 12 months, they show surprise if a familiar sequence of actions (e.g., preparing something to eat) does not go in the right order or ends with a "surprising" outcome (Baldwin, Baird, Saylor, 2000).

* Optimality theory, among other things, deals with these issues by hypothesizing a set of universal cognitive-linguistic constraints in production that are ranked differently for different languages (Prince and Smolensky, 2004). The most important are faithfulness constraints (trying to match what is heard) and markedness constraints (which constrain the possible range of correct forms for a particular language). The question of whether there is any need to postulate these innate constraints has been the subject of much debate.
and Clark, 2000). This research has been almost exclusively carried out in English-speaking urban environments, but although differences in the objects and situations that surround the child may result in differences in the types of categories or action schemas abstracted, there is little reason to think that these cognitive abilities would fundamentally differ between infants reared in different cultures.

Probably the most striking changes during the first year of life are the major developments in socio-cognitive skills between 9 and 12 months: using interpersonal context to inform others and to work out their intentions. These are almost certainly universal and, at least in the combination and degree shown by infants, unique to human beings (Tomassello, Carpenter, Call, Behne, and Moll, 2005). Thus, as far as we know, pointing develops universally from approximately the age of 9 months and is used for the same range of functions worldwide: requesting, drawing attention, and informing. There is, however, a great deal more work to be done to see how this species-unique behavior is modulated by differences in childrearing environments across the world.

Thus, by the time children are 12 months old, they have developed the species-unique skills that underpin intentional communication and the ability to understand the communication of others. The sounds and patterns of the language that surround them have also become separable and identifiable. If we assume that this is true for all human infants growing up without developmental problems, the question that is important in cross-linguistic research is how children equipped with these skills break into the very different languages that they are hearing and whether they use the same strategies in learning and producing linguistic structures independent of the structure being learned. To study this requires a deep understanding of the typological differences between languages as well as of the developmental characteristics of the child at this stage. Slobin's path-breaking research, which started with his first cross-linguistic project (Slobin and Bever, 1982), fulfills these requirements.

**Slobin's Cross-Linguistic Project**

The continuation, and most elaborate development, of Slobin's project was the publication of a series of volumes documenting cross-linguistic language acquisition (Slobin, 1985a; 1985b, 1992, 1997a, 1997b). This included 23 languages from several language families and a chapter on American sign language. In the five volumes of this series, the acquisition of these languages was described by leading specialists within a uniform scheme to enable comparisons of acquisition strategies.

One of the main tenets of this approach was "patterns of acquisition VARY from language to language, while they are determined by common principles of a higher order" (Slobin, 1985a, p. 5). Two conclusions came out of this research. First, language acquisition can be explained by so-called "operating principles" (OPs). Second, the child comes endowed with a "basic child grammar." OPs constitute very general strategies every child uses in learning a language. The function of OPs is to organize and store the input. An example of a general OP is the OP about the interpretation of the function of elements: "OP (Review): Limited Functions. At first apply a solution to the smallest category and do not extend it without evidence" (Slobin, 1985b, p. 1199). Other OPs are more specific, such as the "OP (Mapping): ANALYTIC FORM." If you discover that a complex notion can be expressed by a single, unitary form (synthetic expression) or by a combination of several separate forms (analytic expression), prefer the analytic expression" (Slobin, 1985b, p. 1229). This approach, which is based on innate processing strategies (either cognitive or specifically language-based), was a counter proposal to formal and content-based universals as proposed in generative approaches in the tradition of Chomsky. Thus, according to this approach, formal structure is acquired without the help of innate syntactic rules, but it is guided by processing strategies. The second conclusion was formulated in "Basic Child Grammar," which claims that the child is endowed with a "prestructured space" that influences and sometimes even predetermines the acquisition of grammatical markers. This would lead children learning very different languages to look more similar at the outset of language learning because it was suggested that, initially, these prestructured concepts provide the basis for form-meaning mappings.

This is the idea that, as a result of the salience of objects in the child's environment, it may be easier to learn words for objects than for other categories.

**Are Nouns Easier to Learn?**

Research that seems to support the idea of cognitive underpinnings to language universals is Gentner's (1982) analysis of the composition of early vocabulary in English, German, Japanese, Korean, Chinese, and Dutch. Gentner found a noun bias in early word use in all the surveyed languages, and she argued that this bias is a result of the more complex structure of verbs. Nouns in early child language are usually concrete and refer to "naturally individuated referents" (Gentner, 2006, p. 544). Verbs are more complex because they relate a participant to a certain action or event in contrast to nouns, which lack this relational component. Some subsequent research challenges these findings, with researchers reporting a verb bias for languages like Dutch and Korean (e.g., Brown, 1998b; Choi and Gopnik, 1995). However, to properly compare these various results is problematic because of the different methods applied (Clark, 2003).

Some studies use maternal checklists, whereas others use spontaneous speech samples, and thus, the results from such different methods and speech contexts are difficult to compare. Furthermore, because early one-word utterances are difficult to interpret, it is far from clear whether parts of speech can straightforwardly be assigned to words (i.e., whether a "noun" used by a child also has the meaning of a noun; Clark, 2003). More controlled studies such as Bornstein et al. (2004), however, support the finding of a strong noun bias in early language acquisition for Spanish, Dutch, French, Hebrew, Italian, Korean, and American English, using the same vocabulary checklists. By contrast, a study comparing Mandarin and English verb-noun ratios by Tandif, Goldman, and Xu (1999) using the exact same methods and data sets for both languages showed that even though across all measures Mandarin-speaking children used more verbs and fewer nouns than English-speaking children, the distributions in various contexts varied significantly. In a book-reading context, children of both languages used more nouns than verbs, but not in a free-play situation. Other factors like urban versus rural setting need to be controlled for as well (Bornstein and Cote, 2005). Thus, to resolve this issue, more studies on a variety of different languages using the same method, data sets, and contexts are needed.

**Linguistic Influences on Conceptual Structure**

Development in infancy and early childhood is obviously relevant to the complex issue of the relation between language and thought. Do children start with universals of cognition, which are reflected in their early language, only later refining the language to fit the semantic distinctions that it makes? Or do children observe the semantic distinctions of the language they are learning from the outset? One major area of research into this issue has been concerned with whether there are conceptual predispositions in the structuring and expression of spatial relations. In a cross-linguistic study on English, Italian, Serbo-Croatian, and Turkish, Johnston and Slobin (1979) found similar sequences of development in these languages, and they took this as evidence that conceptual development determines the order of emergence of grammatical forms, not spatial expressions. The assumption was that children's ability to conceptualize spatial relations develops from simple to more complex relations. However, how exactly these relations look and whether they are indeed universal has been debated. As shown by Boyer (1985), semantic space is more flexible than was postulated for Basic Child Grammar, and a more...
relativistic view seems to be warranted. The variation in structuring space and the influence of the individual language on the conception of space becomes especially obvious in Bowerman and Choi's work (Bowerman, 1996; Bowerman and Choi, 2001; Choi and Bowerman, 1991) on cross-linguistic differences in expressing and conceptualizing space in Korean and English. English uses mainly prepositions, whereas Korean uses verbs. The crucial distinction, however, is what kind of spatial relations are important in the two languages. The main feature for English is the distinction of putting a "figure" into contact with the surface of a ground object (eg. "in"), and putting a "figure" into some kind of enclosure (eg. "in"). In Korean, by contrast, the features tight fit (kitna, "interlock, fit tightly") versus loose fit (nokcha, "put loosely in or around") are important, which are irrelevant for spatial expressions in English. Furthermore, English children do not have to distinguish between spontaneous and caused motion, whereas Korean children must. Results show that, when asked to refer to particular actions and events, children of both languages from the start do so along the distinctions made by the language they are learning. Thus, at least once children are starting to make form-meaning mappings between language and the world, there does not seem to be an initial developmental stage in which children show language-independent conceptualization.

"Thinking for Speaking"

Exactly this kind of influence of language-specific features on conceptualization became a focus of Slobin's later research (Slobin, 1996). In his "thinking for speaking" hypothesis, he proposed that online thinking is strongly influenced by the type of categorization used in the language used. This was investigated in a large-scale cross-linguistic project on event structuring in narratives (Berman and Slobin, 1994). The languages studied in this project were English, German, Spanish, Hebrew, and Turkish, and the goal was to find out whether and how typological differences bear out in narratives. To test this, a picture book without words, *Frog, Where Are You?* (Mayer, 1989), was used as the stimulus. In a study of motion events, Slobin (1997b) classified the languages into a binary typology on the means of expressing the path of a movement: languages were divided into verb-framed languages in which the verb expresses the path (e.g., *enter* "go in") and satellite-framed languages in which the path is expressed by a satellite (e.g., *go in*). Systematic differences in the packaging of events depending on language type were found. There is a clear tendency for a speaker of a satellite-framed language like English to include information about the path of a motion event in a single verb. In a verb-framed language like Spanish, information about the path is either completely omitted or the path description is simplified or divided up by several verbs. In a continuation of the project (Strömqvist and Verhoeven, 2004), which included languages from a wider range such as Warlpiri, Tzeltal, West-Greenlandic, Basque, Thai, and several other languages, this binary typology was extended and equi-potentially framed languages needed to be included as a third category. Furthermore, the expression of the path turns out to be only one factor among many, such as online processing of forms, cultural practices and perspectives, and communicative aims of the speaker (Slobin, 2004).

"Intratypological Approaches"

One of the key issues in cross-linguistic language acquisition studies has been what makes languages or a feature of a specific language difficult or easy to learn? In other words, what controls early learning versus later learning? These questions can best be answered by what Slotkin called the intratypological approach. The intratypological approach focuses on variation in languages that belong to one typological grouping and are genetically related (Slobin, 1997b). Fine-grained differences between similar languages can be studied. The advantage of this approach is that one can hold most factors constant while investigating one factor in which the languages vary systematically. An illustration of such intralinguistic research is the study by Strömqvist et al. (Strömqvist, Peters, and Ragnarsdottir, 1995; Strömqvist, Ragnarsdottir, et al., 1995) on the acquisition of verb–particle constructions in Swedish, Danish, and Norwegian. All three languages have verb–particle constructions; however, they differ systematically in prosody and word order. The Swedish and Danish particles are stressed, but only in Swedish is the particle contiguous to the verb. Danish and Norwegian also differ minimally. The Danish particle is prosodically prominent, whereas the Norwegian particle is not. However, in both of the languages, the particle is separated from the verb. This is an ideal situation to test the role of prosodic prominence and the position of the particle with respect to the verb. Strömqvist, Ragnarsdottir, et al. (1995) predicted that acquisition is conditioned by two general principles. First, prosodically more prominent features are easier to attend to in the speech flow, and second, semantically close elements should be placed closely together syntactically. Their results showed that the acquisition patterns for these three languages differ. In Danish, the postponed particle is learned very early as a one-word utterance (i.e. as an individual word). In Swedish, the emergence of these particles is a later development, and they occur attached to the verb. In Norwegian, where there is neither prosodic prominence nor contingency to the verb, it seems that the verbs occur first in isolation and the particles are a later development.

"Learning Argument Structure"

In this context, a major theme has been how children learn to mark the arguments of verbs (e.g., agents and patients). Children's ability to express and understand who did what to whom represents an important milestone in their development of language, and the transitive constructions almost always show some of the most fundamental features of how a language works. Languages basically use three methods of marking major arguments either alone or in combination: word order (e.g., English), case marking on nouns (e.g., Turkish), and agreement marking on verbs (e.g., subject–verb agreement in Italian). English uses word order exclusively, although some pronouns are also case marked ("He ate him"). The cat ate the mouse means something very different than "The cat ate the cat." German uses case marking on determiners (der Zug 'the train' nominative subject, den Zug 'accusative object') and allows a greater variety of word orders; French, like English, only has case marking on pronouns but changes the word order when the object of the verb is a pronoun rather than a noun (Marie pousse Jean; Marie lui pousse 'Mary pushes/John.' Mary pushes/John'). In a language like Turkish with highly regular case marking, children appear to start marking the arguments of verbs at least as early as or earlier than do children in languages where word order is the predominant method (Slobin and Bever, 1982). This shows that there is nothing inherently more complicated about learning case marking than learning syntactic word order.

A major issue in trying to understand what cues might be easier to learn is that cues often go together in a language. To separate out the effect of each cue, researchers design experiments where children act out sentences, some of which are not fully grammatical. For example, in English, subjects of transitive verbs tend to be animate and patients inanimate. If a child is presented with "Table eat doggie," will the child follow the word order (which would mean that they have a grasp of word order syntax), or will the child go with animacy and make the dog eat the table? A series of experiments in nine languages investigating, among other things, case, animacy, word order, and subject–verb agreement indicates that children, on the one hand, follow the clearest and most available cue and, on the other, do not always behave as adults would (summarized in...
Bates and MacWhinney, 1989, and Tomasello, 2003, p. 138). Out of the results of these experiments, Bates and MacWhinney developed their "competition model" to try to quantify the ways in which cues within a language interact and compete (Bates and MacWhinney, 1987; Keppenne and MacWhinney, 1998). One problem with these experiments, which introduces a major confound, is that almost all of them used verbs familiar to the children. There have been a few attempts to run the same sort of experiment but using novel verbs (e.g., Dittman, Abbott, Smith, Lieven, and Tomasello, 2008; Neighs, Gleitman, and Gleitman, 1993; Wiles, and Tomasello, 2005).

It seems clear that children are able to learn the ways in which cues such as word order, case marking, and agreement mark agent and patient roles relatively early (at least by the end of their third year), but the speed with which they do this depends on the relative frequency of the cues, not necessarily on how quickly or how well they are distributed and so on, and how they are interrelated with other cues.

Practical Issues in Cross-Linguistic Developmental Research

We have raised a number of practical issues throughout; here we summarize and add additional points. Generalizations about language acquisition are still very limited by the scarcity of data available. Presently, our knowledge is dominated by the acquisition of some Indo-European languages. We clearly need more detailed longitudinal studies of children's language development that move beyond the confines of children growing up in urban surroundings in industrialized cultures learning a rather small range of languages. Data alone, however, are not enough, and there is much to do on the level of methodology. To quantitatively compare data of completely different structures, we need structure-sensitive methods. For instance, if we want to compare the development of utterance length in an analytic and a synthetic language, we cannot use the same measurement. A popular way of comparing children by calculating their mean length of utterance at a particular age is of no use; one word or morpheme in one language can mean something similar to many words and morphemes in another language. Another no less important issue is the role of CMS. To judge the order of development and what has to be acquired, we need to know how adults talk to children, and this implies that it is critically important that the actual language that children hear be well documented. This can only be studied if we have recorded the actual conversations of children and their caregivers. A linguist's description of the grammatical principles of a language is not a substitute for recorded data addressed to the child. We know that genre, frequency, in use of particular constructions, and the immediate context, to name only a few factors, are crucially important for the acquisition process. This information is usually entirely absent in grammars.

The enterprise of studying language in widely different cultures requires a truly multidisciplinary effort. Linguists are essential to working out the structure of the language, anthropologists are essential to understanding the culture and ideologies of child-rearing, and psychologists are essential to design culture-sensitive but robust methods of gathering replicable data. Finally, we need to think carefully about the implications of the multilingual situations in which many children grow up and to develop methods of incorporating this fact into our theories of language development.

Conclusion

We have attempted to give some idea of the challenges that any child would face learning any of the world's languages and of the theoretical issues that are raised when attempting to account for how children undertake this task of language learning. Whether or not children come with pre-given and linguistically specific skills, the main burden of language learning clearly has to be in interaction with what they are hearing; this is where the specifics of phonology, morphology, syntax, semantics, and pragmatics come from, and it is these that vary so much from language to language and from culture to culture. One important conclusion to draw is that English is not a very good basis for understanding how children learn this wide range of languages because it has a number of characteristics that make it a poor exemplar. Two of the most important are very fixed syntactic word order and impoverished morphology. A second important conclusion is that we need to study not only a wider range of languages, but also a wider range of language learning environments. This includes not only children growing up in one less on-one environments than those children normally studied, but also the many children in the world who grow up learning, or at least hearing, more than one language.

In terms of theories of language development, it is clear that studying children learning different languages is critical to developing an understanding of the relationship between cognition and language and of how this may change with development. It is also important to the main theoretical divide in the literature—that between a nativist-approach to language development and emergentist-constructivist approach. Theories that postulate a universal grammar that provides children with the basis for breaking into language need to be able to support claims of early linguistic abstraction and of the biological maturation of emerging structures by reference to a range of different languages. On the other hand, because constructivist theories depend to a considerable extent on the relative frequencies of different structures in what children are hearing, they too should look to a much wider variety of input situations as a test for their theories.

Clearly, the study of language development in typologically different languages and in a wide variety of cultural situations is fundamental to coming up with a psychologically realistic theory of how language is learned.

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References


Literacy

DANIEL A. WAGNER

Introduction

Literacy has been equated with freedom, economic development, and even civilization. Literacy comes with many different definitions, historical trends, and serious implications for individuals and societies all over the world. The study of literacy combines all social science disciplines, including psychology, linguistics, history, anthropology, sociology, and demography, but the field itself broadens beyond research to both policy and practice, from childhood through adulthood. Literacy, at its core, refers to the composite set of abilities needed to comprehend and produce written forms of language.

Within a cross-cultural developmental science perspective, literacy invokes a band of research that includes the intersection of both cognitive and social inputs to literacy development across the life span, along with contextual, cultural, and linguistic variations that shape literacy acquisition around the world. It would be convenient to be able to say that there is a consensus that ties together the various ways that social scientists view literacy, but such is not the case. Every subfield of literacy research has its own internal debates, and the disciplinary variants on literacy work assure that such debates, even over the meaning of literacy itself, will continue into the future. It needs to be kept in mind too that in industrialized countries, literacy acquisition begins and is completed largely in childhood and early adolescence, but that in poor and developing countries, literacy acquisition may take place in later adolescence and adulthood. The present analysis takes into account a breadth of research from early childhood through adolescence and into adulthood, while trying to give a sense of cross-cultural variation. This chapter begins with broad historical brushstrokes and then moves into several key domains of literacy work today, eventually focusing on policy and practice considerations for the future. As we shall see in later sections, the varieties of literacy used today, of which school-based literacy tends to be the most prominent, mirror the increased social complexity in rapidly changing societies.

Historical Perspectives on Literacy

The history of literacy has been the subject of a considerable number of scholarly studies in recent years (see Wagner, Venezky, and Street, 1999). Historical research indicates that literacy was often transmitted and practiced outside of what we now call “formal schooling.” For example, as early as the sixteenth century, reading was widespread in Sweden on account of family and church efforts to teach Bible reading at home (Johansson, 1987). In nineteenth-century Liberia, the Vai created a indigenous script and have used it ever since for economic and personal written communication (Scribner and Cole, 1981). Likewise, the Native American Cree of northern