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How social contexts support and shape language development ☆

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Abstract

The human potential for language is based in human biology but makes requirements of the social environment to be realized. This paper reports evidence regarding (1) the nature of those environmental requirements, (2) the ways in which the varied social contexts in which children live meet those requirements, and (3) the effects of environmental variability in meeting those requirements on the course of language development. The evidence suggests that all human environments support language acquisition by providing children with opportunities for communicative experience, which motivate the language acquisition process, and a language model, which serves as data for the language acquisition mechanism. Different environments do so to different degrees, thereby producing group and individual differences in the rate and course of language development.

Keywords: Social context; Language development; Environment

All normal children in normal environments learn to talk. This fact no doubt reflects innate capacities of the human species that make language acquisition both possible and virtually inevitable, but it may also reflect universally available environmental supports for language acquisition. One goal of this paper is to ask whether there is evidence of such universal environmental supports. Another fact about language acquisition is its

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variability. At every point in development, children differ in the size of the vocabularies they command, the complexity of the structures they produce, and the skill with which they communicate. This variability no doubt also has a genetic basis. Behavior genetic studies of language acquisition estimate the heritability of language to be between 1 and 82%-depending on the method of study, the language outcome, and the age of the children (Dale, Dionne, Eley, & Plomin, 2000; Ganger, Pinker, Chawla, & Baker, 2002; Reznick, Corley, & Robinson, 1997; Stromswold, 2001). The values of most of these estimates suggest that the environment also plays a role in explaining individual differences. A second goal of this paper is to ask whether variation in the degree to which children's environments provide the support on which language acquisition depends is a source of variation in children's rates or courses of language development.

Two different and largely separate approaches to the study of development form the backdrop to this current effort. One, which is common to much of the research on language acquisition, rests on the conceptualization of language acquisition as the product of mental processes that take as their input information from the environment and produce as their output the ability to produce and understand language. This conceptualization has been asserted or assumed in seminal works and introductory texts since the 1960s (e.g., Chomsky, 1965; Crain & Lillo-Martin, 1999; Hoff, 2003a, 2005). It makes central to the field the discovery of the nature of the mental mechanisms that perform this function. The second approach, more common in the study of social and cognitive development than language development, has its theoretical basis in the bioecological model of development, which focuses attention less on the internal processes underlying development and more on the shaping role of the social contexts in which children live (Bronfenbrenner, 1979, 1988; Bronfenbrenner & Morris, 1998; Tudge, Gray, & Hogan, 1997). The social contexts are described as a nested set of systems surrounding the child. The systems most distant from the child include culture, socioeconomic status, and ethnicity. These distal systems shape the proximal systems, which include schools, child care settings, and peer groups. The proximal systems are then the source of the child's direct interactions with the world, and these interactions are the primary "engines of development" (Bronfenbrenner & Morris, 1998, p. 996).

Combining these models of language acquisition and of child development yields a model in which the mechanisms of language acquisition reside in the head of the child while the child resides in a system of social contexts, thus raising the question of how the internal mechanism and external environment meet and interact. This question incorporates two questions that have typically been dealt with separately in the field of language acquisition. They are the questions of how the mind acquires language and of how the social context shapes language development. Research addressing the first question has typically not considered variation in the social context in which children develop as a factor. Research addressing the second question has tended to more frequently look at language use as the outcome more than at language acquisition, per se. There are exceptions to this generalization, however, and it is possible to cull from the literature a description of the relation of social context variables to language development. The literature on the relation of language development to language environments has been reviewed before (Gallaway & Richards, 1994; Hoff-Ginsberg & Shatz, 1982). The goals of these earlier reviews were to consider the case for the role of environmental support in language acquisition and to elucidate how the language acquisition mechanisms make use of that support. This review shares those goals and provides an updated consideration of the evidence in that regard. This review has the additional goal of connecting evidence

of how the language acquisition mechanism makes use of environmental support to the larger question of how the ecology of children's lives supports and shapes this human achievement.

Universal environmental supports for language development

Children acquire language under apparently widely differing circumstances. In some cultures, children are talked to a great deal and in others, very little. In some cultures children typically can observe adults' conversations and in others children are less frequently witness to interaction among adults. This variability not withstanding, there must be something that all cultures provide if language development arises out of human experience in addition to human DNA. Two proposals for universal contextual supports have been offered. One proposal argues that children need only to participate in or to observe conversations and to experience an affectionate interactional relationship with another (Crago, Allen, & Hough-Eyamie, 1997). The argument is that environmental support is necessary for children to learn that language can be used for communicative purposes and for children to have the motivation to do so themselves, but that acquisition of the linguistic system per se does not depend on input from the environment. A second proposal argues, in contrast, that in addition to providing opportunities for communication, all environments also draw the child's attention to speech, provide information about speech segmentation, and provide opportunities for making sound-meaning mappings. Different environments accomplish this in different ways. Western middle class mothers energetically engage babies in interaction, provide exaggerated clues to segmentation, and follow the child's attentional focus. In other cultures in which infants are not directly addressed, infants tend to be held in such a way that they can see adults talking and see what the adults are talking about (Lieven, 1994). Harkness (1990) has similarly argued that the contingency between language input and the nonlinguistic world that Western mothers provide their children by following their children's attentional focus is achieved in other societies by mother and child jointly focusing on a common topic. Together, these arguments suggest the hypothesis that the universal contextual supports for language acquisition include the opportunity for communicative interaction and an analyzable language model.

One way to test this hypothesis regarding the necessary environmental supports for language acquisition is to look at outcomes in the rare circumstances in which one or the other source of support is absent. Absence of a language model is the case for deaf children born to hearing parents who do not know any sign language. These children invent sign systems with which they communicate, and these sign systems show many features of language. The inventions of these children are a revealing window on the innate contribution to language (Feldman, Goldin-Meadow, & Gleitman, 1978; Goldin-Meadow, 2003), and it is telling, therefore, that none of these children has been observed to create a full-fledged language (Goldin-Meadow, 2003). Circumstances do exist in which new languages are created. The most recent and best-documented example of language creation is the emergence of Nicaraguan Sign Language in the last 40 years in the deaf community that arose in Nicaragua after the founding of the first schools for the deaf (Senghas & Coppola, 2001). The creation of language may well make use of the same human capacity as language acquisition and may shed light on the nature of that capacity, but it is not the same phenomenon. The process of language creation requires multiple potential speakers and much more time than the process of language acquisition requires of individual children.

Absence of a communicative partner, but availability of a language model, is the case for children who are exposed to a language only via television. This is the circumstance of exposure to a second language for many children (Snow et al., 1976) and, in rare cases, for the only language of hearing children of deaf parents (Sachs, Bard, & Johnson, 1981) In these cases, too, language acquisition does not result, although the language heard on TV may be inadequate for reasons other than the impossibility of two-way communication. Another source of evidence of the importance of a communicative partner are the cases of children who are social isolates, such as the "wild boy" of Aveyron (Lane, 1976) and Genie (Curtiss, 1977). Unlike the linguistically isolated deaf children of hearing parents, these children do not invent language systems (Shatz, 1994). Because these tests of the effects of depriving children of either a language model or a communicative partner are experiments of nature rather than well-designed studies and because they are few in number, their implications are only suggestive. Their suggestion, however, is that although language is quite reliably achieved given the ingredients of communicative opportunity and a language model, it is not achieved in the absence of either.

Variability across environments in support and in language development

If language acquisition depends on access to communicative opportunities and an analyzable language model, then language acquisition should proceed differently in environments that differ in the provision of these supports. The following sections test this prediction against data on the relation of social contextual variables to children's access to communicative opportunities and a language model and to children's language development.

It is important to note that the bioecological model is not a model of language development but a model of environmental sources of influence on development, broadly conceived. It could turn out that despite the foregoing evidence of universal environmental support for language acquisition, the bioecological model contributes nothing to the understanding of language development. This could be because language acquisition does not, in fact, depend on environmental support—the universals are a coincidence. Alternatively, it could be that supports above a minimum, universally achieved threshold have no effect on language development. Last, it could be that environmental variability in support matters, but the particular environmental variables identified in the bioecological model are irrelevant to variability in environmental support for language development. If, however, the social context variables specified in the bioecological model affect the availability of both communicative experience and a language model and these variables are also related to language outcomes, such evidence would suggest an integrated account of what in children's environments makes language acquisition possible while also making language outcomes variable. Effects of the more macro-level variables of culture, socioeconomic status, and ethnicity are examined first, followed by consideration of effects of the more micro-level variables that also define children's social environments including multilingualism, maternal age, birth order, child care and school, the settings of caregiver-child interaction, peers, television, and parents.

Cultural influences on language environments and language development

Two sorts of cultural variation in children's language environments have been well described in the literature. One, already mentioned, is a difference in the degree to which

adults engage prelinguistic children in communicative interaction. North American mothers talk to their infants from (or before) birth building "conversations" out of babies' burps and sneezes (Snow, 1977). In contrast, the Mayans of Mexico (Brown, 2001), the Walpiri of Australia (Bavin, 1992), and some groups of African Americans in the southern US (Heath, 1983), do not regard young children as potential or appropriate conversational partners, and children are not directly addressed by adults. The second well-described cultural difference is a difference between North American and Asian cultures in the degree to which conversation with children is focused on objects. North American mothers—at least the middle class, educated mothers who are most frequently studied—talk a great deal about objects when talking to children, and their speech contains a high proportion of concrete nouns. Asian mothers seem less object-oriented, and their speech contains proportionately more verbs and fewer nouns. Some of this difference can be explained in terms of structural differences between English and Asian languages, but some of it seems less narrowly linguistic and more a reflection of how North American and Asian mothers present the world to their children (Choi, 2000; Fernald & Morikawa, 1993; Tamis-LeMonda, Bornstein, Cyphers, Toda, & Ogino, 1992; Tardif, Shatz, & Naigles, 1997).

These cultural differences in the quantity and type of children's early language experience have been linked with differences in the course of early language development. In her review of the literature, Lieven (1994) argued that in cultures in which adults speak directly to prelinguistic children, children begin talking by producing single words that the modified speech they hear helps them to isolate from the speech stream. Later, they produce novel combinations of those words. In contrast, children who rely predominately on overheard speech for language do not get as easily parsed data and therefore begin talking by producing large memorized chunks of input, which they only later analyze into component words. Circumstantial evidence supports this argument. The developmental course that proceeds from single word utterances to combinatorial speech is the textbook course of development in Western, middle class children who are spoken to directly, and the development course that begins with production of larger memorized chunks of speech has been described in a rural African American culture in which children are not directly addressed by adults (Heath, 1983) and in children learning a second language in sink-or-swim circumstances (Bates, Bretherton, & Snyder, 1988; Wong Fillmore, 1991).

Turning to rate of acquisition as the outcome measure, data on cultural differences come in the form of independent reports of studies of different cultures rather than systematic studies of the effect of culture. There are suggestions in these data that language development proceeds less rapidly in cultures in which children are talked to less. Reports of the Walpiri of Australia and the Mayan of Mexico describe these children as late talkers compared to North American children (Bavin, 1992; Brown, 2001). Crago et al. (1997), however, have argued that Inuit children, who are also talked to very little, reach the major milestones of language development at ages comparable to middle class North American children. More cross-cultural data would help address this question, but there are limits to what could be learned from cross-cultural comparison of rates of language development. Cultures differ in how and how much they expect children to talk (e.g., Crago, Eriks-Brophy, Pesco, & McAlpine, 1997; Minami & McCabe, 1995), limiting the usefulness of measures of language production as bases for comparison. Studying language comprehension may provide a solution to this dilemma, although the challenges of developing tests of comprehension that produce comparable data across languages and cultures are formidable.

The consequences of the Asian-North American difference in object focus has been the subject of several studies, with the finding that the early vocabularies of English-speaking children are more dominated by nouns than the vocabularies of children acquiring Mandarin or Korean (Choi & Gopnik, 1995; Tardif, 1996; Tardif, Gelman, & Xu, 1999). Another, potentially culturally related, difference in children's early vocabularies has been found in a comparison of children in Italy, Argentina, and the US (Bornstein & Cote, 2005). Italian and Argentine children produced significantly more words for people (e.g., *aunt, grandmother*) than US children of the same age. Bornstein and Cote argue that this reflects cultural differences in the amount of contact children have with extended family. This cultural difference was only in vocabulary composition, not vocabulary size. In sum, cultures do vary in the communicative opportunities and language models that they provide young children, and the cross-cultural data on language acquisition suggest differences in language acquisition consistent with the hypothesis that the language acquisition mechanism depends on both.

Influences of socioeconomic status on language environments and language development

Conceptually, socioeconomic status (SES) is a compound variable, usually comprising education level, occupational prestige, and income, which together create "different basic conditions of life at different levels of the social order" (Kohn, 1963, p. 471). In studies of child development, SES is most frequently indexed using maternal education (Ensminger & Fothergill, 2003). The individual effects of the components of SES is, at present, an unanswered question (Ensminger & Fothergill, 2003), but whether measured with a single indicator or an aggregate variable, the effects of SES on children's language environments and language development are robust and substantial. A recent review of the literature on SES and parenting found consistent evidence, across cultures, that higher SES mothers talk more to their children than do lower SES mothers, that the speech of higher SES mothers more frequently is uttered for the purpose of eliciting conversation than the speech of lower SES mothers, and that the speech of lower SES mother more frequently is uttered for the purpose of directing their children's behavior than the speech of higher SES mothers (Hoff, Laursen, & Tardif, 2002). The magnitude of the differences in children's language experience associated with SES can be great. Heath (1990) has described children living in public housing with single mothers who have little education as living in virtual silence. A larger-scale and quantitative comparison of the in-home conversation in low-SES (on public assistance), mid-SES (working class), and high-SES (professionals) families with a child under 2 years suggested that over the course of one week children of high SES parents hear 215,000 words, children of middle SES parents hear 125,000 words, and children of lower SES parents who are on public assistance hear 62,000 words (Hart & Risley, 1995). The higher SES children in this study not only heard more total words than the lower SES children, but also they heard more different words. Despite hearing less talk overall, children of lower SES parents heard an average of 11 prohibitions per hour compared to 5 for the children of professional parents. It is worth noting that all of the parents in this study spoke lovingly of their children, all of these parents volunteered to participate in a study of their children's development, but, depending on SES, they had very different styles of interaction—particularly with respect to language use.

A similar pattern of differences in child-directed speech associated with the education and occupational levels of parents can be observed at the higher end of the socioeconomic

scale as well. A comparison of college-educated and high school-educated mothers' conversations with their 2-year-old children found that the college-educated mothers talked more and used a richer vocabulary, more frequently produced contingent replies to their children's speech, issued fewer directives, and asked more questions than did the high school-educated mothers (Hoff-Ginsberg, 1991, 1998). It is also relevant to a description of SES-related differences in child-directed speech that there are consistent effects of setting. Most notably, the extemporaneous speech mothers produce when looking at books with their preschool children is syntactically more complex and lexically richer than speech in other settings (Hoff-Ginsberg, 1991; Snow et al., 1976). Because children in higher SES families are read to more than children in lower SES families (Fletcher & Reese, 2005; U.S. Department of Education, 2001), the characteristic SES-related differences in mothers' language use are augmented by differences in the activities parents choose to engage in with their children.

With respect to associations between SES and children's language, a substantial body of evidence makes it clear that higher SES children have more advanced language skills than lower SES children of the same age. The most reliably observed difference is in the area of vocabulary. Among the 42 children studied by Hart and Risley (1995), SES-related differences in vocabulary size were noticeable from almost the beginning of speech, and they increased with development. By 3 years of age, the mean cumulative recorded vocabulary for the higher SES children was over 1000 words and for the lower SES children it was close to 500; SES accounted for 36% of variance in vocabulary in this sample. The children in Hoff-Ginsberg's (1998) study also showed SES-related differences in the size of the vocabularies they used in spontaneous speech, although the differences in family SES were smaller, the differences in maternal speech were smaller, and the SES-related differences in the children's vocabularies were also smaller; SES accounted for 5% of the variance in children's vocabulary in this sample (Hoff, 2003b). Other studies using spontaneous speech, maternal report measures, and standardized tests show similar findings, with the magnitude of the SES-related differences depending on the range of SES in the sample studied (Arriaga, Fenson, Cronan, & Pethick, 1998; Dollaghan et al., 1999; Pan, Rowe, Singer, & Snow, 2005; Rescorla, 1989). For example, SES accounted for less than 1% of the variance in vocabulary assessed via maternal report using the MacArthur Communicative Development Inventory (MCDI) in a fairly homogeneous, middle class sample (Fenson et al., 1994), but Arriaga et al. (1998) found that 80% of a sample of low income children scored below the 50th percentile on this same instrument. In a public school sample, Oller and Eilers (2002) found SES-related differences in Kindergarten and 5th grade children's scores on standardized tests of oral vocabulary equal to almost one standard deviation.

With respect to grammatical development, children from higher social strata have been found to produce longer responses to adult speech (McCarthy, 1930), to score higher on standardized tests that include measures of grammatical development (Dollaghan et al., 1999; Morrisset, Barnard, Greenberg, Booth, & Spieker, 1990), to produce more complex utterances in spontaneous speech as toddlers (Arriaga et al., 1998) and at age 5 (Snow, 1999), and to perform significantly better on measures of productive and receptive syntax at age 6 (Huttenlocher, Vasilyeva, Cymerman, & Levine, 2002). As an indicator of the magnitude of these effects on grammatical development, the low income sample studied by Snow (1999) had an average mean utterance length (MLU) at age 3;9 that would be typical of children more than a year younger according to norms based on a middle class

sample. At age 5;6, they had an average MLU typical of middle class children aged 3;1. Arriaga et al. (1998) found that 70% of low income children were below the 50th percentile on the MCDI measure of sentence complexity. On the other hand, the SES-related differences are not in whether or not children can use complex structures in their speech, but in the frequency with which they do so (Huttenlocher et al., 2002; Tough, 1982).

With respect to communicative style and skill, studies of school-aged children find SES-related differences in the communicative purposes to which language is put, such that children with less educated parents less frequently use language to analyze and reflect, to reason and justify, or to predict and consider alternative possibilities than children with more educated parents. It has been suggested that the structural differences in children's language associated with SES may be a byproduct of these functional differences (Tough, 1982). In an early sociological analysis of class and language, Bernstein (1970) similarly argued that higher- and lower-SES children do not differ in language knowledge but that differences in the communicative burden carried by language give rise to differences in the amount, the structure, and the lexical repertoire of the speech produced.

SES-related differences in school-aged children also appear in the ability to communicate meaning through language and to draw meaning from language—sometimes referred to as speaker and listener skills (Lloyd, Mann, & Peers, 1998). In the referential communication task, which requires children to describe one item in an array of objects so that a visually separated listener with the same array can identify that item, lower SES children are less able than higher SES children to produce sufficiently informative messages and to use information in messages addressed to them to make correct choices (Lloyd et al., 1998). Children from lower socioeconomic strata also perform less well than higher SES children in solving mathematics word problems. That some of this difference is attributable to language ability, not mathematical ability, is suggestion by evidence from one sample of lower SES children who showed poorer performance than higher SES children in word problems and in tests of verbal skills but who did not differ in their performance on in math calculations (Jordan, Huttenlocher, & Levine, 1992).

An obvious and important question for the enterprise of identifying environmental influences on language development is whether the SES-related differences in children's language reflect differences in ability rather than experience. One relevant source of evidence is studies in which SES, children's input, and children's language development are all measured, and the role of input as a mediator of the SES-language development relation is tested. There are two such studies, and both suggest that SES-related differences in children's language development reflect differences in experience, not just differences in ability. Hoff (2003b) found that the SES-related differences in the richness of maternal speech fully explained SES-related differences in 2-year-old children's vocabulary development. Huttenlocher et al. (2002) found that variation in the syntactic complexity of maternal speech substantially explained SES-related differences in the syntactic complexity of 5-year-old children's speech. Relatedly, Hart and Risley (1995) found that although SES predicted both the input that parents provided and their children's vocabulary growth, actual measures of input were stronger predictors of child outcome than was SES. These findings do not eliminate ability differences as a source of SES-related differences in the population, but they do suggest that SES-related differences in the input are part of the story.

The literature also contains findings of no difference in language development associated with SES. In Hoff-Ginsberg's (1998) study of $2\frac{1}{2}$-year-olds, there were significant differ-

ences between children of high school- and college-educated mothers in vocabulary size but not in utterance length. The Bristol Study, which spanned a greater range of SES, found some differences in grammatical development, but not in the pragmatic functions of children's speech (Wells, 1986). Snow (1999) reported that SES differences are greater for measures of productive vocabulary than comprehension vocabulary, but Wells (1986) reported that the clearest SES-related difference is in oral comprehension. Two studies have reported SES-related differences in children's vocabulary, with lower SES children showing larger vocabularies. Both used the MCDI, and both attributed their findings to lower SES mothers' tendencies to over estimate their children's abilities (Feldman et al., 2000; Fenson et al., 1994). This mix of findings makes it clear that the statement that SES affects language development must be qualified by a description of the language outcome, the method of measurement, and the range of SES under consideration, although just what those qualifications would be is not quite clear from the literature. It is also possible to argue against the whole enterprise of comparing language development across socioeconomic strata on the grounds that it is as conceptually ill-founded as comparing the language development of children from different cultures because lower SES children may be learning a different style of language use than higher SES children. On the other hand, SES-related differences do appear on measures of comprehension, not just production (Huttenlocher et al., 2002; Snow, 1999), and the existence of stylistic differences does not mean that children from different social strata differ only in style of language use. Thus, as was the case for culture, the weight of the evidence suggests that SES affects children's opportunities for communicative interaction and the availability of language input with the consequence that, even after effects of language style are taken into account, the rate of children's language development differs as a function of SES.

Influences of ethnicity on language environments and language development

Ethnic diversity is clearly associated with diversity in the social environment of language learning, but because ethnicity covaries with SES and with dialectical variability in the language itself, effects of ethnicity are difficult to isolate. African Americans are the most studied ethnic group, although the literature on African Americans is still small. Mothers in low-income African American families have been described as less child-centered and less conversation-eliciting than mothers in European American middle class families (Heath, 1983). In contrast, middle class African American families show interaction patterns much like those described for European American middle class families (Massey, 1996). A direct comparison of white and African American middle class and working class parents in a picture labeling task with their children found effects of both SES and ethnicity: on average white parents provided more information about objects than African American parents, and in both groups middle class parents provided more information than working class parents (Lawrence & Shipley, 1996). Eisenberg (1996) similarly found that both SES and ethnicity affected parents' speech to children in a study of Anglo and Mexicano families from different social strata.

Turning to effects of ethnicity on language development, the research on African American children suggests a complicated picture. One study of low income African American children found that their very early vocabulary and grammatical development were in keeping with general population norms but that by 30 months the children started to fall behind (Roberts, Burchinal, & Durham, 1999). School aged African American

children consistently perform below norms on standardized tests of language development (Mount-Weitz, 1996), but several factors make interpretation of this finding difficult (Craig, 1996). Ethnicity is confounded with SES, and SES has known effects. Also, dialect differences between the variety of English spoken by many African Americans and the variety of English assessed in standardized tests may affect children's scores (Washington, 1996).

The degree to which African American children use the features that distinguish African American English (AAE) from English as spoken by Americans of European descent in the northern regions of the US is, itself, an outcome of interest in the study of African American children's language development. There is wide variation on this dimension among African American children, some of it systematically related to SES, to the level of integration in the community, to gender, and to discourse genre. Among African American children, boys, children from low SES families, and children in nonintegrated communities show greater density of AAE features in their speech than do girls, children from higher SES families, or children living in integrated communities (Craig & Washington, 2004). African American children also code-switch, displaying more features of AAE in free play than in more structured interactions (Craig & Washington, 2004). The relation of AAE use to other aspects of language development in African American children is not clear. Evidence from one sample of preschoolers suggests that children who use more AAE features also use more complex syntax (Craig & Washington, 1994) and more complex semantics (Craig & Washington, 1995). On the other hand, evidence from slightly older children suggests that some children shift to using fewer AAE features when they begin first grade, and these children outperform their peers who do not shift on standardized tests of reading and vocabulary (Craig & Washington, 2004).

Last, and in contrast to the picture of weak language skills suggested by studies of standardized test performance, ethnographic studies of language use in social interactions of school-aged African American children document unique strengths in narrative, interactive, and poetic uses of language that do not afford quantitative comparison to language use by children in other ethnic groups (e.g., Gilmore, 1983; Goodwin, 1990; Hester, 1996; Hyter & Westby, 1996). In sum, the findings from research on African American parents and children suggest that ethnicity affects both children's input and their language development. The effects on the rate of language development are indistinguishable in the available data from effects of SES. In contrast, the acquisition of contrastive features of AAE and the unique stylistic features of the language of African American children suggest group-specific influences of input on the outcome of language development.

The influence of multilingualism on language environments and language development

Approximately half the children in the world live in multilingual environments (De Houwer, 1995; Tucker, 1998), yet the range of variation in multilingual environments and their consequences for language acquisition are only beginning to be documented. The circumstances of multilingualism vary enormously, and even confining discussion to the best-studied circumstance of bilingualism, environments vary. For example, one language may be spoken in the home and another in the community, or two languages may be spoken in the home but only one in the community, or the home and the community both may be bilingual. For language learning children in bilingual homes, their exposure to two languages may be fairly balanced, or one language may dominate.

Like monolingual children, children acquiring more than one language vary in their language development. One frequently made observation about the consequences of multilingual exposure is that simply overhearing a language in the conversations of others is not sufficient for language acquisition (Snow et al., 1976). Even being addressed in multiple languages does not guarantee that multiple languages will be acquired. Children for whom a second language constitutes less than 25% of their input, according to parental report, tend not to acquire that language (Pearson, Fernandez, Lewedeg, & Oller, 1997).

Given sufficient input for language acquisition to occur, the rate and course of language development in children acquiring two languages has been described as similar to the rate and course of monolingual development (Genesee, Paradis, & Crago, 2004; Petitto et al., 2001). To the extent that this description is true, the effect of exposure to more than one language is simply that more than one language is acquired, implying that the language acquisition mechanism can work in parallel on two tasks. Other evidence suggests, however, that the bilingual child is not two monolinguals in one (Genesee et al., 2004; Grosjean, 1982) and that bilingualism has consequences for the acquisition of each language. There is evidence, for example, that phonological development may proceed differently in children exposed to multiple languages. In the case of monolingual development, phonetic perception becomes tuned to the target language during the first year of life. Infants lose the ability to hear phonetic contrasts that their ambient language does not use and form phonetic categories that capture the distinctions their language does use (Kuhl & Meltzoff, 1997; Werker & Tees, 1984). Some infants exposed to two languages that make use of different contrasts seem to develop the phonetic categories of both the languages they hear (and thus may be like two monolinguals in one), but some do not. These other children in bilingual environments may process both of the languages they hear through a single phonological system (Werker, Weikum, & Yoshida, 2006).

Lexical development appears to follow the same course in bilingual and monolingual children, but children learning two languages tend to have smaller vocabularies in each of their languages than do children learning only one language (Oller & Eilers, 2002; Pearson et al., 1997). Vocabulary differences between monolingual and bilingual children as large as one standard deviation remain observable at age 10 (Oller & Eilers, 2002). At least some aspects of grammar are also mastered later by bilingual children than by monolinguals (Gathercole, 2002a, 2002b, 2002c). The role of input in explaining these differences in lexical and grammatical development is made clear by the findings that the relative size of bilingual children's vocabularies in each of their languages is a function of their amount of exposure to each (Pearson et al., 1997) and that for school aged children, the size of the differences between monolingual and bilingual children in vocabulary and grammar is a function of how much exposure to each language the bilingual children have both at home and at school (Oller & Eilers, 2002).

It is important to complement this picture of delay associated with bilingualism with the point that bilinguals' language knowledge is "distributed" (Oller & Eilers, 2002). Because bilinguals typically are exposed to their different languages in different settings, they know different sorts of vocabulary in each language. For example, bilingual children are likely to know the vocabulary related to academic subjects in the language of schooling and vocabulary related to domestic topics in the language used at home. Bilingual children's total conceptual vocabularies (i.e., the number of concepts they have words for) may be equivalent in size to monolingual children's vocabularies (Pearson et al., 1997). A logical, but untested, extrapolation from this work is that bilingual children's mastery of structural

aspects of their two languages may also differ as the settings in which each is acquired differ in the way language is used. For example, children who use one language orally at home may be more familiar with the forms that informal language use requires and less familiar with the formal forms. It has been suggested that blanket statements about the effect of bilingual exposure on language development are not reasonable. Rather, the effects depend on what aspect of language development is under consideration and the similarity between the two languages that the child is learning. For example, to the degree that the phonological inventories or syntactic rules of two languages overlap, learning accomplished in one language is useable in both languages. Where a bilingual's two languages differ in phonological inventory or syntactic devices, there will not be transfer and there may be interference, with the result that bilinguals will develop in each language at a slightly slower pace than monolinguals (Oller & Jarmulowicz, in press).

Although there are effects of amount of exposure to each language on language proficiency, the one study that asked whether there is a tradeoff in proficiency between a bilingual individual's two languages found none. Cobo-Lewis, Eilers, Pearson, and Umbel (2002) found no negative and only weakly positive correlations between their subjects' English and Spanish standardized oral language test scores (reading and writing scores showed strong positive correlations). The finding of no tradeoff between a bilingual's two languages with respect to oral language development may reflect individual differences in language learning ability, which would work in the same direction for both languages, attenuating a tradeoff in the amount of exposure to each language. It is also the case, however, that a tradeoff in time exposed to each language is not a logical necessity. Some bilingual children have more experience with each of their languages than other monolingual children have with one (De Houwer, 2005).

The evidence from the study of language development in multilingual environments, in sum, is consistent with the hypothesis that language development requires communicative opportunity and a language model. Given only a language model, as in overheard speech, language is not acquired. Given both, multiple languages can be acquired, at a rate influenced by the amount of communicative opportunity and language input provided and by the relevance of input in each language to the acquisition of the other language.

The influence of age of caregiver on language environments and language development

Compared to children raised by older mothers, children raised by adolescent mothers have different language experiences and, possibly, different language outcomes. Adolescent mothers (mean age = 15 years) have been found to speak less, produce fewer utterances in joint attention, provide fewer object labels, produce less affectionate speech, and issue more commands than young adult mothers (mean age = 23 years) (Culp, Osofsky, & O'Brien, 1996). These are exactly the differences associated with SES, but in this sample care was taken to match the adolescent and young adult mothers on education. No studies have looked specifically at language outcomes in the children of adolescent mothers, but there are findings that preschool children of adolescent mothers have lower IQ scores than children of older mothers matched for SES (Brooks-Gunn & Furstenberg, 1986; Carlson, Labarba, Sclafani, & Bowers, 1986). Given the substantial verbal component of IQ tests, it seems reasonable to infer that adolescent parenting may negatively affect children's language development, although in these data the possibility of genetically transmitted relations between mothers' and children's IQs cannot be eliminated.

Sometimes a child's young caregiver is not an adolescent mother, but a young aunt, an older cousin, or an older sibling. In rural Kenya, older children are frequently caregivers, and they have been found to use less complex speech, ask fewer questions, and sustain less continuous dialogue with their 2- to 3-year-old charges than do mothers (Harkness, 1977). Young Nigerian baby-maids (mean age = 10 years) talk less and use more imperatives in interaction with young children than do Nigerian mothers (Nwokah, 1987). With respect to outcomes, Harkness (1977) found among the Kenyan children she studied that those who spent more time talking to adults were linguistically more advanced for their age (i.e., had higher MLUs) than children who spent less time talking to adults. A genetic basis for this finding seems less plausible. Being the child of an adolescent mother appears to be another social context variable with influences on language experience and language development.

Birth order influences on language environments and language development

In cultures and in families in which children are cared for in the home by their mothers, the first born child experiences a different early social and language environment than do later born children. First born children are temporarily only children, and while that status lasts they have greater possibilities for communicative interaction with an adult and greater exposure to adults' child-directed speech than later borns ever do. When a sibling is present, each child receives less speech directed solely at him or her because mothers produce the same amount of speech whether interacting with one or two children (Jones & Adamson, 1987). In addition, the functions of mothers' speech differ depending on whether they are interacting with one or two children. Mothers' speech in triadic interactions is more centered around activities and social interaction whereas speech in dyadic interaction contains more talk about language itself (Oshima-Takane & Robbins, 2003). There also may be structural and lexical differences in the speech mothers address to first and later born children, but the evidence here is scanty and does not yield a consistent account of such differences (Hoff-Ginsberg, 1998). The role of older siblings as a source of input is another reason that the language environments of first and later born children differ (Hart & Risley, 1999). Older siblings differ from mothers in the speech they address to young children: their speech more frequently serves social-regulatory functions (Oshima-Takane & Robbins, 2003), is structurally less complex, and uses a smaller vocabulary (Hoff-Ginsberg & Krueger, 1991).

With respect to birth order effects on language outcomes, first borns appear to have an early advantage in the development of vocabulary and syntax, but later borns may have an advantage in the development of conversational skills. Later borns also have been found to be more advanced in the production of personal pronouns than first born children (Oshima-Takane, Goodz, & Deverensky, 1996). Evidence of a general first born advantage in early vocabulary development comes from several studies. Fenson et al. (1994) found significant birth order-related differences in children between 8 and 30 months using the MCDI, although birth order accounted for only 1% of the variance. In 20-month-old children, Jones and Adamson (1987) also found birth order-related differences using maternal report, but no differences appeared in spontaneous speech. In 24-month-olds, Hoff-Ginsberg (1998) found first borns used larger vocabularies in spontaneous speech, and first borns have been found to reach the 50-word milestone on average one month sooner than their second born siblings (Pine, 1995). The early path of vocabulary development may also be affected by birth order. First borns are particularly likely to show a referential style

of vocabulary acquisition, such that their vocabularies are more dominated by object labels than the vocabularies of later borns, who are more likely to be expressive-style language learners (Goldfield & Reznick, 1990). Evidence is equivocal with respect to longer term vocabulary differences associated with birth order. Hart and Risley (1999) found no differences at age 3 years, but a literature review found first borns and only children scored higher on standardized tests of vocabulary (Bates, 1975).

Evidence of a first born advantage with respect to syntactic development comes from studies of spontaneous speech and maternal reports during the preschool years (Bernicot & Roux, 1998; Fenson et al., 1994; Hoff-Ginsberg, 1998). There is also evidence that some language advantage for first borns persists through school age that may or may not have a syntactic basis. Again, Bates (1975) reported in a review of the literature to that date that most studies found first borns and only children scored higher on standardized tests of sentence comprehension, and other less well defined measures such as ''enunciation'' and ''communicativeness'' (e.g., Moore, 1968). Lieven (1994) and Pine (1995) also suggest that first born and later born children may take different routes in early syntactic development. They argue that first born children are more likely to take the analyze-first, speak-later route, whereas later born children are more likely to take the speak-first, analyze-later route characteristic of children in cultures where adults do not direct speech to prelinguistic children. Thus reliance on overheard speech and limited or no access to a captive conversational partner, whether due to culture or birth order, may give children less pre-parsed data to work with and at the same time push them to talk if they want to be included.

With respect to the development of communicative skill, there seem to be some advantages for later born children. Hoff-Ginsberg (1998) and Bernicot and Roux (1998) found later born preschool-aged children were less likely to produce noncontingent responses in conversation with their mothers than first born children of the same age. This could be because mothers become more supportive conversational partners with later born children, or it may be that the later born children have more pressure to learn the conversational skills required for entry into ongoing conversation (Dunn & Shatz, 1989). The advantage later borns show in communicative skill may also be a benefit of the opportunity for interaction with other children that siblings provide. Research on the role of peers in language development, which is discussed in a later section, suggests interactions with other children may make a unique contribution to children's language learning experiences. These effects of birth order are consistent with the hypothesis that variation in access to communicative interaction and a language model produces variation in the rate of language development. The findings that first borns are more advanced in vocabulary and grammar but later borns are more advanced in conversational skill further suggest that different experiences are relevant to each aspect of development. They suggest that the development of conversational skill may be driven by motivational factors, but the acquisition of language per se is paced by the availability of data. The finding that later borns are more advanced in the production of personal pronouns is evidence that, even though overheard speech is not an adequate data base by itself, children do learn some things about language from the speech they overhear (Oshima-Takane et al., 1996).

The influence of child care experience on language environments and language development

The environment of a child who spends eight or more hours a day in a group care setting is certainly different from the environment of a child at home with his mother, but, as

it turns out, being in child care as opposed to home care has little effect on early language development (NICHD Early Child Care Network, 2000). In contrast, variability among child care settings does. The US national study of early child care found that the amount of language directed at children by caregivers in the child care setting is a positive predictor of children's language development at 15, 24, and 36 months, using standardized tests and maternal reports of child language (NICHD Early Child Care Network, 2000), although child care experience accounts for only 1.3–3.6% of the variance. Other studies have similarly found that the amount of one-to-one interaction with adults that children experience in group care settings is a positive predictor of language development among children in group care (McCartney, 1984) and that a composite measure of preschool child care quality significantly predicts children's receptive vocabulary at kindergarten (Peisner-Feinberg et al., 2001).

The influence of school on language environments and language development

For somewhat older children, school is another environment in which they hear and learn language, and children's language experiences at school differ—to different degrees for different children—from their language experience at home. Talk at school is frequently decontextualized (Snow, 1983), whereas talk at home is more likely to be about the here-and-now. Language use at school tends to follow mainstream, middle class norms, which may be different from language use in the home for some children. For example, the narrative structure expected in classroom "sharing time" or "show and tell" differs from the narrative structure that is typical of storytelling in some African American groups (Michaels, 1981). Also, question routines in which the adult asks the child a question that the adult knows the answer to and the child knows that the adult knows the answer (e.g., *How many checkers do you have now?*) are a staple of classroom interactions but not of all homes (Crago et al., 1997; Heath, 1983). As a result, higher SES children experience continuity when they move to a school environment, and their school language experience builds on skills begun at home. In contrast, lower SES children experience discontinuity. Skills begun at home are not built upon, and the lower SES children begin school behind in the language skills the school requires. Issues of style aside, school is also a place where children are exposed to speech that illustrates the vocabulary and grammar of their language.

Although research on the effects of school language is sparse, there is evidence of influence. First, being in school is associated with more rapid language development than not being in school. Huttenlocher, Levine, and Vevea (1998) found that children's language skills progressed more rapidly during the school year than over summer vacation. Variation in school experience also has an effect. Preschool children in classes where the teachers' speech is syntactically more complex show greater syntactic growth over the school year than children in classes where the teachers' speech is syntactically less complex (Huttenlocher et al., 2002). More general measures of the quality of kindergarten classroom practices are related to children's vocabulary at the end of the school year, and a program that trains early childhood teachers in language and literacy practices is associated with greater than control group vocabulary gains among children in those classrooms (Dickinson, St. Pierre, & Pettengill, 2004). In sum, the effects of language experiences in child care and at school, though not necessarily large, are reliable, and they are consistent with the hypothesis that the amount and quality of language input children receive has effects on children's language development.

The influence of conversational settings on language environments and language development

The setting of interaction influences the nature of the talk produced. Several studies have compared the mother–child interactions that occur in book reading to those that occur in toy play. The findings are that mothers produce more speech per unit of time in book reading and that speech during book reading is structurally more complex, uses a larger vocabulary, includes a higher frequency of questions, includes a higher frequency of talk about language, and includes a lower frequency of directive and social regulatory speech (Goddard, Durkin, & Rutter, 1985; Hoff-Ginsberg, 1991; Jones & Adamson, 1987; Snow et al., 1976; Weizman & Snow, 2001). The frequency of object labels and of explicit labeling (e.g., "*This is a tiger*.") is greater during book reading than during toy play interactions (Choi, 2000; Hoff, 2003c). The effect of book reading on the nature of maternal speech is sufficiently strong that it attenuates the effect of SES, bringing the structural complexity and vocabulary use of lower SES mothers up to the level of higher SES mothers (Hoff, 2003c; Hoff-Ginsberg, 1991). The shaping effect of the book reading setting on the nature of child-directed speech is also sufficiently strong that variability among mothers in how they read to their children is not a predictor of language development (Weizman & Snow, 2001), whereas variability in the time children spend in book reading with an adult is a predictor of vocabulary development (Payne, Whitehurst, & Angell, 1994; Scarborough & Dobrich, 1994). Mealtime is another setting in which children observe and participate in conversation—often multiparty conversations. Mealtime also appears to be a setting that is construed differently in different households. In some households the purpose of mealtime is to eat; in others it is more of an occasion for conversation, often including extended narratives as family members recount their days (Beals, 2001; Hoff-Ginsberg, 1994). Variability in language use during mealtime has been found to predict children's subsequent vocabulary development (Beals, 1997; Dickinson & Tabors, 2001; Weizman & Snow, 2001).

The influence of peers on language environments and language development

Young children interact with peers in play groups, in child care settings, and in preschool, and peer interaction may be a significant context for language acquisition. That children learn some language from their peers is obvious. Often to the dismay of their parents, small children come home from preschool with words that they did not hear at home and that the teacher is not likely to have produced. More substantively, the fact that languages change over historical time means that children do not end up speaking exactly as their parents do—they follow their peers, and they do so from at least the age of 3 years (Labov, 1972).

A role for peers in language acquisition is also suggested by studies of bilingual development. Bilingualism that exists only in the family and not in the community is very difficult to sustain (e.g., Leopold, 1939–1949), and in the absence of peers as a source of native input, children may not acquire native-like competence. This latter possibility is suggested by study of the Spanish-English bilingual community of South Florida, where bilingualism is prevalent but children tend not to have native-like competence in either language. Oller and Eilers (2002) suggest one possible reason for the low levels of language competence is that language is significantly learned in the context of peer interaction, and there are virtually no children in this community who are monolingual, native speakers of either language to provide models of native levels of competence.

In addition to serving as a source of language models, peers also may provide unique opportunities for language use and may serve as particularly powerful agents of language socialization (Ervin-Tripp, 1991). Very young children (aged 1–2 years) engage in sound play with peers, and this is something adults are less inclined to do. From 2 years on, peers, more than adults, provide the opportunity to engage in joint planning, negotiate conflicts, provide explanations, tell stories, and engage in a variety of types of multi-party interactions. Friends, in particular, may provide opportunities for using advanced language to express and resolve conflicts (Pellegini, Galda, Flor, Bartini, & Charak, 1997). Thus far, research on this topic consists primarily of description of the sorts of interactions that occur in young children's peer groups and identification of the pragmatic skills such interactions require (e.g., Kuntay & Senay, 2003; Pesco & Crago, 1996; Preece, 1992; Sheldon, 1996) but not analyses of the relation of these experiences to measures of language development.

Although peers may be an important source of input and may be a unique source of language socialization opportunities, the evidence suggests that peer interaction alone is not a sufficient context for language acquisition. Children must get input from expert speakers, and they must get it in fairly substantial amounts. When expert input is reduced, for example by high child–teacher ratios in child care settings or when children are twins, language development is slower than otherwise (Bates, 1975; McCartney, 1984; NICHD Early Child Care Research Network, 2002).

The influence of television on language environments and language development

Television is a significant feature of many children's environments, watched both at home and in child care settings. Language exposure via television differs from language exposure through social interaction because in watching television the child is not a participant in the activities that the language is about. On the other hand, examinations of the language in educational programs aimed at preschool children have found that it contains many of the features of speech used in direct interaction with children: the speech on TV describes ongoing events visible on the screen, includes many repetitions and questions, and novel words receive prosodic stress (Rice, 1984; Rice & Haight, 1986).

The effect of TV watching on language development appears to depend on what is watched. The total amount of TV children watch bears a small negative relation to their levels of grammatical and lexical development, but these data come from correlational analyses of concurrent measures (Naigles & Mayeux, 2000). Thus, it could well be that TV is merely associated with other factors that are negatively related to language development. Other evidence suggests that time spent watching age-appropriate educational TV has a positive relation to lexical development. A prospective longitudinal study found that the amount of Sesame Street watching was a positive predictive of future vocabulary development in 3- and 4-year-olds, but not in 5-year-olds (Rice, Huston, Truglio, & Wright, 1990). Other research has demonstrated that children learn the particular words illustrated on such TV programs (Naigles et al., 1995; Singer & Singer, 1998), bolstering the conclusion that the positive correlations obtained reflect a causal relation. Thus, the data suggest that 3- and 4-year-old children can learn some new vocabulary from educational programming aimed at preschoolers. The qualifiers of this conclusion may be of more general relevance than the central assertion. That is, even the best TV is not a fully adequate source of language input, watching general programming and watching shows

aimed at younger or older audiences probably has no benefit to language development, and, to the degree that it replaces the activities that do benefit language development, TV watching may have a negative effect.

To summarize, the foregoing survey of social context variables suggests that social contexts do differ in the support they provide for language development with consequences for children. Children in social environments that provide them with more communicative interaction, particularly with an engaging and responsive communicative partner, and more adult-produced, child-directed speech, particularly speech that uses a rich vocabulary and complex structure—acquire language more rapidly than children in social environments that provide less of these supports.

The influence of parents on language environments and language development

Parents are a primary source of language experience for most children, and parents vary in the experiences they provide. Some of this variation is systematically related to the just-reviewed variables of culture, SES, and ethnicity, but there is also a great deal of variation that is unrelated to these larger contextual variables. It is impossible to make a general statement about the relative importance of the larger social context variables versus individuals as sources of variability because the answer depends entirely on the variables under question and the nature of the sample. For example, Hart and Risley (1995) found that professional parents addressed, on average, over three times as many words to their 2-year-old children as did parents receiving welfare. In contrast, Hoff (2003b) found a much smaller SES-related difference in the amount of child-directed speech comparing groups that were closer on the SES continuum: college-educated mothers addressed approximately 25% more words to their 2-year-old children than did high-school educated mothers. Both studies reported large variation within groups, and other studies have found substantial variation in maternal speech within low-income samples (Dickinson & Tabors, 2001; Pan et al., 2005; Rowe, Pan, & Ayoub, 2005; Weizman & Snow, 2001).

The hypothesis that provision of communicative experience and language input are the means by which contexts support and shape language development yields the prediction that within-group variation among parents in the provision of these experiences should be part of the explanation for within-group variation in children's language development. This prediction can be tested against the literature that has described individual differences among parents (usually mothers) in how they interact with their children and the consequences of those differences for language outcomes. The following review of this substantial literature is organized by the properties of maternal behavior and language use that serve the functions of either providing communicative opportunities or providing a language model.

Effects of maternal responsivity and contingency

Communicative opportunities depend upon mutual engagement, and some mothers pursue engagement by being responsive to their children's prelinguistic vocalizations and to their speech more than do other mothers. The children of more responsive mothers begin to talk sooner and reach the milestone of a 50-word vocabulary at a younger age than do children of less responsive mothers (Tamis-LeMonda, Bornstein, Baumwell, & Damast, 1996; Tamis-LeMonda, Bornstein, Baumwell, Kahan-Kalman, & Cyphers, 1998). The children of mothers who frequently produce contingent replies to their

children's early verbalizations develop syntax more rapidly than the children of less contingent mothers (Snow, Perlmann, & Nathan, 1987). In fact, several measures of maternal responsiveness, both to vocalizations and to play, predict the timing of the achievement of basic language milestones (Tamis-LeMonda, Bornstein, & Baumwell, 2001).

In interpreting this finding, it is important to note that measures of verbal responsiveness not only index mothers' efforts at engagement, they also often index the amount of verbal input mothers provide. That is, mothers who frequently respond verbally to their children's play and vocalizations provide their children with more language input than mothers who respond infrequently. Maternal speech that is responsive to child behavior is particularly likely to be interpretable by the child, and contingent replies are likely to be good primary data because they are often expansions or recasts of children's prior utterances which have been shown to be positive predictors of language development (Nelson, Carskaddon, & Bonvillian, 1973; Newport, Gleitman, & Gleitman, 1977). The point is that the positive relation between verbal responsiveness and child language development can be interpreted as both an effect of engagement and also as effects of the amount and nature of the language data provided.

Effects of joint attention

Engagement is more directly reflected in measures of joint attention, and substantial evidence suggests that language is best learned when the child and adult are in a joint attentional state. Children who at 14 and 15 months are better at achieving joint attentional states develop language more rapidly than other children (Carpenter, Nagell, & Tomasello, 1998; Mundy & Gomes, 1998). Differences among mother–child dyads in the time they spend in joint attention when the children are under 18 months predict subsequent vocabulary growth (Carpenter et al., 1998; Laakso, Poikkeus, Katajamaki, & Lyytinen, 1999). More rapid vocabulary development in children (particularly those under 19 months) is associated with maternal input that follows the child's attentional focus, rather than input that attempts to redirect the child's attentional focus (Akhtar, Dunham, & Dunham, 1991; Harris, Jones, Brookes, & Grant, 1986; Tomasello & Farrar, 1986, & see Carpenter et al., 1998, for a summary). Some of these effects can be quite large. For example, Akhtar et al. (1991) found a measure of maternal following of the child's attention at 1 year, 1 month accounted for 60% of the variance in children's vocabularies at 1 year; 10 months.

Effects of the communicative functions of maternal speech

Talk that elicits conversation from the child also creates mutual engagement, and mothers vary in the degree to which the speech they address to their children is uttered for the purpose of eliciting conversation (Hoff-Ginsberg, 1986, 1991; McDonald & Pien, 1982; Olsen-Fulero, 1982). The frequency of conversation-eliciting questions in maternal speech positively predicts children's grammatical development (Hoff-Ginsberg, 1985, 1986; Hoff-Ginsberg & Shatz, 1982), although some of this benefit is probably the result of structural features of questions such as making aspects of verb phrase structure salient (Shatz, Hoff-Ginsberg, & MacIver, 1989).

A different purpose of maternal speech is to direct behavior, and evidence suggests a negative relation between mothers' use of directives and children's development of both grammar and vocabulary (Barnes, Gutfreund, Satterly, & Wells, 1983; Newport et al., 1977). This may be due in part to structural and lexical properties of directives: they tend

to be short and not to provide new information. The frequent use of directives in speech to children old enough to respond verbally, however, may indicate a style that does not engage children in discourse. Consistent with this argument, several studies have found that a high use of directives is negatively associated with frequent use of questions—at least in some samples (Della Corte, Benedict, & Klein, 1983; Hoff-Ginsberg, 1991; McDonald & Pien, 1982). Last, directives may be less useful for language learning than other types of utterances because they tend not to occur in episodes of joint attention. It is particularly directives that attempt to redirect the child's attentional focus that are negatively related to children's language development (Dunham, Dunham, & Curwin, 1993; Tomasello & Farrar, 1986), and directives that follow the child or encourage the child's continuing attention are positively related to language development (Akhtar et al., 1991; Vibbert & Bornstein, 1989).

Effects of the quantity of child-directed speech

Greater access to language models results in more rapid language development. The evidence for this assertion comes from multiple findings that the total quantity of speech addressed to children at home and in day care is related to both general measures of children's cognitive and linguistic development (Bradley & Caldwell, 1976; Clarke-Stewart, 1973; McCartney, 1984) and to specific measures of lexical, semantic, and syntactic development (Barnes et al., 1983; Huttenlocher, Haight, Bryk, Seltzer, & Lyons, 1991). Other properties of child-directed speech covary with quantity, however. Mothers who talk more also produce more pairs of semantically related utterances (Hart & Risley, 1995; Hoff-Ginsberg, 1991, 1994) and use a richer vocabulary (Hoff & Naigles, 2002) than mothers who talk less. Thus, isolating the source of the positive association between maternal talkativeness and children's language development is difficult. Hart and Risley (1999) have made the suggestion that where parents differ in the amount of speech they address to their children, it is not in the amount of speech used to regulate behavior, but in the amount of "extra" nonregulatory speech they produce, and they further suggest that the language advancing properties of speech are found in this "extra" nonregulatory speech.

Effects of redundancy in child-directed speech

Adult speech to young children is highly repetitious, and when adults produce a sequence of utterances that are only minimally different from each other, they may be providing children with useful data (see Hoff-Ginsberg & Shatz, 1982 for a fuller argument). Hoff-Ginsberg (1986) found that the frequency with which mothers produced self-expansions or recasts (i.e., utterances that included repetition or partial repetition of her own prior utterance), was a positive predictor of children's grammatical development, accounting for between 18 and 40% of the variance, depending on the measure. Cross (1978) found that mothers of children who were relatively advanced in MLU for their age produced more of several categories of self-repetitions and expansions than mothers of less rapidly developing children.

Effects of the syntactic complexity and lexical richness of child-directed speech

At one time it was hypothesized that child-directed speech supports language development by providing a simpler model of language than does adult-directed speech and, by extension, that within the variability in child-directed speech that exists, simpler is better. That latter hypothesis is not supported by the evidence. There is one finding in the

literature that shorter maternal MLUs are positively related to children's syntactic development (Furrow, Nelson, & Benedict, 1979), but that finding has never been replicated despite multiple attempts to do so (Pine, 1994). To the contrary, some evidence suggests that children who hear longer utterances in input are more advanced in syntactic development (Harkness, 1977; Hoff-Ginsberg, 1998; Huttenlocher et al., 2002). Additionally, some of the features of input that are positively associated with children's syntactic development, such as question-asking, increase its grammatical complexity. With respect to vocabulary development, two studies have recently found that longer MLUs and richer vocabulary in input is associated with larger vocabularies in 2-year-old children (Bornstein, Haynes, & Painter, 1998; Hoff & Naigles, 2002). In one sample, the effect of SES on children's vocabulary was fully mediated by these properties of maternal speech (Hoff, 2003b). The benefit of a rich vocabulary in input may be part of the reason that the total amount of speech directed to children is a positive predictor of vocabulary development. The more speech that mothers produce, the greater the number of different words they produce. It is also true, of course, that mothers who produce more speech illustrate the same words more times, and frequency in input is a strong correlate of word learning (Huttenlocher et al., 1991; Naigles & Hoff-Ginsberg, 1998).

Despite the findings that simpler maternal speech is not associated with more rapid language development than more complex maternal speech, it still may be the case that the average degree of simplification in child-directed speech benefits language acquisition. All of the observed benefits of complexity were obtained within the range of complexity in child-directed speech. Furthermore, children may filter out, by not processing, input that is too complex—with no negative consequences to language development—so long as sufficient processable input is available. In contrast, children have no way to make up for input that is too simple.

Effects of clues to meaning in input

The context in which new words are introduced to the child may provide clues to meaning and thus affect word learning. Learning common nouns (i.e., names for things) may be aided by mothers' explicit labeling of objects for children. Roger Brown (1958) described this sort of interaction as "the original word game" and he and others have argued that it plays an important role in vocabulary acquisition (Ninio, 1983; Ninio & Bruner, 1978). This is the characteristic of middle class Western mothers' speech that is argued to be the source of the high proportion of nouns their children's vocabularies (Goldfield & Reznick, 1990). Further indirect support for this hypothesis comes from the finding that maternal speech during book reading contains an especially high frequency of such explicit ostension (Hoff, 2003c) and book reading experience is associated with vocabulary development in young children (Payne et al., 1994; Scarborough & Dobrich, 1994). Another source of clues to meaning, at least for verbs, is the variety of syntactic environments in which verbs appear in input (Naigles & Hoff-Ginsberg, 1998). Again, contrary to the simpler-is-better view, verbs that children hear in a greater variety of sentence structures are acquired earlier than verbs that children hear equally often, but in fewer different sentence structures.

In sum, individual differences among parents are a source of variability in children's experiences which is, in turn, correlated with variability in children's language development. In broad outline, the same properties of experience that were implicated as contributors to variability in language development across social contexts seem to play a role

within social contexts. They are the degree to which children observe or participate in communicative interaction and the amount and nature of the language input provided in those interactions.

Conclusion

The evidence that all environments provide children with opportunities to see language used for communicative purposes and to hear samples of speech makes plausible the hypothesis that the human language acquisition mechanism requires these experiences and that the universal acquisition of language reflects these universal properties of environments—in addition to reflecting genetic properties of the human species. The evidence of co-occurring variability in the degree to which children experience communicative interaction and hear analyzable speech and the rate or course of their language development further supports the hypothesis that the language acquisition mechanism depends on these environmental supports. The evidence of co-occurring variation in environmental support and language development also contributes to explaining individual and group differences in language development. That is, all normal human environments meet the basic environmental prerequisites for language development, but different environments do so in different ways and to different degrees with consequences for the rate or course of language development.

Sources of environmental effects on language development

The bioecological model of development (Bronfenbrenner, 1979; Bronfenbrenner & Crouter, 1983; Bronfenbrenner & Morris, 1998) provides a useful framework for considering how the multiple sources of environmental influence exert their effects on language development. Culture and SES provide overarching ideologies of childrearing and characteristic modes of language use and interaction. These factors, in turn, influence what children actually experience—the institutions such as child care centers and schools, the people within and outside the family with whom the child interacts, the settings in which interactions occur, and the nature of the interactions themselves. In addition, factors operating at the level of the individual mother, teacher, sibling, or child care provider are also sources of variance in children's experience that have consequences for their language development.

Loci and magnitude of environmental effects on language development

The nature and magnitude of the environmental effects on language development are different for different aspects of language development. Language use is most susceptible to environmental influence. Like other aspects of interpersonal behavior, language use is socialized to match community expectations from an early age. For example, by the age of 5 years, if not earlier, the language use of African American children from low income families differs from that of white, middle class children (Heath, 1983), and the narratives that Japanese children produce differ from the narratives of North American children (Minami & McCabe, 1995).

Vocabulary development is also affected by context. Children whose social experience provides more communicative opportunities and richer input build their vocabularies at

a faster rate than children with less communicative experience and less rich input. The magnitude of these effects can be large. In Tamis-LeMonda et al. (2001) children of the top and bottom 10% of mothers in terms of verbal responsiveness and stimulation differed by 5 months in the timing of the achievement of a 50-word vocabulary. In Hoff and Naigles (2002), 24% of the variance in 2-year-old children's growth in productive vocabulary was accounted for by two properties of maternal speech. In Huttenlocher et al. (1991), 20% of the variance in vocabulary growth curve acceleration between 14 and 26 months was attributable to the amount of speech mothers produced. Bornstein et al. (1998) accounted for 60% of the concurrent variance in children's vocabulary sizes with a model that included maternal SES, person characteristics of mothers, and mothers' vocabulary use. The content of children's early vocabularies also varies as a function of context. For example, children in Argentina know more words for people and children in the US know more words for objects (Bornstein & Cote, 2005), and the degree to which early vocabularies are dominated by nouns varies across cultures, languages, birth order, and maternal style (Hoff-Ginsberg, 1998; Tardif et al., 1997, 1999).

Some would argue that grammar is the most canalized of language components, because the grammatical knowledge that all children achieve is much the same across languages. It is consistent with this argument that heritability studies typically yield higher estimates for grammar than for vocabulary (Dale et al., 2000; Ganger et al., 2002; Reznick et al., 1997), and studies that have looked for environmental effects on both vocabulary and grammatical development have often found larger effects on vocabulary development than on grammatical development (Arriaga et al., 1998; Hoff-Ginsberg, 1998). That notwithstanding, some of the observed effects of experience on grammatical development are substantial. Barnes et al. (1983) found that the amount of speech mothers addressed to their 2-year-old children accounted for 16% of the variance in children's MLU growth over the following 9 months. Hoff-Ginsberg (1985, 1986) found relations between properties of mothers' speech and children's grammatical development that accounted for between 18 and 40% of the variance.

Beyond environmental effects to the mechanisms of language development

The environment can only exert an influence via mechanisms that make use of it. The findings reviewed here suggest that the language acquisition mechanism makes use of communicative experience and language data. Although correlations between maternal speech and child language development could be reflections of a common genetic verbal talent (Pinker, 2002), correlated variability at the level of large groups, such as whole cultures, is less likely to have a genetic basis. Also, the foregoing evidence included findings of relations between children's language development and the input they receive at school, in child care, and on television, and the finding that, among children exposed to two languages, their rate of development in each is related to the proportion of their input that they receive in each language (Oller & Eilers, 2002; Pearson et al., 1997). These effects, and effects of birth order, could not have a genetic basis. In addition, the relations between the nature of input and the nature of the correlated aspect of language development can be quite specific. For example, the order in which words enter children's vocabularies depends on the frequencies of those particular words in maternal speech (Huttenlocher et al., 1991; Naigles & Hoff-Ginsberg, 1998) and, for verbs at least, on the degree to which the structure of the sentences in which they are used reveals their meanings (Naigles &

Hoff-Ginsberg, 1998). The age at which children begin to use auxiliary verbs in their speech depends on the frequency with which their mothers use those verbs in question forms which make the auxiliary salient by preposing it with the subject (*Can the truck fit here?*) Furthermore, effects of input on vocabulary and grammatical development have been demonstrated in experimental manipulations of children's input (Hollich, Hirsh-Pasek, K, & Golinkoff, 2000; Schwartz & Terrell, 1983; Shatz et al., 1989; Valian & Lyman, 2003). These data clearly imply that children learn language from input.

The present conclusion that the environment contributes to language acquisition both by illustrating communicative interaction and also by providing data for language analysis suggests that the mechanisms of language acquisition are both social and cognitive/linguistic in nature. The social basis may be of two sorts: the opportunity to communicate with another person, that is, the opportunity to meet another mind, may be a profound motive and catalyst for language development (Bloom, 1993; Bloom & Tinker, 2001), and the communicative understandings that children and their conversational partners can achieve on a nonlinguistic basis (eye gaze as a clue to reference, for example) may help children crack the linguistic code. The first social basis would fit Chomsky's (1965) suggestion that certain kinds of experience "may be required to set the language-acquisition device into operation, although they may not affect the manner of its functioning in the least" (p. 33). The second social basis places socially derived information into the database that children use to induce language. These social sources of motive and information cannot be the complete story, however, or properties of children's language input such as utterance length and vocabulary richness would have no consequence—and they do.

Language development appears also to depend on a process of culling patterns from primary linguistic data (Maratsos, 1998; Tomasello, 2003). This pattern extraction process is the "manner of functioning (Chomsky, 1965, p. 33)" of the language acquisition device. Admittedly, there is no current, fully adequate, account of how all of language could be achieved via analysis of input, and the evidence of environmental effects reviewed here neither makes a claim for adequacy nor addresses the details of what sort of pattern extraction the child does. What the foregoing evidence does argue with respect to the mechanisms of language acquisition, is that input from the environment matters and that it is not just the communicative functions of input that matter. There is a body of work on the effects of experimenter-provided input on language development, and this sort of research is better suited to identifying the specific value of isolated properties of input than the naturalistic data reviewed here (see, for example, Hollich et al., 2000; Naigles, 1996; Shatz et al., 1989, and discussions of the implications of that literature in Hoff, 2004; MacWhinney, 2004; and Tomasello, 2003).

The environment is not the whole story, of course. The environment provides support only to those with the capacity to make use of it. That capacity includes the capacity to achieve and find satisfying the state of mutual engagement with another and the capacity to find underlying patterns in the speech signal and in its relation to meaning. In the normal course of events, these innate capacities are met by a human environment that provides other people with whom the child may engage and from whom the child hears meaningful speech. Language development is the reliable result of the mental processes set in motion when the child meets the social and linguistic world. To the degree that ontexts differ in how they meet the child, language development takes different forms in different contexts.

Future directions

The foregoing review of the literature on the relation of children's social environments to their language development has suggested the outlines of how the language acquisition mechanism makes use of environmental support, resulting in the universal acquisition of language, but along different developmental paths, at varying rates, and with varying outcomes depending on the nature of the communicative experiences and the language model provided. Many details of this account need to be filled in. One set of questions concerns the magnitude and source of environmental effects. It is difficult to discern from the available data an estimate of the total amount of variance attributable to environmental factors and even more difficult to properly apportion the variance accounted for among individual predictors. It is clear that the properties of children's environments that predict language development are interrelated, both concurrently and over time. For example, we know that mothers who talk more to their 2-year-olds also use a richer vocabulary (Hoff & Naigles, 2002), and it may well be that mothers who follow their 1-year-old children's attentional focus also ask conversation-eliciting questions when those children are 2 years old. Longitudinal research over longer periods of time and with larger and more diverse samples than has typically been the case would help to fill in the picture of how variability in children's environments contributes to variability in children's language development. Larger sample sizes will allow inclusion of more contextual variables in single study, longer-term longitudinal studies will provide a more comprehensive picture of both experience and development over its course, and both larger samples and longer-term studies will allow the field of language development to take advantage of recent statistical advances in the modeling of growth and identifying predictors of growth. Some such studies already exist, and their findings attest to the promise of this approach (Huttenlocher et al., 1991; Rice, Tomblin, Hoffman, Richman, & Marquis, 2004; Rice, Wexler, & Hershberger, 1998).

In pursuing this comprehensive picture of environmental effects on language development, research needs also to provide a richer description of the nature of children's language experiences, how they vary across social contexts, and what remains constant despite contextual variability. To do so will require systematic comparative studies of children's experiences in different environments. Single culture, ethnographic descriptions of environments have made the important point that environments differ, but to properly test the hypothesis offered in this review, there needs to be direct comparison of environments. This requires measures of children's experience that can be applied across contexts. Some work of this sort has been done, for example, comparing mothers' provision of object labels in conversation with their young children across multiple languages and cultures (Choi, 2000; Fernald & Morikawa, 1993; Tamis-LeMonda et al., 1992; Tardif et al., 1997). The meaningful comparisons that can be made are limited, however, by the availability of measures that are equivalent across groups, and there is work to be done in developing such measures. In the terminology of cross-cultural and cross-linguistic work, researchers need to derive from the emic measures used within cultures and languages, etic measures that allow comparison across cultures and languages (Berry, 1989; Berry, Poortinga, Segall, & Dasen, 1992).

Similarly, theoretical and empirical work need to provide a way for comparing language development outcomes across languages and cultures. Again, some work has been

done, but as was the case for comparisons of input, direct comparisons of language acquisition across groups are most readily made in the domain of vocabulary (Bornstein & Cote, 2004, 2005; Tardif et al., 1999). More needs to be done to provide a way to compare the acquisition of phonology and morphosyntax across typologically different languages. Some of this will be linguistic work addressing questions of how to measure grammatical development across languages with very different grammars. There are also issues of language style. Because cultural expectations for children's talk vary a great deal, measures of language knowledge based on spontaneous speech will not always be a meaningful basis for comparison across cultures. Measures of comprehension will need to be developed. Again, such work has begun across levels of SES within a culture (Huttenlocher et al., 2002).

A rich description of the environment and its effects is one component of the database necessary for an understanding of how the environment supports and shapes language development. A description of the learning mechanisms that mediate the effects of the environment on language development is the other necessary component. Toward that end, there is an important role for experimental work that manipulates experience in order to test hypotheses about experience-outcome relations and for computational simulations that test hypotheses about what language knowledge could be derived from the information available in children's experience. Ongoing and future complementary naturalistic and experimental work on the relation of language experience to language development hold the promise of a more complete picture of how children learn to talk, supported by the varying social circumstances in which they live.

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