CHAPTER 4

Learning a Semantic System
What Role Do Cognitive Predispositions Play?

MELISSA BOWERMAN

To what extent is language "teachable"? The answer to this question is closely bound up with the answer to another: In what sense is language *learned?* Successful teaching presupposes learning—learning that takes place in response to deliberate modifications of the environment. If some linguistic structures or constraints are not in any significant sense learned—because they are either inborn or set to develop in a fixed way according to an internal maturational timetable—these structures will be relatively insensitive both to natural environmental variations and to manipulations of the input. When children do not acquire language normally and must be helped, teaching is likely to promote only those aspects of language whose acquisition normally depends to some significant degree on a particular kind of linguistic or nonlinguistic experience. But which aspects of language are these?

The question of what is innate and what is learned has long been the most fundamental theoretical issue in the study of language acquisition. Following Chomsky's influential arguments for an inborn "Language Acquisition Device" (e.g., Chomsky, 1965), controversy initially focused on whether there is innate knowledge of syntactic structure (and of course this is still hotly debated). Although many researchers were persuaded by Chomsky's arguments that the then-reigning theory of learning, behaviorism, was incapable of accounting for the acquisition of grammar, they did not, like him, necessarily assume that this meant that grammar was not learned. Instead, they suspected that children's developing cognitive understanding, together with their general capacity to detect and mentally represent regularities, might be a sufficient basis on which to acquire grammar.

One important line of theorizing pursued by cognitively minded investigators gave a major role in language acquisition to children's growing conceptual

knowledge. This approach held that a critical foundation for language learning is laid during the prelinguistic period, as the infant builds up an understanding of such basic notions as objects, actions, causality, and spatial relations. As children begin to want to communicate, they search for the linguistic forms (content words, grammatical morphemes, word order or intonation patterns, etc.) that will allow them to encode their ideas. Initial lexical, morphological, and syntactic development, according to this view, is a process of learning to map linguistic forms onto preestablished concepts, and these concepts, in turn, at first serve to guide the child's generalization of the forms to new contexts.

Although this approach was at first fueled partly by the desire to provide a "learning" alternative to Chomsky's innatism, it has gradually developed some important nativist tendencies of its own. In particular, researchers point to growing evidence that the initial semantic categories of children learning the same or different languages show many intriguing similarities. These similarities can be accounted for if we assume that the way children conceptualize and classify the elements of their experience is not free to vary arbitrarily, but rather is shaped and constrained by the inherent properties of the human perceptual and cognitive system. According to this hypothesis, children's early categories may be "learned" in the sense that experience is required to set their development in motion, but they will develop in a relatively uniform way despite exposure to different linguistic and nonlinguistic environments.

The goal of this chapter is to evaluate this important proposal. First I review the rise of the hypothesis that children's early language maps onto a universally constrained set of meanings that emerges independently of experience with any particular language. Following this, I argue that although there is good evidence that children do have cognitive biases with respect to the organization of meaning, the position has been overstated. In particular, I present evidence that recent theorizing has overestimated the strength and specificity of children's cognitive predispositions for semantic organization, and, conversely, underestimated the extent to which, even from a very young age, children are sensitive to language-specific principles of semantic categorization that are implicitly displayed in the linguistic input. In concluding, I suggest some possible implications for children's language disorders.

EVIDENCE SUGGESTING COGNITIVE PREDISPOSITIONS FOR SEMANTIC ORGANIZATION

In the modern era of the child language research, the belief that children come to the task of acquiring language equipped with prestructured categories has developed only over the last 20 years or so (although of course the idea that humans apprehend the world with innate categories of mind has a much longer

philosophical tradition).[1] In the 1950s and 1960s, researchers generally assumed the opposite, that the meanings children associate with linguistic forms are constructed through linguistic experience, for example, by a process of abstracting the properties of objects, events, relationships, and the like that remain constant across successive uses of a form by fluent speakers (see Brown's [1958, Chap. 6] characterization of "The Original Word Game"). Interest was also strong in the extreme statement of this position, associated with Whorf (1956), that not only is children's understanding of the world shaped by the categories provided by their language ("linguistic determinism"), but also that languages differ so radically in the way they classify reality that learners of different languages end up with essentially noncomparable systems of thought ("linguistic relativity").

What happened to change these ideas? Interrelated developments in several different disciplines contributed to the shift, and it is worth reviewing them briefly.

Linguistics

During the earlier part of the 20th century linguists were fascinated by evidence from newly described American Indian languages for the apparently endless ways that languages could differ from one other. By the 1960s, however, interest began to turn away from diversity and toward similarity. Underlying all the apparent differences, were languages in some respects all alike?

Inspired by Chomsky, initial work on language universals was aimed primarily at formal syntactic properties of language. Gradually, however, semantics came in for attention as well. Comparative studies such as Berlin and Kay's (1969) classic work on color terminology began to show that languages are indeed more similar in their semantic structure than had previously been supposed (see also Heider, 1972); other examples include Allan's (1979) study of the semantics of classifier systems, Talmy's (1975, 1976) work on the semantics of motion and causation, and chapters in Greenberg (1978) on a variety of se-

[1]A few remarks about terminology: In this chapter, the words "category" and "concept" are often used interchangeably. Traditionally, a "category" has been defined as a (potentially infinite) group of items (objects, actions, relationships, etc.) that, although distinguishably different, are responded to as if at some level they are "the same" (e.g., the same word is applied to them). "Concept" is the term for the mental representation that provides the grouping principle for a category (it is also used to refer to mental constructs in a more general way, as in "the concept of object permanence"). For present purposes, this distinction is often unimportant. By the "meaning" of a word or other linguistic form is intended the concept that guides the form's use, or, more loosely, the associated category. Still more loosely, "meaning" is sometimes used to refer to a prelinguistic concept that is a candidate for being linked to a form. The term "semantic" is used in connection with concepts, categories, distinctions, and so on, that *make a difference* in the structure of the language under consideration (e.g., that govern the choice between two contrasting forms). It is not equivalent to "cognitive" or "conceptual," since aspects of nonlinguistic understanding may often have no consequences for the structure of a particular language.

mantic domains. For some domains, particularly color, there was also evidence linking cross-linguistic similarities to properties of human physiology (see Bornstein, 1979, for a review). It began to seem as if the semantic organization of language, far from influencing or determining speaker's categories of thought, was itself a reflection of deep-seated properties of human perceptual and cognitive organization.

Psychology

In the late 1960s, interest increased enormously among American developmental psychologists in the work of Piaget (1954, 1970), who attributed little role to language in children's more general cognitive development. According to Piaget, children acquire a basic grasp of concepts of space, causality, object permanence, and so forth in the first 18 to 24 months of life, when language is still absent or rudimentary.

An additional influence was new approaches to the fundamental psychological process of categorization, including in particular research on prototype structure and "basic level categories" by Rosch (1973; Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976). This work suggested that natural language categories are less arbitrary than had often been thought, and more "given" in the correlational structure of reality. This meant that reliable clues to categorization were available to children independently of language, and, indeed, Rosch and Mervis (1977) demonstrated that children can categorize objects at the "basic level" before they learn names for them.

On still another front, new work on infant cognitive and perceptual development began to show that babies have less to learn than had previously been assumed. Rather than experiencing the world as a "blooming, buzzing confusion," infants appear to come "prewired" to interpret their experiences in certain ways, for example, to pick out objects from their background (Spelke, 1985), to infer causality (Leslie & Keeble, 1987), and to perceive changes along certain physical continua in a discontinuous or "categorical" way (see Bornstein, 1979, and Quinn & Eimas, 1986, for reviews).

Language Acquisition

Studies of language acquisition both fed into the developing "nonlinguistic meanings first" view of the relationship between language and thought and were influenced by it. Three important lines of early research were: (1) studies of the semantic properties of children's first word combinations, (2) work on determinants of the order in which children within and across languages acquire the members of a set of linguistic forms, and (3) analyses of children's overextensions of words.[2]

[2]Equally important was research on the more general relationship between cognitive and linguistic development, such as studies of whether linguistic advances can be linked to the establishment of the concept of object permanence or other cognitive milestones. I omit these here in the

Semantic Relations and Early Word Combinations An important finding of research of the late 1960s and early 1970s was that regardless of the language being learned, children's first sentences revolve around a restricted set of meanings to do with agency, action, location, possession, and the existence, recurrence, nonexistence, and disappearance of objects (Bloom, 1970; Bowerman, 1973; Brown, 1973; Schlesinger, 1971; Slobin, 1970). These semantic commonalities led several researchers (e.g., Bowerman, 1973; Brown, 1973; Schlesinger, 1971) to hypothesize that early syntactic development consists of children's discovery of regular patterns for positioning words whose referents are understood by the child as playing relational roles like "agent," "action," and "location." The relational roles are not learned through language, according to this view, but instead reflect the way children come to conceptualize the structure of events during the sensorimotor period of development (see Brown, 1973). This hypothesis was the starting point for a more general idea that developed over the 1970s: that children initially link not only word order patterns but also many other grammatical forms and construction patterns to categories of meaning and pragmatic function that have developed prior to, and independently of, language.

Order of Acquisition A second important line of research was initiated by Slobin's (1973) proposal that the order in which children acquire linguistic items is jointly determined by two factors: the order in which the relevant meanings are understood and the relative formal linguistic complexity of the items themselves. The time of emergence of the meaning expressed by a language form sets the lower boundary: the form will not emerge until the child has a grasp of the relevant concept. However, acquisition can be delayed beyond this point if the formal means of expression are difficult. A fundamental tenet of Slobin's approach was that the semantic basis for acquisition is universal: "the rate and order of development of the semantic notions expressed by language are fairly constant across languages, regardless of the formal means of expression employed" (1973, p. 187).

Subsequent work has strongly confirmed that relative difficulty of meaning plays an important role in the time of acquisition of linguistic forms, and there is evidence for a few semantic domains that the sequence of cognitive mastery is similar across children learning different languages. For example, Johnston and Slobin (1979) established that the order of acquisition of locative markers is remarkably consistent across languages, and Johnston (1979) showed further that the order in which English-speaking children acquire locative prepositions mirrors the order in which the underlying concepts are grasped, as determined by nonlinguistic testing (see also Corrigan, Halpern, Aviezer, & Goldblatt, 1981; Halpern, Corrigan, & Aviezer, 1981). An analo-

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interests of concentrating on the problem of categorization, but see, for example, Bowerman (1978b), Cromer (1987), and Johnston (1985) for reviews.

gous cross-linguistically shared sequence was established by Clancy, Jacobsen, and Silva (1976) for the emergence of the meanings underlying the use of connectives like *and, but, when,* and *if.*

Overextensions and Other Non-Adult-Like Uses A third early impetus for the "meanings first" position was the approach to children's early acquisition of word meaning pioneered by Eve Clark in her (1973b) publication, "What's In a Word?" In this chapter Clark called attention to the phenomenon of overextension—children's use of words for a broader range of referents than is appropriate in adult speech. After reviewing and classifying reported overextensions from a variety of languages, Clark concluded that children at first link words to perceptual properties of objects that are salient to them prior to language, and that possibly reflect biologically given ways of viewing and organizing the world (Bierwisch, 1967, 1970).

Clark's claims engendered much debate about the relative importance of overextension versus underextension, overlap, and "mismatch" of children's word meanings relative to those of adults, about whether children's early word use reflects perceptual or functional concepts, and about whether early categories are based on necessary-and-sufficient conditions or have a prototype or family resemblance structure (e.g., Anglin, 1977; Bowerman, 1978a; Nelson, 1974). Throughout these controversies, however, most researchers agreed with Clark that early words are mapped to meanings that arise in the child before the words themselves are learned. The reasoning behind this assumption was that if the meanings were learned from observing how adults use the words, the range of referents for which children use the words should be closely similar to those for which adult speakers use them, not persistently larger, smaller, or "different."

COGNITIVE PRETUNING FOR LANGUAGE: STILL STRONGER EVIDENCE

The various kinds of evidence I have outlined strongly support the hypothesis that cognitive/perceptual understanding of some sort must be established before certain linguistic forms are acquired. However, with the exception of E. Clark's proposals, they are not very specific about the exact properties of this understanding. In particular, they do not indicate that, at any given level of cognitive development, children are biased to *categorize* the situations they understand in one way rather than another, nor do they show that their early preferred categorization principles are universally important across languages.[3] However, additional research shows that, in applying linguistic forms to refer-

[3]See Bowerman (1976, 1987), Labov (1978), Newport (1982), Plunkett and Trosberg (1984), and Schlesinger (1977) on the difference between the ability to understand and interpret experiences on a nonlinguistic basis and the ability to categorize them.

ents, children often classify spontaneously on the basis of categorization principles that play a role in the semantic systems of natural languages.

Overextensions Revisited

Several researchers have noted that children's overextensions and word substitution errors are often strikingly well motivated from a linguistic point of view. That is, although the perceived similarities and differences among objects, events, and the like that guide the child's use of a form may be incorrect for that particular form, they often define semantic categories that are important in languages, sometimes even in connection with translation-equivalent forms in other languages.

For instance, consider again children's initial overextensions of words for objects, which, according to E. Clark's (1973b) analysis, are based primarily on salient perceptual properties of objects. In a later study, Clark (1977) showed that the categories that guide children's object-word overextensions are strikingly similar to the meanings encoded by noun classifiers in languages that have classifier systems (noun classifiers are a system of obligatory markers that must accompany or can often replace nouns in specific syntactic contexts, such as after numerals, e.g., *two ROUND-THINGS balls/stones/gourds, five LONG-THINGS pencils/poles, three FLAT-THINGS rugs/newspapers*). In both children and classifier systems, according to Clark, "objects are categorized primarily on the basis of shape, and the same properties of shape appear to be relevant in acquisition and in classifier systems. Roundness and length . . . appear to be very salient" (1977; p. 263 in 1979 reprint). Clark concludes that the categories defined by children's overextensions of object words are similar to the meanings of classifiers because both reflect, and are constrained by, fundamental properties of the human perceptual system.

Errors with body-part terms and related words provide a second example of spontaneous classifications that are linguistically "sensible." English-speaking children sometimes make overextensions like *hand* for "foot," *ankle* for "wrist," *sleeve* for "pantleg," and *kick* for an action of throwing (Bowerman, 1980). Although the everyday vocabulary of English has separate words for body parts and actions involving upper and lower extremities, many other languages have words that collapse the distinction; for example, the word for "finger" is often also used for "toe" (see Andersen, 1978, for a discussion of cross-linguistic constraints on body part terms and further evidence that these constraints play a role in language acquisition). English-speaking children's errors indicate that even though they are learning a language that models a differentiated classification scheme, they are still able to recognize parallels between upper and lower extremities, and so command a mode of categorizing body parts that is often important for language.

For a third example, consider periphrastic causative constructions. In these sentences English makes an obligatory distinction between "active" and

"permissive" causation, as illustrated by the meaning difference between *MAKE John sing* (active: do something to bring John's singing about) and *LET John sing* (permissive: do not do something that, if done, would prevent John from singing). Although English-speaking children respect this distinction most of the time, they occasionally substitute *make* and *let* for each other: for example, "I don't want to go to bed yet; don't LET me go to bed" (= don't MAKE me go to bed; said after the child has been told to go to bed), and "MAKE me watch it" (= LET me watch it; said as the child begs to be allowed to watch a TV program) (Bowerman, 1978c). These errors suggest that the meanings of *make* and *let* in periphrastic causatives are closely related for children, even though they are learning a language that does not encourage this classification. And this sensitivity to the similarity in meaning between the two forms is linguistically well founded: many languages make no obligatory distinction between active and permissive causation, but construct causative sentences with a single causative morpheme that can mean either MAKE or LET, according to context (Comrie, 1981).

Basic Child Grammar

Scattered evidence that there is a close relationship between children's spontaneous ways of organizing meaning and classification schemes that are common in the world's languages has been assembled and marshalled into a strong hypothesis by Slobin (1985). Slobin's proposal concerns the acquisition of forms that constitute the closed-class or "grammaticized" portion of language; that is, inflections and other bound affixes, prepositions and postpositions, connectives, negative markers, and so on. Following Talmy (1978, 1983, 1985), Slobin proposes that there is a difference between the kinds of meanings expressed by open-class and closed-class forms: the former are essentially unbounded, while the latter are quite constrained. As Talmy puts it:

> [Grammatical forms] represent only certain categories, such as space, time (hence, also form, location, and motion), perspective-point, distribution of attention, force, causation, knowledge state, reality status, and the current speech event, to name some main ones. And, importantly, they are not free to express just anything within these conceptual domains, but are limited to quite particular aspects and combinations of aspects, ones that can be thought to constitute the "structure" of those domains. (1983, p. 227)

After reviewing cross-linguistic evidence concerning the meanings that children initially associate with a variety of different grammatical forms and constructions, Slobin (1985) concludes that children, like languages, are constrained in the meanings they assign to the grammaticized portions of language. Specifically, he proposes that children approach the language acquisition task with a prestructured "semantic space" in which meanings and clusters of meanings (which include pragmatic as well as semantic notions) constitute a "privileged set of grammaticizable notions" onto which functors and other

grammatical constructions are initially mapped. The particular forms that get mapped vary from language to language, of course, but the basic meanings are constant. The outcome of this initial mapping process (which, in addition to the basic "grammaticizable" meanings, includes certain constraints on the cooccurrence and positioning of forms) is a "universally specifiable 'Basic Child Grammar' that reflects an underlying ideal form of human language" (p. 1160).[4]

Slobin's specific proposals about the core meanings that constitute children's initial "semantic space" are based primarily on evidence for typical patterns of overextending and underextending inflections and other grammatical forms. A paradigm illustration concerns children's acquisition of markers associated with transitivity. In many languages, the direct objects of transitive verbs must be marked with an accusative ending (e.g., *John opened the box*-ACC.) In some languages, it is the subject of a transitive sentence rather than the direct object that requires special marking. According to Slobin (1982, 1985), when children learning a language of either kind begin to use the relevant markers, they at first restrict them to the objects or subjects of verbs that specify a *direct physical manipulation* of an object, such as *break, take,* and *throw.* Only later is the marker extended to the objects or subjects of nonmanipulative verbs like *see, read,* and *call (to).*

To explain this pattern Slobin proposes that children are initially sensitive to an experiential gestalt that he terms the "prototypical transitive event" (1982) or the "manipulative activity scene" (1985): a causal event in which an animate agent intentionally brings about a physical and perceptible change of state in a patient by means of direct bodily contact or with an instrument under the agent's control. This category of events serves as a core meaning that initially attracts markers associated with transitivity in the language the child is learning. Slobin notes that the "manipulative activity scene" is important not only to children but also to the structure of language more generally. For example, Hopper and Thompson (1980) have identified it as the core conceptual notion associated with markers of transitivity in all languages, and in many languages it has served as the historical starting point for forms that eventually spread to become general markers of transitivity (Givón, 1975; Lord, 1982).

Although English lacks general markers for the objects or subjects of transitive verbs, children learning English also seem to be sensitive to the "manipulative activity scene." In an analysis of self-referent forms (*I, me, my,* name) in the spontaneous speech of six children between 20 and 32 months of age, Bud-

[4]This proposal has close correspondences with Bickerton's (1981) claim, based on creole studies, that there is an innate universal cognitive/semantic substratum for language—the "language bio-program." More distantly, it is also related to Pinker's (1984) "semantic bootstrapping" hypothesis, according to which children use certain nonlinguistic concepts to identify instances of the grammatical categories or roles with which they are most highly correlated (e.g., "if a word names a concrete object, it must be a noun," or "if a word names an entity that performs the role of agent, it must be the subject of the sentence").

wig (1985, 1986) found that, for the three children who referred only to themselves and never to others in sentence-subject position, selection among pronouns correlated with degree of agentivity of the subject. Thus, *my* tended to occur in utterances expressing events in which the child acted as a prototypical agent bringing about a physical change (*My blew the candles out, My cracked the eggs*), whereas *I* was used primarily in utterances expressing the child's experiential states and intentions, or activities that did not result in change (*I like peas, I no want those, I wear it*).

Summary

To summarize, the various lines of evidence sketched above all indicate that children can spontaneously categorize objects, events, situations, and the like for purposes of linguistic expression. Further, these spontaneous categories are often of "the right kind"—that is, categories that are important in the semantic/grammatical systems of languages, even though perhaps not in connection with the particular forms to which children have linked them. This evidence testifies to an impressive contribution from nonlinguistic cognitive and perceptual development in children's formation of language-relevant concepts. But does it show that the meanings children initially link to words and grammatical morphemes are entirely provided by nonlinguistic cognitive and perceptual development, as is currently often assumed? Or does the linguistic input also direct young language learners' attention to ways of classifying that they would not have hit upon otherwise?

CROSS-LINGUISTIC SEMANTIC VARIATION

One problem that affects attempts to understand the relative balance between nonlinguistic cognition and linguistic experience in children's early semantic development is methodological. When children's use of language forms is guided by categories that have been generated independently of linguistic experience, the result is often errors from the adult point of view. Errors are salient, and they demand an explanation.[5] In contrast, when children extend forms on the basis of categorization principles they have induced by observing how the forms are used in adult speech, their usage is more conventional. Correct use where in principle there might have been errors is easy to overlook. If even only 10% (for example) of children's early forms were used in connection with self-generated categories, whereas 90% were linked to concepts constructed par-

[5]As Anglin (1979) has pointed out, overt errors occur only when children's categories are too broad (e.g., *doggie* applied to horses as well as dogs). Too-narrow categories lead to usage that is correct on any particular occasion, but underextended with respect to the adult range of application. Brown, Cazden, and Bellugi (1969) term these obvious versus more subtle departures from adult usage "errors of commission" and "errors of omission," respectively. Errors of omission can be detected by careful comparison of children's usage patterns with those of adults.

tially or entirely with the help of the linguistic input, our attention and explanatory efforts would immediately be drawn to the 10%, since this is where the errors would be concentrated.

Even when we recognize that children use a given form more or less correctly, we rarely interpret this as evidence that they have been attending to the linguistic input in their construction of the governing concept. This is because—at least if the language is our own—the categories involved seem to us so "natural" that it is easy to imagine that they could be formed directly on the basis of nonlinguistic cognition.

In the current era of interest in linguistic universals, researchers have tended to deemphasize or neglect cross-linguistic differences in semantic categorization. However, even though recent research has shown that languages are semantically less varied than had previously been supposed, they are by no means uniform. In most conceptual domains there are significant options from among which languages can "choose" in structuring the categories of meanings to which words, grammatical morphemes, or construction patterns are linked (see, e.g., Lakoff, 1987; Langacker, 1987; Plunkett & Trosberg, 1984; Talmy, 1975, 1976, 1985).[6]

To the extent that a particular semantic domain is partitioned differently across languages, human cognition is correspondingly flexible in how it can construe the to-be-classified actions, events, and so forth. In this case there is no a priori reason to assume that just one mode of construal should be easiest or most obvious for children—that is, that one is somehow "basic" (Brown, 1965, p. 317). In such situations children, like human beings more generally, may be sensitive to a number of different similarities and differences among referents, and they may be relatively easily influenced by classification schemes introduced by their language.

Spatial Relationships

To make the significance of cross-linguistic variation in semantic categorization more concrete, let us compare how certain spatial relationships are classified in a few languages. Variability in spatial categorization provides a particularly striking demonstration that children have more to learn than is at first obvious, because spatial relationships are often taken as quintessential examples of concepts that children can acquire purely on the basis of their nonlinguistic manipulations and observations. After all, what could be more sensorimotor than an understanding of space?

I do indeed take it as well established that the development of a nonlinguistic understanding of space is an important prerequisite to the acquisition of

[6]It is likely that some conceptual domains are subject to more cross-linguistic variation in semantic partitioning than others. For example, Gentner (1981, 1982) presents evidence that, in general, relational concepts are less "given" by the structure of reality and hence more variable from one language to another than are concepts of concrete objects.

spatial words (e.g., E. Clark, 1973b; H. Clark, 1973; Corrigan et al., 1981; Halpern et al., 1981; Johnston, 1979; Johnston & Slobin, 1979; Levine & Carey, 1982). However, it is not clear exactly what this nonlinguistic understanding consists of. Many investigators, I think, have assumed that it takes the form of concepts such as "containment," "support," and "lower than in vertical alignment," which correspond relatively directly to words such as *in, on,* and *under* and their translation equivalents in other languages. This knowledge would allow children to distinguish among the three situations shown in Figure 4.1 in a straightforward way, and to assign a different locative marker to the category of spatial relations that each one represents. However, an inspection of how different languages solve the problem of categorizing spatial relationships for linguistic expression suggests that the match between nonlinguistic spatial knowledge and the concepts underlying spatial words in particular languages must be less direct than this.

Although all languages make categorical distinctions among spatial configurations for the purpose of referring to them with a relatively small set of expressions such as the spatial prepositions of English, they do not do so in exactly the same way. That is, what "counts" as an instance of a particular spa-

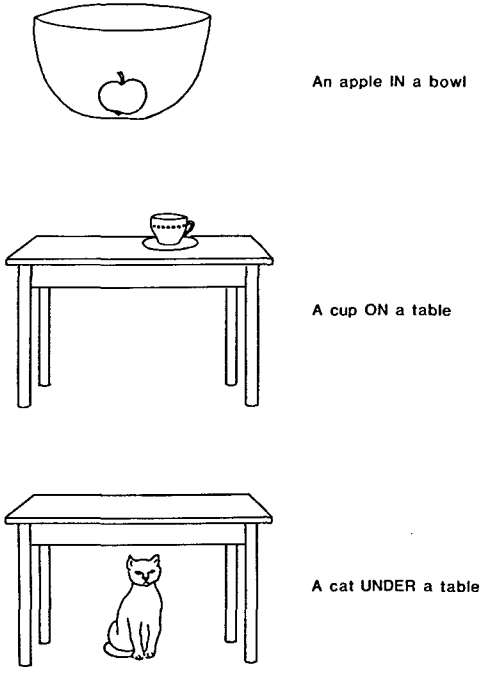

Figure 4.1. Three spatial configurations.

tial relationship varies from one language to another. For example, in English, the distinction between "containment" and "noncontainment" is critical: although an object in contact with the surface of a reference-point object may be "contained" within a curvature of that surface to varying degrees (picture a button resting against the palm of a slowly closing hand), speakers of English must decide categorically if the object is *on* or *in* (Brown, 1973, pp. 328, 330). In Spanish, in contrast, a single preposition, *en*, can be used for the entire range of spatial relations that English obligatorily splits into *on* versus *in*. Unless they want to be very explicit, Spanish speakers do not have to worry about the breakdown of the "on-to-in" continuum; thus, the spatial relations shown in the top and middle parts of Figure 4.1 are routinely described as "an apple EN a bowl" and "a cup EN a table."

Before being tempted to dismiss this as a case of homonymy—use of the same name for two clearly distinct meanings—let us look at some languages that make distinctions that English does not make. Consider Figure 4.2, which shows some instances of the "support" relationship that English encodes with the preposition *on*: (*a*) a cup ON a table, (*b*) a picture ON the wall, (*c*) leaves ON

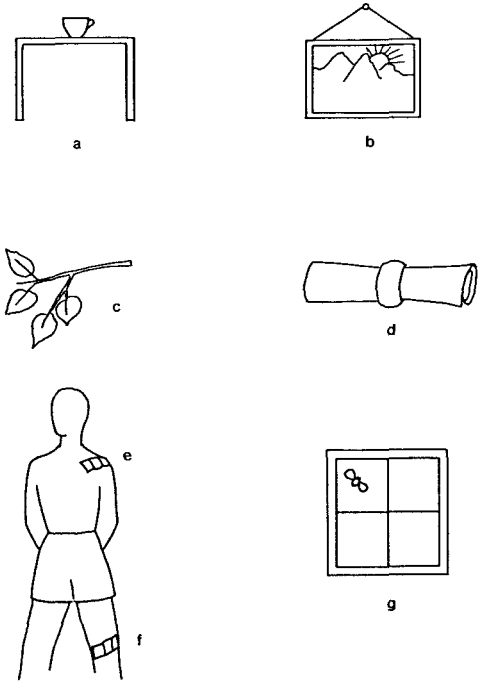

Figure 4.2. Some to-be-classified "support" relationships.

a twig, (*d*) a napkin ring ON a napkin, (*e*) a Band-Aid ON a man's shoulder, (*f*) a Band-Aid ON a man's leg, and (*g*) a fly ON a window.

In German, this array of spatial configurations is broken down for linguistic encoding into three different categories, expressed by *auf* (cup AUF table, Band-Aid AUF shoulder), *an* (picture AN wall, leaves AN twig, Band-Aid AN leg, fly AN window), and *um* (napkin ring UM napkin). German is sensitive, in a way that English is not, to whether a relationship of contact between two objects involves a relatively horizontal surface (table, shoulder: *auf*), a vertical or otherwise nonhorizontal surface or contact point (wall, twig, leg, window: *an*), or encirclement (napkin: *um*. *Um* is usually translated as *around*. English speakers can also say "the napkin ring is AROUND the napkin", but *on* is typically preferred when an encircling object is in close contact with, and supported by, the object it encircles; cf. also "the ring *on* my finger," "a diaper *on* a baby," and "a pillowcase *on* a pillow").

Dutch, like German, describes the spatial configurations of Figure 4.2 with three different prepositions, but although these words—*op, aan,* and *om*—are cognate with German *auf, an,* and *um,* the semantic categories they encode are slightly different. As in German, "cup on table" and "Band-Aid on shoulder" (*op*) are differentiated from "picture on wall" and "leaves on twig" (*aan*), and "napkin ring on napkin" must also be given separate marking (*om*). However, whereas in German, "Band-Aid on leg" and "fly on window" are described with *an,* and hence classed together with, for example, "picture on wall" (all involve nonhorizontal surfaces), in Dutch they are encoded with *op* rather than *aan,* and thus fall together with "cup on table." For Dutch, the distinction between *op* and *aan* has less to do with orientation than with *method of attachment:* if a surface is not horizontal, an object is described as *aan* it if it is attached (often hanging or projecting) by one or more fixed points ("picture on wall," "leaves on twig," "clothes on line," "coathook on wall," "handle on pan"). In contrast, if it is a living creature like a fly (whose means of support are not perceptually obvious) or a flattish object attached over its entire base ("Band-aid on leg," "sticker on refrigerator," "pimple on chin") the relationship is called *op*.

Although English, German, and Dutch differ in their classification of "on" relationships, they also share certain features. For example, they are not terribly fussy about the overall shape of the reference-point object (although the orientation and concave versus convex curvature of its surfaces may be important). On the other hand, they *are* particular about whether the located object is *in contact with* the reference-point object, or only adjacent to it. For example, an object like a cup or a lamp can only be described as *on, auf,* or *op* a table if it is actually resting on the table. A different preposition (e.g., *over* or *above* in English) is needed if the two objects are not touching.

A markedly different set of contrasts is found in Chalcatongo Mixtec, an Otomanguean language of Mexico. Mixtec has no prepositions (or other loca-

tive markers) devoted to expressing spatial relationships. Instead, it classifies spatial configurations via an extended and systematic body-part metaphor (Brugman, 1983, 1984; see also Lakoff, 1987). For example, consider the spatial configurations shown in Figure 4.3. These would all be encoded as *on* in English (and as *auf, op,* and *en* in German, Dutch, and Spanish, respectively); note that they all involve a relatively horizontal supporting surface: (*a*) "the man is ON the roof of the house," (*b*) "the cat is ON the mat," (*c*) "the tree is ON (the top of) the mountain," and (*d*) "the boy is ON the tree branch." In Mixtec, these configurations fall into four different categories, as suggested by the loose translations: (*a*) "the man is-located the house's ANIMAL-BACK" (there are separate words for a human back and an animal's back; the word for human back is used for expressing 'behind' relations—cf. English *in back of*); (*b*) "the cat is-located the mat's FACE"; (*c*) "the tree is-located the mountain's HEAD"; and (*d*) "the boy is-located the tree's ARM."

At first glance it might seem that by metaphorically projecting human and animal body parts onto reference-point objects, Mixtec differs from the other languages we have looked at in classifying more finely. This is not the case, however: the total number of categories appears to be similar, but they are partitioned according to *cross-cutting criteria of similarity and difference* among spatial configurations.

For instance, in contrast to descriptions with *on* (*auf*, etc.), the Mixtec de-

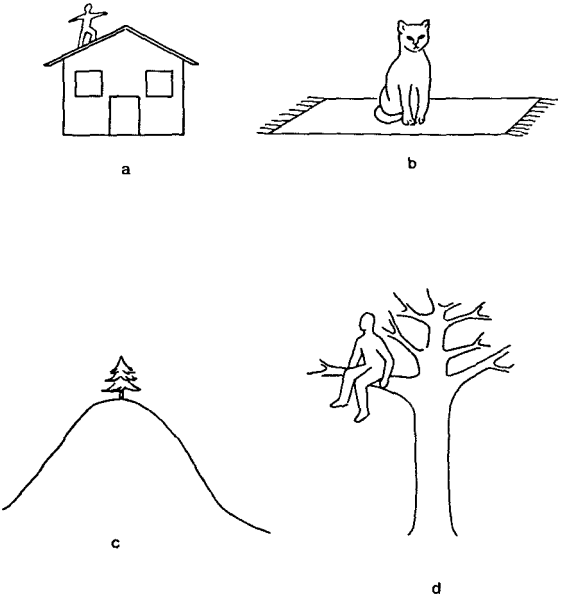

Figure 4.3. Further spatial relations involving "support."

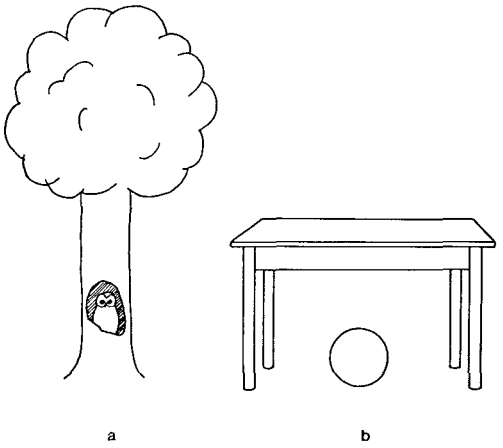

Figure 4.4. Spatial relations *in* and *under* (English) versus "*belly*" (Mixtec).

scriptions of configurations *a*–*d* in Figure 4.3 could also be applied to situations in which the located objects are hovering in the air above the reference-point objects, since the appropriate use of locating expressions like ANIMAL-BACK, FACE, and ARM does not require contact and support, but only adjacency.[7] Further, consider the two spatial configurations shown in Figure 4.4. In Mixtec, these fall together into the same category: (*a*) "the owl is-located the tree's BELLY" and (*b*) "the ball is-located the table's BELLY." (The tree's "belly" is positioned analogously to a human belly by virtue of the tree's overall resemblance in shape to a person; the table's "belly" is positioned analogously to the (downward-facing) belly of a four-legged animal.) In contrast, in English, configurations *a* and *b* clearly fall into two different spatial categories, which are encoded with *in* and *under,* respectively.

As speakers of English we may protest that the spatial relations shown in parts *a* and *b* of Figure 4.4 are "really" fundamentally very different, hence that BELLY in the two uses must be homonymous for Mixtec speakers. But this is no more logical than for a Mixtec speaker to argue that configurations *a*–*d* of Figure 4.3 are "really" fundamentally different; hence that English *on* in the four uses is obviously homonymous. Spatial categorization in both languages involves classifying referents that are dissimilar in some ways on the basis of properties they share. However, the shared properties on which the two languages focus—and the dissimilarities they choose to disregard—are different.

Cora, a second Mexican Indian language, takes still another approach to spatial classification (Casad, 1977; Casad & Langacker, 1985). For example, in

[7]Some other languages that work like Mixtec in this respect are Korean, Japanese, and Chinese.

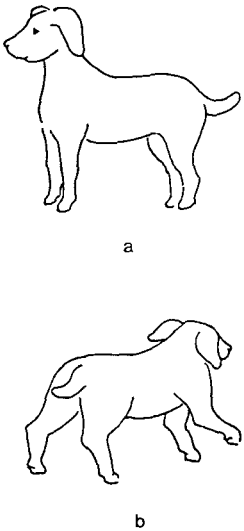

Figure 4.5. Spatial classification according to viewing perspective in Cora.

referring to one object that is (from the English point of view) "on" another object—for example, a tail on a dog—speakers must choose between two expressions on the basis of whether, from their viewing perspective, the located object projects beyond the plane of the object on which it is located ("outside-slope") or is visually contained within that plane ("inside-slope"); compare the dog's tail in *a* and *b* of Figure 4.5.

By now, I hope that readers who a few paragraphs ago were untroubled by the assumption that nonlinguistic cognitive development provides children with spatial concepts suitable for fairly direct mapping to the English words *on, in, under* and the like are somewhat less certain. What seemed such an obvious—"natural"—linguistic classification of spatial relationships may be widespread, but it is by no means universal.[8]

I do not, with these examples, intend to imply that the way we think is necessarily influenced by the categories of our language (although I would not rule this out either; see Kay & Kempton, 1984, and Lucy, 1987, for positive evidence on this persistent Whorfian question, and discussion in Lakoff, 1987, Chap. 18). I assume that all human beings have the same basic perceptual and cognitive capacities and can in principle recognize the same similarities and differences among spatial configurations or other to-be-categorized referents. However, to the extent that languages use different criteria for classifying refer-

[8]For some other interesting examples of cross-linguistic differences in spatial classification, see Denny (1978), Hill (1978), Zubin and Choi (1984), and Zubin and Svorou (1984).

ents, semantic categories cannot be viewed as a direct reflection of the structure of nonlinguistic thought. Instead, they constitute a level of organization in which, from among all the possible ways human beings can classify the elements of their experience, a language selects and combines certain options and not others. It is therefore a level of organization that children must *learn*, through experience with the way linguistic forms are used in the speech around them.

Characteristics of the Learning Process

We are still far from understanding how and when this learning takes place. With respect to "how," however, it is worth emphasizing that the obligatory nature of linguistic distinctions has important consequences for the learning process.

First, notice that the notion of "communicative intentions" provides little help in explaining how children acquire language-specific ways of partitioning a semantic domain such as space. Proponents of the view that early linguistic forms map onto nonlinguistic meanings often assume that children acquire forms to express meanings they have come to want to communicate. While it is probably true that children start to acquire spatial forms as they begin to want to talk about the locations of objects, it is unlikely that their communicative intentions are conveniently cast in terms of the particular categories of spatial relations their language employs. (For example, it is improbable that Dutch children are intent on expressing the method of attachment of one object to another, whereas German children are more interested in orientation and English-speaking children do not care about either one.) Part of learning to talk is learning what meaning distinctions *must* be attended to, regardless of whether one is interested in those distinctions at the moment of speech (Bowerman, 1983, 1985a; Slobin, 1979, 1982).

Some of the obligatory meaning distinctions a language makes may coincide with similarities and differences among referents that children find naturally salient; presumably this results in rapid learning (E. Clark, 1973a, explains the early emergence of *in* among spatial prepositions in English-speaking children in these terms). In other cases, however, the criteria will be relatively unsalient: children then must learn to notice properties of referent events, relationships, and so forth that do not naturally attract their attention, and they also may have to learn to suppress their sensitivity to linguistically irrelevant properties that are more immediately salient. In this case arriving at the right categories will take longer, and children may for a time classify according to principles that are incorrect from the adult point of view. The situation may often lie between these two extremes: children are spontaneously sensitive to several different properties of referents that might or might not be relevant to semantic

classification in their language, and they find it equally easy to learn to categorize on the basis of any one of these properties (Bowerman, 1985b).[9]

Finally, it is important to note that learners' attention to properties of referents that are critical to semantic categorization in their language must become highly *automatic:* that is, speakers must continually and unconsciously scan for the relevant features and note their values if they are to choose correctly among contrasting forms. Registration of obligatory distinctions cannot be left under voluntary control, since a speaker's attention may often be elsewhere at the moment of speech.[10]

WHEN DOES LANGUAGE-DIRECTED SEMANTIC LEARNING BEGIN?

I have argued that the existence of cross-linguistic differences in semantic classification means that semantic development requires considerably more of the child than simply working out concepts on a nonlinguistic basis and then matching them up with the words and grammatical morphemes of the language being acquired. The child must figure out, by observing how forms are distributed in the input, what the needed classification principles are. When does the process of attending to language for clues to categorization begin?

To the extent that researchers have been concerned with cross-linguistic semantic differences, they have generally assumed that the process of learning categories from the linguistic input begins relatively late. According to current theorizing, the concepts that drive the early use of words, grammatical morphemes, and construction patterns are nonlinguistic and more or less universal. With linguistic experience, however, children begin to diverge in the direction of the category structure of their particular language (see Slobin, 1985, for a strong statement of this position with respect to the categories underlying grammatical marking and early construction patterns). For example, a form that is at first linked to a universal core meaning that is too narrow may gradually be extended to situations that are increasingly dissimilar to the core, until lan-

[9]Research traditions in developmental psychology that might profitably be brought to bear on how children identify language-specific principles of semantic categorization include work on acquired cue distinctiveness and selective attention (e.g., Gibson, 1966; Lane & Pearson, 1982; Odom, 1982).

[10]The automaticity requirement probably accounts for many of the problems experienced by adult second language learners in trying to achieve fluency in their new language. When faced with a meaning distinction that is not obligatory in their native language, learners may (sometimes) be able to grasp it intellectually, but they often cannot register it fast enough or they fail to notice that it is relevant in all the contexts in which it must be marked. Some clues to how automatization takes place in the context of first and second language acquisition may come from the literature on controlled search versus automatic processing (e.g., Schneider & Shiffrin, 1977; Shiffrin & Dumais, 1981; Shiffrin & Schneider, 1977).

guage-appropriate boundaries have been reached (Schlesinger, 1974; Slobin, 1985). Conversely, a form associated with a too-broad meaning may gradually have its range of application cut back. Change toward language specificity could also involve collapsing categories that are too finely differentiated by effacing unnecessary distinctions, or splitting categories that are too broad by introducing new distinctions (Slobin, 1985).

These proprosals about the course of early semantic development from universal to language specific remain largely conjectural. Little empirical research has been carried out on the problem of when and how children learn language-specific modes of categorization. It is likely that further work will confirm that semantic development does at times follow the hypothesized path from universal to language specific. However, recent research suggests that this is only part of the story. Children are also able to home in on the categories of the particular language they are learning from an astonishingly early age, sometimes before there is evidence for a preceding, "universal" stage (Bowerman, 1985b). Let us look at two examples, one concerning early words encoding spatial actions and the other to do with the grammatical treatment of subjects and objects.

Early Relational Words: Talking about Spatial Actions

In an earlier section I illustrated the problem of cross-linguistic semantic variation with examples of different systems of categorizing spatial relationships. In recent work, together with colleagues and students, I have been exploring how young children talk about certain spatial relations in different languages. Here I would like to summarize some findings that are emerging from an ongoing comparative study that Soonja Choi (San Diego State University) and I are conducting of the way children learning English or Korean talk about space during and just beyond the one-word stage of development.[11] In particular, I want to compare the way these children describe actions involving putting things on or in other things, and taking them off or out.

Spatial manipulations of objects are salient and interesting to young children, and they begin to talk about them early, often—if they are learning English—with particles like *on, off, in,* and *out.*[12] Some or all of these words are

[11]The English data come from detailed diary records of my two daughters from the start of the one-word stage; these are generally consistent with published reports of the acquisition of spatial expressions by other English-speaking children. For Korean, longitudinal spontaneous speech samples from four children between 1;8 and 3;0 were used. One child was followed by Choi; for the additional materials, we are grateful to Pat Clancy (two children) and Youngjoo Kim (one child).

[12]These particles are used for some time only in the context of action, where they seem to have a verbal force suggested by glosses like "*put on*" and "*take off.*" Use of the same words to encode static spatial configurations emerges somewhat later, although still during the one-word period for many children. I here ignore the syntactic distinction between these words as particles and as prepositions, and simply call them "particles."

typically found among the small set of relational words acquired during the one-word period (Bloom, 1973; Bowerman, 1978a; Farwell, 1976, 1977; Gopnik, 1982; Gopnik & Meltzoff, 1986; McCune-Nicholich, 1981; Tomasello, 1987), and they also often figure prominently in children's first two-word combinations (Miller & Ervin, 1964).

The early acquisition of spatial particles and certain other relational words, along with similarities in the way different children use them, has led many investigators to hypothesize that these words map directly onto relational concepts that children form on a nonlinguistic basis during the second year of life (Bloom, 1973, p. 112; McCune-Nicholich, 1981; Nelson, 1974).[13] For example, McCune-Nicholich proposed that relational words encode operative knowledge (knowledge of transformations) attained in the late sensorimotor period (Piaget, 1970), and she predicted that "since operative intelligence is a universal aspect of cognition, the same categories of meaning would be expected for all children, although various lexical items might be used to encode these" (p. 18).

This hypothesis can be tested by comparing English-speaking children's use of words like *on, in, off,* and *out* with what Korean children say in similar contexts. Actions of "putting on," "taking off," and the like are categorized differently by the semantic systems of English and Korean. However, if it is sensorimotor concepts rather than experience with the categories of language that guides children's generalization of early relational words to new contexts, the situations in which children learning English say *in,* for example, should correspond closely to the situations in which Korean children say some Korean word; similarly for *out* and so on.

The English words *in, out, on, off,* and the like are part of a larger, closed-class system of spatial morphemes that factor out what Talmy (1975, 1976, 1983, 1985) terms the Path of Motion ("Motion" is defined in such a way that it also includes static location) and gives it constant expression, regardless of whether the verb is transitive or intransitive (e.g., *put in* versus *go in* or *be in*) and regardless of the specific manner expressed by the main verb (e.g., *take/pull/push/cut off; go/fly/run/crawl in*). Similar systems are found in most or all Indo-European languages except Romance languages, according to Talmy's analyses, and also in Chinese. However, many languages, including Romance and Semitic languages, lack a system of Path morphemes and instead incorporate the spatial meanings encoded by these words directly into the verb (analo-

[13]Gopnik and Meltzoff (1986) present interesting arguments for a somewhat different position: that new relational words in the sensorimotor period do not map onto concepts that have already been established but, rather, concepts that children find "problematic" and are still in the process of working out. They speculate that hearing a word such as *gone* or *down* in a variety of contexts could help draw children's attention to what these contexts share. However, they do not take up the question, raised here, of whether exposure to different kinds of input could cause concepts to develop differently.

gous to *enter* [= go IN], *exit* [= go OUT], *ascend* [= go UP], etc., which have been borrowed from Romance into English). Korean presents a somewhat mixed picture, but it patterns in the Romance way with respect to verbs specifying spatial manipulations of objects.

In English the choice among particles is governed by the nature of the Path (or what we might loosely call the "geometry" of the spatial relationship). For example, if one object is seen as moving toward another more stable (and usually larger) object such that it ends up (partially) contained by the reference-point object, *in* is selected ("put the apple IN the bowl/the cassette IN its case/the cigarette IN your mouth/your finger IN this ring I'm holding"). In contrast, *on* is the morpheme of choice if the moving object ends up in flat surface contact with the reference-point object ("put the cup ON the table/the sticker ON the wall"), (partially) covering or encircling it ("put the cap ON the pen/hat, shoes, coat ON [the relevant body part]/ring ON your finger"; *over* can be used in some contexts of this type as well), or attached to it by a fixed point ("put the ear ON Mr. Potatohead"). When two (or more) objects are similar in size and move roughly equally, *together* is appropriate and the *on* versus *in* contrast is lost: "put TOGETHER two Lego pieces/two Pop-beads/two toy train cars/two tables." The set of contrasts encoded by *take OUT, take OFF,* and *take APART* is similar, but for the opposite direction of motion.

The categories associated with everyday Korean verbs for actions of putting in, on, or together, and their reversals, cross-cut the contrasts drawn by the English particles. Consider the two verbs *kki-ta* and *ppay-ta,* which are very frequent in the speech of young children. In one way these verbs seem very tolerant: *kki-ta* is used indiscriminately across actions that English obligatorily distinguishes as *put IN, put ON,* and *put TOGETHER.* Similarly, *ppay-ta,* its opposite, collapses the distinctions between *take OUT/OFF/APART.* In another way, however, *kki-ta* and *ppay-ta* are much more restricted than *put IN/ON/TOGETHER* and *take OUT/OFF/APART.* Specifically, they can be used ONLY for actions in which objects are brought into or out of a relationship of *tight fit* or *attachment.* Thus, *kki-ta* is used for both putting a ring ON a finger and a finger IN a ring, a glove ON a hand and a hand *IN* a glove, a screw-on or click-down lid ON a jar, a cassette IN its case, and two Lego pieces or two Pop-beads TOGETHER, also for buttoning a button, snapping a snap, closing a tight-fitting drawer, pan lid, or door, and wedging a book between other books. *Ppay-ta* describes the reversal of all these actions.

Kki-ta and *ppay-ta* cannot be used for "loose-fit" or "no-fit" actions like putting an apple IN a bowl or taking it OUT, putting a blanket ON a bed or taking it OFF, putting ON or taking OFF clothing (with a few exceptions, like gloves), putting two tables TOGETHER or moving them APART, or opening and closing drawers and other objects that do not attach tightly. Nor can they be used in connection with magnets, Band-Aids, or stickers: to qualify for *kki-ta* and *ppay-ta,* attachment should involve some degree of three-dimensional

meshing, not completely flat surfaces. For these various non-*kki-ta*/*ppay-ta* actions, Korean uses a number of different verbs. Some are specific to clothing that goes on different parts of the body. There are also verbs to describe putting objects into containers where they do not fit tightly, for putting objects onto surfaces, for attaching or juxtaposing flat surfaces, and for the reverse actions.

The relationship between Korean *kki-ta* and English *put in, put on,* and *put together* is shown schematically in Figure 4.6.

These differences between English and Korean mean that children who listen to English-speaking adults are exposed to a distribution of words that instructs them, in effect, that tightness of fit is unimportant but that the geometry of the spatial relationship (e.g., containment, flat contact or covering, (a)symmetrical movement) is critical. In contrast, children who listen to Korean-speaking adults are told, in effect, that tightness of fit is important, and that when tightness of fit obtains, the geometry of the relationship is irrelevant. If the early use of relational words is guided by universal sensorimotor schemes, children should be unaffected by these differences—that is, the categories of actions to which they extend particular words should look very similar. However, Choi and I are finding that English- and Korean-speaking children in fact classify actions of putting in, on, and so forth, and their reversals, in profoundly different and language-specific ways for purposes of talking about them. These differences are present by at least 20 to 22 months of age, and probably earlier, to judge from the English data (we do not yet have Korean data from a younger age).

Korean children by this age clearly grasp the importance of the notion of tight fit or attachment for *kki-ta* and *ppay-ta,* and they do not extend these verbs to "loose-fit" or "no-fit" situations such as putting objects into paper bags or other large containers, putting on clothing (except for gloves, where it is appropriate), and reversals of these actions. Additionally, children grasp that the precise geometry of the spatial relationship is irrelevant to *kki-ta* and *ppay-ta,* and they extend the words indiscriminately, as is appropriate, to spatial actions that in English must be distinguished on the basis of whether the Path of motion is "on," "in," or "together," or their opposites.

In the data we looked at, for example, *kki-ta* was used to describe both putting gloves ON hands and hands IN gloves, a toy shovel IN a narrow hole, putting ON rings, BUTTONING buttons, and so on. *Ppay-ta* was used for taking a nail OUT of a hole, an object OUT of an envelope, a book OUT of a bookcase (where it was wedged in), the cap OFF a pen, and the lid OFF a can, for taking a flute or Lego pieces APART, and so on. Actions of putting objects into bags and other loose-fitting containers and taking them out, putting objects onto surfaces and taking them off, and donning or doffing clothing were described with other, generally appropriate verbs.

Our English-speaking subjects differed from the Korean children in several important respects at this age. First, they used *on* and *off* in connection

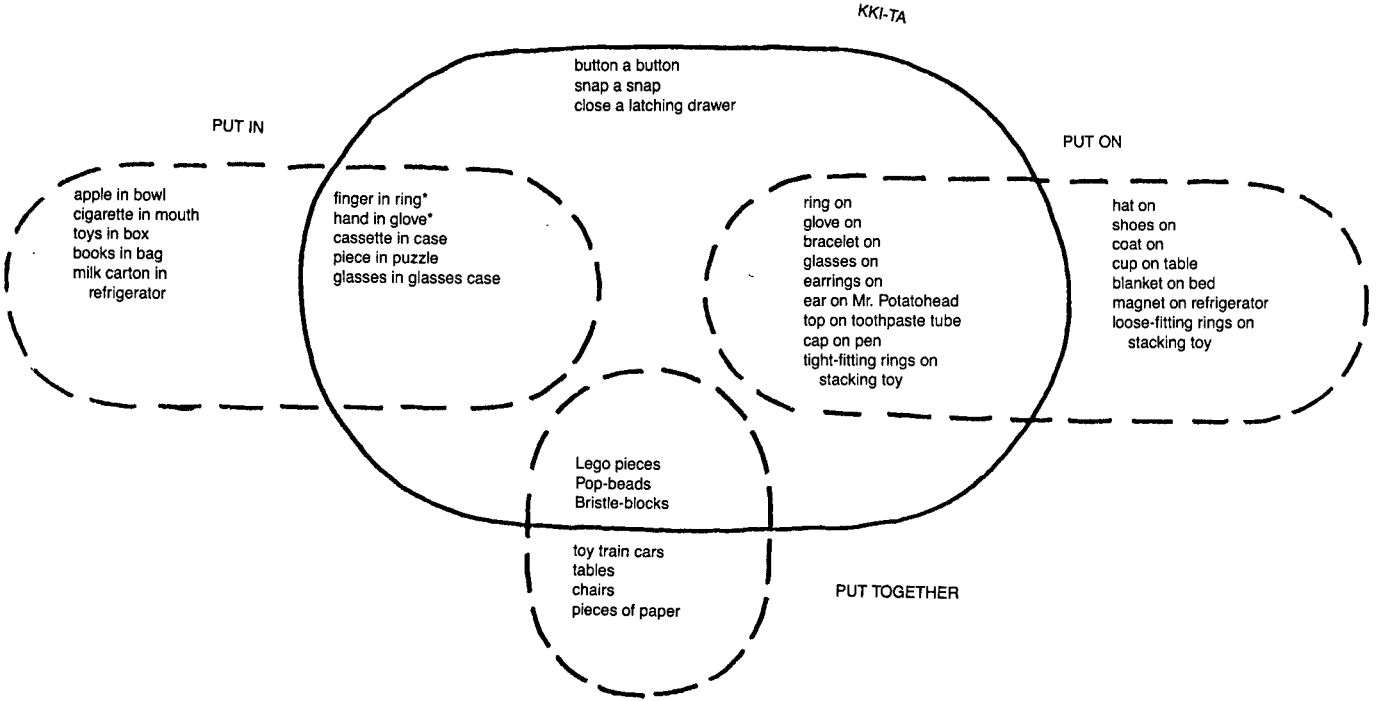

Figure 4.6. Relationship between Korean *kki-ta* and English *put in, put on,* and *put together.**, Canonically, rings are put on fingers and gloves on hands, but envision here a situation in which the ring or glove is held stable and the finger or hand moves toward it.

with clothing of all sorts, regardless of which body part was involved; the Korean children, in contrast, used different verbs, as is appropriate, for putting things on the head, the feet, and the trunk. Second, unlike the Korean children, the English-speaking children also applied the words they used in connection with clothing to other actions, most typically those involving "attaching" and "detaching" objects to and from other objects (see also Gopnik & Meltsoff, 1986).[14]

Third, the critical English distinction between *on/off* situations (those involving covering or flat surface contact, or fixed-point-of-attachment) and *in/out* situations (those in which the moving object is contained) emerged very early (e.g., by 18½ months for my daughter Eva). Thus, *on* and *off* were used, for example, in connection with caps on pens, lids on jars, tops on bottles, doll clothes on hangers, clip-on sunglasses, magnets or tape stuck on surfaces at any angle, and ears, nose, and so forth on the Mr. Potatohead doll. In contrast, *in* and *out* were said in connection with putting books into a tiny, fitted container and removing them, putting a picture in a wallet, and the like. Recall that the Korean children encoded both "in/out" and "on/off" situations involving "tight fit" with *kki-ta* ("put on/in/together") or *ppay-ta* ("take off/out/apart").

Fourth, the English-speaking children also differed from the Korean children in that they used the same words for both tight- *and* loose-fitting containment relationships. For example, they said *in* both for putting books into a fitted container and a piece into a puzzle (tight fit) and for dropping a key into a glasses case and putting blocks into a pan (loose fit); similarly, they said *out* both for removing books from a fitted container and a piece from a puzzle (tight fit) and extracting toys from bags and large boxes (loose fit). In contrast, the Korean children distinguished between tight and loose containment—they applied *kki-ta* and *ppay-ta* only to the former, and used other verbs for the latter.

Finally, the English-speaking children used *in* and *out* (and, very occasionally, *on* and *off*) in connection with *intransitive* movements of themselves or other people (e.g., getting in and out of a bathtub, going in and out of a house or a room, climbing on or off laps). In contrast, the Korean children did not extend words for either "tight-fit" or "loose-fit" manipulations of objects to intransitive spatial actions, but instead used completely different (intransitive) verbs, as is appropriate in Korean.

It is not clear whether Korean children perceive a similarity between "tight-fit" and "loose-fit/no-fit" containment or contact, or between causative actions of putting things into containers and taking them out and noncausative

[14]Our English-speaking subjects, like those of other researchers, used *on* and *off* for "attachment" and "detachment" relationships before they used them in connection with horizontal supporting surfaces like tables. Also like other children, they used these words very early in connection with lights and other electrical appliances. Although there is a metaphorical basis for the extension of *on* and *off* from spatial to "activation" meanings (Lindner, 1982), it seems most likely that children initially learn these different uses independently, that is, the words are homonyms.

motions of animate beings into and out of containers. At any rate, they do not use these similarities as a basis for extending their early words. This means that the concepts that children learning English associate with *in, out, on,* and *off* in the second half of their second year do not directly reflect nonlinguistic sensorimotor concepts (because then Korean children would extend words according to the same concepts), but instead reflect experience with the categories picked out by the abstract Path morphemes of English.[15]

Although Korean and English-speaking children clearly identify the major cleavages in their language's system of talking about spatial manipulations at a remarkably early age, they still make certain errors. These errors are important for two reasons. First, they demonstrate that children are not simply parroting back the words they have heard in specific contexts (which would make apparent early language specificity less significant), but rather are linking the words to concepts that can guide generalization to new referent situations. Second, the errors reveal which distinctions are difficult for children, and provide interesting clues to their efforts to work out the needed categories.

For example, although the Korean children were quick to determine that attachment or tight fit is important for *kki-ta* and *ppay-ta,* they were apparently unclear about exactly what "counts" as attachment or tight fit. Sometimes they overextended *kki-ta* to putting magnets on surfaces to which they stick, and *ppay-ta* to peeling stickers off surfaces. Similarly, although the English-speaking children mastered the obligatory contrast between *on/off* and *in/out* situations early, they found the "symmetrical movement" property relevant for *together/apart* difficult, and they often overextended *off* or *open* to actions involving the separation of Lego pieces, Pop-beads, and stuck-together Frisbees.[16]

The patterns of correctness and errors I have described testify to a complex interaction between linguistic input and nonlinguistic cognitive development. Clearly children in the age range 18–24 months are not simply mapping words directly onto nonlinguistically developed concepts of surface contact or support, containment, and so on. Already at this age they have analyzed the distribution of words in the speech they hear to discover which classification principles are important. On the other hand, not all classification principles are equally accessible to them. For example, "tight fit/attachment" versus "loose fit/no attachment" is relatively easy, but three-dimensional versus two-dimensional attachment (e.g., Lego pieces versus magnets) is more difficult. Sim-

[15]Berman and Slobin (1987), who studied narratives from children learning English, German, Spanish, or Hebrew, found profound cross-linguistic differences in the encoding of Path meanings from as early as 3 years (their youngest group), with English- and German-speaking children clearly in control of the Path morphemes by then. The present study indicates that these differences are well established even at a very much younger age.

[16]*Open* is also sometimes used for certain "off" and "out" situations, and for situations where more specific verbs are needed like *unbutton* and *unfold*; see Bowerman (1978a).

ilarly, "containment" versus "noncontainment" (covering, surface attachment, etc.) is straightforward, but the distinction between asymmetrical and symmetrical movement is more problematic.

In sum, the categories of the input language clearly have an important effect on children's early semantic categorization, but their influence is not absolute: input distinctions must coincide with distinctions that are readily accessible to children, or they will not be picked up.

What to Do with Intransitive Subjects?

As a second example of early language-specific categorization, let us look at how children determine the correct grammatical handling of the major noun arguments of verbs and other predicates. The three most basic grammatical roles associated with arguments are subject of a transitive verb ("transitive subject"; e.g., *JOHNNY opened a box*), object of a transitive verb ("object"; e.g., *Mary hit SUSIE*), and subject of an intransitive verb ("intransitive subject"; e.g., *DADDY went (to the store)*). Some languages (e.g., Takelma, an American Indian language) mark nouns in all three role distinctly. However, most languages reduce the three categories to two by marking nouns in two of the roles identically.

Transitive subjects and objects are always distinguished in such systems. Where languages differ is in whether they treat intransitive subjects like transitive subjects or like objects (e.g., whether intransitive subjects behave like transitive subjects or like objects with respect to typical positioning in the sentence, type of case marking they can receive, and ability—or lack of it—to govern verb agreement). Languages that opt for the first solution, like English, Spanish, and Hungarian, are called "nominative" or "nominative-accusative" languages, whereas those that choose the second, like Eskimo and Samoan, are called "ergative" or "ergative-absolutive" languages (Dixon, 1979; Haiman, 1979).

Both classifications can be considered well motivated, since intransitive subjects share certain properties with both transitive subjects and objects. For example, the grouping of intransitive subjects with transitive subjects by nominative languages is responsive to the shared tendency of noun arguments in these roles (as opposed to in the object role) to be *animate agents* and/or *topics*. Conversely, the grouping of intransitive subjects with objects by ergative languages reflects the shared tendency for noun arguments in these roles (but not in the transitive subject role) to express *new information* (Du Bois, 1985, 1987; see also Keenan, 1976, 1984, for additional properties shared by intransitive and transitive subjects but not objects, on the one hand, and by intransitive subjects and objects, but not subjects, on the other).

Children acquiring languages of either type are faced with an intriguing

language-specific learning problem. Once they realize that distinctions are to be made at all among major sentence constituents, they should treat transitive subjects and objects differently, since this pattern is shared by both nominative and ergative languages. But what should they do with intransitive subjects? Should they treat them like transitive subjects, like objects, or like neither one?

If children indeed start out in a uniform, universal way, and only later diverge in the direction of language-specific categorization schemes, they should wait to take a stand on intransitive subjects. When they learn case markers and word order patterns in connection with transitive subjects or objects, they should at first withhold marking for intransitive subjects or treat them inconsistently. Only later should they begin to extend the grammatical privileges of either transitive subjects or of objects—depending on the language they are learning—to intransitive subjects. This unbiased, universal beginning point is also what we would predict on the basis of Slobin's (1985) proposal, discussed earlier, that subject and object markers are at first restricted to sentences expressing "prototypical transitive events," since sentences with intransitive subjects fall outside of this set.

Yet the prediction is incorrect. From their earliest two-word sentences, children learning nominative languages treat intransitive subjects—as is appropriate—like transitive subjects, and not like objects. For example, when they learn a word order pattern for positioning the agents of transitive verbs such as *open* and *push,* this pattern is also immediately applied to the agents of intransitive verbs like *go, walk,* and *cough* (Braine, 1976; see Bowerman, 1985b, for discussion of this and other evidence). Conversely, children learning ergative languages never overextend the so-called ergative marker from transitive to intransitive subjects (Schieffelin, 1985, on Kaluli; Pye, 1980, on Quiché); in addition (although the data are sparser on this point), they seem to treat intransitive subjects like objects rather than like transitive subjects with respect to word order patterns (Ochs, 1985, on Samoan).

The uniform treatment of agents by children learning English and other languages that happen to be nominative led many researchers in the early 1970s to hypothesize that the concept of "agent"—the one who initiates and carries out an action, whether transitive or intransitive—emerges spontaneously in the sensorimotor period, and is used as a core meaning to which word order patterns and other grammatical privileges are mapped (e.g., Bowerman, 1973; Schlesinger, 1971). However, the more recent evidence from children learning ergative languages shows that agent is *not* a universal cognitive organizer for early grammatical development (see also Slobin, 1982). Instead, it is a semantic category that reflects experience with a language that treats transitive and intransitive agents alike (see Schlesinger, 1977, for independent speculation that agent is a category learned from language). If children are exposed to a language that makes a fundamental grammatical distinction between transitive and intransitive agents, they respect this distinction from the beginning.

CONCLUSIONS: IMPLICATIONS FOR LANGUAGE DISORDERS

The evidence just discussed indicates that children are highly sensitive, even in the very earliest stages of language acquisition, to the way the words, grammatical forms, and construction patterns of their language are used by fluent speakers. Although learners may sometimes match language forms to concepts generated independently of linguistic experience, they are also capable, at least from the late one-word period and possibly earlier, of building language-specific categories by observing the distribution of forms in adult speech and making inferences about the categorization principles that might underlie this distribution.

This evidence for early language specificity in semantic categorization may seem surprising, given the heavy emphasis on innate principles of conceptual and perceptual structuring in recent theorizing about semantic and syntactic development. However, it is compatible with several recent studies of other aspects of language acquisition that also demonstrate strikingly early effects of experience with a particular language—for example, on children's early phonemic inventories (Pye, Ingram, & List, 1987), on infants' ability to discriminate speech sounds (Streeter, 1976; Werker & Tees, 1984; see also Bornstein, 1979), and on two-year-olds' reliance on word order versus noun animacy to interpret who does what to whom when they are confronted with simple strings containing two nouns and a verb (Bates et al., 1984).

Recognizing the importance of semantic learning in early language acquisition does not mean devaluing the progress that has been made within the cognitivist framework. There can be little doubt that nonlinguistic conceptual and perceptual development is an important prerequisite to many aspects of language acquisition, including acquiring the meanings associated with particular linguistic forms. However, having a general nonlinguistic understanding of particular situations (e.g., certain spatial configurations) does not automatically mean having a preference for *classifying* these situations in certain ways and not others.

In some cases (e.g., for "basic level objects" and for colors) initial cognitive/perceptual understanding probably does include recognition of, or sensitivity to, certain "natural" cleavages among referent entities. However, for many conceptual domains—including "spatial actions," as discussed earlier—children seem to be prepared from the beginning to classify in different ways (although this plasticity unquestionably has limits; see Bowerman, 1985b). Whatever form children's nonlinguistic understanding of these domains may take, it does not supply the initial semantic categories directly. Rather, categorization is influenced, from the outset, by the distribution of forms in the speech the child hears: the evidence is that the categories differ across children acquiring different languages.

Do the linguistic and developmental phenomena discussed in this chapter have any relevance for the assessment or treatment of children with language disorders? It seems to me that they may.

It is possible that some children experience special difficulties in bridging the gap between nonlinguistic understanding and the formation of semantic categories. Although their conceptual development may be normal, they have trouble discovering the grouping principles that would allow them to make sense of the adult use of linguistic forms. Several potential sources of difficulty can be imagined.

1. A prerequisite to adopting language-specific modes of categorization is the ability to let one's attention be guided to potential classification principles by the linguistic input. That is, the learner must be alert to similarities among actions, relationships, and so on, to which the same linguistic forms are applied, and to differences among referents to which different forms are applied. Language-disordered children often suffer from attentional deficits (Johnston, 1982) that may cause reduced sensitivity to the details of form-meaning pairings in the input they receive.
2. Some children may have a normal ability to scan the input for clues to categorization, but nevertheless be limited in their ability to make sensible guesses about what the needed grouping principles might be. Alternatively or in addition, they may have trouble suppressing attention to distinctions that, although irrelevant for the particular language forms they are working on, are naturally highly salient to them, in order to focus on critical distinctions that are relatively less salient.
3. For some children, the requirement that attention to obligatory distinctions become fully automatic may present special difficulties. That is, they may succeed in identifying certain critical distinctions and be able to choose correctly among linguistic forms part of the time, but have trouble in establishing and maintaining the continual, unconscious scanning for these distinctions that fluent speech requires.

Awareness of these potential sources of trouble that a child might experience in classifying the world for purposes of language use may be useful in diagnosis, and it also might help in targeting deficits for particular attention in the design of training programs.

On a more general note, I would like to suggest that even though clinicians and researchers concerned with children's language disorders may deal only with children learning one particular language, they could potentially benefit from information about similarities and differences in semantic structure across languages. As I pointed out earlier, speakers internalize the semantic system of their native language so thoroughly that its categories feel like a direct reflection of the structure of thought. We are not aware—at least until we try to learn a second language—that distinctions that we think of as fundamental might be

irrelevant in some languages, or, conversely, that distinctions that seem minor or exotic to us may play a major role in the structure of other languages. One consequence of our having learned our language lesson so well is that when language-disordered children have trouble grasping the meanings of certain forms, we may be too quick to assume that the problem lies in their nonlinguistic understanding of the relevant situations.

In some cases this assumption will no doubt be warranted. But in other cases the problem may lie purely in the mapping between nonlinguistic knowledge and the categories of the language being learned. When this is so, no amount of nonlinguistic training with the relevant situations (e.g., with objects in containers or on surfaces for a child who has trouble with the words *in* and *on*) is likely to help. What the child needs is guidance in identifying which, out of the various cross-linguistically possible ways of classifying spatial relations, is the way his language does it.

It is likely that children will have more trouble with classification principles that are uncommon cross-linguistically than with those that turn up frequently in the languages of the world, since frequency is likely to correlate with degree of cognitive "naturalness" or ease for human beings (Bowerman, 1985b). It is also possible that children will have more difficulty identifying the needed semantic principles for conceptual domains that are classified in widely different ways across languages than for those that are classified very similarly. This is because cross-linguistic variation suggests a basic flexibility in human cognitive structure—with a concomitant need for children to *learn* the locally appropriate categories—whereas similarity suggests strong nonlinguistic conceptual or perceptual constraints on categorization. Thus, knowledge of how the particular semantic categories a child is trying to acquire are related to the categories with which other languages partition the same domain may provide valuable cues to the kinds of problems the child may experience.

At present, our understanding of cross-linguistic similarities and differences in semantic structure is still quite limited, as is our knowledge of how these are reflected in the ease or difficulty of particular semantic distinctions for children. However, future research on these questions may well lead to information with direct relevance for the treatment of children with language disorders.

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