Chapter 10
Words and Concepts

In *One Hundred Years of Solitude,* Gabriel García Márquez tells how the people of Macondo, struck with the plague of insomnia, coped with its worst effect, the loss of memory. One of the villagers used an inked brush to mark everything with its name—*table, clock, wall, cow, hen, banana.* But he soon realized that as the plague grew worse, the day would come when he would forget not only the names of objects but also their use. So he wrote detailed instructions on the cow: *This is the cow. She must be milked every morning.* But this too would be only a temporary solution, since soon he would forget how to read.

Implicit in this story is the idea that knowing the name for something is separate from knowing about the thing itself. It is one thing to know what the cow is called; it is quite another to know what to do with the cow. The assumption has intuitive appeal. On at least some occasions when children learn a new word, it is clear that they already have the right concept. They might know, for instance, about shoes—what they are for, what they look like, and so on. Learning the word *shoe* lets them talk about shoes and understand when others talk about them, but it has no other effect on their mental life.

In accord with this perspective, scholars have often assumed that before learning language, children already know about the kinds and individuals that occupy their world. They just don't know their names. As Jerry Fodor (1975) has put it, under this view all language learning is actually *second*-language learning. Before being exposed to words in a language such as English, infants possess the concepts that these words correspond to, as part of what Fodor calls *mentalese* or *a language of thought.*

This is not currently a popular view within the cognitive sciences. Many philosophers reject the idea that thought, or at least all thought, can exist without language. Many linguists and anthropologists claim that the language one learns has a profound influence on how one thinks. And many developmental psychologists have been struck by the correlation between language development and cognitive

development: a 12-month-old has few words and a limited mental life; a 24-month-old has many words and a much richer mental life. The idea that words are a catalyst to mature thinking is one way to explain this correlation.

A similar claim has been made about human evolution. Nonhumans have no words and a relatively limited mental life; humans have many words and a much richer mental life. This might be no accident. Charles Darwin (1874, p. 128) suggests: "If it could be proved that certain high mental powers, such as the formation of general concepts, self-consciousness, etc., were absolutely peculiar to man . . . it is not improbable that these qualities are merely the incidental results of other highly-advanced intellectual faculties, and these again are mainly the result of the continued use of a perfect language."

Following Darwin, many modern scholars have argued that the unique aspects of human thought (creativity, the ability to think about the past and future, powers of logical thought, and so on) are made possible through language (e.g., Bickerton, 1995; Carruthers, 1996; Corballis, 1992). Daniel Dennett (1996, p. 17) sums up the strongest version of this proposal in admirably stark terms: "Perhaps the kind of mind you get when you add language to it is so different from the kind of mind you can have without language that calling them both minds is a mistake."

This chapter reviews different versions of this proposal. I argue that some of the weaker versions are true; in certain ways the words one learns affect the nature of thought. But in the end, the commonsense view implicit in García Márquez's story is the right one: rich abstract thought is possible without words, and much of what goes on in word learning is establishing a correspondence between the symbols of a natural language and concepts that exist prior to, and independently of, the acquisition of that language.

Language, Thought, and Structured Thought

The most radical proposal about the relationship between language and thought is that all thinking is done in natural language. Most readers of this book think in English, someone who speaks only Dutch thinks in Dutch, and someone with no language does not think at all. Steven Pinker (1994b) raises some serious concerns with this view: Do chimpanzees, dogs, aphasics, and babies really have no mental life at all? Are they *unconscious*, like bricks, sand, and slime molds? This seems to be an absurd conclusion. If all our thoughts were in the words that we speak, how could we ever have difficulty finding the right words to express an idea? If you need a word to have a concept, how

could anyone ever coin a new word? Furthermore, under any theory of word learning, children need to have *some* mental capacities to start with, and so there must be some thought without language.

Perhaps nobody would deny this. After all, even Edward Sapir (1921) and Benjamin Lee Whorf (1956), the strong proponents of *linguistic determinism,* were adamant that language and thought are distinct. But they claimed that in the absence of language, thought is an unstructured mess. As Whorf (pp. 213–214) puts it, "The categories and types that we isolate from the world of phenomena we do not find there because they stare every observer in the face; on the contrary, the world is presented as a kaleidoscopic flux of impressions which has to be organized by our minds—and this means largely by the linguistic systems in our minds."

And one way in which languages imposes this structure is through words (p. 240): "Languages differ not only in how they build their sentences but also in how they break down nature to secure the elements to put in those sentences. This breakdown gives units of the lexicon. . . . By these more or less distinct terms we ascribe a semifictitious isolation to parts of experience."

Linguistic determinism is not an exclusively American preoccupation. Ferdinand de Saussure (1916/1959, p. 110) asserts the following as simple fact: "Philosophers and linguists have always agreed were it not for signs, we should be incapable of differentiating any two ideas in a clear and constant way. In itself, thought is like a whirling cloud, where no shape is intrinsically determinate. No ideas are established in advance, and nothing is distinct, before the introduction of linguistic structure."

Under the strongest version of this claim, children start with none of the concepts that language-using adults have. It is wrong, then, to say that children first know what a shoe is and then learn the word for it. Instead, by hearing the word *shoe* they come to know about shoes. In fact, the very notion of a solid object is sometimes argued to derive from exposure to the words and grammar of natural language (Quine, 1960).

There are several ways in which words might conceivably structure thought. Imagine a long horizontal line. Suppose you were shown the leftmost third of the line and told that it is *zoop* and then shown the rest of the line and told that it is *moop.* You had not initially thought of the line as having structure, but now you do. This has cognitive consequences. For instance, if you had to cluster three equally spaced dots where two are in the zoop region and one is in the moop region, you might use this linguistically induced categorization as a cue and put the two zoop ones together.

Or imagine that someone dumped in front of you 50 small objects of different colors and textures and the person pointed to all the red and soft object and called them "doops." This would cause you to view the red soft objects as falling into a distinct category, and forming the category might affect how you reason about and recall other sets of objects you encounter, even in contexts that have nothing to do with communication.

Another way in which language could affect thought is that it could provide an alternative representational format for the storage of information. Imagine seeing a cluttered room and then, much later, having to remember what was in it. A creature without language could access only its visual memory of the scene, but a creature with language might also be able to access a linguistic description that was generated when the room was first seen—something that might make a substantial difference.

So language *could,* at least in principle, have an influence on nonlinguistic thought. But does it? The problem with radical linguistic determinism is its premise that human thought is unstructured prior to language. This just isn't true; as reviewed in previous chapters, babies have a rich mental life. For instance, they know a lot about objects. They expect them to continue to exist even when they go out of sight, can predict their trajectories, can determine the numerosities of small arrays of objects, and can compute the results of simple additions and subtractions performed over these arrays. They do *not* see the world as a "kaleidoscopic flux of impressions" (or the "blooming buzzing confusion" of William James). And so Whorf was wrong when he said that the categories we see in the world do not "stare every observer in the face." Actually, at least some of them do.

Cross-Linguistic Differences

Whorf and Sapir were most interested in the effects of cross-linguistic variation on adult cognition. If our thoughts are shaped by language, and if languages differ in major ways, it follows that adult speakers of different languages should differ in how they think.

Under the most plausible version of this view, this effect of language applies to conscious experience. For instance, one might be able to unconsciously distinguish different types of dogs but only consciously attend to this distinction on hearing the types described with different words. Or perhaps continued use of a language in which verbs differ according to the shape of the object that is acted on (as in Navajo, in which one verb is used for describing the giving of a long thin object like a stick and another for a spherical object like a rock) might lead

language users to think about object shape, more so than they would if using a language like English that doesn't make such a distinction.

Does this actually happen? Whorf presented several case studies that were said to support this view. Most famously, he suggested that Hopi speakers, just by virtue of having learned Hopi, think about time and space in a very different way than speakers of languages such as English. Part of the attraction of this claim is its cultural generosity. Whorf claimed that, as a result of the languages that they have learned, individuals in Western societies have a stodgy and linear Newtonian perspective on space and time, while the Hopi have an up-to-date funky Einsteinian view. The Hopi are natural physicists; we are not.

Whorf's empirical claims have not weathered well. On more careful scrutiny, the languages are not nearly as dissimilar as Whorf made them out to be (Malotki, 1983). Furthermore, Whorf never actually presented evidence that Hopi think any differently about time and space than Americans do; he simply came to this conclusion that they *must*—because, after all, their languages are different (Brown, 1958b). This sort of circular reasoning is not unprecedented in contemporary discussions of linguistic determinism. Gregory Murphy (1996, p. 183) provides the following parody:

> *Whorfian:* Eskimos are greatly influenced by their language in their perception of snow. For example, they have *N* words for snow [*N* varies widely; see Pullum, 1991], whereas English only has one, *snow.* Having all these different words makes them think of snow very differently than, say, Americans do.
>
> *Skeptic:* How do you know they think of snow differently?
>
> *Whorfian:* Look at all the words they have for it! *N* of them!

Subsequent psychological research has provided little support for the Whorfian hypothesis in domains such as the perception of color and counterfactual reasoning. Such studies have found either that speakers of different language have identical nonlinguistic capacities (e.g., Au, 1983; Brown, 1958b) or that they differ only in tasks that are themselves language dependent, such as those that rely on explicit verbal memory of words (e.g., Kay & Kempton, 1984). As a result, many psychologists have viewed the Whorfian claim as being decisively refuted.

More recent studies are sometimes said to resuscitate the Whorfian view. Lucy and Gaskins (in press) report a series of experiments in which subjects are shown a target object and two alternatives—one of the same shape but a different material from the target, the other of a different shape and the same material. When simply asked which of

the alternatives was most similar to the target—without the introduction of any novel word—the dominant response by English-speaking adults is to choose the object of the same shape. Such findings support the claim that adults have a bias toward shape in object categorization (see chapter 6). But Lucy and Gaskins also tested native speakers of Yucatec Maya, a classifier language spoken in southeastern Mexico. These adults did not show the same shape bias; instead, they tended to generalize to the material match.

Lucy and Gaskins suggest that this is an effect of language: English describes the shape match using the same word that describes the target, while Yucatec describes the substance match with the same expression. For instance, a long thin candle would usually be described in English as *candle,* a word that would be extended to other entities on the basis of shape and function. But the same candle would be described in Yucatec with a classifier plus a mass noun, an expression akin to "one-long-thin wax," and this mass noun would be extended to other entities on the basis of substance. It might be, then, that judgments of similarity are affected by the language one knows.

But other ways can be found to explain these findings. One is that subjects explicitly use their linguistic knowledge when doing such a task. That is, they use the strategy of naming the target object to themselves and then look toward the other objects and see which gets the same name. Alternatively, the effect might be due to cultural factors independent of language; these might have to do with how people from different cultures behave when asked to make similarity judgments or (more interestingly) might reflect differences in how they think about simple artifacts. The reason to favor such alternatives is that Lucy and Gaskins also tested seven-year-olds on the same task and found no difference across the two groups: *all* subjects showed a strong shape bias. Since the seven-year-olds already know English and Yucatec, this suggests that the adult difference is not an effect of language.

Another set of studies has been carried out by Steven Levinson (1996). When describing the spatial relations between objects, languages typically use multiple frames of reference and choose the frame according to the situation. Dutch, like English, tends to use either an *intrinsic* frame that employs the spatial properties of objects in the scene (as in "The boy is in front of the truck") or a *relative* frame based on the viewer's own position (as in "The boy is to the left of the truck"). But this is not universal. A dialect of Tzeltal, a Mayan language spoken in the community of Tenejapa within Chiapas, Mexico, uses an *absolute* system. The Tenejapans describe the spatial relations between objects using three main expressions: *downhill* (roughly north), *uphill* (roughly

south), and *across* (roughly, east and west). So the same situation that would be described by a Dutch speaker as the equivalent of "The boy is in front of me" might be described by a Tzeltal speaker as the equivalent of "The boy is uphill of me." Phrases such as "Take the first right turn" are simply untranslatable into Tzeltal; that language has no way to express spatial notions that are entirely independent of absolute location.

Levinson predicted that Dutch speakers would think about objects in close proximity in terms of relative notions like right and left, while Tzeltal speakers would think about them in terms of absolute notions such as north and south. In one study, four toy animals (cow, pig, horse, sheep) were placed on a table in a random order—such as in left-to-right order or in north-to-south order. Subjects were asked to remember the array, were rotated 180 degrees to face another table, and were asked to recreate the array "exactly as it was." Dutch speakers tended to preserve relative order; they would put cow, pig, horse, and sheep on the table in left-to-right order. The Tenejapans tended to do the opposite: they violated relative order but preserved absolute location by putting the sheep, horse, pig, and cow on the table, in left-to-right order.

In another study, Tenejapan subjects were asked to face north and then shown a cartoon in which movement occurred from east to west. The subjects were then moved to another room and asked to tell someone else about the cartoon, and their spontaneous gestures were surreptitiously observed. Unlike Dutch subjects, who preserved the relative direction of the movement (left to right), the Tenejapans tended to preserve the absolute east-to-west movement in their gestures, and so they either gestured from right-to-left or left-to-right, *depending on which direction they were facing when telling the story.*

It is unlikely that such results are due to the conscious use of linguistic strategies, and so Levinson (1996, p. 125) concludes that "The frame of reference dominant in the language, whether relative or absolute, comes to bias the choice of frame of reference in various kinds of nonlinguistic conceptual representation."

Just as with the Lucy and Gaskins studies, however, one needs to rule out the possibility that some third factor explains both the linguistic and the nonlinguistic differences between members of the two cultures. It might be, for instance, that the physical environment in which the Tenejapans live encourages *both* the use of an absolute spatial system in Tzeltal *and* an absolute spatial encoding of objects, but that there is no direct effect of learning Tzeltal on the Tenejapans' spatial thought.

It is not impossible to rule out this alternative; more convincing would be research into the potential effects of linguistic variation in

human groups from more similar physical and cultural environments, such as between English and Japanese speakers raised in Japan or between English and Spanish speakers in the United States. Such research is in progress by Levinson and others.

But what if Levinson's explanation of these effects is right? That is, what if language per se, not culture, really causes the difference? This would be a striking finding, but it is important to acknowledge its scope. It would be a mistake to take this finding as showing that language somehow *creates* systems of spatial thought. After all, both relative and absolute systems are encoded in brain mechanisms that underlie the navigation of species other than humans and hence are independent of language (O'Keefe & Nadel, 1978; Peterson, Nadel, Bloom & Garrett, 1996). Furthermore, Dutch speakers can think in absolute terms, and Tzeltal speakers can think in relative terms (and, in Levinson's studies, some do): it is just that they tend not to. If language does have a role to play in spatial cognition, then, it is not in creating new ways of thinking of space but in determining which of the available methods of spatial thought gets used the most.

Inner Speech

A related version of linguistic determinism focuses on what is sometimes called *inner speech,* though deaf signers have a visual equivalent called *inner sign.* Under this view, the inner voices some of us perceive as we think actually reflect processes of thought. To put it in a more formal way, the acquisition of a natural language may give rise to an alternative representational medium with which to carry out certain computations. Babies have only a language of thought; adults have a language of thought plus a natural language such as English.

The most obvious use of inner speech is in cognitive tasks related to language, such as planning what to write or imagining what someone else will say in the course of a conversation. But many scholars have argued that inner speech plays a larger role. Peter Carruthers (1996) has suggested that certain types of thought, such as causal reasoning and social cognition, require the support of an internalized natural language. For instance, when I try to anticipate the reactions the behavior of others (how will Jane react if I don't go to her party?), I might do so in *English;* a language of thought is not sufficient. Similar proposals have been made by Dennett (1996) and Vygotsky (1962).

It is clear that knowledge of a natural language cannot be necessary for all causal and social reasoning, since nonlinguistic creatures, such as babies and chimpanzees, have competence in these domains and, if the arguments in chapter 3 are correct, some social reasoning capacities

are necessary to explain how word learning starts in the first place. But certain limitations on the part of children might be explained by this proposal, particularly with regard to complex tasks involving theory of mind.

Consider the false-belief task (Wimmer & Perner, 1983). In one version of this, the experimenter shows children a Smarties container (the American equivalent to Smarties is M&Ms) and shakes the container, making a rattling noise. The children are asked "What is inside?" and they inevitably reply "Smarties." Then the container is opened, and they are shown that it actually contains small pencils. They are then asked how another child who has not seen the opened container will answer when he is asked the same question "What is inside?" By the age of about four, children answer as do adults, saying "Smarties." But younger children tend to answer "pencils" and will give the same answer when asked what they themselves had previously thought was in the container before it was opened (Perner, Leekham & Wimmer, 1987).

The explanation for this developmental difference is a matter of some debate, and many scholars have blamed children's difficulties with task demands, not actual lack of competence (e.g., Leslie, 1994). But Carruthers raises the possibility that young children's poor performance is due to their failure to encode the situation into natural language (see also de Villiers & de Villiers, 1997).

Evidence from adult aphasics is relevant here (Varley, in press). Many aphasics suffer from serious cognitive impairments. This could be due to an intrinsic connection between language and thought or to anatomical accident because lesions that damage language might damage other capacities. But other aphasics demonstrate a dissociation between language and thought. They give the impression of being rational people struggling to communicate. They are not retarded or deranged but instead act as we would act if our primary ability to communicate was stripped from us. They can find their way around, use tools, drive cars, and show appropriate behavior in social situations. As one would expect, they are frustrated by their problems with language and try to compensate by communicating in other ways, such as drawing and gesture. In some cases, their impairment extends to inner speech, as indirect evidence suggests that some aphasics lack the subjective experience of an inner voice in their heads (e.g., Goodglass, Denes & Calderon, 1974).

Such cases provide an excellent opportunity to explore Carruther's claim. Rosemary Varley (in press) tested a severely aphasic man on tasks involving causal reasoning and an understanding of false beliefs (a variant of the Smarties task above). He was unable to produce or

comprehend anything more than strings of isolated words, but he nonetheless did perfectly well at such tasks. This doesn't show that language is irrelevant for the understanding of these notions (after all, he had *once* had language). But it does suggest that the online computation of causal and intentional inferences does not require the possession of a natural language.

The inner-voice proposal might be right about one domain, however. It was argued in the last chapter, following Dehaene (1997), that the ability to reason about the larger numbers—to understand, for instance, that if you remove two objects from 20 objects, 18 will remain—is impossible without the possession of a natural language. This makes a prediction about acquisition: only people who have learned a generative number system can reason about these larger numbers. But a stronger version of this theory makes the prediction that only people who can *access* the language of numbers can reason about them. Without language, all that remains is the approximate accumulator mechanism that humans share with rats and other animals.

If so, then the man with aphasia studied by Varley (assuming that he lacks the linguistic number system) should find it impossible to judge, for instance, the precise number of pencils that would remain if he was presented with an array of 20 and then saw two of them removed. In fact, there is evidence for a clinical dissociation between precise numerical reasoning (arguably the product of language) versus approximate numerical reasoning (arguably the product of the accumulator mechanism) (Dehaene, 1997). But as yet no evidence bears on the important issue of whether the loss of the number words has a specific effect on precise numerical reasoning.

Language and Concepts

A different way in which language can affect thought is not by shifting one's focus of attention or creating a new format for mental computation but by actually creating new concepts. Many developmental psychologists propose that exposure to words might serve to establish the boundaries of novel concepts (e.g., Bowerman, 1996; Gentner & Boroditsky, in press; Gopnik & Meltzoff, 1987, 1997; Waxman & Markow, 1995; Waxman & Thompson, 1998).

What would count as evidence for this proposal? It is important to distinguish between showing that words can create categories and showing that they can draw attention to existing ones. For instance, Markman and Hutchinson (1984) find that if you show young children a novel object and just say "See this one. Find another one," they will typically choose something that has a spatial or thematic relationship

to that object, such as finding a bone to go with a dog. But if you use a new word, as with "See this fendle. Find another fendle," they typically seek something from the same category, such as another dog.

This shows that the presence of a word can motivate categorization. But, of course, the children *already* know that the two dogs belong to the same category; the concept of dog exists prior to their hearing the new word. As Markman and Hutchinson conclude, the role of the word is to tell the child that the category, and not some spatial or thematic relationship, is relevant in this context. It draws attention to a category already in the child's mind; it doesn't cause one to exist.

More generally, abundant evidence shows that hearing words (and later, hearing words that belong to certain syntactic categories) can draw children's attention to kinds. But more is needed to show a causal role of language on concept formation. To take a trivial example, babies who suffer from recurrent ear infections sometimes have an operation in which tubes are put in their ears to drain out fluid. I used to call these "tubes in the ears," but, on talking with a pediatrician, I learned that they actually have a name; they are *grommets.* Learning this word didn't motivate the creation of a new concept. I already knew about the category; I just didn't know its name. If all word learning worked like this, there would be no interesting sense in which words shape or create novel concepts.

It is sometimes argued that cross-linguistic differences in spatial language do have a corresponding effect on spatial cognition. Consider a cup on a table, a handle on a door, and an apple in a bowl. In English, the first two are deemed to be in the same relationship—contact and support—described with the spatial preposition *on,* while the third relationship of containment is described by *in.* But Finnish treats the handle on the door and the apple in the bowl as instantiating the same relationship (collapsing both containment and attachment as highly intimate relations), which is distinct from the support relationship present in the cup on the table. Dutch names each of the three relationships with a different expression, and Spanish collapses them all into a single expression.

Melissa Bowerman (1996) reports a series of studies suggesting that, in this spatial domain and in others, children very quickly come to grasp the specific spatial system to which they are exposed. She concludes (p. 422) that "We have to appeal to a process of learning in which children *build* spatial semantic categories in response to the distribution of spatial morphemes across contexts in the languages that they hear."

This is one interpretation of the results. But Mandler (1996) points out another. Perhaps multiple nonlinguistic categorization schemes

serve to carve up space and are available to children. Language learning involves not creating new semantic categories but establishing the conventional mappings between the words of a given language and the particular spatial categorization scheme to which they correspond. To take a potentially parallel example, an array of objects could be talked about in many ways—the red ones versus the blue ones, the squares versus the circles, the wet ones versus the dry ones. Suppose a child quickly learned all of these categorization schemes; she learned the words *red, square, wet,* and so on. This would not prove that the concepts were "built" through interaction with language, as the notions of red, square, wet, and so on could possibly have been available prior to the learning of the words. The same point holds if three children are each learning a different language—one that has only the words *red* and *blue,* another that has only *square* and *circle,* and a third that has only *wet* and *dry.* If each of the children quickly learns the words of their language, this *might* be because language is shaping thought—but it could also mean that the concepts are there already and that languages differ in the concepts that they have words for. By the same token, then, children's quick learning of distinct spatial expressions does not show that language shapes spatial cognition.

This alternative is plausible only to the extent that one doesn't have to posit a new set of nonlinguistic spatial notions for every language we look at; the variation that exists should be highly constrained (see Bowerman, 1996; Landau & Jackendoff, 1993). It would also bear on this issue if there was evidence for these putatively non linguistic spatial categories in babies and in other species. I see this as an open question. It might turn out that Bowerman's conclusion is correct; the point here is that the rapid acquisition of different spatial systems is not decisive evidence in favor of it.

Susan Gelman and her colleagues have done several studies that bear directly on the question of how words influence conceptual structure. As discussed in chapter 6, Gelman and Markman (1986, 1987) found that sameness of category can override sameness of appearance when children are inferring hidden properties that objects possess. For instance, children were told that a brontosaurus has one property (cold blood) and a rhinoceros has another property (warm blood) and were then asked which property a triceratops has. Both the brontosaurus and the triceratops were described as belonging to same kind: they were both described as "dinosaurs." Under these conditions, children tend to infer that the triceratops has cold blood, even though it looks more like the warm-blooded rhinoceros.

One concern, however, is that children might draw the same inference even if they hadn't been given the labels. Children's assumption

that the brontosaurus and the triceratops have the same sort of blood might be based solely on their knowledge that both are dinosaurs; their having the same label might have been irrelevant. Davidson and Gelman (1990) explored this issue in a series of experiments in which four- and five-year-olds were taught hidden properties of *unfamiliar* animals. In one condition, the target animal was given a familiar label (such as "cow"). Children tended to generalize the hidden properties to other animals that were given the same label, even if these animals were perceptually dissimilar from the target (see also Gelman & Coley, 1990). This shows that language really does affect children's categorization; it can serve as a cue that different objects belong to the same kind.

In another condition, however, the animals were given novel labels. For instance, the target animal might be described as "This is a zav. This zav has four stomachs." Then children would be shown other animals—some which were "zavs," others which were "traws"—and asked which of these also have four stomachs. The results were surprising. When the objects were perceptually dissimilar, there was no effect of sameness of label. In other words, if two objects didn't look alike, then their having the same novel name did not motivate children to treat them as belonging to the same category.

This caution about using words as a cue to conceptual structure makes sense. After all, there is an excellent reason for children *not* to automatically assume that if two objects get the same name, then they belong to the same category. One word (or more precisely, one phonological string) can correspond to many concepts. Flying mammals and instruments for hitting baseballs are both *bats,* and so a child who had the assumption of same-word-equals-same-concept would end up with a strange concept indeed. Because of this, children cannot lean too heavily on words; hearing two objects receive the same name might be a *cue* that they belong to the same category, but it is not definitive.

I don't want to be overly skeptical here. After all, Davidson and Gelman looked at only basic-level kinds; it might be that words play more of a role for subordinate kinds. These carry more information than basic-level kinds (at the cost of being harder to tell apart) and are more associated with expertise in a given domain (Murphy & Lassaline, 1997). As an example, consider going to a wine-tasting class. If you are a wine novice, all wines might taste pretty much the same, and might be categorized, and named, solely as *wine.* But because linguistic cues are repeatedly provided in the context in this class—"This is a *Merlot,* this is a *Beaujolais*"; "This is *dry,* this is *sweet*"—you might come to organize the "flux of impressions" that you experience into discrete categories and to appreciate the ways in which wines differ. As a result, you can acquire the functional ability to distinguish the wines and also

come to have a different, richer, phenomenal experience of their taste (though see Solomon, 1997, for an alternative view).

It might be that wine-tasting classes really do have such effects, at least sometimes, and that language plays an important causal role. After all, evidence suggests that exposure to category labels in artificial learning tasks can increase one's sensitivity to certain perceptual properties (Goldstone, 1994), and that the mere presence of labels causes people to exaggerate differences between groups (Tajfel & Wilkes, 1963). But note there is nothing special about words in this situation; any other distinctive signal would work as well. One might run a wine class by holding up different colored cards to denote the different wines or putting them in distinctively shaped glasses. Words are just particularly convenient ways of drawing distinctions; there is nothing magical about them.

The argument so far can be summed up as follows. It is often proposed that the words we learn guide our patterns of habitual thought (as in the domain of spatial reasoning), enable us to perform abstract inferences (as in the domain of theory of mind), and help us carve the external world into distinct categories (as in the domain of object categorization). Such proposals might be true, but as yet no strong evidence exists for any of them. Instead, we find that spatial reasoning, theory of mind, and object categorization can all apply independently of language.

None of this is to deny that exposure to language can create new concepts. This would be crazy; *of course* it can. If you are a hockey novice, you might not know what a hat trick is. Someone might helpfully tell you that "A hat trick is when someone scores three goals in a row," and now you know. What goes on here? You didn't already have the notion of hat trick and simply learn what it was called; this isn't like the *grommet* example above. Instead, the concept was created through the vehicle of language. As discussed in Chapter 8, this is likely to hold for the acquisition of many abstract words.

But this is not a Whorfian process in which words give structure to a previously undifferentiated conceptual space. The creation of new concepts instead results from language conveying ideas. It is not the *form* of language that causes the concepts to emerge; it is the *content* that the language conveys.

A World without Words

In the end, how important are words to thought? How far can one get without them? If you try to answer these questions by comparing normal language-using adults with babies and nonhuman animals, you

risk overestimating the importance of words. After all, the limitations of babies and animals are due in part to factors other than language. On the other hand, studies of aphasics might lead one to underestimate the role of words. Aphasics *once* knew words, after all, and these might guide their structure of thought in the sense that blueprints guide the construction of a house: after the house is built, it doesn't matter if the blueprints are lost.

One way to explore this issue is to look at otherwise normal people who have never been exposed to a natural language. Some such cases arise through conditions of terrible neglect. These are so-called wild children, such as the Wild Boy of Aveyron, who was raised by animals in the woods (Lane, 1976), and Genie, who was kept in a closet until puberty by her mad father (Curtiss, 1977). But these wild children have been deprived of much more than language, and so the extent to which their cognitive limitations (which are often profound) are caused by other factors is unclear.

A better group to look at is congenitally deaf adults who have been raised within a hearing society and have grown up without exposure to sign language. As Oliver Sacks (1988) reviews, throughout much of European history, the languageless deaf were thought of as imbeciles. Many modern commentators would draw a similar conclusion. A deaf isolate is, in Sacks's own words, "severely restricted in the range of his thoughts, confined, in effect, to an immediate, small world" (p. 41). Others have said that such isolates lack the capacity for abstract thought (Church, 1961) or suffer from a (curable) form of mental retardation (Rapin, 1979).

This is not an unfounded view. Sacks describes Joseph, a boy who was born deaf and was misdiagnosed first as retarded and then as autistic. When his deafness was finally recognized, he was categorized as "deaf and dumb." No attempt was made to expose him to sign language. By the time Joseph was 11, he *was* retarded and showed no sign of any ability to cope with abstraction, to think about the past, or to plan the future. Such cases support the view that exposure to language is essential for abstract and mature cognition.

But two qualifications should be made. The first is that Joseph and others in a similar situation are often, like wild children, deprived of more than language. They also miss out on everything that language typically conveys. Susan Schaller (1991, pp. 35–36) discusses the plight of another deaf isolate named Ildefonso:

> Ildefonso was sane after twenty-seven years of a mental isolation worse than any solitary confinement in prison. His cell had open windows; he could experience everything in he world—touch it, feel it, taste it, watch it—but only in total isolation.

> No one had ever agreed or disagreed with him, mirrored, confirmed, or argued with his impressions. He had only his own mind to connect experiences, find patterns, imagine meanings, and fit together semantic puzzles. Even with shared meaning, feedback, and help in interpreting the world, many people have trouble with reality. How does one stay sane when all interpretation is generated by one's self alone?

But as Schaller later discusses, there are means of communication other than language. People who have no language in common can make some progress at getting ideas across to one another. It is unclear how much of Joseph's plight really was inevitable and how much he would have benefited from the careful attention and support of people who might have used other means to communicate with him.

Second, it is hard to know what goes on in the mind of someone without language. Imagine suddenly being stripped of your ability to use and understand words, and consider how hard it would be to convince a skeptical audience of language users that you are capable of full-blown abstract thought. Who really knows what Joseph is thinking? This is the dilemma that arises more generally when studying people and animals without language. Often it is only when clever experimental studies are done—as with Varley's work with aphasics, Hauser's work with monkeys, or Spelke's work with babies—that one learns how smart these individuals really are.

One somewhat unusual source bears on the question of the abilities of people without language—autobiographical accounts. One interesting account came from the deaf artist and photographer, Theophilus d'Estrella, who did not acquire a formal sign language until the age of nine. After he had acquired language, he wrote a letter to William James that contained an account of his early experience. This letter described elaborate ruminations that he had had about religion and other matters. This greatly impressed James, who wrote (1893, p. 144), "His narrative tends to discountenance the notion that no abstract thought is possible without words. Abstract thought of a decidedly subtle kind, both scientific and moral, went on here in advance of the means of expressing it to others."

Helen Keller is also interesting in this regard. She became deaf and blind at 17 months of age. She most likely had learned several words by then, though the only word she remembered later was *water.* Keller learned no other language until the age of six, when she was first exposed to a tactile language by a talented and persistent teacher. She was later able to read and write, eventually attending college and writing several books, including an autobiography entitled *The Story of My Life* (1909).

Keller's autobiography is often cited as evidence for the position that no thought exists prior to language. After all, this was Keller's own view; she described herself "at sea in a dense fog" and doubted that her "wordless sensations" could really be called "thoughts." But I think that even a cursory reading of the events that Keller recounts from that period shows that her skepticism was misplaced. She was able to develop a simple nonlinguistic communication system, using both simple signs (nodding to mean yes, shaking her head for no, a pull meaning "come") and more complicated ones (shivering to request ice cream). She could anticipate future events, noticing when her mother dressed to go outside and demanding to join her. She soon learned that she was different from other people, that they somehow talked with their mouths—and the fact that she could not communicate this way caused her terrible frustration. She would play practical jokes, using a key to lock her mother in a pantry and laughing with glee as she pounded to get out. (Mother was rescued by servants hours later.)

Then there is the famous story of how Helen Keller (1909, pp. 23–24) came to realize that the proddings of her teacher were instances of the act of naming: "As the cool stream gushed over one hand she spelled into the other the word *water,* first slowly, and then rapidly. I stood still, my whole attention fixed upon the motions of her fingers. Suddenly I felt a misty consciousness as of something forgotten—a thrill of returning thought; and somehow the mystery of language was revealed to me. I knew then that w-a-t-e-r meant the wonderful cool something that was flowing over my hand."

"I learned a great many new words that day," she concludes. This story might not convince a skeptic. After all, it is reasonable to distrust autobiographical reports. Many of James's contemporaries rejected his conclusion for this reason, and both the d'Estrella and Keller autobiographies—like most autobiographies, from St. Augustine to Larry King—contain episodes that strain credulity. But as support, consider the testimony of her teacher, Anne Sullivan, from a letter she wrote on the next day (Keller, 1909, p. 316): "She has learned that *everything has a name, and that the manual alphabet is the key to everything she wants to know*. . . . All the way back to the house she was highly excited, and learned the name of every object she touched, so that in a few hours she had added thirty new words to her vocabulary. Here are some of them: Door, open, shut, give, go, come, and a great many more. . . . Helen got up this morning like a radiant fairy. She has flitted from object to object, asking the name of everything."

In a sense this episode is more impressive, and informative, than what occurs with word learning. Normal children go quite a while hearing words before starting to use them, and a Whorfian might argue

that this early exposure provides the conceptual foundation for their own first words. And besides, when normal children first start to use words, these words are learned very gradually; no normal one-year-old has ever learned 30 words in a day. But Keller was a different story. In the years before her epiphany, she had been exposed to no words at all. And so her rapid learning of these tactile signs is clear evidence that the relevant concepts were already present in her mind.

Finally, Schaller (1991) studied adult deaf isolates in the United States, many of them illegal immigrants from Mexico. Some showed profound limitations in their cognitive and social abilities. But others, such as Ildefonso, did not; they showed all signs of possessing a rich mental life. They had elaborate spatial knowledge and skills, including the ability to repair complicated machinery, and they could handle money: in fact, some of them did well enough to live on their own. They could also describe events from the past, using pantomimed narratives.

In sum, no support can be found for the view that words are necessary for thought. Instead, a continuum of abilities includes some people without language who are like Joseph and others without language who are like Ildefonso. This shouldn't be surprising. Language is the main way we transmit and store culture. Unless one is lucky enough to be in a supportive community that can compensate for the lack of language, the results can be tragic.

A useful analogy can be made here with vision, which is also an excellent tool for the transfer of information. People who are blind find it harder than people who can see to pick up certain aspects of human culture because they lack the same access to books, diagrams, maps, television, and so on. And without a supportive community that provides alternative means of information transfer—such as Braille—blind people will lose out on social and cultural interaction, which might have cognitive consequences. But this does not mean that vision makes you smart or that explaining how vision evolves or develops is tantamount to explaining the evolution and development of abstract thought. Language may be useful in the same sense that vision is useful. It is a tool for the communication of ideas. It is not a mechanism that gives rise to the capacity to generate and appreciate these ideas in the first place.

This book can be seen as a long argument for just this conclusion. Consider the sorts of capacities that underlie early word learning—an understanding that the world contains objects, events, and relations, kinds and individuals; an appreciation that the nature of some categories does not reduce to their superficial features; an ability to appreciate the referential intentions of others, to understand what they are referring to when they communicate. These are precisely the abilities that

many scholars have argued to be the products of language learning. But they are not: they are its prerequisites.

Words are not necessary for thought. Structured and abstract thought occurs without them. Words are important because they are the building blocks of language, and language allows us to express our thoughts and understand those of others—to become full-fledged members of the human community.

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Chapter 11
Final Words

It looks simple. A 14-month-old toddles after the family dog, smacking it whenever she gets close. The dog wearily moves under the table. "Dog," the child's mother tells her. "You're chasing the dog. That's the dog." The child stops, points a pudgy hand at the dog, and shrieks, "Daw!" The mother smiles: "Yes, dog."

It looks simple—but it isn't. This book began with a discussion of why word learning requires cognitive capacities of considerable richness (chapter 1). These include the ability to learn and store arbitrary mappings (chapter 2), theory of mind (chapter 3), an understanding of concepts corresponding to kinds and individuals (chapters 4 to 7), and, for at least some words, an appreciation of syntactic cues to meaning (chapters 8 and 9). These abilities—with the exception of the appreciation of syntax—exist prior to language learning; they are not the result of it (chapter 10). This theory was applied to the acquisition of different kinds of words, including common nouns, pronouns, proper names, adjectives, verbs, number words, and (if only in passing) determiners and prepositions.

Most of the specific proposals made in the preceding chapters—for instance, about how children name visual representations or how they learn the precise meanings of the smaller number words—can be easily refuted or modified by further empirical work, and no doubt some of them will be. Also, as discussed in the first chapter, the more general position that children learn words by means of conceptual, social, and linguistic capacities that are not special to the task of word learning is also falsifiable.

There are two ways in which this position could be wrong. It might attribute too much to young children. For instance, the findings of Dare Baldwin, Eve Clark, and Michael Tomasello might be better explained in terms of capacities that do not involve theory of mind. (It would be decisive evidence for such an alternative if some children with severe theory of mind deficits had little or no problems with word learning.) Alternatively, this account might err in the opposite direction: perhaps