

## Drawing Distinctions

To categorize is to disregard differences. A house and a barn are different things, but when they are classified together as instances of the concept labeled *building*, their differences are put aside. An ability to classify is an important component of the human ability to cope with experience, and a large segment of the vocabulary of any language—the nouns—is dedicated to standardizing the categories that are chosen as important. But ignoring differences is not always the most intelligent response to a situation. There are times when it is necessary to notice differences and draw distinctions between individuals or events. All higher animals have this discriminative ability, but its scope in human adaptation is greatly enhanced by the further ability to assign words to important distinctions.

Language serves many purposes, one of which is to communicate information. Other purposes are more fun, but serious people emphasize communication. And to emphasize communication is to emphasize reference: If the participants in a discussion cannot agree on what they are talking about, they will never realize the benefits of exchanging information. For that reason, linguistic devices that discriminate among possible referents come to be particularly important.

A proper noun usually denotes an individual thing—there is only one Princeton University, for example—so its referential intent can be reasonably clear. But confusion can arise with common nouns. Common nouns designate classes of objects or events, not specific instances. English provides a variety of syntactic devices to individuate a specific member of such a class. For example, to designate a particular car, you can use a relative clause (*the car that the truck hit*), or a prepositional phrase (*the car in the driveway*), or a genitive apposition (*your father's car*), or adjectival modification (either attributively, *the small car*, or predicatively, *the car is small*). All of these syntactic devices presuppose that the objects or events in question have certain features—histories, locations,

*Even the eggplant has multiple dimensions of variability, and each dimension maps onto an adjectival attribute in English.*



owners, appearances, parts, uses, whatever—and that those features can be used to distinguish one instance from another. The words that best serve to draw such distinctions are words in the syntactic category known as modifiers: adjectives and adverbs. Here again, the organization of a large part of the mental lexicon derives from a basic device that the human mind uses to manage experience and learn from it.

### *Dimensions of Meaning*

Take some simple object—a cup, say. The word *cup* seems unambiguous, yet it fails to specify whether any particular cup is big or little, full or empty, white or brown, clean or dirty, paper or porcelain, here or there. These attributes can become important when it is necessary to distinguish one cup from another. A cup has size (both height and width, and the sides have thickness), color (hue, brightness, saturation), weight, temperature, shape, volume, hardness, elasticity. A cup has value, cost, age, usefulness, suitability, location, accessibility, portability, pleasantness. The list of attributes can go on and on. Any of these attributes can be used to distinguish one cup from another.

Attributes must be attributes OF something. That is to say, different attributes pertain to different kinds of things; people can discriminate many attributes other than those required to distinguish one cup from another. A cup is not ordinarily said to be ambitious, intelligible, aggressive, persuasive, powerful, or thoughtful—a list of irrelevant attributes would be longer than the list of relevant ones. What a person knows about any common noun includes the attributes of its referents, the attributes that determine which modifiers are appropriate to use in designating particular instances.

Some theorists think of attributes as dimensions. In that case, the  $N$  attributes of a given referent define an abstract  $N$ -dimensional space (a hyperspace); any particular instance can be thought of as a point in that space, its location given by its value on each dimension. Note that nouns are used to name attributes, but modifiers specify values of those attributes. The size (noun) of the cup, for example, can be large or small (modifiers), its height (noun) can be tall or short (modifiers), and so on. Each modifier specifies the position of a referent along a particular dimension; the full set of modifiers specifies a particular location in the  $N$ -dimensional space; differences between referents are given by their different locations in that space. Of course, not every value of every referent on every dimension needs to be specified; ordinarily a small subset will be enough to resolve any particular confusion between candidate referents. But the point is that modifiers provide an elaborate multidimensional system for distinguishing one object or event from another, and so facilitate agreement on what is being talked about.

In Indo-European languages, modifiers are an open class; new words can be introduced to express values of new attributes. But that freedom does not

*Illustrating the effect of varying two attributes of an object. In this case, height and width generate the following lexical designations, from upper left to lower right: vase, cup, bowl.*



exist in every language. Some languages (Swahili is an example) have a class of words that can be called adjectives, but it is a closed class with a limited number of members—usually between eight and about fifty. Other languages have no adjectives at all, but express adjectival meanings primarily by nouns or by verbs.

Languages in which adjectives form a closed class shed suggestive light on the attributes you would choose if you were choosing very few. From one of these languages to the next, the range of meanings that the adjectives express is

remarkably consistent. They usually include adjectives giving values of size, color, age, and worth; some also include adjectives for values of position, hardness, kindness, or speed. A paradigm example is Igbo, a Kwa language spoken in West Africa. It has only eight adjectives, which state values for four attributes; they translate into English as *big/little*, *light/dark*, *old/new*, and *good/bad*.

In English, of course, the variety of adjectives is unlimited. When the stock of pure adjectives runs thin, there are many affixes available to turn nouns into adjectives: *-y* (*flowery*), *-ly* (*leisurely*), *-like* (*childlike*), *-ful* (*wonderful*), *-some* (*burdensome*), *-ish* (*foolish*), *-en* (*silken*). Even constructions like *a meat-and-potatoes restaurant* or *a just-pretend-I'm-not-here observer* are acceptable in English (they would be unthinkable in French).

English adjectives are complicated, and getting the different varieties straight is a good way to start a discussion of the semantics of modification.

### **Predicable Adjectives**

A predicable adjective is one that can be used in the predicate of a sentence. For example, *wealthy* is a predicable adjective because it can be used predicatively in such sentences as *The man is wealthy*. A few English adjectives can be used only predicatively; *afloat*, for example, can be used predicatively in *The boat is afloat*, but not attributively, as in *the afloat boat*. But most adjectives can be used attributively—*the wealthy man*. The important point to understand is that many adjectives cannot be used predicatively. For example, *the previous owner* is admissible, but *the owner is previous* is not; *the natal day* is admissible, but *the day is natal* is not. Adjectives that cannot be used predicatively are called nonpredicable adjectives.

The distinction between predicable and nonpredicable adjectives is complicated by the fact that many adjectives can be both. The adjective *mechanical* is an example: *A mechanical device* is a device that is mechanical, so one use of *mechanical* is predicative; but *a mechanical genius* should not be a genius who is mechanical, so *mechanical* has a second use that is nonpredicative. *Nervous* provides another example: *a nervous patient* versus *a nervous disorder*. Sometimes the distinction can be ambiguous: Out of context it is not clear whether *dramatic criticism* refers to criticism of drama or to criticism that is dramatic.

Linguists have provided several criteria that can be used to distinguish predicative from nonpredicative uses:

1. Predicable and nonpredicable adjectives cannot be combined conjunctively (with *and*, *or*, or *but*): *The rude and civil engineer* can only be a joke.

2. Nonpredicable adjectives partition the head nominal into subclasses: *criminal lawyer*, *corporate lawyer*, *divorce lawyer*, *trial lawyer*, and so on. These subclasses are not gradable: *The quite corporate lawyer* or *a very divorce lawyer* are unacceptable.

3. Predicable adjectives can be nominalized, but nonpredicable adjectives cannot be. For example, the predicative use of *nervous* in *the nervous patient* admits such constructions as *the patient's nervousness*, but its nonpredicative use in *the nervous disorder* does not—*the disorder's nervousness* is distinctly odd.

By all three criteria, nonpredicable adjectives behave as if they were nouns being used as modifiers. For example, in *garden party* the noun *garden* is used as an adjective; like a nonpredicable adjective, the nominal adjective does not conjoin, is not gradable, and cannot be nominalized:

1'. Predicable adjectives and adjectival nouns cannot be combined conjunctively: *the large and garden party*.

2'. Adjectival nouns are not gradable: *the highly garden party*.

3'. Adjectival nouns cannot be nominalized: *the party's gardenness*.

In short, nonpredicable adjectives can be considered stylistic variants of modifying nouns. In dictionaries, the definitions of nonpredicable adjectives are usually introduced by some phrase such as “of or pertaining to ———.”

Numbers are a class of nonpredicable adjectives. Note that *the expensive and six books* is unacceptable, as are *the extremely six books* and *the book's sixness*. Of course, one does encounter such apparently predicative uses as *The apostles were twelve*, but that statement combined with *Peter was an apostle* does not lead to the conclusion that *Peter was twelve*. Although English has many nonpredicable adjectives, when people speak of adjectives it is almost always the predicable adjectives that they have in mind. The following discussion, therefore, is limited to predicable adjectives; hereafter, *adjective* will mean *predicable adjective* unless otherwise noted.

## Antonymy

Hyponymy is basic to the organization of nouns in the mental lexicon, and from that transitive asymmetric relation the inheritance hierarchies are generated (see Chapter 9). Adjectives, however, are organized differently; it is not clear what it would mean to say that one adjective “is a kind of” some other adjective. Instead of hyponymy, the basic semantic relation organizing adjectives is antonymy.

The psychological role of antonymy first became obvious from results obtained with word association tests. When the probe word in such a test is a familiar adjective, the most common response from adults is another adjective—almost always the antonym of the probe. For example, when *hot* is the stimulus, *cold* is the most frequent response; when *cold* is the stimulus, *hot* is the most frequent response. This mutuality of association is a salient feature of data for adjectives; it led psychologists to an early appreciation of the importance of antonymy.

It would be helpful, therefore, to have a clear definition of this important semantic relation. Unfortunately, antonymy is not easily defined. The general idea is one of contrast or opposition along some given dimension, but words can contrast or stand in opposition to one another in a variety of ways. At a minimum, the following six types of antonyms have been distinguished in the literature on this subject:

1. Contradictory terms (*perfect/imperfect*)
2. Contrary terms (*white/black*)
3. Reverse terms (*constructive/destructive*)
4. Contrasted terms (*rich/destitute*)
5. Relative terms (*brother/sister*)
6. Complementary terms (*question/answer*)

From a cursory examination of this list it is obvious that no simple linguistic test will accommodate all these different kinds of opposition. Yet native speakers of English have little trouble recognizing antonyms when they encounter them.

The problem of defining antonymy is simplified by limiting the discussion to adjectives, since that move eliminates relative and complementary antonyms, which are antonymous nouns or verbs. The remaining four categories can be accounted for in terms of a few commonsense assumptions about the semantic role that adjectives play in English. The following ideas have already been introduced:

- A1. Adjectives express values of attributes.
- A2. Attributes are bipolar.
- A3. Attributes can be gradable (continuous) or ungradable (dichotomous).

According to A1, *x is Adj* means that there is an attribute *A* such that  $A(x) = Adj$ ; that is, *Adj* is the value of the function  $A(x)$ . For example, *The chair is heavy* means that there is an attribute *Weight* such that  $Weight(chair) = heavy$ .

A2 implies that antonyms are labels for the opposing ends of a bipolar attribute: *The feather is light* means that  $Weight(feather) = light$ —toward the pole of the *Weight* dimension opposite the pole labeled *heavy*. Of course, A2 is false on a strict interpretation. Some attributes seem to be trichotomous (*solid/liquid/gaseous*) and some may have an even greater polarity (*red/green/yellow/blue*). But A2 assumes that such complications are exceptional and that bipolarity is the general rule. It is the bipolarity of attributes that makes it so natural to think of them as dimensions.

## C. K. Ogden on Oppositions

The British psychologist Charles Kay Ogden (1889–1957) is best known for his 1930 book *Basic English*, in which he proposed an international auxiliary language derived from English by simplifying its grammar and reducing the vocabulary to 850 words. Far less well known is the short monograph that he published two years later, *Opposition: A Linguistic and Psychological Analysis*, in which he analyzed various types of opposition between pairs of English words. Ogden saw classification and opposition as the two basic methods available to lexicographers for defining words, and he feared that the importance of opposition was being neglected. “Most controversial discussion in which practical problems of definition tend to arise,” he wrote, “turns on questions of degree and contrast, as much as on differentia and hierarchy.” And questions of degree and contrast, he noted, involve oppositions.

Two types of opposition were fundamental for Ogden. He called them Scale and Cut—oppositions between the two extremes of a scale (*long* and *short*, for example) and oppositions between the two sides of a cut (*inside* and *outside*, for example). But different Scales and Cuts have different properties,



Charles K. Ogden.

which led him to a complex notation for representing different types of oppositions.

The practical reason for Ogden's concern with opposition was that approximately 20 percent of his list of 850 Basic English words could be paired. By eliminating opposites and a few other terms,

he was able to reduce the list of Basic words from 850 to 500. He calculated that the time saved by this reduction—a couple of hours per person spent in memorizing vocabulary—was, when multiplied by the world's population, like saving the entire productive lives of thousands of people.

According to A3, there are two kinds of attributes, gradable and non-gradable. *Weight*, for example, is a gradable attribute whose values range over a continuum between *heavy* and *light*, whereas *sex* is an ungradable attribute that takes two values, *male* and *female*. A3 is really too vague to falsify. Sometimes the distinction between gradable and ungradable is unclear, and any adjective that has comparative and superlative forms can appear to be graded. But since the majority of hard-working adjectives in English are graded, the distinction is more logical than practical.

For the vast majority of adjectives, these three assumptions suffice to account for the observation that antonymy is basic to the semantics of adjectives: The semantic role of adjectives is to express opposite values of (gradable or ungradable) bipolar attributes. Each of the four types of antonymous adjectives can be understood in these terms; consider them in turn.

Begin with the distinction between (1) contradictory and (2) contrary terms. This terminology originated in logic, where two propositions are said to be contradictory if the truth of one implies the falsity of the other, and the falsity of one implies the truth of the other: *Caesar is dead* implies that *Caesar is alive* must be false, and vice versa. Logicians distinguish contradictories from contraries, where two propositions are contrary if only one of them can be true, but both can be false: *That is hot* and *That is cold* cannot both be true of the same "that," but both can be false. So *hot* and *cold* are contrary terms.

One problem with this logical distinction is that the definition of contrary terms is not limited to opposites. It can be applied so broadly as to be practically meaningless. For example, *That is a tree* and *That is a dog* cannot both be true, but both can be false, so *dog* and *tree* are also contrary terms. Assumptions A1 through A3 ignore this logical distinction and assume instead that gradability is basic. What a logician would call contradictory terms are simply values of nongradable attributes; contraries are gradable.

The same assumptions account for (3) reverse terms, which signify acts or states that reverse or undo one another. Reverse terms are usually antonymous verbs, but they do occur as deverbal adjectives (*tied/untied*). Reverse adjectives are simply values of ungradable attributes; mutual exclusivity derives from the special relation of reversibility.

Which leaves to be discussed: (4) contrasted terms.

### ***Indirect Antonyms***

If antonyms are defined as pairs of labels for opposite poles of an attribute, then pairs like *dry/moist* and *vigilant/careless* are clearly antonyms. How do they differ from other antonyms? The most obvious difference is that they are not primary associates of one another; compare them to *dry/wet* and *careful/careless*.

For ease of discussion, the contrasted terms can be called indirect antonyms, as distinguished from the so-called contradictory, contrary, and reverse

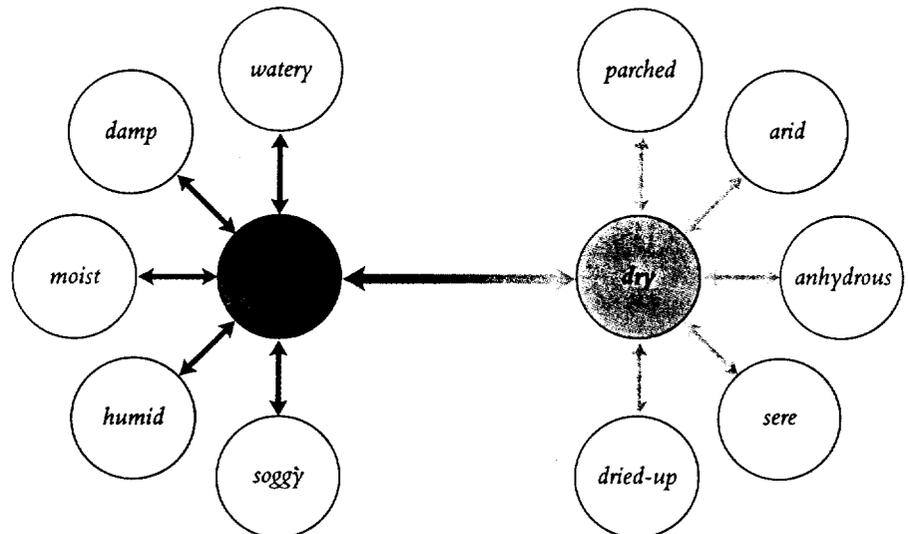
terms, which can be called direct antonyms. This grouping reduces the variety of antonymous adjectives from four types to two: direct versus indirect antonyms. Then the question becomes: Why is a distinction needed between direct and indirect antonyms? Why do native speakers of English feel that the relation between *dry/moist* is different from that between *dry/wet*? Why are *vigilant/careless* felt to be somehow less antonymous than *careful/careless*?

The rationale for this distinction begins with the observation that many adjectives do not have direct antonyms. What is the direct antonym of *musty*, for example? A contrasting term is *fresh*, but the direct antonym of *fresh* is *stale*. To call *fresh/musty* indirect antonyms is to suggest that the conceptual contrast between *fresh* and *musty* is mediated by the semantic similarity between *musty* and the direct antonym *stale*. Similarly, the conceptual contrast between *dry* and *moist* is mediated by the synonymy of *moist* and *wet*; *vigilant/careless* is mediated by the synonymy of *vigilant* and *careful*; and so on.

Thus, the rule is that the direct antonym of an adjective  $A_1$  that is similar in meaning to adjective  $A_2$  is the indirect antonym of adjective  $A_2$ . This rule merits an additional semantic assumption:

- A4. Adjectives lacking direct antonyms are synonyms of adjectives that have direct antonyms.

In other words, both synonymy and antonymy are required to characterize the semantic structure of adjectives.



Two clusters of adjectives having similar meanings are related by the direct antonymy of wet and dry. Within each cluster, the adjectives are related by similarity of meaning.

The general picture that emerges from these four assumptions is that predicable adjectives are organized in the mental lexicon in clusters of synonymous (or near synonymous) terms, and that pairs of clusters are held together by bipolar attributes whose opposite ends are labeled by direct antonyms that provide foci for the clusters. Or, to state it the other way round, associated with each member of a directly antonymous pair is a cluster of other adjectives with similar meanings. For example, *wet* and *dry* are direct antonyms; clustered around *wet* are *moist*, *damp*, *soggy*, *waterlogged*, and so on, while clustered around *dry* are *arid*, *baked*, *parched*, *dehydrated*, and so on.

### **Gradation**

In addition to antonymy and synonymy, a third semantic relation is added to the adjective system as a consequence of the gradability of bipolar attributes. For example, there are differences between *big* and *huge* and between *small* and *tiny*. These quantitative differences between terms that express similar values of an attribute are differences in gradation. Gradation is not entirely lexical, however. It is partially lexicalized, but most grading is expressed by suffixation or adverbial modification.

Gradable adjectives come in three flavors: *some*, *more*, and *most*, otherwise known as the positive, comparative, and superlative degrees. Comparatives and superlatives of monosyllabic adjectives are formed by adding *-er* or *-est*, which was the Anglo-Saxon rule for all adjectives. This rule also applies to many bisyllabic adjectives, but it is not reliable. It applies to *tender* but not to *proper*, for example, and to *able*, but not to *hostile*, so the terminal sounds are not a reliable guide. These are matters that speakers of English simply have to memorize.

When the morphological rule does not apply, *more* and *most* are used. A natural five-point scale results when *less* and *least* are added:

least desirable, less desirable, desirable, more desirable, most desirable

Psychologists who make frequent use of rating scales tend to avoid this natural terminology, however, probably because *least* and *most* are understood to designate unique instances, not classes of instances. A psychologist would probably prefer something like

highly undesirable, undesirable, indifferent, desirable, highly desirable

where the interpretation is less relativistic. That is to say, the least desirable option may not be undesirable, and the most desirable need not be desirable. Sir Winston Churchill, for example, could agree that democracy is not a good form of government and still conclude that it is the best there is.

## Quantifiers

Quantifiers are a special class of adjectives. Three of them are particularly important: *all*, *some*, and *no*. These three played a central role in Aristotelian syllogisms and have fascinated logicians ever since. For example,

All men are mortal.  
Some Greeks are men.  
Therefore, some Greeks are mortal.

The conclusion that some Greeks are mortal does not logically imply that some Greeks are not mortal, although that is how it would be understood in everyday speech. In logic it follows that if all men are mortal, then some men are mortal, but in everyday speech it would be considered misleading to say that some men are mortal if you knew that they all are. That is only one

of the discrepancies between logic and ordinary language.

As an aid to reasoning with these words, the English logician John Venn (1834–1923) introduced the use of circles to represent the sets of things involved—Greeks and men, in this example. Unfortunately, the same statement can be true of more than one Venn diagram.

These three adjectives form a closed logical system. With the negative operator NOT, they can be defined in terms of one another. For example:

All men are mortal.  
≡ It is NOT the case that *some* men are NOT mortal.  
≡ No men are NOT mortal.

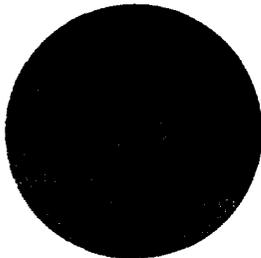
Or:

Some Greeks are men.  
≡ It is NOT the case that *all*

Greeks are NOT men.  
≡ It is NOT the case that *no* Greeks are men.

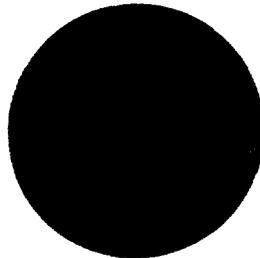
And so on. The combinatorial possibilities are truly endless.

The quantifiers of natural languages are much richer than the quantifiers of logic. In English, for example, there are also such quantifiers as *every*, *any*, *many*, *more*, *nearly all*, *most*, *not many*, *few*, *each*, *only*, *other*, *both*—and perhaps others, as well as the more specialized *the* and *a/an*, plus the specific numerals *one*, *two*, *three*, . . . and *all three*, *all four*, . . . (but not *all two*). How formal logic might be extended to represent all these important quantificational concepts is a subject that only experts should debate. It is obvious, however, that these words are not ordinary predicable adjectives.



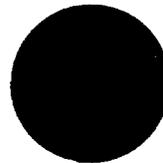
men

Not all Greeks are men.  
Not all men are Greeks.  
Some Greeks are men.  
Some men are Greeks.



men

All Greeks are men.  
All men are Greeks.  
Some Greeks are men.  
Some men are Greeks.



All Greeks are men.  
Not all men are Greeks.  
Some Greeks are men.  
Some men are Greeks.

Venn's diagrams. Not only are several statements true of the same diagram, but the same statement (Some Greeks are men, for example) can be true of several diagrams.

Some grading is lexicalized. For example, the clusters of adjectives involved in the *hot/cold* polarity provide a lexicalized grading from fire to ice:

*torrid, scalding, fiery*  
*HOT, sweltering, tropical*  
*warm, toasty, heated*  
*tepid, temperate, lukewarm*  
*cool, chilly, bracing*  
*COLD, frosty, wintry*  
*frigid, ice-cold, frozen*

Lexical gradation is the exception in English, however, not the rule. Only a few attributes allow it; size, brightness, age, and value (important attributes in any language) provide good examples.

Most clusters consist of adjectives that modify limited classes of nouns. For example, both climates and lips can be wet or dry, but *arid climate* and *parched lips* are preferable to *arid lips* and *parched climate*. How the different adjectives in a cluster relate to one another and to the nouns they modify is a complex and subtle topic.

### **Markedness**

Attributes underlying antonymous pairs usually have an orientation. In 1967 the German linguist Manfred Bierwisch published an important analysis of German adjectives in which he pointed out that not all spatial adjectives can take measure phrases. For example,

*Der Zug ist zehn Wagen lang (The train is ten cars long)*

is acceptable; the measure phrase *zehn Wagen (ten cars)* describes how long the train is. But when the antonym is used:

*Der Zug ist zehn Wagen kurz (The train is ten cars short)*

the result is not acceptable in either language (unless it has already been established that the train is short in the sense that some cars are missing).

The antonymous pairs, *lang/kurz* in German and *long/short* in English, illustrate a phenomenon known as markedness. The primary member (*lang, long*) is unmarked and can take a measure phrase; the secondary member (*kurz, short*) is marked and does not take measure phrases without special preparation. Note that it is the unmarked member that lends its name to the

attribute (*Länge, length*). In Bierwisch's terminology the primary pole of the attribute is positive and the other negative. Or, to revert to the idea of dimensions in a hyperspace, one end of each dimension (the end expressed by the unmarked member of the antonymous pair) is anchored at the point of origin of the space.

Not all unmarked adjectives take measure phrases. Nevertheless, markedness is a general linguistic phenomenon that seems to characterize all direct antonyms. In nearly every case one member of an antonymous pair is primary: more customary, more frequently used, less remarkable. It is the default value, the value that would be assumed in the absence of information to the contrary. And it is the member normally used in asking questions: *How long is it? How big were they?* Unmarked adjectives include *long, big, bright, pleasant, comfortable, good, strong, happy, healthy, legal, public*, and so forth—a perfect world for Pollyanna.

How can you tell which member of any given pair of antonyms is marked? A few cases are puzzling, but for the vast majority of pairs the marker is plain to see. *Unpleasant* carries the prefix *un-* as an explicit marker; *impatient* is marked by *im-*, *illegal* by *il-*, and so on. *Un-* is the most productive of these negative affixes. But even the common Anglo-Saxon adjectives whose antonyms are not marked morphologically usually have a clear orientation; such uncertain pairs as *wet/dry* or *hot/cold* are exceptions. For example, if a language has modifiers, it will have an adjective that can be translated as *good*. Many languages, however, do not have a word for *bad*, which is expressed as *not good*. But no language is known that lacks a word for *good* and expresses that concept as *not bad*. *Good* is the unmarked member in all known languages.

The fact that most antonyms are formed by the addition of a negative affix is a reminder that antonymy, like synonymy, is a semantic relation between words, not a semantic relation between concepts or meanings. Synonymy is a relation of similarity of meaning among words: Any two or more words that can express the same meaning are said to be synonyms. Antonymy is a relation of opposition of meaning between words: Antonymy is frequently the semantic change that accompanies the addition of the negative *un-* prefix. (Recall the necessary element of semantic change, or change in meaning, associated with the derivational rules established in Chapter 6, and the fact that the domains of such rules are always actual words.) In this respect, antonymy (and synonymy) differ from hyponymy and meronymy, which are semantic relations between concepts.

Note that this feature of antonymy is responsible for the organization into direct and indirect antonyms. Two clusters of adjectives that express opposite meanings cannot all be direct antonyms of one another because an adjective can have only one direct antonym. For example, *big* and *large* express very similar meanings, as do *little* and *small*, but the meaning {*big, large*} is not the antonym of the meaning {*little, small*}. Instead, the words *big/little* form one pair of direct antonyms, and *large/small* form another. *Large/little* are indirect antonyms, conceptually opposed but unpaired.

## Color Terms

Color commands a lexicon of its own: English has more than three thousand color terms. The color lexicon has received so much attention, and seems to be organized so particularly, that something special must be said about it.

First, the color terms of English serve both as nouns and as adjectives. As nouns, they have a clear hierarchical structure: For example, a scarlet is a red, a red is a color, and a color is a visual attribute. *Scarlet*, along with *crimson* and *vermilion*, are secondary color terms; *red*, *green*, *yellow*, *blue*, *black*, and *white* (and sometimes *brown*, *olive*, *orange*, *purple*, *violet*, *pink*, and *gray*) have been called basic color terms. Unlike most nouns, however, color terms when used as adjectives are predicable adjectives. But the usual pattern of direct and indirect antonymy that is observed for other predicable adjectives does not hold for color adjectives. Only one attribute is clearly described by direct anto-

*The variety of color terms in a language seems to depend on the sophistication of the society's color technology. English allows discrimination of thousands of colors.*



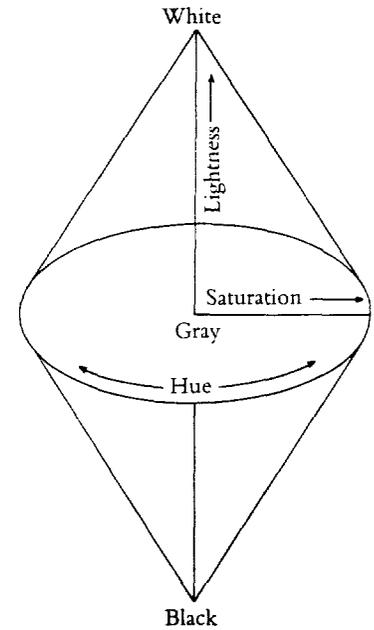
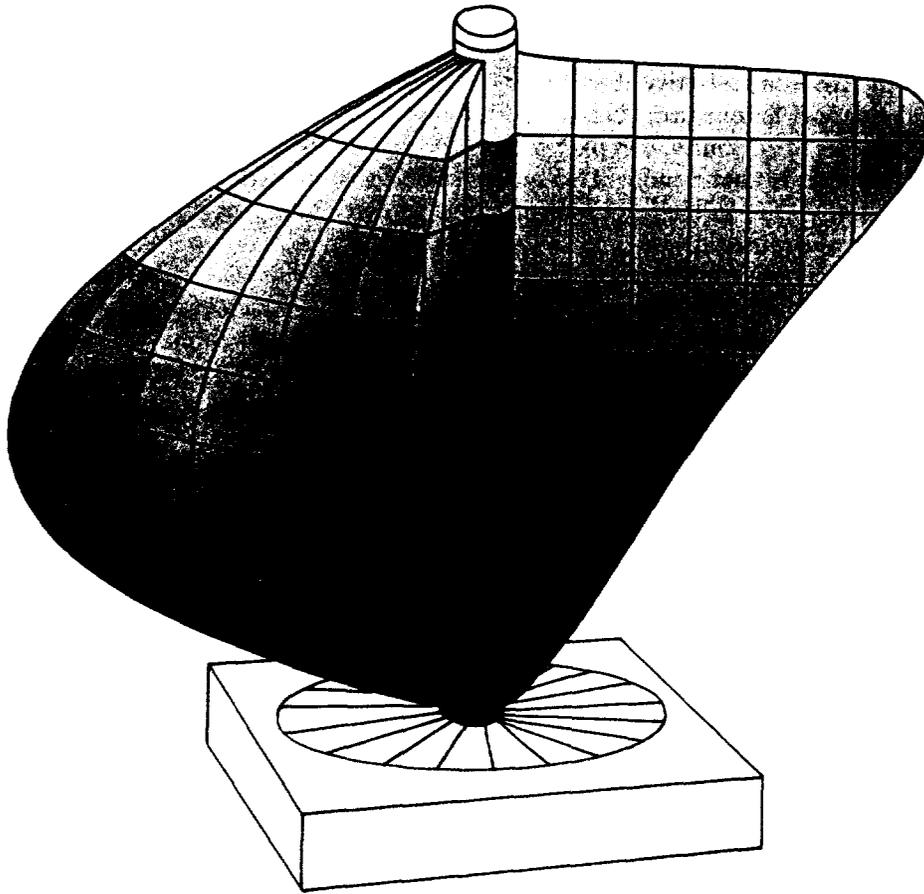
nyms: lightness, whose values are expressed by *light/dark* or *white/black*. Students of color vision can produce evidence of an opposition between red and green and also between yellow and blue, but the names of those color pairs are not treated as direct antonyms in lay discourse. The secondary color terms can be viewed as groups of similar adjectives clustered around a basic color term, but antonymy does not play a central role.

In brief, color terms are not a good example either of a noun hierarchy or of adjective oppositions. Rather, the semantic organization of color terms is given directly by the dimensions of color perception: hue, lightness, and saturation. These dimensions define an abstract color solid, and every color that the eye can recognize is located somewhere in that solid. The achromatic colors—white, gray, black—form a graded scale of lightness running through the center of a circle of hues, providing the vertical dimension of the color solid. Saturation gives the location of the color between achromatic center and the highly saturated colors on the perimeter.

The color solid is not a concrete object available for inspection; it is a conceptual structure, a representation of the theory of color perception. Color terms are defined by mapping them onto the color solid—by giving their focus and boundaries on the solid. The focus for the word *yellow*, for example, is the most typical, highly saturated yellow on the perimeter of the solid. Other colors immediately adjacent to that focal yellow will also be called *yellow*; yellow is a region in the color solid. But the farther you move away from that focus, the less confident you will be that the color should be called *yellow*. The point at which the majority of people would stop calling it yellow and start calling it something else is the boundary of the yellow category. In general, judgments of focal colors are relatively stable and independent of the language you happen to speak, but judgments of category boundaries are variable and depend on what other color terms you are allowed to use.

Psychological experiments have shown that any chromatic color can be described by using combinations of only four terms: *red*, *yellow*, *green*, and *blue*. These four colors are the so-called psychological primaries. Orange, for example, can be described as 50 percent red and 50 percent yellow. In these experiments, however, no color was found that was described either as a combination of red and green or as a combination of yellow and blue. Red/green and yellow/blue are opponent processes; the visual system has evolved in such a way that light can excite either a red or a green response (but not both) and either a yellow or a blue response (but not both). That fact is represented conceptually by placing red opposite to green on the hue circle and yellow opposite to blue. Lexically, it is represented by the absence of any color terms that would be defined as, say, *reddish green* or *bluish yellow*.

Not all languages are blessed with as many color terms as English; the variety of color words seems to correlate with the sophistication of the technology. It has been noted that color terms tend to appear in a fixed order. In some languages there are only two words that can be used to designate colors; they translate into *light/dark* or *white/black*. The first chromatic adjective to be



added is a term for focal *red*. Many languages have only those three color terms. One of the puzzles that has received much attention is the existence of many languages with five basic color terms that translate as *black*, *white*, *red*, *yellow*, and a fifth term that refers to both blue and green. But no known languages have a primary color term for brown, pink, gray, purple, violet, or orange without also having terms for all of the six landmark colors. It is as if color terminology began with a conventional adjective, but then developed along lines determined more by perception than by linguistic principles as the need for greater precision grew.

One qualification of this generalization is that in some cultures the domain of color may not be as completely abstracted from surfaces as it has been in technologically advanced countries. For example, the Hanunóo people in the Philippines use their words for *red* and *green* to signify desiccated and succulent, respectively. A shiny wet brown-colored section of newly cut bamboo is *malatuy*, a color term that would usually be translated into English as *green*.

*The color solid as seen from the blue-green side. Each point in this three-dimensional space represents a separate color.*

## *Selectional Preferences*

Adjectives are selective about the nouns they can modify. A cup can be tin and a dog can be obedient, but not vice versa. It is as if common nouns denote bundles of attributes, and only those adjectives can be used that state values of attributes in that bundle. This generalization is systematically violated in the figurative use of language, but it seems to describe the normal or expected state of the world.

Evaluative adjectives—for example, *good/bad*, *pleasant/unpleasant*, *clean/dirty*—can modify almost any noun at all, but other kinds of adjectives have more restricted domains of application. Charles E. Osgood, an experimental psychologist at the University of Illinois who was one of the founders of the modern field of psycholinguistics, conducted extensive studies of this question. He began with fifty rating scales defined by pairs of antonymous adjectives and asked people to rate each one of twenty nominal concepts (nouns or noun phrases) on all fifty of the rating scales. For example, *nurse* might be rated closer to *good* than to *bad* on the *good/bad* scale; closer to *active* than to *inactive*; near the middle on *angular/rounded*; and so on through the fifty scales. He found consistent patterns of correlation between the scales: Concepts that were rated *good* were also rated *nice* and *clean*; concepts that were rated *weak* also tended to be rated *cowardly*, and so on.

Osgood found that EVALUATION accounted for the most variance in the ratings; all of the nominal concepts could be rated meaningfully on the evaluative scales. Next most important were the scales rating POTENCY (*strong/weak*, *brave/cowardly*) and those rating ACTIVITY (*active/passive*, *fast/slow*); these adjectives cannot modify all nouns, but they are appropriate for nouns denoting animate beings. Ratings on these three kinds of scales were not correlated, so together they defined a three-dimensional space in which Osgood could plot the various concepts that his subjects had rated. Osgood interpreted positions in this space as indicators of the affective value of the concepts. For example, the concepts of *sleep* and of *gentleness* lie close together in that space; these words have different meanings, but the same adjectives can be used to modify them, and Osgood judged them to have similar emotional connotations.

It would seem, therefore, that every common noun has evaluative attributes and that animate nouns have attributes of potency and activity. Beyond those highly general dimensions of meaning, however, each noun has its own bundle of attributes.

It is a common observation that the values expressed by adjectives depend critically on the head nouns that they modify. A horse, for example, has an expected size, and that expectation determines the interpretation of such phrases as *a large horse* or *a small horse*. To say that a pony is a small horse and that a canary is a small bird does not mean that ponies and canaries are the same size. Linguists have usually assumed that the meaning of the head noun must include information about the expected (or default) values of its referent. This

fact implies that a noun's meaning cannot be JUST a bundle of attributes; normal values for at least some attributes must also be part of the meaning of a noun. Then the adjective simply modifies that expected value up or down: A large horse is larger than the expected size for horses; a tall snowman is a snowman that is taller than the expected height of snowmen; and so on. But why a tall snowman built by a basketball team is clearly much taller than the tall snowman built by a kindergarten class can be explained only in terms of general knowledge, not specifically lexical knowledge.



No single theory can account for all the different semantic structures that coexist in the mental lexicon. Hierarchical inheritance systems can represent the semantic relations between nouns; hyperspaces are handy for thinking about the organization of modifiers in the mental lexicon. But how are these representations related? Presumably, adjectives provide features for distinguishing among the nouns: The glittering hyperspaces defined by bipolar attributes hang on the hierarchy of nominal concepts like ornaments on a Christmas tree.

The more deeply semantic structures are explored, the more complex they seem. And the most complex words of all still lie ahead.