one’s person—satisfy the meaning of “carry” in that law? Justice Stephen Breyer argued that Congress intended the word in its ordinary, everyday meaning, without the artificial limitation that it be immediately accessible. Quoting *Robinson Crusoe* and *Moby Dick*, he pointed to the common use of “carry” to mean “convey in a vehicle.” The mandatory sentence, he concluded, is thus properly imposed. Justice Ruth Bader Ginsburg found Breyer’s literary evidence selective and unpersuasive; in response, she offered quotations from Rudyard Kipling, the TV series *M*A*S*H*, and President Theodore Roosevelt’s “Speak softly and carry a big stick” to show that “carry” is properly understood in the federal statute to mean “the gun at hand, ready for use as a weapon” [*Muscarello v. U.S.*, U.S. 96-1654 (1998)]. In this controversy, which side puts forward the better precising definition?

### 3.5 The Structure of Definitions: Extension and Intension

A definition states the *meaning* of a term. When we look closely at the literal (or descriptive) meaning of a term, however, we see that there are different *senses* in which that term has meaning. With those different senses distinguished (our object just below), we will also see that definitions may be grouped and understood not only on the basis of their functions (as in the preceding section), but in view of the way those definitions are built: their *structure*.

We focus on *general* terms—terms that are applicable to more than one object—which are of critical importance in reasoning. The word “planet” is a typical general term; it is applicable to a number of objects, and it applies in the same sense equally to Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune.* What is meant by the word “planet” is (in one sense) that set of objects. The collection of planets constitutes the meaning of the term, its *extensional* meaning. If I say that all planets have elliptical orbits, part of what I assert is that Mars has an elliptical orbit, and another part is that Venus has an elliptical orbit, and so on. The *extension* of the general term “planet” consists of the objects to which the term may be correctly applied. The *extensional meaning* (also called the *denotative meaning*) of a general term is the collection of the objects that constitutes the *extension* (or *denotation*) of the term.

To understand the meaning of a general term is to know how to apply it correctly. But it is not necessary to know all of the objects to which it may be applied correctly in order to apply it correctly. All the objects within the extension of a given term have some *common attributes* or characteristics that lead us

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*But not to Pluto! As explained in the preceding section, Pluto is now classified by the International Astronomical Union as a “dwarf planet.”*
to use the same term to denote them. If we know these attributes, we may know the meaning of a term in a different sense, without knowing its extension. In this second sense, meaning supposes some criterion for deciding, with respect to any given object, whether it falls within the extension of that term. This sense of meaning is called the intensional meaning (or, sometimes, connotative meaning) of the term. The set of attributes shared by all and only those objects to which a general term refers is called the intension (or connotation) of that term.

Every general term has both an intensional (or connotative) meaning and an extensional (or denotative) meaning. Consider the general term “skyscraper.” It applies correctly to all buildings over a certain height; that is its intension. The extension of the term “skyscraper” is the class of buildings that contains the Empire State Building in New York, the Sears Tower in Chicago, the Shanghai World Financial Center, the Petronas Twin Towers in Kuala Lumpur, and others also—that is, the collection of the objects to which the term applies.

The extension of a term (its membership) is determined by its intension. The intension of the term “equilateral triangle” is the attribute of being a plane figure enclosed by three straight lines of equal length. The extension of “equilateral triangle” is the class of all those objects, and only those objects, that have this attribute. Because any object that has this attribute must be a member of that class, we say that the term’s intension determines its extension.

However, the reverse is not true: The extension of a term does not determine its intension. Consider “equiangular triangle,” which has an intension different from that of “equilateral triangle.” The intension of “equiangular triangle” is the attribute of being a plane figure enclosed by three straight lines that intersect each other to form equal angles. It is true, of course, that the extension of the term “equiangular triangle” is exactly the same as the extension of the term “equilateral triangle.” So if we were to identify the extension of one of these terms, that would leave the intension of the class uncertain; intension is not determined by extension. Terms may have different intensions and the same extension; but terms with different extensions cannot possibly have the same intension.

When attributes are added to the intension of a term, we say that the intension increases. Begin with a general term such as “person.” Add “living.” Add “over twenty years old.” Add “born in Mexico.” With each such addition the intension increases; the intension of the term “Living person over twenty years old born in Mexico” is far greater than that of “person.” So these terms are given here in order of increasing intension. However, increasing their intension decreases their extension. The number of living persons is much lower than that of persons, and the number of living persons over twenty years old is lower still, and so on.
One may be tempted to say that extension and intension always vary inversely, but in fact that is not the case. This is because there comes a point when increasing the intension of the term has no effect on its extension. Consider this series: “living person,” “living person with a spinal column,” “living person with a spinal column less than one thousand years old,” “living person with a spinal column less than one thousand years old who has not read all the books in the Library of Congress.” These terms are clearly in order of increasing intension, but the extension of each of them is exactly the same, not decreasing at all. So we can say that, if terms are arranged in order of increasing intension, their extensions will be in nonincreasing order. That is, if extensions vary, they will vary inversely with the intensions.

Note that the extensions of some terms are empty; there simply are no objects having the indicated attributes. In Greek mythology, Bellerophon killed the fire-breathing Chimera, a monster with a lion’s head, a goat’s body, and a serpent’s tail. We fully understand the intension of the term Chimera, but it has no extension.

Some bad arguments play on the fact that meaning can refer to extension or to intension, while extension may be empty. For example:

The word “God” is not meaningless; therefore it has a meaning. But by definition, the word “God” means a being who is all-powerful and supremely good. Therefore that all-powerful and supremely good being, God, must exist.

The word “God” is certainly not meaningless, and so there is an intension that is its meaning. But it does not follow from the fact that a term has an intension that it denotes any existent thing.* A contemporary critic has argued in similar fashion:

Kitsch is the sign of vulgarity, sleaze, schlock, sentimentality, and bad faith that mark and mar our human condition. That is why utopia can be defined as a state of affairs in which the term has disappeared because it no longer has a referent.¹⁴

Here the writer has failed to distinguish between meaning and referent. Many valuable terms—those naming mythological creatures, for example—have no existing referent, no extension, but we do not want or expect such terms to disappear. Terms with intension but no extension are very useful. If utopia someday comes, we may wish to express our good fortune in having eliminated “kitsch” and “sleaze,” but to do that we will need to be able to use those very words meaningfully.

*The useful distinction between intension and extension was introduced and emphasized by St. Anselm of Canterbury (1033–1109), who is best known for his “ontological argument”—to which the preceding fallacious argument has little resemblance.
We now use the distinction between intension and extension to explain some techniques for constructing definitions. Some definitions approach a general term by focusing on the class of objects to which the term refers. Some definitions approach a general term by focusing on the attributes that determine the class. Each approach, as we shall see, has advantages and disadvantages.

**EXERCISES**

A. Arrange each of the following groups of terms in order of increasing intension.

1. Animal, feline, lynx, mammal, vertebrate, wildcat.
2. Alcoholic beverage, beverage, champagne, fine white wine, white wine, wine.
3. Athlete, ball player, baseball player, fielder, infielder, shortstop.
5. Integer, number, positive integer, prime number, rational number, real number.

B. Divide the following list of terms into five groups of five terms each, arranged in order of increasing intension.

Aquatic animal, beast of burden, beverage, brandy, cognac, domestic animal, filly, fish, foal, game fish, horse, instrument, liquid, liquor, musical instrument, muskellunge, parallelogram, pike, polygon, quadrilateral, rectangle, square, Stradivarius, string instrument, violin.

**A. EXTENSION AND DENOTATIVE DEFINITIONS**

Denotative definitions employ techniques that identify the extension of the term being defined. The most obvious way to explain the extension of a term is to identify the objects denoted by it. This is one very effective technique, but it has serious limitations.

We saw in the preceding section that two terms with different intensions (e.g., “equilateral triangle” and “equiangular triangle”) may have the same extension. Therefore, even if we could enumerate all the objects denoted by a general term, that would not distinguish it from another term that has the very same extension.

Of course it is usually impossible to enumerate all the objects in a class. The objects denoted by the term “star” are literally astronomical in number;
the objects denoted by the term “number” are infinitely many. For most general
terms, complete enumeration is practically out of the question. Therefore
denotative definitions are restricted to partial enumerations of the objects
denoted—and this limitation gives rise to serious difficulties. The core of the
problem is this: Partial enumeration of a class leaves the meaning of the gen-
eral term very uncertain.

Any given object has a great many attributes and thus may be included in
the extensions of a great many different general terms. Therefore, any object
given as an example of a general term is likely to be an example of many gen-
eral terms with very different intensions. If I give the example of the Empire
State Building to explain the term “skyscraper,” there are many other classes
of things to which I could be referring. And even if we give two examples, or
three, or four, the same problem arises. Suppose I list, along with the Empire
State Building, the Chrysler Building, and the Trump Tower. What is the class
I have in mind? It could be skyscrapers. But all these are also “great structures
of the twentieth century,” “expensive pieces of real estate in Manhattan,” or
“landmarks in New York City.” And each of these general terms denotes ob-
jects not denoted by the others. So partial enumeration cannot distinguish
among terms that have different extensions.

We may seek to overcome this problem by naming groups of members of
the class as examples. This technique, definition by subclass, does some-
times make complete enumeration possible. Thus we might define “verte-
brate” to mean “amphibians and birds and fishes and reptiles and mammals.”
The completeness of the list gives some psychological satisfaction—but the
meaning of the term “vertebrate” has not been adequately specified by such
a definition.

Instead of naming or describing the objects denoted by the term being
defined, as ordinary denotative definitions do, we might try pointing at
them. Such definitions are called ostensive definitions or demonstrative defi-
nitions. An example of an ostensive definition is that “the word ‘desk’ means
this,” accompanied by a gesture such as pointing a finger in the direction of
a desk.

Ostensive definitions have all the limitations mentioned earlier, as well as
some limitations peculiar to themselves. Gestures have a geographic limi-
tation; one can only indicate what is visible. We cannot ostensively define the
word “ocean” in an inland valley. More seriously, gestures are invariably am-
biguous. To point to a desk is also to point to a part of it, and also to its color
and its size and its shape and material, and so on—in fact, one points to every-
thing that lies in the general direction of the desk, including the lamp or the
wall behind it.
This ambiguity might sometimes be resolved by adding a descriptive phrase to the *definiens*, thus producing a **quasi-ostensive definition**—for example, “the word ‘desk’ means *this* article of furniture” accompanied by the appropriate gesture. But such an addition supposes the prior understanding of the phrase “article of furniture,” which defeats the purpose that ostensive definitions have been claimed to serve, having been alleged by some to be the “primary” (or primitive) definitions, the way we first learn the meanings of words. In fact, however, we first learn language by observing and imitating, not by relying on definitions.

Beyond such difficulties, all denotative definitions have this further inadequacy: They *cannot* define words that, although perfectly meaningful, do not denote anything at all. When we say that there are no unicorns we are asserting, meaningfully, that the term “unicorn” does not denote, that its extension is empty. Terms with no extension are very important, and this shows that techniques of definition that rely on extension cannot reach the heart of the matter. “Unicorn” has no extension, but the term is certainly not meaningless. If it were meaningless, it would also be meaningless to say, “There are no unicorns.” But this statement we fully understand, and it is true. Meaning pertains more to intension than to extension; the real key to definition is intension.

**EXERCISES**

C. Define the following terms by example, enumerating three examples for each term.

1. actor
2. boxer
3. composer
4. dramatist
5. element
6. flower
7. general (officer)
8. harbor
9. inventor
10. poet

D. For each of the terms given in Exercise Set A, find a nonsynonymous general term that your three examples serve equally well to illustrate.
B. INTENSION AND INTENSIONAL DEFINITIONS*

The intension of a term, we have said, consists of the attributes shared by all the objects denoted by the term, and shared only by those objects. If the attributes that define the term “chair” are “being a single raised seat” and “having a back,” then every chair is a single raised seat with a back, and only chairs are single raised seats with a back.

Even within this restriction, three different senses of intension must be distinguished: the subjective, the objective, and the conventional. The subjective intension of a word for a speaker is the set of all the attributes the speaker believes to be possessed by objects denoted by that word. This set varies from individual to individual, and even from time to time for the same individual, and thus cannot serve the purposes of definition. The public meanings of words, not their private interpretations, are the logician’s concern. The objective intension of a word is the total set of characteristics shared by all the objects in the word’s extension. Within the objective intension of the term “circle,” therefore, is the attribute that a circle encloses a greater area than any other plane figure having an equal perimeter. However, this attribute of circles is one that many who use the word are completely unaware of. No one possesses the omniscience required to understand all the attributes shared by the objects denoted by general terms, and therefore objective intension cannot be the public meaning whose explanation we seek to give.

People do communicate with one another and therefore do understand the terms they use; hence there must be publicly available intensions that are neither subjective nor objective in the senses just explained. Terms have stable meanings because there is an implicit agreement to use the same criterion for deciding about any object whether it is part of the term’s extension. What makes a thing a circle, in common discourse, is its being a closed plane curve, all points of which are equidistant from a point within called the center. It is by convention that this criterion is established, and this meaning is the conventional intension of the term “circle.” This is the important sense of intension for purposes of definition: It is public but does not require omniscience to use. The word “intension” is normally taken to mean conventional intension, and that is our usage here.

*A term that is sometimes used instead of “intension” is “connotation”; intensional definitions are connotative definitions. We avoid the use of the word “connotation” here because, in everyday English, the connotation of a term is its total significance, including especially its emotive as well as its descriptive meaning. Because we are concerned here only with informative significance, we put the term “connotation” aside; this section therefore uses the terms “intension” and “intensional.”
What are the techniques, using intension, for defining terms? Several methods are common. The simplest and most frequently used is that of providing another word, whose meaning is already understood, that has the same meaning as the word being defined. Two words with the same meaning are called synonyms, so a definition given in this way is called a **synonymous definition**. Dictionaries, especially smaller ones, rely heavily on this method of defining terms. Thus a dictionary may define “adage” as meaning “proverb”; “bashful” may be defined as “shy”; and so on. Synonymous definitions are particularly useful when it is the meanings of words in another language that call for explanation. The word *chat* means “cat” in French; *amigo* means “friend” in Spanish; and so on. One learns the vocabulary of a foreign language by studying definitions using synonyms.

This is a good method of defining terms; it is easy, efficient, and helpful. But it has very serious limitations. Many words have no exact synonym, and therefore synonymous definitions are often not fully accurate and may mislead. Translation from one language to another can never be perfectly faithful to the original, and often fails to catch its spirit or convey its depth. From this realization comes the Italian proverb, “*Traduttore, traditore*” (“Translator, traitor”).

A more serious limitation of synonymous definitions is this: When the concept the word aims to convey is simply not understood, every synonym may be as puzzling to the reader or hearer as the definiendum itself. Synonyms are virtually useless, therefore, when the aim is to construct a precising or a theoretical definition.

One may seek to explain the intension of a term by tying the definiendum to some clearly describable set of actions or operations; doing that is giving the term what is called an **operational definition**. For example, in the wake of the success of Einstein’s theory of relativity, space and time could no longer be defined in the abstract way that Newton had used. It was therefore proposed to define such terms “operationally,” that is, by means of the operations actually undertaken when we measure distances and durations. An operational definition of a term states that the term is applied correctly to a given case if and only if the performance of specified operations in that case yields a specified result. The numerical value given for length can be defined operationally by referring to the results of a specified measuring procedure, and so on. Only public and repeatable operations are accepted in the definiens of an operational definition. Social scientists have also applied this technique. Some psychologists, for example, have sought to replace abstract definitions of “mind” and “sensation” by operational definitions that refer only to behavior or to physiological observations.

Of all the kinds of definition, the one that is most widely applicable is **definition by genus and difference**. This is the most important of all uses of
the intension of general terms, and it is far and away the technique that is most commonly relied on in defining terms. We therefore devote the next and final section of this chapter to a detailed examination of definition by genus and difference, and the rules that properly guide its use.

The following table summarizes the kinds of definition by function (of which there are five), and the six techniques that depend on extension (three) and intension (three).

### Five Types of Definition

1. Stipulative
2. Lexical
3. Precising
4. Theoretical
5. Persuasive

### Six Techniques for Defining Terms

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### EXERCISES

E. Give synonymous definitions for each of the following terms.

1. absurd  
2. buffoon  
3. cemetery  
4. dictator  
5. egotism  
6. feast  
7. garret  
8. hasten  
9. infant  
10. jeopardy  
11. kine  
12. labyrinth  
13. mendicant  
14. novice  
15. omen  
16. panacea  
17. quack  
18. rostrum  
19. scoundrel  
20. tepee