

## UNIT 8 WORDS AND THINGS: EXTENSIONS AND PROTOTYPES

**Entry requirements** SENSE and REFERENCE (Unit 3), PREDICATE (Unit 5), IDENTIFYING the REFERENT of a REFERRING EXPRESSION and UNIVERSE of DISCOURSE (Unit 6). If you feel you understand these notions, take the entry test below. If not, review the relevant unit(s).

- Entry test**
- (1) Which of the following most appropriately describes reference? Circle your preference.
    - (a) Reference is a relationship between sentences and the world.
    - (b) Reference is a relationship between certain uttered expressions and things in the world.
    - (c) Reference is a relationship between certain uttered expressions and certain things outside the context of the utterance.
  - (2) Which of the following is a correct statement about sense?
    - (a) All words in a language may be used to refer, but only some words have sense.
    - (b) If two expressions have the same reference, they always have the same sense.
    - (c) The sense of an expression is its relationship to semantically equivalent or semantically related expressions in the same language.
  - (3) How do hearers identify the referent of a referring expression (other than a proper name) –
    - (a) by seeking in the context of the utterance some object to which the predicates in the referring expression apply?
    - (b) by sharing with the speaker a conventional system according to which each possible referring expression has a single agreed referent?
    - (c) by telepathy – reading the speaker's mind?
  - (4) Which of the following words are predicates? Circle your choices. *Henry, square, expensive, and, under, not, love*
  - (5) Which of the following is correct?
    - (a) The universe of discourse is a part of the context of an utterance.
    - (b) The context of an utterance is a part of the universe of discourse.
    - (c) The universe of discourse is the whole real world.

## Feedback

(1) (b) (2) (c) (3) (a) (4) *square, expensive, under, love* (5) (b)

If you have scored at least 4 out of 5 correct, continue to the introduction.  
Otherwise, review the relevant unit.

## Introduction

We have outlined the basic distinction between sense and reference (Unit 3) and explored details of the use of reference (Units 4–7). In subsequent units (9–11) we will develop the idea of sense in similar detail. The present unit will act as a bridge between the preceding units on reference and the following units on sense, introducing several notions, including extension and prototype, which in certain ways bridge the conceptual and theoretical gap between sense and reference. In other words, we are going to try to pin down more specifically how the notions of sense and reference are related to each other in determining the meaning of a linguistic expression.

To show what we mean when we talk of a ‘gap’ between reference and sense, we look first at the question of how much a knowledge of the reference of referring expressions actually helps a speaker in producing and understanding utterances which describe the world he lives in.

## Practice

- (1) In the case of expressions with constant reference, such as *the Sun* or *the Moon*, could a speaker be said to know what they refer to simply by having memorized a permanent connection in his mind between each expression and its referent? Yes / No
- (2) In the case of expressions with variable reference, such as *the man* or *the middle of the road*, could a speaker be said to know what they refer to by having memorized a permanent connection in his mind between each expression and its referent? Yes / No
- (3) How, in a given situation, would you know that in saying ‘the cat’ I was not referring to a man sitting in an armchair, or to a book in his hand, or to the clock on the mantelpiece? (Remember, from your answer to question (2), that it cannot be because you have memorized a connection between the expression *the cat* and some particular object, a cat, in the world.)  
.....
- (4) Might it seem reasonable to say, in the case of a referring expression with variable reference, such as *the cat*, that a speaker has memorized a connection between the expression and a set, or type, of the expression’s potential referents? Yes / No
- (5) How many potential referents are there for the expression *the cat*?  
.....

**Feedback** (1) Yes (2) No, because for such expressions there is no single referent with which the speaker could establish a permanent connection in his mind. (3) Because you know that the expression *the cat* can only refer to a cat, and not to anything which is not a cat, and you know that men, books, and clocks are not cats. (4) Yes (5) As many as there are (or have been, or will be) cats in the world – certainly a very large number.

**Comment** The point that we are spelling out here is that someone who knows how to use the word *cat* has an idea of the potential set of objects that can be referred to as cats, i.e. he has some concept of the set of all cats. (This idea or concept may only be a vague, or fuzzy, one, but we will come back to that point later.) This leads us to the notion of the extension of a predicate.

**Definition (partial)** The EXTENSION of a one-place predicate is the set of all individuals to which that predicate can truthfully be applied. It is the set of things which can POTENTIALLY be referred to by using an expression whose main element is that predicate.

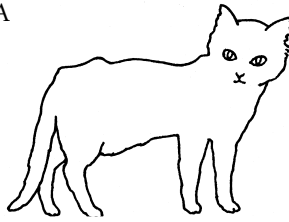
**Example** The extension of *window* is the set of all windows in the universe.  
The extension of *dog* is the set of all dogs in the universe.  
The extension of *house* is the set of all houses.  
The extension of *red* is the set of all red things.

**Comment** In the case of most frequent common nouns, at least, an extension is a set of physical objects. Thus, extension contrasts with sense, since a sense is not a set of anything. And extension contrasts with referent, since a referent is normally an individual thing, not a set of things. Beside these contrasts, the notion of extension has similarities to that of sense, on the one hand, and to that of reference, on the other. Extension is like sense, and unlike reference, in that it is independent of any particular occasion of utterance. Speakers refer to referents on particular occasions, but words which have sense and extension have them 'timelessly'. On the other hand, extension is like reference and unlike sense, in that it connects a linguistic unit, such as a word or expression, to something non-linguistic (i.e. outside language) be it a set of physical objects or an individual physical object, or a set of abstract entities (e.g. songs, distances) or an individual abstract object (e.g. a particular song, a specific distance).

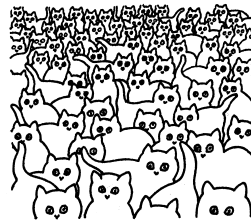
**Practice** (1) In the light of the above comment, fill in the chart with '+' and '-' signs to indicate the differences and similarities between these three concepts.

	Sense	Extension	Reference
Involves a set			
Independent of particular occasions or utterance			
Connects language to the world			

(2) A



B



Which of the two pictures would more informatively be captioned: ‘part of the extension of the word *cat*’?

A / B

(3) Might the other picture appropriately be captioned: ‘the referent of “Jaime Lass’ present eldest cat”, uttered on January 1st 1983’? (Assume that there is someone named Jaime Lass who owned cats at that time.)

Yes / No

(4) Could the expression *her cat*, uttered on different occasions with different topics of conversation, have a number of different referents?

Yes / No

(5) Would each object (each separate animal, that is) referred to by the expression *her cat* on separate occasions belong to the extension of the word *cat*?

Yes / No

(6) Could both pictures actually be labelled: ‘part of the extension of the word *cat*’ (though to do so might not immediately clarify the notions involved)?

Yes / No

Feedback

(1) – + –  
+ + –  
– + +

(2) B (3) Yes (4) Yes (5) Yes (6) Yes, since any individual cat belongs to the set of all cats.

Comment

The notions of reference and extension are clearly related, and are jointly opposed to the notion of sense. The relationship usually envisaged between sense, extension, and reference can be summarized thus:

- (1) A speaker’s knowledge of the sense of a predicate provides him with an idea of its extension. For example, the ‘dictionary definition’ which the speaker accepts for *cat* can be used to decide what is a cat, and what is not, thus defining implicitly the set of all cats. Some semanticists describe this relationship between sense and extension by saying that the sense of a predicate ‘fixes’ the extension of that predicate.
- (2) The referent of a referring expression used in a particular utterance is an individual member of the extension of the predicate used in the expression; the context of the utterance usually helps the hearer to identify which particular member it is. For example, if any English speaker, in any

situation, hears the utterance ‘The cat’s stolen your pork chop’, he will think that some member of the set of cats has stolen his pork chop, and if, furthermore, the context of the utterance is his own household, which has just one cat, named *Atkins*, he will identify Atkins as the referent of ‘the cat’.

Now we will consider further the idea that a speaker of a language in some sense knows the extensions of the predicates in that language, and uses this knowledge to refer correctly to things in the world.

- Practice
- (1) The cat I had as a child is long since dead and cremated, so that that particular cat now no longer exists. Is it possible to refer in conversation to the cat I had as a child? Yes / No
  - (2) Does it follow that the extension of the predicate *cat* includes the cat I had as a child, which now no longer exists? Yes / No
  - (3) New cats are coming into existence all the time. Does it seem reasonable to say that a speaker is continually updating his idea of the set of all cats, to include the newcomers? Yes / No
  - (4) Or does it seem more reasonable to define extensions in such a way as to include objects in the future, as well as in the present and the past? Yes / No
  - (5) Is it possible to refer to the cat which you may own one day in the distant future, a cat which does not yet exist? Yes / No

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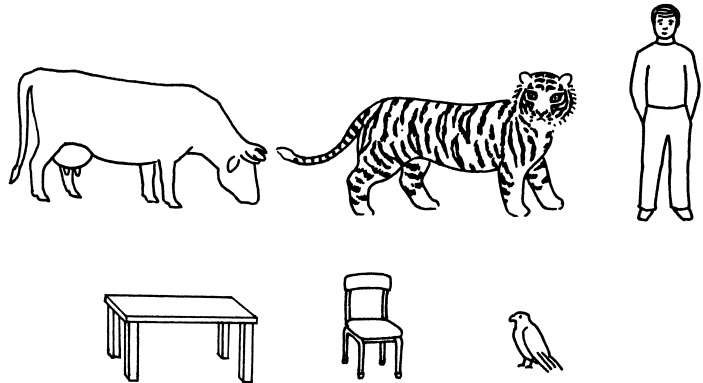
Feedback (1) Yes (2) Yes (3) No (4) Yes (5) Yes

Comment Since clearly one can refer to things which no longer exist and to things which do not yet exist, and since the notion of the extension of a predicate is defined as a set of potential referents, we are forced to postulate that extensions are relative to all times, past, present, and future. Thus, the extension of *window*, for example, includes all past windows, all present windows, and all future windows. Similarly, the extension of *dead* includes all things which have been dead in the past (and presumably still are, if they still exist), which are dead now, and which will be dead in the future. Predicates are tenseless, i.e. unspecified for past, present, or future.

In actual use, predicates are almost always accompanied in sentences by a marker of tense (past or present) or a future marker, such as *will*. These have the effect of restricting the extensions of the predicates they modify, so that, for example, the extension of the phrase *is dead* could be said to be the set of all things which are dead at the time of utterance. Correspondingly, the extension of the phrase *is alive* could be said to be the set of all things alive at the time of utterance. Thus the extensions of *is dead* and *is alive* are different in the appropriate way at any particular time of utterance. This restricting of the extensions of predicates is an example of a more general fact. The extension of

a combination of several predicates is the intersection of their respective extensions, or in other words, it is the set of things common to all of the extensions of the individual predicates.

**Practice** Study the drawing. Imagine a very impoverished little universe of discourse containing only the objects depicted.



**Practice** Assuming that the predicates *two-legged*, *four-legged*, *striped*, *mammal*, *creature*, etc. have their normal English meanings, draw circles on the drawing as follows:

- (1) Enclosing all four-legged things, and nothing else (i.e. the extension, in this little universe, of the predicate *four-legged*)
- (2) Enclosing the extension of the predicate *creature*
- (3) Enclosing the extension of *mammal*
- (4) Enclosing the extension of *two-legged*
- (5) Did the intersection of the first two circles you drew enclose just the set of four-legged creatures? Yes / No
- (6) Did the intersection of the last two circles you drew enclose just the set of two-legged mammals? Yes / No
- (7) In this little universe, is the extension of *non-human mammal* identical to that of *four-legged creature*? Yes / No
- (8) In this little universe, does the extension of the expression *striped human* have any members at all? Yes / No

<b>Feedback</b>	<p>(1) The circle encloses the table, the chair, the cow, and the tiger. (2) It encloses the man, the bird, the cow, and the tiger. (3) It encloses the man, the cow, and the tiger. (4) It encloses the man and the bird. (5) Yes (6) Yes (7) Yes (8) No, the extension of <i>striped human</i> has no members. It is technically called 'the null (or empty) set'. Logicians allow themselves to talk of a set with no members.</p>
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**Comment** It has tempted some philosophers to try to equate the meaning of a predicate, or combination of predicates, simply with its extension, but this suggestion will not work. Classic counterexamples include the pairs *featherless biped* vs *rational animal*, and *creature with a heart* vs *creature with a kidney*. The only featherless bipeds, so it happens apparently, are human beings, and if we assume that human beings are also the only rational animals, then the phrases *featherless biped* and *rational animal* have the same extensions, but of course these two phrases do not mean the same thing. It also happens to be the case that every creature with a heart also has a kidney, and vice versa, so that the extensions of *creature with a heart* and *creature with a kidney* are identical, but again, these two phrases do not mean the same thing. Philosophers and logicians who have developed the idea of extension have been very resourceful and ingenious in adapting the idea to meet some of the difficulties which have been pointed out. We will not discuss such developments here, because they seem to carry to an extreme degree a basic flaw in the essential idea of extensions. This flaw can be described as the undecidability of extensions. We bring out what we mean by this in practice below.

**Practice** We will try to solve the well-known ‘chicken-and-egg’ problem. To do so we make the following assumptions: (a) the only kind of egg that a chicken can lay is a chicken’s egg, and (b) the only thing that can hatch from a chicken’s egg is a (young) chicken.

- (1) Do the assumptions given allow the following as a possibility?  
The first chicken’s egg, from which all subsequent chickens are descended, was laid by a bird which was not itself a chicken, although an ancestor of all chickens. Yes / No
- (2) Do our initial assumptions allow the following as a possibility?  
The first chicken was hatched from an egg that was not a chicken’s egg. Yes / No
- (3) Now imagine that, miraculously, a complete fossil record was available of all the birds and eggs in the ancestry of some modern chicken, going back to clear examples of non-chickens and non-chickens’ eggs. Would it be possible, by careful inspection of this sequence of eggs and birds, to solve the chicken-and-egg problem empirically by pointing either to something that was clearly the first chicken, or alternatively to something that was clearly the first chicken’s egg? Yes / No
- (4) Try to explain the reasons for your answer to question (3).

.....  
.....

**Feedback** (1) Yes (2) Yes (3) No (4) Evolution proceeds in such minute stages that one has the impression of a continuum. We do not have a clear enough idea of what is and what is not a chicken (or a chicken's egg) to be able to tell with any certainty which one in a long line of very subtly changing objects is the 'first' chicken('s egg).

**Comment** The point is that even people who can reasonably claim to know the meaning of *chicken* cannot draw a clear line around the set of all chickens, past, present, and future, separating them from all the non-chickens. In short, the extension of chicken is not a clear set. It is a 'fuzzy set', and fuzziness is far from the spirit of the original idea of extensions. This fuzziness is a problem which besets almost all predicates, not only *chicken* and *egg*.

- Practice**
- (1) If all the ancestors of some modern cat, going back as far as pre-cats, were available for inspection, do you think it would be possible to tell clearly which one of them was 'the first cat'? Yes / No
  - (2) Is the extension of *cat* a clearly defined set? Yes / No
  - (3) Can you imagine finding some creature in the woods and, despite thorough inspection, not being able to decide whether it should be called a 'cat' or not? Yes / No
  - (4) Is the 'present extension' of *cat* (what we have called the extension of *is a cat*) a clearly defined set? Yes / No
  - (5) Could a potter make some object which was halfway between a cup and a mug? If so, what would you call it?  
.....
  - (6) Could a whimsical carpenter make an object that was halfway between a table and a chair? If so, what would you call such an object?  
.....

**Feedback** (1) No (2) No (3) Yes, this situation is imaginable. (4) No (5) Yes; it would be hard to know whether to call it a cup or a mug. (6) Yes; it would be hard to know whether to call it a chair or a table.

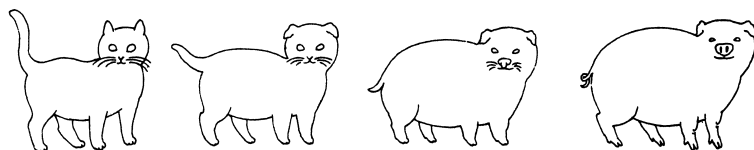
**Comment** In practice, certain kinds of predicates present more difficulties than others. It is unusual, in everyday situations, for there to be much problem in applying the predicates *cat*, or *chicken*. Cats and chickens are natural kinds, which the world obligingly sorts out into relatively clear groups for us. But in the case of some other kinds of predicates, it is obvious that everyday language does not put well-defined boundaries around their extensions. A good example of this is the difficulty people often have in deciding what the boundary is between two similar colours, as shown in the following practice.



- Practice**
- (1) Have you ever argued with another English speaker about whether or not to call some object blue? Yes / No
  - (2) Have you ever been in doubt yourself, as an individual, about whether to call something pink or orange? Yes / No
  - (3) Have you ever been in doubt about whether to call something a tree or a shrub? Yes / No
  - (4) Is there a clear difference for you between what can be called a book and what can be called a pamphlet? Yes / No
  - (5) Is there a clear difference between what can be called paper and what can be called card? Yes / No

**Feedback** (1) Yes, probably (2) Yes, probably (3) Yes, probably (4) No, probably not (5) No, probably not

**Comment** The original motivation for the idea of extension was to explain the ability of speakers of a language to group entities having similar characteristics, such as cats or chickens, into distinct mental categories and to refer to these objects in the world, using linguistic expressions containing predicates. In addition, the idea of extension was to explain their ability as hearers to identify the referents of referring expressions containing predicates, and their ability to make and understand descriptive statements using predicates, as in *Atkins is a cat*. But speakers are in fact only able to do these things in normal situations. The idea of extension is too ambitious, extending to all situations. In fact, a speaker does not have a perfectly clear idea of what is a cat and what is not a cat. Between obvious cats and obvious non-cats there is a grey area of doubt, as we see in the following sketches.



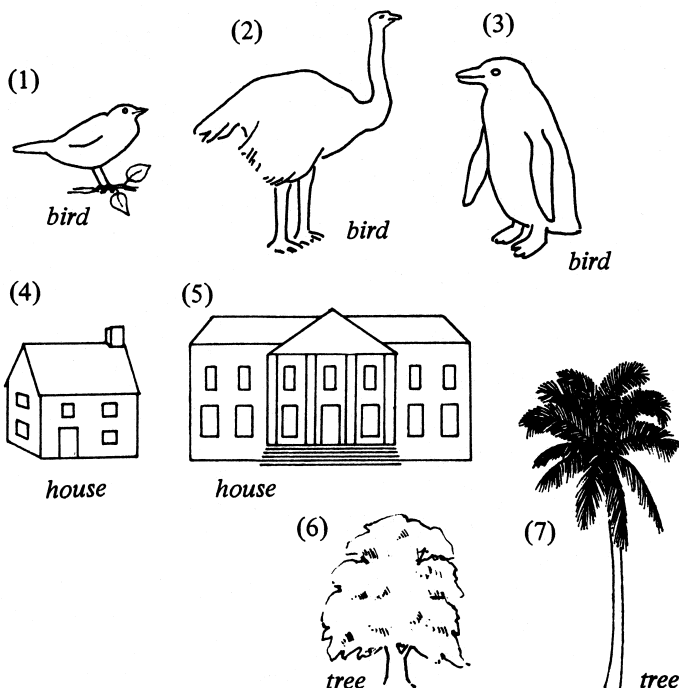
In order to get around such difficulties with the idea of extension, semanticists have introduced the two closely related notions of prototype and stereotype.

**Definition** A PROTOTYPE of a predicate is an object which is held to be very TYPICAL of the kind of object which can be referred to by an expression containing the predicate. In other words, the prototype of a predicate can be thought of as the most typical member of the extension of a predicate.

**Example** A man of medium height and average build, between 30 and 50 years old, with brownish hair, with no particularly distinctive characteristics or defects, could be a prototype of the predicate *man* in certain areas of the world.

A dwarf or a hugely muscular body-builder could not be a prototype of the predicate *man*.

**Practice** For each of the drawings (1)–(7), say whether the object shown could be a prototype of the predicate given below it for an average person living in Europe or North America.



**Feedback** (1) Yes (2) No (3) No (4) Yes (5) No (6) Yes (7) No

**Comment** Since we are not especially interested in the language of any one individual, but rather in, say, English as a whole, we will talk in terms of shared prototypes, i.e. objects on which there would be general agreement that they were typical examples of the class of objects described by a certain predicate. In a language community as wide as that of English, there are problems with this idea of prototype, due to cultural differences between various English-speaking communities. Consider these examples.

- Practice**
- (1) Could a double-decker bus (of the kind found in British cities) be a prototype for the predicate *bus* for a British English-speaker? Yes / No
  - (2) Could such a bus be a prototype for the predicate *bus* for an American English-speaker? Yes / No
  - (3) Could a skyscraper be a prototype for the predicate *building* for an inhabitant of New York City? Yes / No

- (4) Could a skyscraper be a prototype for the predicate *building* for someone who had spent his life in Britain (outside London)? Yes / No
- (5) Could a palm tree (like that pictured in a practice above) be a prototype for someone who has lived since birth on a tropical island, say in Hawai'i? Yes / No
- (6) Could a parrot (or other similar large brightly coloured bird) be a prototype for someone who has lived her life in the rain forest? Yes / No

**Feedback** (1) Yes (2) No, probably not (3) Yes (4) No (5) Yes (6) Yes

**Comment** You will be able to think of other examples of cultural differences leading to different prototypes.

The idea of a prototype is perhaps most useful in explaining how people learn to use (some of) the predicates in their language correctly. Recent research on the acquisition of categories in human language indicates that the prototypical members of the extension of a predicate are usually learned earlier than non-prototypical members. Predicates like *man*, *cat*, *dog* are often first taught to toddlers by pointing out to them typical examples of men, cats, dogs, etc. A mother may point to a cat and tell her child 'That's a cat', or point to the child's father and say 'Daddy's a man'. This kind of definition by pointing is called ostensive definition. It is very plausible to believe that a child's first concepts of many concrete terms are induced by ostensive definition involving a prototype. Obviously, however, not all concepts can be learned in this way.

- Practice**
- (1) Could the predicate *bottle* be defined ostensively, by pointing to a prototypical bottle? Yes / No
- (2) Is it likely that the predicate *battle* would be learned by ostensive definition? Yes / No
- (3) Are predicates for various external body-parts, e.g. *chin*, *nose*, *eye*, *leg*, *elbow*, most probably first learned from ostensive definitions? Yes / No
- (4) Are colour predicates, such as *red*, *blue*, *green*, *yellow*, probably first learned from ostensive definitions? Yes / No
- (5) Could the meaning of *ambition* be learned from a simple ostensive definition (i.e. by someone pointing to an ambitious man and saying 'That's ambition' or even 'He's an ambitious man')? Yes / No
- (6) Could the meaning of *electricity* be defined ostensively? Yes / No

**Feedback** (1) Yes (2) No, although one might just possibly learn the meaning of *battle* from being shown a battle in a movie. (3) Yes (4) Yes, most likely (5) No, someone who doesn't know the meaning of *ambition* couldn't identify the relevant quality just by being shown an ambitious man. (6) No, it's difficult to see how this could happen.

**Comment** Some predicates which do not have clearly defined extensions (e.g. colour terms like *red* and *blue*) do in fact have clear prototypes. Influential research in the 1960s by Brent Berlin and Paul Kay demonstrated that although one cannot be sure exactly where red shades off into pink or orange, for example, there is general agreement in the English speech community about the central, focal, or prototypical examples of red. Thus the idea of prototype has at least some advantage over that of extension. But in other cases, such as abstract mass terms (e.g. *ambition*) there is about as much difficulty in identifying the prototype of a predicate as there is of identifying its extension.

We conclude by repeating definitions of referent, extension, and prototype below.

**Definition** The REFERENT of a referring expression is the thing picked out by the use of that expression on a particular occasion of utterance.

The EXTENSION of a predicate is the complete set of all things which could potentially (i.e. in any possible utterance) be the referent of a referring expression whose head constituent is that predicate.

A PROTOTYPE of a predicate is a typical member of its extension.

**Comment** We make a distinction between prototype and stereotype: we will define stereotype in the next unit. In other texts, the two terms are often used interchangeably. A further term, which we will have an occasional use for, is 'denotation'. In many cases denotation can be thought of as equivalent to extension. Thus, for example, the predicate *cat* can be said to denote the set of all cats. But often the term is used in a wider, essentially vaguer, sense, especially in connection with predicates whose extensions are problematical. Thus one may find statements about meaning such as '*redness* denotes the property common to all red things', or '*ambition* denotes a human quality', or 'the preposition *under* denotes a spatial relationship'.

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**Summary** Reference, extension, and prototype all focus attention on the relationship between words and things. Clearly, language does not exist in a vacuum. It is used to make statements about the world outside, and these three notions are useful in an analysis of exactly how the relationship between language and the world works.

**Unit 8** Study Guide and Exercises

**Directions** After you have read Unit 8 you should be able to tackle the following questions to test your understanding of the main ideas raised in the unit.

- 1 You should understand these terms and concepts from this unit:
 

extension	fuzzy set
extension of a one-place predicate	ostensive definition
prototype	denotation
- 2 Is the difference between **reference** and **sense** clear-cut or not? Explain and illustrate.
- 3 Explain the notion of **potential referents** in connection with the phrase *the book*.
- 4 What term introduced in this unit describes the set of potential referents of a referring expression such as the noun phrase *the book* in 3 above?
- 5 Distinguish between **referent** and **extension**.
- 6 Make sure you understand the chart on page 81 in which the differences and similarities between sense, extension, and reference are described. In what way are **sense** and **extension** alike, and unlike **reference**? In what way are **extension** and **reference** alike, and unlike **sense**?
- 7 In this unit we said that 'A speaker's knowledge of the sense of a predicate provides . . . an idea of its extension'. In other words, we noted that sense fixes (determines) extension. Explain as best you can in your own words.
- 8 Do you think it would be possible for the extension of a predicate to fix (determine) the sense of that predicate? Why or why not?
- 9 Describe briefly the extension of *car*.
- 10 What is meant by the statement that 'extensions are relative to all times, past, present, and future'? How can we restrict the extension of a predicate?
- 11 In this unit we noted that **extension** and **meaning** cannot be equated (cf. *featherless biped* and *rational animal*). Why not?
- 12 What is the basic flaw in the idea of extensions? What are **fuzzy sets** and how is this notion supposed to resolve the problem? Give your own example.
- 13 What role does the notion of **natural kind** play with respect to the notion of **extension**? What originally motivated the notion of an extension?
- 14 Briefly describe **prototypical** examples of the following entities, along with one or two non-prototypical examples that could also be referred to by each predicate. Explain why the non-prototypical examples diverge from the prototype.

- |             |          |
|-------------|----------|
| a bird      | d dog    |
| b book      | e flower |
| c furniture | f chair  |

- 15 What does the concept **prototype** have to do with meaning? How is it related to the learning of the meanings of certain expressions?
- 16 In this unit we gave several examples in which cultural differences can lead to different prototypes. Think of some more examples not mentioned in the book.
- 17 Give some examples not in the book which would probably be learned via **ostensive definition** and some which are probably not likely learned that way.