7.1 The semantics of categorization

Categorization is an important topic in semantics because language can be seen as means of categorizing experience. A word like *flower*, for example, categorizes an indefinitely large number of different entities in the world as all examples of a single kind of thing, the category FLOWER. The actual types of flower vary widely – think of the difference between a tulip, a carnation and a sunflower – but these differences in no way affect the categorization of all types as flowers. The same is true of other lexical categories. The types of action I might describe by saying *I am writing*, for example, cover a wide range: filling in a form with a biro, typing on a keyboard, drawing letters in freshly poured concrete with a stick, and sitting in front of a blank sheet of paper with a pen, wondering how to begin a sentence. These outward differences are all glossed over by the verb *write*, which can be used for all of these activities indifferently. For both linguists and psychologists it is a question of considerable interest how such natural language categories arise. What principles govern what may and may not be categorized under a single word like *flower* or *write*? In this section, we explore an answer to this question from the perspective of a conceptualist theory of meaning, which sees the origin of linguistic categories in the nature of human psychology.

7.1.1 Classical categorization

Standard logical approaches to language, like the ones discussed in Chapter 6, are two-valued approaches. This means that they only recognize two truth values, true and false. On this approach, any proposition must either be true or false. There is no room for the proposition to be partly true and partly false, or true in some respects but false in others. The two-valued approach goes hand in hand with the classical view of definition (the one assumed throughout Chapter 2). The classical view was summarized as follows by Frege in his 1903 work *Foundations of Arithmetic*:

A definition of a concept... must be complete; it must unambiguously determine, as regards any object, whether or not it falls under the concept... Thus there must not be any object as regards which the definition leaves in doubt whether it falls under the concept; though for us men, with our defective knowledge, the question may not always be decidable. We may express this metaphorically as follows: the concept must have a sharp boundary.

(In Aarts et al. 2004: 33)

Another way of describing this view is the idea that definitions are lists of necessary and sufficient conditions for particular meanings. Consider as an example the definition of *bird* as a feathered, egg-laying, flying vertebrate. This definition involves the four properties feathered, egg-laying, flying and vertebrate, and on the classical view of definition those four properties constitute necessary and sufficient conditions of birdhood:

- The conditions are necessary because something must meet all of them if it is to count as a bird – if something only has some of the
7.1 The semantics of categorization

four properties, for instance, it does not count as a bird. (This might be the case with bats, which are flying and vertebrate, but which are not feathered or egg-laying.)

- The conditions are **sufficient** because *anything* that has all four properties counts as a bird: no further conditions need to be met.

The classical view of definition is also a view of the nature of the categories to which the definition applies. To say that the definition of bird consists of the four properties above is, quite clearly, the same thing as saying that the category bird is also so constituted. Accordingly, this view is often referred to as the **classical view of categorization**, or, because of the figure credited with its proposal, the **Aristotelian view of categorization**. Classical or Aristotelian categories have the following two important characteristics:

- The conditions on their membership can be made explicit by specifying lists of necessary and sufficient conditions.
- As a result, their membership is determinate: whether or not something is a member of the category can easily be checked by seeing whether it fulfils the conditions.

**QUESTION** Try to develop a list of necessary and sufficient conditions for the following categories: sport, building, planet, book, animal, weapon and bodypart. What problems do you encounter?

7.1.2 Problems with classical categories

The classical view of categorization is open to a number of criticisms. First, there are remarkably few examples of adequate definitions in the classical mould. In fact, as discussed in Chapter 2, some researchers doubt that there are any. We noted in 2.6 that many definitions do not seem successful in specifying necessary and sufficient conditions for membership of a given category. This is certainly true of dictionary definitions, but the same problem applies to more technical and detailed definitions like those given in semantics. To pick an example almost at random, the Concise Oxford’s definition of food, ‘substance(s) (to be) taken into the body to maintain life and growth’ applies just as much to medicine as it does to food like bread or apples, a circumstance which invalidates that particular definition. Similarly, the same dictionary’s definition of game as ‘contest played according to rules and decided by skill, strength or luck’ does not apply to card games like patience (solitaire), which involve a single participant and are thus not contests, nor to a game in which a child throws a ball against a wall. Further, it also applies to wars and exams, which are decidedly not examples of games. As discussed in Chapter 2, the history of semantics is full of examples of a proposal for the correct definition of a term being shown to be inaccurate. A famous example is the previously standard definition of kill as ‘cause to die’. Imagine that someone has tampered with the sheriff’s gun in such a way as to cause it not to fire in a shoot-out with an outlaw. As a result, the outlaw is able to shoot the sheriff to death. In a case like this, we would
say that the tamperer has caused the sheriff to die, but has not actually killed the sheriff (for further problems with this case, see Fodor 1970). Furthermore, even longer and more detailed definitions like those advanced by Wierzbicka and her colleagues apparently do not resolve these problems. Cases like this occur time and time again in the history of definitional semantics. The problems of definition are discussed at length in Chapter 2 (see especially 2.6).

Rosch and Mervis outline a more influential criticism of the classical view of categorization (1975: 573–574):

As speakers of our language and members of our culture, we know that a chair is a more reasonable exemplar of the category furniture than a radio, and that some chairs fit our idea or image of a chair better than others. However, when describing categories analytically, most traditions of thought have treated category membership as a digital, all-or-none phenomenon. That is, much work in philosophy, psychology, linguistics, and anthropology assumes that categories are logical bounded entities, membership in which is defined by an item’s possession of a simple set of criterial features, in which all instances possessing the criterial attributes have a full and equal degree of membership.

In other words, the classical interpretation of categories (and hence meanings) as sets of necessary and sufficient conditions fails to do justice to the fact that there seem to be different statuses of category membership: some members of a category seem to be better examples of that category than others.

We can illustrate this with an example which has played an important role in critiques of classical categorization. Consider a colour category like RED. We can think of many shades of red, including the red of a fire-engine, the deep reds found on fruit like plums, which might also be described as purple, and very pale reds which might also be described as pink. It seems impossible to identify any single point along the scale of redness that constitutes the boundary between red and other colours, and as a result it seems clear that the category RED is not defined by any necessary and sufficient conditions, or anything else that might provide a clear category boundary for it. Yet there is a clear sense in which the red of a fire engine seems a better example of red than the colour of a ripe plum. In order to give an idea of the type of colour referred to by red, we would obviously do much better pointing to a fire-engine or a standard red rose, than to a ripe plum or the orangey-pink of a sunset, even though both of these might also be described as ‘red’. RED, then, seems to be a category of which some members are better examples than others.

**QUESTION** What are some other categories in which some members are better examples of the category than others?

Colours are by no means the only example of categories with different statuses of category membership. Consider Figure 7.1 below, a series of representations of various cup- and mug-like objects, taken from an influential study by Labov (1973).
It seems obvious that some of these objects, like (1), are very good examples of cups, and that others, like (11), are very good examples of mugs. There also seem to be several intermediate cases, like (7), in which it is not clear whether cup or mug is the better description, as well as others, like (17) and perhaps (4), where we might hesitate to apply either label. (If some of the objects were represented with accompanying saucers this might reduce the ambiguity, of course.) This is, in fact, exactly what Labov found when he asked subjects to decide which was the appropriate label in each case.

We could make similar observations about many other categories in natural language. The category CHAIR is a case in point (Figure 7.2). The chair in the centre of the diagram seems a particularly good example of the category, unlike the high chair on the middle left or the deck chair in the bottom row. The arm chair and the rocking chair also seem clear examples of the category, but somehow less obvious than the original ordinary four-legged chair. That, indeed, is the only one of the pictured chairs which is precisely that: an ordinary chair of the sort we might refer to through expressions like a normal chair, an ordinary chair, a standard chair, and so on.

There are two important points to draw from these examples:

- There are categories in which some members are better exemplars of the category than others.
- There are categories in which the boundaries of membership are not clear-cut: it is not always possible to say whether or not something is a member of the category.

FIGURE 7.1
If categories are constituted by nothing other than sets of necessary and sufficient conditions, neither of these points is expected. The second one in particular is very unexpected: if there is a finite set of necessary and sufficient conditions for a category, we should be able to state unambiguously what a given category’s members are.

What conclusions can we draw about the nature of the categories? One possible answer is that these categories are not structured in terms of necessary and sufficient conditions, but that membership in them is graded: a matter of degree.

### 7.1.3 Prototype categorization

The idea that category membership is graded is at the heart of the prototype theory of categorization, most strongly associated with the psychologist Eleanor Rosch and her colleagues (Rosch 1975, 1978; Rosch and Mervis 1975). Rosch was impressed by one of the many observations about meaning...
made by the philosopher Ludwig Wittgenstein in his *Philosophical Investigations* (1953: §66):

Consider for example the proceedings that we call ‘games’. I mean board-games, card-games, ball-games, … and so on. What is common to them all? – Don’t say: There must be something common, or they would not be called “games” – but look and see whether there is anything common to all. – For if you look at them you will not see something that is common to all, but similarities, relationships, and a whole series of them at that. To repeat: don’t think, but look! – Look for example at board games, with their multifarious relationships. Now pass to card games; here you find many correspondences with the first group, but many common features drop out, and others appear.

The result of comparison between different types of game, Wittgenstein says, is that ‘we see a complicated network of similarities overlapping and criss-crossing’ (1953: §66), and he compares the relationships between different games to the family resemblances that exist in the outward appearances of members of the same family. Members of a single family might be identifiable by certain characteristic features – prominent cheek bones, a certain hair colour, a certain type of walk or laugh, and so on – without any single member of the family necessarily having all of these attributes. (In fact, it might even be the case that a particular member had none of the characteristic attributes.) In the same way, Wittgenstein suggests, members of the category ‘game’ might not be defined by any core of shared attributes that we could capture by listing necessary and sufficient conditions, but by a network of ‘family resemblances’: there is a certain set of possible attributes which tie together the members of the category GAME, but not every member of the set need possess every attribute. This is displayed in Table 7.1.

<table>
<thead>
<tr>
<th></th>
<th>Patience</th>
<th>Hopscotch</th>
<th>Cat’s cradle</th>
<th>Tennis</th>
<th>bouncing a ball</th>
<th>Trivial Pursuit</th>
<th>flipping a coin</th>
<th>‘I Spy’</th>
</tr>
</thead>
<tbody>
<tr>
<td>mostly outdoor</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>played with others</td>
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<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>has rules</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>clear winner</td>
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<td></td>
<td>x</td>
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<tr>
<td>uses ball</td>
<td></td>
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<td>x</td>
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<td></td>
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<tr>
<td>uses string</td>
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<td></td>
<td>x</td>
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<td></td>
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<tr>
<td>uses cards</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>uses board</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>luck mostly determines result</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Rosch generalized the family resemblance structure which Wittgenstein saw in GAME to other categories. She and her colleagues conducted experiments in which subjects were asked to consider examples of different natural language categories like FRUIT, BIRD, VEHICLE, and CLOTHING, and rate them on a scale of representativity for each category. These experiments demonstrated convincingly the truth of the initial belief that some members are better examples of their category than others. For the category BIRD, for instance, subjects consistently rated robin and sparrow as better examples than penguin or emu. Rosch described this situation as one in which robin and sparrow are more prototypical examples of the category BIRD than emu or penguin. Prototypicality judgements for this type of category proved to be remarkably consistent across different speakers: subjects consistently converged on the same members when asked to say what the best examples of different categories were.

**QUESTION**  Consider the categories PROFESSION, LADDER and PLANE. What are the best examples of each? Why? What are some marginal examples?

The prototype of a category, for Rosch, is not any one of its members, no matter how good an example of the category this might be. Rather than one of the members, the prototype of a category can be thought of as the central tendency of that category’s members (see Barsalou et al. 1993). Any particular member of the category will be closer to or further from the prototype. What are these degrees of prototypicality based on? According to Rosch, prototypical category members are those which share the most attributes with other members of their category, and the fewest with members of other categories. BIRD, for instance, might be defined through attributes such as ‘egg-laying’, ‘flying’, ‘small’, ‘vertebrate’, ‘pecks food’, ‘winged’, ‘high-pitched call’, ‘builds nests’ and so on. Not every member of the category, however, has to possess all these attributes; emus, for instance, are neither small nor flying, but they are still birds. But the more attributes an example possesses the better an example of the category it appears.

Categories are not structured, then, by a set of necessary and sufficient conditions; instead, they consist of entities with various shared attributes. We can illustrate this with the category COAT, whose members might include trenchcoats, overcoats, raincoats, duffel coats, parkas, fur coats, labcoats, topcoats and frockcoats. The attributes of this category presumably include the following features:

(i) covers the body from the shoulders to the thigh/knee
(ii) worn on top of other clothing
(iii) has sleeves
(iv) for both sexes
(v) can be fastened closed
(vi) worn for protection from cold or rain

Certain examples of the category, like trenchcoats or overcoats, possess all or most of these attributes: these are the most prototypical. Less prototypical examples have fewer: a labcoat, for example, is not worn for protection...
7.1 The semantics of categorization

from the weather, and a parka does not extend to the thigh. The more attributes a member shares with other, different categories, the less typical it is of its own category. Think of the difference between the categories COAT and JACKET. These categories share a certain number of attributes, such as being sleeved, being able to be fastened closed, and being worn on top of other clothing. They are distinguished principally in terms of length and purpose; coats extend below the waist and are principally worn for protection from cold or wet weather, whereas jackets typically end around waist level and are not principally worn for protection against the elements. This distinction is clearly true of the most typical examples of each category: for example, it is a correct description of the difference between a woollen overcoat and a suit jacket. But when we consider less representative examples of coats and jackets, we find that they are less distinct. Parkas, for instance, which are less typical examples of coats, have a jacket attribute: they do not extend below the waist. Similarly, a light linen thigh-length jacket is not a typical example of a jacket, because it does extend beyond the waist: this is, of course, a coat-attribute. So as we move away from the central members, the differences between categories become less marked.

QUESTION Consider the following garments. How many superordinate categories do they belong to? Describe as fully as possible the prototype of each category.

- dinner suit jacket
- hospital gown
- poncho
- cape
- academic gown
- anorak
- cardigan

QUESTION What are the attributes of the category BOAT? What attributes might the prototype of the category possess? Rank the following examples with respect to their closeness to the prototype. Are all of them members of the category? If not, what other categories might they belong to?

- raft
- sailboard
- buoy
- kayak
- canoe
- airboat
- dragonboat
- barge
- catamaran
- ferry
- cutter
- yacht
Prototype theory was originally developed as a theory of how concrete, visual objects, like furniture, colour or fish, are categorized. But several studies have revealed prototype effects in domains involving activities. Thus, Coleman and Kay (1981) discuss the nature of the prototype of the category lie. Pulman (1983: 113) analysed the members of the categories kill, speak and walk with respect to prototypicality (the leftmost verb is the most prototypical member, the rightmost the least):

**kill**: murder, assassinate, execute, massacre, sacrifice, commit suicide  
**speak**: recite, mumble, shout, whisper, drone, stutter  
**walk**: stride, pace, saunter, march, stumble, limp

**question**  Consider the structure of the category eat. What verbs are its members? Assume that the category is arranged around a prototype, and try to specify the appropriate attributes.

The hypothesis that categories are structured in terms of prototypes is consistent with a number of experimental results. In fact, Rosch says that ‘the prototypicality of items within a category can be shown to affect virtually all of the major dependent variables used as measures in psychological research’ (1978: 38). For instance, Rosch and her colleagues performed experiments in which subjects were asked to verify statements about category membership of the form ‘An [exemplar] is a [category name]’ (e.g. ‘a robin is a bird’) as quickly as they could. Response times were shorter when the exemplar was a representative member of the category; subjects took less time, in other words, to confirm that a robin is a bird, than they did to confirm that an emu is. Prototype effects like these are systematic and have been confirmed widely in the experimental literature (Mervis and Rosch 1981: 96). Second, Mervis and Rosch (1981: 96–97) report experiments by Battig and Montague (1969) in which subjects were asked to list exemplars of each of 56 superordinate categories such as furniture, fruit, weapons, sports or parts of the human body. Prototypical members of the categories were found to be mentioned more frequently than non-prototypical ones. Lastly, natural languages possess mechanisms for expressing the extent to which an exemplar of a category is typical. In English, for example, a sentence like *A sparrow is a true bird* is perfectly normal, unlike *A penguin is a true bird*: sparrows, not penguins, are prototypical exemplars of the category bird. Conversely, *technically* can only be applied to non-prototypical category members: *A penguin is technically a bird* is acceptable, but *A sparrow is technically a bird* is not (Lakoff 1973).

Many linguists have seen the graded structure of categories discovered by Rosch as an indication of the nature of the meanings of natural language category terms. The idea that categories are structured by attributes...
7.1 The semantics of categorization

and degrees of membership solves some difficult problems in semantic analysis. As commented by Lehrer (1990: 380), ‘When we look at some of the detailed lexical descriptions that have been done, the data themselves often have forced the investigator to posit fuzzy boundaries and partial class inclusion, implicitly acknowledging something like prototype theory.’ Consider the problems associated with the definition of game as ‘contest played according to rules and decided by skill, strength or luck’. As noted earlier, this does not apply to card games like patience (solitaire), which involve a single participant and are thus not contests, nor to a game in which a child throws a ball against a wall. Problems like this might constitute a reason to reject the definition as inaccurate, but a prototype interpretation of category membership allows us to save it. On the prototype approach, the definition can be rephrased as an identification of the most prototypical attributes of the category GAME: the most typical, best examples of games are precisely those which can be defined as ‘contests played according to rules and decided by skill, strength or luck’. This covers football, hide-and-seek and many other games: the fact that it does not obviously apply to other activities like patience, etc., can be explained by the fact that these are not central members of the category.

7.1.4 Problems with prototype categories

For all its attractions, prototype theory is open to a number of problems, which we consider briefly in this section.

7.1.4.1 Problems identifying the attributes

The first type of problem concerns the nature of the semantic attributes on which judgements of prototypicality are based. In our discussion of categories we have simply isolated the attributes in an intuitive fashion, an apparently unproblematic procedure. For instance, it doesn’t seem unreasonable to suggest that people use the attribute ‘has a seat’ as part of the decision about whether to classify a particular object as a CHAIR. But Rosch herself acknowledges that the ease of identification for many attributes is deceptive (1978: 42). There are essentially three problems, which we deal with in turn:

- attributes can often only be identified after the category has been identified
- attributes are highly context-dependent
- there are many different alternative descriptions of the attributes of a given category

Attribute identification depends on category identification  In the ‘has a seat’ case, for example, the identification of this attribute seems to paradoxically depend on a prior identification of the CHAIR category itself: how do we know, for instance, that an armchair ‘has a seat’ unless we have already categorized it as a chair? Why do we not treat the seat of the armchair simply as a physical zone of the armchair without any particular functional significance, in the same way we treat, for example, the separately
stitched piece of material which covers the shoulder section in a shirt? The answer seems to be that we can isolate the seat as a distinctive attribute of an armchair only because we already know that the armchair is designed to be sat on – that it is a chair. This is a paradox for the theory: examples are supposed to be assigned to a category in virtue of their attributes, but at least some attributes seem to depend for their identification on a prior identification of the category in question.

Rosch also points out (1978: 42) that some attributes, like 'large' for the category PIANO, depend on considerable background knowledge: pianos are large for pieces of furniture, but small for buildings. It could therefore be objected that attributes like this are not more basic cognitively than the whole objects to which they belong, and that they cannot be considered the basis for the categorization. As Rosch puts it, 'it appeared that the analysis of objects into attributes was a rather sophisticated activity that our subjects...might well be considered to be able to impose only after the development of the category system' (1978: 42; italics original).

Attributes vary with context  In a similar spirit, Khalidi (1995: 404) notes that the kinds of features that subjects associate with certain concepts vary widely and almost without limit when one varies the experimental context in which they are tested. Rather than accessing a fixed set of features in conjunction with each concept, there is apparently no limit to the features that even a single subject associates with a certain concept depending on the context in question.

For example, members of the category MEAL will have very different attributes if the context is a hospital, a wedding banquet, a camping trip or the family dinner table. What would be a good example in one of these contexts will not be a good example in another, and the attributes on which prototypicality depends will vary similarly. The same remarks apply to the category MUSICAL INSTRUMENT: a plastic recorder is a good example and a bassoon a bad one if the context is an infants' school music class, whereas these values are reversed if the context is a symphony orchestra. Similarly, the concept PIANO will be credited with different features depending on whether the context is taken to be producing music or moving furniture (Barclay et al. 1974, cited by Khalidi 1995: 405). Any attempt to specify the prototypical features of a category or the attributes of one of its members will therefore have to deal with the possibility that these features may change significantly from one context to another.

Alternative descriptions of attributes  Another question arises even if we grant that a relatively fixed list of attributes could be constructed for a category: how do we know which descriptions of the attributes are psychologically real? For example, what are the attributes of the category TREE? Langacker (1987: 374) suggests ‘tall plant’, ‘with leaves’, ‘with branches’ and ‘with bark’. It is true that these attributes are among those which distinguish trees as a matter of fact, but we may not be entitled to
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assume that they enter into the conceptual representation of the category. It may be, for example, that the relevant attributes of TREE are actually best described as ‘made of wood’, ‘growing in ground’, ‘with long trunk’ and ‘sometimes covered in small green objects’. This description of the attributes makes no difference to the rankings of exemplars of trees: an oak will still be a prototypical tree, and a cactus will be an atypical one. But the nature of the attributes on which the prototypicality judgements are claimed to rest will reflect an entirely different understanding of the underlying structure of the category. Indeed, the category TREE might not depend on any underlying abstract features like ‘with bark’. Instead, it could be based around a particular example of a tree as stored in long-term memory. This, indeed, is precisely the hypothesis made in exemplar theories of categorization, which are alternatives to the prototype model in psychology (see Storms et al. 2000).

7.1.4.2 Accounting for category boundaries

A second type of problem with the prototype theory of categorization is that it fails to account for category boundaries. The very insight behind prototype theory is that category boundaries are ‘fuzzy’. Membership is a graded phenomenon defined through attribute-possession, and there is no hard and fast division between members and non-members of a category. For example, two important attributes of the category BIRD are ‘flies’ and ‘winged’. On the prototype model, anything that is winged and flies fulfils two of the attributes of birdhood, and is thus a potential member of the category. For instance, bats have partial membership in the category BIRD on this model of categorization. Yet speakers have strong intuitions that many categories do have absolute, unfuzzy boundaries: bats simply are not birds; they are not even atypical birds. These intuitions suggest that there is something more to natural language categories than closeness to a prototype (see Cruse 1990: 388–389 and Wierzbicka 1990: 350–351).

7.1.4.3 Scope of prototype categorization

A third type of question concerns the scope and applicability of prototype theory as a general explanation of natural language semantics. Most of the original work on prototypes concerned visible categories like BIRD or FURNITURE. In spite of prototype theory accounts of categories like LIE, mentioned above, several scholars have questioned whether the theory is equally justified when applied to abstract, non-visual categories. Since there is not the same perceptual basis for the analysis of attributes, it may be that the diagnosis of prototypes is more hazardous. Lehrer (1990) notes that this question is especially acute for the highly abstract categories expressed in language by prepositions and sentence connectives. Another challenge to the scope of prototype categorization is Wierzbicka’s (1990) critique of Rosch’s assimilation of taxonomic concepts like BIRD to what Wierzbicka calls ‘collective’ concepts, such as KITCHENWARE or CLOTHING. Taxonomic concepts, according to Wierzbicka, have clear boundaries (recall the bat/bird contrast just discussed) and are not open to a prototype
account. (On the other hand, collective concepts, which refer to things of many different kinds, are fuzzy, and prototype approaches may well be able to contribute to their analysis.)

In this context, it is worth noting a change in the way Rosch presented the results of her research. Sometimes Rosch presents prototypes as a theory of ‘the nature of the cognitive representation’ associated with category terms (Rosch 1975: 192). Often, however, she stressed the opposite, claiming that prototype theory is not a theory of how the mind actually represents semantic content (Rosch 1978: 40–41; see also MacLaury 1991: 57). For example, she said that ‘facts about prototypes can only constrain, but do not determine, models of representation’ (1978: 40). On this view, prototype theory is a description of the structure of categories which highlights a number of prototype effects – goodness of exemplar ratings, response times, and so on. These effects are, in principle, compatible with a number of different hypotheses on the mental representation of categories, and there is no reason to believe that all words in natural language will correspond to concepts with a prototypical structure.

7.1.4.4 Prototypes and formulating definitions
Another objection concerns the effect of prototype theory in semantics. Wierzbicka (1990), for example, complains that the idea that categories have fuzzy boundaries has served as an excuse to avoid the painstaking work of accurate definition. According to prototype theorists, she says, …the actual usage of individual words is too messy, too unpredictable, to be accounted for by definitions. But fortunately, semanticists don’t have to worry about it any longer: they can now deploy the notion of ‘prototype’… Semantic formulae SHOULD NOT ‘work’; that’s one thing that ‘prototypes’ have taught us. (1990: 347)

This objection will only have any force if it turns out that traditional definitions are in fact possible for natural language categories – a possibility about which many researchers are sceptical, as discussed in Chapter 2.

7.1.4.5 Prototype experiments and metalinguistic belief
A final objection concerns the contrast between the evidence for a prototype model of semantics versus more traditional ones. At least some of the experimental evidence that motivates the postulation of prototypes can be criticized on the grounds that it is not evidence about how speakers actually use words, but evidence about how they think words are used or should be used. For instance, one of Rosch’s standard sets of instructions to the subjects of her experiments makes it clear that subjects are being asked to assess how far an example ‘represents what people mean’ when they use particular category terms (1975: 198), and subjects in one of Rosch’s classic experiments were asked how far certain words represented their ‘idea or image of what the category is’ (Rosch and Mervis 1975: 588). The problem here is that the results of these experiments are about subjects’ beliefs about language and the categories referred to in it, not about their actual language use itself:
they are, in short, metalinguistic. As such, they may be the result of an unpredictable range of prescriptive and other considerations which may not be operative in ordinary language use. Just as subjects’ ideas about how to define words are notoriously unreliable and unrepresentative of words’ actual use, so too their goodness of exemplar ratings may not tell us anything about the underlying meanings of the words concerned. This criticism is avoided to a certain extent by other experiments, such as the reaction time experiments mentioned in the previous section, which show various ways in which goodness of exemplar rating is correlated with actual processing time. But even these apparently less metalinguistic experiments may not be representative of people’s real-time categorizing behaviour in ordinary unmonitored discourse. In one type of experiment, for instance, subjects ‘typically are required to respond true or false to statements of the form X item is member of Y category’ (Rosch 1978: 38), with their speed in doing so correlating to the prototypicality of the exemplar in question. This experiment may reveal various psychological facts about categorization, but it could not be taken to reveal anything about the meaning of the words involved without the additional assumption that people’s natural language use involves the same principles observed in experimental situations, where subjects are consciously attending to issues of the truth and falsity of category terms. Thus, while prototype theory may be well-founded as a theory of categorization, we should not assume that its results can be transferred immediately to the explanation of language use, since the naming options which people exercise in actual discourse may be affected by many other factors than the prototypicality of the referent.

This criticism does not have to apply to the necessary and sufficient conditions view of categorization. When assembling a list of necessary and sufficient conditions, an investigator can proceed simply by observing how words are actually used, and hypothesizing necessary and sufficient conditions to explain these uses; no-one has to be consulted in order to discover their beliefs about what words mean, as in the prototype approach. The centrality of subjects’ judgements about their own language use in prototype theory is a potential problem if there is any chance that subjects may simply be mistaken about the ways in which they use words. I may well say, when asked or tested by a prototype researcher, that tennis is a better example of a game than patience, but what if it turns out that in spite of this judgement I typically refer to tennis as a sport in my actual language use? The frequency of this sort of mismatch between subjects’ self-reports and their actual behaviour is unknown; however, it is clearly an important issue that needs to be settled.

In spite of these problems, prototype models of categorization have been the source of a major reorientation in the practice of much semantic description. In spite of Rosch’s unwillingness to elevate prototype theory into a full-blown theory of mental representation, many semantic investigators now take it for granted that the meaning of all or most lexical items consists in a prototype structure. As a result, the semanticist’s role is to characterize only the most prototypical aspects of that structure, and a range of meanings outside it is only to be expected.