# 4

# Categories, concepts and meanings

## 4.1 Introduction

The act of categorization is one of the most basic human cognitive activities. Categorization involves the apprehension of some individual entity, some particular of experience, as an instance of something conceived more abstractly that also encompasses other actual and potential instantiations. For instance, a specific animal can be construed as an instantiation of the species DOG, a specific patch of color as a manifestation of the property RED, and so on. We shall call this abstract mental construct a **conceptual category**. Conceptual categories can be regarded as cognitive tools, and are usually credited with a number of general functions:

(a) *Learning*. Experiences never recur exactly: our ability to learn from past experience would be severely impaired if we could not relate the present to similar aspects of past experience, that is, by putting them into the same conceptual categories.

(b) *Planning*. The formulation of goals and plans to achieve them also requires knowledge to be disassociated from individuals and packaged into concepts characterizing categories of entities.

(c) *Communication*. Language works in terms of generalities, that is, in terms of categories. Any linguistic expression, however detailed, in the end represents only a category of referents.

(d) *Economy*. Knowledge does not (all) need to be related to individual members: a significant amount can be stored in relation to groups of individuals. New knowledge gained on the basis of interaction with one or more individuals can be easily generalized to other members of category. Conversely, knowing, on the basis of a limited number of criteria, that an individual belongs to a particular category, can give access to a much wider range of information about that individual.

There is an important distinction to be made between generic concepts like CAT and TERRORIST, and individual concepts like TONY BLAIR and CLEOPATRA. The process of categorization presupposes a more basic one, namely, that of

classifying particular experiences as experiences of one and the same individual entity. In both cases a Gestalt is formed, but they are different sorts of Gestalt. Both are construals, in our sense. An adult human has knowledge about thousands of individual items, not just persons, but also objects, places and so on. A large proportion of things communicated about and consciously entertained are individual in nature: consciousness is largely inhabited by individuals. Generic concepts mostly function to identify and/or characterize individuals. A particular individual concept is also a bundle of knowledge, perhaps very rich, perhaps sketchy in the extreme. An individual concept is not itself a final construal, as it is capable of almost unlimited modulation, particularly via the descriptive content of definite referring expressions (e.g. *that shifty-looking character standing beside the piano*). Such content has a dual function: it contributes to the narrowing down of the search space in which the referent is located, and it modulates the eventual construal of the individual concept. Most experimental work and theorizing, both in cognitive psychology and cognitive linguistics, has been concerned with generic concepts rather than individual concepts.

Conceptual categories can be viewed from several different perspectives, which, although connected, should be clearly distinguished. We shall be mainly concerned with three of these. Firstly, conceptual categories can be viewed as collections of individuals. The properties of collections are distinct from the properties of the individuals that constitute them. The two properties that will concern us most are, first, category boundaries, and second, graded centrality, that is, the fact that a category typically has a core tapering to a periphery. Secondly, we can look at a conceptual category from the point of view of the individuals that make up the category: how can we characterize them, and how can we distinguish them from members of other categories? Thirdly, there is the question of the level of categorization. This is partly a matter of inclusiveness – some categories include others as subcategories – and hence is a relative property, but as we shall see, there are grounds for proposing absolute levels with definable characteristics. We shall treat level of categorization as being determined by the type and quantity of information in the characterization of members of the category.

The view of conceptual categories as fixed cognitive entities with stable associations with linguistic expressions has been, and still is, the dominant one in cognitive psychology and linguistics. However, more recently, a dynamic picture of concepts is emerging, in which they are viewed as being created at the moment of use. On this view, all aspects of conceptual categories are subject to construal. This is the view that will be adopted in this book, alongside a parallel view of word meaning. Before expounding the **dynamic construal** approach, we first survey the theories of conceptual structure that have had the greatest influence on the development of cognitive linguistics.

## 4.2 The classical model of category structure

The so-called classical model of conceptual categories defines them in terms of a set of necessary and sufficient features. The features are necessary in that no entity that does not possess the full set is a member of the category, and they are sufficient in that possession of all the features guarantees membership. Thus, the category COLT may be defined by the features [EQUINE], [MALE], [YOUNG]. This basic idea is of great antiquity, but the immediate inspiration for its adoption by psychologists such as Collins and Quillian (1969) was its use in structuralist semantics, and later by Katz and Fodor (1963). In the Katz and Fodor system, some features were binary and others not. Binary features had only two values, present or absent. For instance, the definition of FILLY would differ from that of COLT in the value of the feature denoting sex: COLT would be [EQUINE], [MALE+], [ADULT−], whereas FILLY would be [EQUINE], [MALE−], [ADULT−]; MARE would be defined by the features [EQUINE], [MALE−], [ADULT+], and STALLION by [EQUINE], [MALE+], [ADULT+]. Non-binary features such as [EQUINE] belonged to sets of 'antonymous n-tuples,' only one of which may be present in any individual (that is to say, a combination of features such as [EQUINE], [CANINE], [FELINE] would be impossible). This picture of category structure is typically accompanied by the 'nesting assumption' (Hahn and Chater 1997:47), which states that a subordinate concept, such as ROBIN, contains as part of its definition the features defining a superordinate concept such as BIRD (in construction grammar, this is called 'inheritance' – see §10.2.1). Collins and Quillian (1969) incorporated the feature definition of concepts, together with the nesting assumption, in their proposal for a hierarchical model of semantic memory.

The classical model establishes a clear and rigid boundary to a category. Inclusion relations between categories are also captured, but no account is possible of absolute levels of categorization (see below). It is important to note that a classical definition of an entity is not a full description of it or its place in the world: one has only to think of one's experience and knowledge of, say, a kitten, in comparison with the definition [FELINE][DOMESTIC+][ADULT−].

The difficulties faced by the classical model of conceptual categories are many. Three frequently cited shortcomings have provided the major motivation for the development of alternative theories. Firstly, for many everyday concepts, as Wittgenstein pointed out with his well-known example of GAME, adequate definitions in terms of necessary and sufficient features are simply not available. Furthermore, as Fillmore (1975) pointed out in connection with the noun *bachelor*, even for those concepts that seem to have definitions, the definitions typically hold only within a specific domain (see discussion of *bachelor* in §2.5). Secondly,

what is here called 'graded centrality' constitutes a problem; that is, the fact that some members of a category are judged 'better', or 'more representative' of the category than others: in a classical category, all members are equal. Thirdly, the classical model can offer no account of why category boundaries, in practice, seem to be vague and variable (they are frequently described as 'fuzzy', but our account will be somewhat different). A model of category structure is supposed to provide a basis for an account of how we use categories in remembering, planning, reasoning and so on. A classical definition is not a very efficient vehicle for this purpose, because the information it contains is too sparse.

Several theories of the nature of natural categories have been proposed, mostly in the psychological literature, but the theory that has had the most influence on the development of cognitive linguistics is undoubtedly prototype theory, to which we now turn.

## 4.3 The prototype model of category structure

The pioneering experimental and theoretical work on prototype theory was carried out by Rosch and her co-workers (see Rosch 1973, 1978; Rosch and Mervis 1975), although this built on earlier insights, notably Wittgenstein 1953 and Brown 1958.

### *4.3.1 Graded centrality*

Not all members of a category have the same status within the category. People have intuitions that some category members are better examples of the category than others. Members that are judged to be the best examples of a category can be considered to be the most central in the category. There has been a considerable amount of experimental work by cognitive psychologists on the notion of **Goodness-Of-Exemplar** (henceforward **GOE**). The most basic experimental procedure is simply to present subjects with a category and a list of putative members of the category and to ask them to assign to each member a numerical score from 1 to 7 according to how good an example it is, with 1 designating a very good example, and 7 a very poor example or not an example at all. Subjects reportedly have no difficulty grasping what is required of them. Furthermore, provided the subjects are drawn from a more-or-less uniform speech community, the results cluster strongly around particular values (in other words, subjects are not responding at random). Combining the results from a large number of subjects allows the identification of the best examples of categories: these are typically referred to as the **prototypes** or **prototypical members** of the category. So, for

instance, if the category was VEGETABLE, the ratings of various items (by British subjects) might be as follows (these scores represent the ratings of one of the authors):

| | **GOE rating** |
|---|---|
| LEEK, CARROT | 1 |
| BROCCOLI, PARSNIP | 2 |
| CELERY, BEETROOT | 3 |
| AUBERGINE, COURGETTE | 4 |
| PARSLEY, BASIL | 5 |
| RHUBARB | 6 |
| LEMON | 7 |

GOE ratings may be strongly culture dependent. (Familiarity is undoubtedly a factor influencing GOE scores, but the scores cannot be reduced to familiarity.) For instance, in a British context (say, a typical class of undergraduates), DATE typically receives a GOE score of 3–5 relative to the category of FRUIT, but an audience of Jordanians accorded it an almost unanimous 1.

The significance of GOE scores is enhanced by experiments showing that they correlate to a significant degree with a number of independent properties. The following is a selection of these properties ('a high GOE score' means one that is close to 1).

(i) *Frequency and order of mention*. When subjects are asked to list as many examples of a given category as possible, usually within a time limit, the overall frequency of mention of an item shows a strong correlation with its GOE score, while the average position of an item in lists correlates inversely with GOE.

(ii) *Order of learning*. By and large, children learn prototypical members of categories before more peripheral members. (This may, however, simply be a function of the frequency of words addressed to them.)

(iii) *Family resemblance*. Items with a high GOE rating have a higher degree of **family resemblance** (measured by sharing of features) to other category members than items with low GOE ratings, and a lower degree of resemblance to members of other categories.

(iv) *Verification speed*. In typical experiments, subjects see two words flashed onto a screen. Their task is to answer as quickly as possible 'Yes' if the second word denotes a member of the category designated by the first word, and 'No' if it does not (e.g. VEGETABLE: CARROT, VEHICLE: CHAIR). The subjects' speed of response is measured. It is found that responses are faster to items with a higher GOE score.

(v) *Priming*. Priming experiments frequently use the **lexical decision task**: subjects are presented with a string of letters and have to say as quickly as possible

whether or not the string forms a word. Presenting a semantically related word, or the same word, before a test item has the effect of speeding up subjects' responses: this phenomenon is known as **priming**. The relevant case here is when the prime is a category name, like FRUIT. The degree of speeding up is the priming effect. The priming effect correlates with the GOE score of the category member, that is, for Britons, FRUIT will speed up the response to APPLE to a greater degree than the response to, for instance, DATE.

Psycholinguistic variables such as verification speed and priming are regarded as particularly significant correlates of GOE because they are not under conscious control and therefore can be claimed to reveal underlying properties of categories.

There has been some dispute in the literature regarding the relationship between the GOE of an item and its **degree of membership** (henceforward **DOM**) in the category. Some say that, in giving GOE scores, subjects are in fact giving DOM scores. However, this is misleading. What they were asked to do was to rate items as to how good they were as members of particular categories. Saying that they were giving DOM ratings is a subsequent interpretation. Those who object to the equation of GOE and DOM (for instance, Lakoff [1987:45], Pulman [1983], Cruse [1992b]), point to examples like OSTRICH in the category BIRD. There is no doubt, they say, that an ostrich is a fully paid-up member of the BIRD category, but also undeniably has a low GOE, hence the two parameters must be independent. Ungerer and Schmid (1996) claim not to see a problem, but they do not throw any light on the matter. Taylor (1989[1997]) claims that both assessments of OSTRICH are DOM judgements, but they are made with respect to differently construed categories. An ostrich is judged a full member relative to an 'expert' category, which has clear membership criteria; the graded membership judgement is made relative to the everyday category BIRD, which does not have clear membership criteria. This is ingenious, and we are sympathetic to the appeal to different construals of categories denoted by the same lexical item, but Taylor's account does not stand up to close scrutiny.

The first point to make is that yes/no judgements and graded judgements co-exist as alternative construals in many semantic domains. Take, for example, the case of *dead* and *alive*. The domain of what might be called 'vital status' is often construed dichotomously: saying *John is dead* normally commits one to the truth of *John is not alive*. But it also possible to say *John is more alive than Mary*. This does not change the domain, but reconstrues it as a gradable scale. The same is true of category membership. In the case of BIRD (whether construed as an expert category or an everyday one), anything on the right side of the boundary is *in the category*, but at the same time, variable centrality allows a gradable construal of some things as *more in the category* than others, hence there is some legitimacy in interpreting GOE as DOM.

At the same time, there is something counterintuitive about saying that an ostrich is, say, only 30% a bird, and perhaps the term DOM should be reserved for a distinctive property. We may think of a category as a container (i.e., a result of the imposition of the Lakoffian CONTAINER image-schema on a domain). What would we normally understand by a description of an object as *30% in a container*? Surely something like a teddy bear that is partly in and partly out of the toy box, rather than one that is nearer the side of the box than the middle? There is a category equivalent of this picture. When we say that, for instance, a priest is *to some extent a social worker*, we are effectively placing him part-in, part-out of the category (cf. Lakoff 1973). That is to say, we are construing the categories PRIEST and SOCIAL WORKER as partially overlapping. This is surely a more useful conception of DOM. (NB: the view expressed here regarding DOM is significantly different from that in Cruse 1992.)

Two problems may be signaled here in connection with GOE experiments and results. One concerns the meaning attributed, in the context of the experiments, to expressions such as *How good is X as an example of category Y?* How, exactly, is *How good?* interpreted? Used in actual contexts, *good* and *better* do not normally give rise to communicative problems. For instance, the goodness of a dog, if thought of as a pet for a young child, is different from what it would be if it was thought of as providing security for a house, or as contributing to the life of a farm. This does not destroy the notion of GOE, but suggests that truly significant results would require specific construals of both the categories being judged and the meaning of *good*. Various at least partially distinct notions of goodness can be teased out (see, for instance, Lakoff 1987:84–90). The following are the main types:

(i) *Typicality/representativeness*. This indicates how accurate/useful an idea of a category one would get from familiarity with only one subcategory. This dimension has a clear relation to frequency. Lakoff points out that we are much more likely to generalize properties from typical to non-typical members than vice versa. In certain cases, a known individual member may be assumed to be typical of a class (for instance, if a person has limited experience of the class).

(ii) *Closeness to an ideal*. This is related to what in Cruse 1990 was called 'quality.' The example given there was that of emeralds. The most highly valued emeralds have a deep, intense color, and are without flaws; but these are also the most rare (and the bigger, the rarer), so they are in no way typical. As Lakoff points out, ideals operate in many domains. They may be represented by a set of abstract properties, as in the case of emeralds, or they may be centered around an individual (called by Lakoff a 'paragon').

(iii) *Stereotypicality*. This is interestingly different from typicality, but a fully convincing explanation of the difference is not yet available. Lakoff's account

(1987:85–6) is suggestive, but not fully explanatory. Lakoff says that the use of typicality is usually unconscious and automatic, whereas the use of stereotypes is conscious: this is plausible. He also says that stereotypes change, but typicality is constant over a person's lifetime. However, typicality changes as reality changes (think of a typical car or computer or camera), whereas a stereotype can persist in the face of change. Stereotypes are also typically associated with evaluative features.

There is another problem. A lot of the classical experiments deal with subcategories as category members, rather than individuals: for example, subjects are given a category such as FRUIT, and a range of fruit types such as APPLE, STRAWBERRY, MANGO, PASSION FRUIT, DATE, OLIVE and so on for GOE scoring. Other experiments involve individuals: for instance, the work on prototypical colors by Rosch (Heider 1971, 1972, and Berlin and Kay 1969) and others; also experiments with young children typically use individual items, not category names. It does make a difference. Using categories as examples of other categories suppresses properties that can enter into the notion of goodness. This is true of quality as described above. Another example is the property of well-formedness: it is all very well saying that an apple is the best example of a fruit, but what if it is a rotten apple? As far as individuals are concerned, well-formedness is yet another variety of goodness.

### *4.3.2 The representation of conceptual categories*

Prototype theory comes in two main versions (according to the psychologist Hampton 1997). In both versions, the linked notions of graded centrality and best examples occupy a central place. (Linguists tend not to distinguish clearly between the two versions.) One version represents a concept in terms of a list of the attributes of category members. This resembles a classical definition except that the features of a prototype representation are not required to be necessary and sufficient (although neither of these is necessarily ruled out for individual features). The centrality of an item in the category depends on how many of the relevant set of features it possesses: the more it possesses, the better an example of the category it will be. A feature is justified if, other things being equal, its presence leads to a higher GOE rating. In some versions, features can be weighted according to their contribution to centrality, and such versions will set an overall weighting score as a qualification for category membership. It is possible that no existing member of a category possesses all the prototype features. In such a case, the core of the category is represented by the member or members with the highest feature count (the actual prototype will then be an idealization represented by the full set of features).

Another version of prototype theory depends on the notion of similarity. A concept can be thought of as represented by an ideal exemplar, and membership and centrality of other items can be defined in terms of their similarity to the prototype. Hampton emphasizes that the two versions of prototype theory are not equivalent. Simple concepts, such as those involving color or shape, for instance, are better served by the similarity approach, whereas complex concepts, such as BIRD or VEHICLE, can best be handled by the feature-list model (see Hampton 1997:88). The feature-list version of prototype theory accounts for Wittgensteinian categories such as GAME, for which there is no definition in terms of necessary and sufficient features, but which show family resemblance relations. The fact that there are no necessary and sufficient features is also consistent with the fact that when subjects are asked to supply attributes that characterize a category, they do not confine themselves to attributes possessed by all members of the category, but also give features that a significant majority possess. Hampton says that both versions of the theory give a satisfactory account of the existence of borderline cases. However, it is difficult to see why a system where category membership depends on the presence of X features out of a list of Y will generate more borderline instances than one where membership depends on the presence of Y features out of a list of Y. On the other hand, one can see how a similarity-based system will throw up borderline cases, especially if the similarity dimensions vary continuously.

### *4.3.3 Levels of categorization*

Prototype theory also provides an account of levels of categorization. Categories occur at different levels of inclusiveness, with more specific ones nested within more inclusive ones:

(1) a. vehicle – ***car*** – hatchback
b. fruit – ***apple*** – Granny Smith
c. living thing – creature – animal – ***dog*** – spaniel
d. object – implement – cutlery – ***knife*** – bread knife
e. object – item of furniture – ***table*** – card table

Normally, one level of specificity in each set, called the **basic** (Rosch et al. 1976) or **generic** (Berlin et al. 1973) level of specificity, has a special status, and importance. (The basic level items in [1] are printed in bold italic.) Apart from the basic level, two further levels of specificity with different characteristics are usually identified: **superordinate level** and **subordinate level**. These are not defined simply by their position in the chain – there are substantive characteristics that distinguish one level from another. (For an extended discussion of hierarchical structure in concepts, see Murphy and Lassaline 1997.)

#### 4.3.3.1 Basic level categories

The principal distinguishing characteristics of basic level items are as follows:

(i) It is the most inclusive level at which there are characteristic patterns of behavioral interaction.

To appreciate this point, imagine one is asked to mime how one behaves with, say, a dog: this is not too difficult, most people would mime, for instance, patting and stroking the dog. But suppose one were asked to mime how one behaves with an animal: this is very difficult unless one knows what kind of animal it is. The same is true of *furniture* relative to *chair*, and *spoon* relative to *cutlery*.

(ii) The most inclusive level for which a clear visual image can be formed.

A similar effect can be observed if one is asked to visualize a member of a category: it is easy to form a mental image of a non-specific dog, chair or apple, but virtually impossible to do so for animal, furniture or fruit, without being specific. It is also the level at which picture-word matching is most rapid.

(iii) The most inclusive level at which part-whole information is represented.

This includes relations between parts. For most superordinate artifactual categories, such as TOOL, CUTLERY, CLOTHES or FURNITURE, there is no common part-whole structure for members. Biological superordinate categories show more regularity in part-whole structure, but there is much less commonality in the relations between the parts.

(iv) The level used for everyday neutral reference.

A chain of specificity, like those illustrated in (1) above, provides a range of terms potentially usable for reference to an individual entity. Thus a particular dog can be simultaneously a spaniel, a dog and an animal. However, unless there is a specific communicative need, the basic level term will be used for reference (see Cruse 1977 for more details):

(2) A: I can hear something outside.
B: It's just a dog/?spaniel/?animal

Basic level terms (i.e., terms whose default construals are basic level categories) are often felt by speakers to be the 'real' name of the referent. Cross-linguistic studies have shown that they tend to be shorter than terms at other levels, normally monomorphemic, and are original in the sense of not being borrowed by metaphorical extension from other domains (Berlin et al. 1973). They are also

more frequently used by parents in talk to children, and thus, not surprisingly, they are the first words children learn.

(v) Individual items are more rapidly categorized as members of basic level categories than as members of superordinate or subordinate categories.

A spaniel, say, in a photograph, will be more rapidly categorized as a dog, than as an animal or a spaniel.

All these properties can plausibly be seen as consequences of what Murphy and Lassaline (1997:106–7) call the 'differentiation explanation' for basic level properties. Basic level categories represent the best categories into which the immediate superordinate category can be divided, in terms of:

the degree of difference between members of the category and members of neighboring categories.
internal homogeneity, i.e., the degree to which members of the category resemble one another.
informativeness, i.e., how much additional information can be accessed over and above what the superordinate term gives access to.

Consider the terms *animal*, *dog* and *spaniel*. The category ANIMAL is satisfactorily distinct from neighboring categories such as BIRD, FISH and INSECT, and is also informative, but the degree of resemblance between members is less than for the category DOG. The category SPANIEL has a high degree of resemblance between members, but distinctiveness from members of neighboring categories and extra informativeness are low. The category DOG scores highly on all criteria.

#### 4.3.3.2 Superordinate level categories

Superordinate categories have the following characteristics (NB: the term 'superordinate' is not here used in the purely relational sense of 'hyperonymic'):

(i) Superordinate categories are less good categories than basic level categories, because although members are relatively distinct from members of neighboring categories, within-category resemblance is relatively low.
(ii) Superordinate categories have fewer defining attributes than basic level categories.

In experiments by Rosch et al. (1976), where subjects were asked to list the attributes of basic level items in a superordinate category, few attributes were generated that could serve as defining attributes of the superordinate category. However, as suggested in Cruse 1992b, this is perhaps not the best way to elicit attributes of superordinate categories. The most salient attributes of a category are

those that differentiate it from other members of its default contrast set. The salient features of a horse are those that distinguish a horse from other animals. Subjects asked to list the attributes of a horse are unlikely to produce 'has bones,' 'breathes' and so on, because these are shared by other members of the contrast set; they are more likely to mention 'can be ridden,' 'has a mane,' 'has a long tail,' 'neighs,' and so on. The only way to get significant attributes of ANIMAL is to set up contrasts with categories such as FISH, PLANT, INSECT. The same is true of FURNITURE: it is no use looking at informants' responses to *chair*, *table* and the like. More revealing would be to ask what features distinguish items of furniture from, say, curtains, carpets, appliances, fireplaces and windows. Thinking of furniture in this way suggests that items of furniture are prototypically hard (unlike carpets), mobile (unlike fireplaces) and are places where things happen (unlike appliances, which are for doing things with). (For a similar, but independent, analysis of the category FURNITURE, see Bolinger 1992). However, it remains true that characteristic features of superordinate categories are fewer, and, as a consequence, family resemblance relations are less marked.

(iii) Immediate superordinates of basic level categories often have a single-attribute relation to a higher superordinate category (think of FOOTWEAR in relation to SANDAL, UNDERWEAR in relation to VEST).

(iv) Linguistically, names for superordinate categories are often mass nouns when basic level terms are count nouns.

Examples of this are *crockery* (*cups* and *plates*), *cutlery* (*spoons* and *forks*), *furniture* (*tables* and *chairs*), *footwear* (*boots* and *shoes*), *(computer) hardware* (*hard disks* and *modems*). Less frequently mentioned are cases where the converse is true: the superordinate is a count noun and the basic level term a mass noun: *metals* (*iron* and *copper)*, *beverages* (*beer* and *wine*), *spices* (*pepper* and *coriander*). There is never a discrepancy in this respect between basic-level and subordinate-level terms. Superordinate terms are also frequently morphologically complex and/or polysyllabic.

#### 4.3.3.3 Subordinate level categories

Subordinate level categories have the following characteristics:

(i) They are less good categories than basic level, because although members have high mutual resemblance, they have low distinctiveness from members of neighboring categories.

(ii) They are much less informative relative to their immediate hyperonymic category, hence, when subjects are asked to list distinctive attributes, the lists differ very little from the lists given for the hyperonymic basic level items.

(iii) They are frequently polymorphemic, the most common pattern being modifier-head (e.g. *teaspoon*, *rocking-chair*).

This is taken by, for example, Ungerer and Schmid (1996) to indicate that they are distinguished from basic level by a single property, rather than encyclopedically (e.g. *teaspoon*, *rocking-chair*). However, a distinction needs to be made between naming practices and conceptual content: the 'single property' is a matter of naming, while there are virtually always unencoded encyclopedic distinctive characteristics. For instance, although *spaniel* is a single-morpheme word, and *long-tailed tit* is a complex expression incorporating a single property (the possession of a long tail), the extra specificity in each case over the basic level category is encyclopedic.

The above account is close to the account given by cognitive psychologists such as Murphy and Lassaline (1997). Anthropological linguists have also made extensive studies of the hierarchical organization of categories (see, for instance, Brown 2002). Their approach differs in many ways from that of the psychologists. Firstly, they have a strong cross-linguistic orientation. Secondly, the most extensive studies have been of biological kinds (a distinction is usually made between 'folk-classifications' and 'expert systems': most studies are of the former): some (e.g. Atran 1990) claim that only biological kinds are truly hierarchized, and among biological kind concepts only 'general purpose' categories such as animal, dog, spaniel, beech, copper beech, bush and so on are hierarchized, but not utilitarian categories such as vegetable, weed or pet. Thirdly, they recognize a greater 'depth' of hierarchization, and use different terms for the levels. The following is an example (the equivalent psychological categories are given in brackets):

(3)

| | | |
|---|---|---|
| beginner | *plant* | |
| life form | *bush* | (= superordinate level) |
| generic | *rose* | (= basic level) |
| specific | *hybrid tea* | (= subordinate level) |
| varietal | *Peace* | |

The properties attributed to the generic level do not significantly add to what was said above concerning the basic level. The remarkable constancy of hierarchical structuring across a wide variety and degree of complexity of cultures suggests that it is a cognitive universal and probably innate. There is a dispute among anthropologists as to the underlying motive force for the evolution of classificatory systems. One school holds that it is driven mainly by utilitarian considerations: the categories evolved because they were an aid to survival. The other school holds that the evolution of the systems for classifying biological kinds is driven

by intellectual curiosity. There are a number of reasons for the latter claim. The systems are remarkably similar across the world, even though the cultures and their environments differ markedly; many cases are found of distinctions that have no utilitarian value in the culture that uses them; they tend to coincide to a high degree with scientific classifications. Brown (2002), while acknowledging the force of these arguments, points out nonetheless that hunter-gatherer societies typically have far fewer categories than settled agrarian societies, and suggests that there is a functional reason for this. Small agrarian communities are typically larger than hunter-gatherer communities, and when harvests fail, it is very important for them to have access to alternative food sources, hence a detailed knowledge has survival value. Hunter-gatherer societies, on the other hand, are typically much smaller, and their essentially mobile lifestyle makes them much less dependent on food available in a particular locality; hence detailed knowledge of local flora and fauna is of less value.

### *4.3.4 Shortcomings of prototype theory*

A number of problems have been pointed out in connection with prototype theory. Only the major ones are presented here.

#### 4.3.4.1 Simplistic nature of feature list

A major criticism of the prototype model of category structure is that a simple feature list, even with a relaxation of the requirement that features be necessary and sufficient, is far too simplistic. Even more sophisticated versions such as Barsalou's (1992b) model, based on frames (in the sense of structured lists of dimensions and values), fail to capture the full range of properties linked in complex chains of association and causation involved in a typical 'rich' concept such as a natural kind concept. There are various aspects to this excessive simplicity. One is that it cannot handle context sensitivity. Studies have shown that what is chosen as the best example of a category can be influenced by indicating a context for the judgement (Barsalou 1987). Labov (1973) also showed that the boundaries between adjacent categories can be affected by adding contextual features. Another concerns the relation between the number of features present and GOE. This relation is not a simple one of counting how many features are present. There is also interaction between the features: the effect of the presence of one feature depends on the presence and values of other features. To give a very simple example, the feature WOODEN lowers the GOE of a spoon if it is small, but not if it is large. There must be thousands of interactions like this, some involving several features simultaneously.

#### 4.3.4.2 The 'odd number paradox'

The 'odd number paradox' has also been put forward as a problem for prototype theory. Armstrong et al. (1983) found that people will grade ODD NUMBERS for centrality, even though the category ODD NUMBER has a clear definition in terms of necessary and sufficient features. Their proposed solution, the so-called 'dual representation' hypothesis, combines the prototype approach and the classical approach (Smith et al. 1974). The idea is that concepts have two representations, which have different functions. There is a 'core' representation, which has basically the form of a classical definition. This representation will govern the logical properties of the concept. The other representation is some sort of prototype system which prioritizes the most typical features, and whose function is to allow rapid categorization of instances encountered. With this set-up, the odd-number effect ceases to be a puzzle. However, this conjunction of two theories inherits most of the problems of both of them: in particular, it reinstates a major problem of the classical theory that prototype theory was intended to solve, namely, the fact that for a great many everyday concepts there is no available core definition.

#### 4.3.4.3 Problems with features

There is a problem that afflicts all models of conceptual structure that traffic in features. What are they, and where do they come from? In most accounts they seem to be simply other concepts. In other words, concepts are just points in a concept network. This is curiously reminiscent of the structuralist characterization of word meaning (see, for instance, Lyons 1963, 1968). But in that case, the conceptual system is hermetically sealed off from the world, and it is difficult to see what explanatory power it can have in terms of human mental activity. To be really explanatory, the features will have to be 'grounded in a subsymbolic level' (Hampton 1997:91), that is, will have to be, or be shown to relate systematically to, non-linguistic features drawn from perception, action, intention and so forth. Hampton points out an even more vicious circularity. If we map BIRD onto HEAD by means of a 'has a' link, we will lose a lot of information if we do not make it clear that the head in question is not, say, an elephant's head, but a bird's head.

#### 4.3.4.4 Contrasting categories

Contrasting categories such as CAT, DOG, LION, CAMEL and so on pose a problem for prototype theory. There is really no explanation for the mutual exclusion relation that holds between them. Such an explanation is logically impossible unless we incorporate into prototype representations features with negative weighting (so, for instance, 'has soft fur,' 'purrs when stroked,' 'moves by

hopping,' 'larger than average human,' 'has scales' would all have negative weighting for *dog*). It does not appear that this strategy has ever been followed.

#### 4.3.4.5 Boundaries in prototype theory

Prototype theorists have paid insufficient attention to the question of category boundaries and their location, and the same is true of many cognitive linguists. In the following quote Langacker appears to deny the existence of boundaries: 'There is no fixed limit on how far something can depart from the prototype and still be assimilated to the class, if the categorizer is perceptive or clever enough to find some point of resemblance to typical instances' (Langacker 1991:266).

Lakoff acknowledges their existence, but devotes little space to discussing them. (Hampton [1991] is one of the few psychologists to propose a version of the prototype model in which category boundaries are explicitly recognized.) However, a boundary is arguably the most basic of all the properties of a category. A category is like a container: one of its major functions is to divide the objects in the world into those things that are in it and those things that are not in it. This function cannot be fulfilled without a boundary.

The notion of category boundary hardly needs detailed justification. If A says *That is an X* and B says *No, it isn't*, then either they perceive the referent of *that* differently or they disagree as to the location of the boundary of the category X. Certain adjectives such as *artificial*, as in *artificial cream*, and *fake* as in *a fake Monet*, indicate that the referent does not fall into the category designated by the noun; *regular* as in Lakoff's (1973) *Mark Spitz is a regular fish* (Mark Spitz was an Olympic swimmer), for appropriate interpretation, requires the hearer to realize that Mark Spitz is not, in fact, a fish.[1]

Apparently well-formed but nonetheless unacceptable inference patterns like the following can only be explained in terms of boundary location:

(4) a. A car seat is a kind of seat.
b. A seat is an item of furniture.
c. ?A car seat is an item of furniture.

One explanation (due to Hampton – a slightly different account is given in chapter 6) is that for *An X is a Y* to be acceptable, it is enough that a prototypical X should fall within the category Y; it is not necessary for all X's to fall within the category. Hence, the pattern of acceptability seen in (4) can be explained by the disposition of boundaries in Figure 4.1 (heavily shaded areas denote prototype cores):

[1] It should be emphasized that the existence of a boundary does not entail the existence of a 'core definition' with necessary and sufficient criteria, as proposed in what Hampton (1997:93) calls the 'binary view' put forward by Smith et al. (1974).

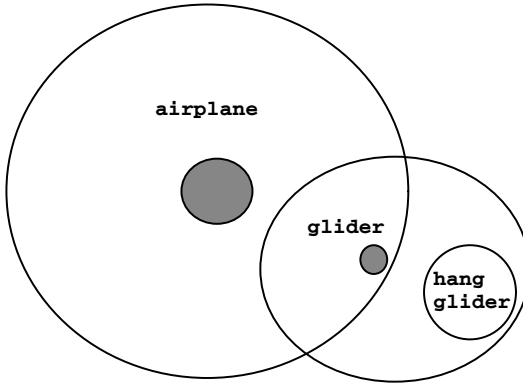


Figure 4.1 *Boundaries of AIRPLANE, GLIDER and HANG GLIDER*

Here, the prototype of GLIDER falls within the category boundary of AIRPLANE, but HANG GLIDER falls outside it.

There is a psycholinguistic correlate of the position of a boundary, involving speed of response to a categorization task. If subjects are asked whether or not an item belongs to a given category, the speed of response depends on how near the item is to the category boundary: the closer it is, the slower will be the response. Hence, in (5), the **bold** items will be responded to slowest:

(5) (FRUIT) apple . . . . . **tomato** . . . . . potato
(VEHICLE) car . . . . . **bicycle** . . . . . chair
(WORD) hand . . . . . **malk** . . . . . pkhq

Another indication of marginal status is the following. Take the case of SHOE as a member of the category CLOTHES. One would not hesitate to say of a suitcase that contained underwear, shirts, socks, jackets and trousers, but nothing else, that it 'contained only clothes.' However, one would hesitate to say of a suitcase full of shoes, that it contained only clothes; on the other hand, there would be no such hesitation if the contents were all shirts. This is arguably a function of the marginal status of shoes in the category of clothes compared with shirts. It appears that we construe the category CLOTHES differently, that is, more generously, when confronted with a variety of types of clothes, including marginal ones; when confronted with a collection of shoes, we construe the categories CLOTHES and SHOES as mutually excluding.

The location of the boundary of a category is independent of its prototype, that is to say, two categories may have the same prototype but different boundaries; likewise, two categories may have the same boundaries but different prototypes. Take the French word *corde* and its default English translation *rope*. A questioning

of native speakers of the two languages suggests that the prototypes of the two categories are very close: both put forward the same sorts of thing as best examples. However, their boundaries differ. *Le Petit Larousse* defines *ficelle* ('string') as 'une corde mince'; a parallel definition of *string* as 'a thin rope,' would seem very odd. That is to say, *ficelle* falls within the (default) boundary of the category CORDE, but *string* falls outside the boundary of the category ROPE. The converse case, of identical boundary but different core, is perhaps exemplified by *courage* and *bravery* in English. It would be hard to think of an act that was a manifestation of courage but not of bravery, or vice versa. But their core regions are arguably distinguishable. Student informants were asked to give a relative rating of (6a) and (6b) as (i) an example of a brave act and (ii) an example of a courageous act.

(6) a. A person jumps into a fast-flowing river in an attempt to save someone who has fallen in.
b. A person risks his/her career and livelihood by exposing malpractice and injustice at the heart of government.

There was substantial agreement that (6a) was the better example of bravery and (6b) the better example of courage.

A fundamental problem with boundaries is that they do not arise naturally from a prototype representation. Even in Hampton's version of the model, the boundaries are simply stipulated in an arbitrary fashion. Prototype theorists typically say that natural conceptual categories have fuzzy boundaries. Indeed, this is one of the main arguments against the classical model. Claimed pointers to fuzziness are, for instance, the fact that different subjects make different judgements as to the location of boundaries, and the same subject will make different judgements under different contextual conditions. Even the psycholinguistic experiment quoted above yields a borderline region rather than a sharp line. However, it should be pointed out that even a fuzzy boundary has a location. The notion of a fuzzy boundary will be critically examined below.

### 4.3.5 *The frame-based account of prototype effects*

A simple list of features is inadequate as a representation of a conceptual category. The notion of frame as described in chapter 2 offers a more satisfactory picture of a concept as a complexly structured body of interconnected knowledge. This picture allows a more flexible account of such matters as graded centrality. Graded centrality can be seen as a matter of the goodness of fit between the perceived features of some individual, and one or more aspects of the frame that characterizes an ideal individual in a category.

Three ways in which this occurs can be identified. First, there is the question of the convergence between the individual and the profiled region of the frame. Take the case of *car* and *tractor* within the category of VEHICLE. Most informants award *car* a somewhat higher GOE score than *tractor*. The reason appears to be that the ideal vehicle is designed for travel along roads, rather than across fields, hence there is a better fit between CAR and VEHICLE than between TRACTOR and VEHICLE. The second type of graded centrality involves items that do have a traditional definition, like *bachelor*. In this case, graded centrality can arise from similarity between the ideal background domain and the actual background of the individual. As we have seen, the definition operates against a set of cultural background assumptions concerning marriageability: the reason we regard a (Roman Catholic) priest as not a very good example of a bachelor, even though he satisfies the basic definition, is that our background assumptions about priests do not fit our assumptions about an 'ideal' bachelor. A third case is when a concept is characterized by a cluster of ICMs, as in the case of MOTHER (§2.5). Here, the ICMs behave like features, in that the more of the members in the ideal cluster are present in a particular instance, the more central the instance is within the category.

## 4.4 A dynamic construal approach to conceptual categories

Most views on the nature of categories have had in common a belief in a constant underlying mental representation of some kind for each category. However, more recently, a new approach to categories has emerged that challenges this assumption. For instance, Smith and Samuelson pass a harsh judgement on the 'fixed categories' assumption: 'These foundational ideas of stable categories and stable concepts, however, have led to little progress. Instead, a steady succession of theories of concepts have been offered, rejected, resurrected and rejected again' (Smith and Samuelson 1997:163).

Smith and Samuelson quote a number of experimental results in support of a proposal that the notion of fixed categories with permanent representations is a myth. Among these are Barsalou's (1983) experiments involving ad hoc categories with no conventional names, like 'things on a desk that could be used to pound in a nail,' or, 'things to take on a picnic.' Subjects readily formed new and contextually coherent categories that showed the same characteristics as established categories, including graded centrality and characteristic features. They propose instead, that categories are inherently variable, and created on-line as and when needed. This general line of approach is endorsed by Whittlesea (1997), who argues that there is no hard evidence for the existence of a separate system of abstracted

knowledge, and that the alleged properties of fixed concepts can be given other explanations.

According to Smith and Samuelson, the elements out of which a concept is created are past history, recent history, current input. On the topic of past history, that is to say, accumulated memories of previous experiences, they point out that each experience has a permanent effect on our 'ways of knowing,' and further have this to say:

> Critically, the accrual of these long-term changes provides a source of stability in a continually changing system. If there are statistical regularities, patterns, in our experiences that recur over and over again, then as each moment of knowing is laid on the preceding moments, weak tendencies to behave and to think in certain ways will become strong tendencies – sometimes so strong that they will not be easily perturbed and thus might seem fixed. (Smith and Samuelson 1997:175–6)

What is recorded on each past experience will include such things as salient contextual factors, perceived and inferred relations (causal and other) with other things, accompanying language and so on. The second element is immediately preceding mental activity. They adduce the ubiquitous effect of priming as an example of this. More particularly for concept formation they claim:

> [T]here is a pull for coherence from one thought to the next one, for the meaning of an event to depend on its place in a stream of events. If we think first about eating and then about frogs we will think differently than if we think first about ponds and then about frogs. (ibid.)

The final element is a construal of immediate context, including linguistic, perceptual, social, psychological aspects, including current goals and plans, inferences and expected outcomes, perceived causal relations and so on.

Let us now look briefly at how this dynamic view of concepts impinges on the three key features of concepts, namely, boundaries, frames and levels.

### *4.4.1 Category boundaries*

It is not difficult to find examples of different placement of category boundaries in construals of a word in different contexts. Take the example of *pet* in English. Nowadays, there are electronic devices that mimic certain characteristics of animals, except that they are less demanding and less messy: they are sometimes called *cyberpets*. Suppose we ask whether these objects are pets or not:

(7) Is a cyberpet a pet?

When this question is put to a typical class of undergraduates, a typical result is that a minority, but a significant minority, answer *Yes*, while the majority say *No*. This is, of course, a typical 'fuzzy' result. Now suppose the question in (8) is asked:

(8) Is a cyberpet a real pet?

The response this time is overwhelmingly *No*, because the word *real* encourages a particular construal of the position of the category boundary. On the other hand, suppose a scene is set such as the following: an educational psychologist, say, is advising the parents of a child with behavioral problems, and says (9):

(9) I advise you to get her some kind of pet – even an electronic one might be beneficial.

In this case, no one in a typical class finds anything anomalous in the psychologist's utterance, even though *pet* is used to include the electronic variety. The expressions *some kind of* and *even* in the context encourage us to construe a broader category of pets.

Another example is *dog* in (10)–(12):

(10) A dog has four legs.

At first sight this seems an obvious truth. But what about dogs that have lost one or more legs in an accident? It seems that when we interpret (10), we construe the category of dogs to include only well-formed dogs. Yet another construal of the boundaries of the category of dogs is illustrated in (11):

(11) Dogs are mammals.

Here we construe a category appropriate to biological discourse, which includes three-legged dogs and wild dogs. Consider also cases like (12):

(12) A dog makes an excellent companion for an old person.

Here we construe a category appropriate to human social behavior, which includes only pet dogs.

As a final example, consider the construals of *bird* in (13) and (14):

(13) I wish I could fly like a bird.
(14) We get lots of birds in our garden.

For (13), we must exclude flightless birds and injured birds incapable of flight from our construal of *bird*. In (14) we are constrained to interpret *bird* (if uttered by an inhabitant of a typical Manchester suburb) as 'most familiar type of small garden bird,' on the assumption that no one would expect to see ostriches or eagles in their garden.

As we have seen, one of the perceived inadequacies of the classical model of category structure was that it entailed sharp boundaries, whereas natural categories were claimed to have fuzzy boundaries. However, the notion of a fuzzy boundary needs reexamining. Claimed pointers to fuzziness are, for instance, the fact that different subjects make different judgements as to the location of boundaries, and the same subject will make different judgements under different contextual conditions. But all the evidence for fuzziness involves reactions to isolated lexical items, rather than construals in specific contexts. While the category boundary construed in response to a lexical item can vary with context, there is no reason to suppose that there is anything fuzzy about the different construed boundaries. A boundary is a line of demarcation between 'inside' and 'outside.' According to the dynamic construal approach, it is in principle sharp. However, we can have various degrees of knowledge about a boundary. For instance, we may only know that it is located within a certain range of possibilities. Uncertainty as to location is perfectly compatible with the sharpness of a boundary.

Consider the boundary between 'alive' and 'dead.' The decision criteria vary according to context and according to what we are talking about. In the case of human beings, the boundary is a matter of dispute. Consider, too, the 'human being' boundary in connection with the debates on abortion. In both these cases, the location of the boundary is a matter of dispute and uncertainty, but is not vague, certainly not to the disputants. The debate presupposes that there is a dichotomous construal with a determinate boundary. Very often a boundary construal serves only to categorize specific individuals as inside a category or not, that is, only a local boundary needs to be construed rather than a complete delimitation of the category. Lakoff (1987) makes a special case for the fuzziness of categories such as TALL MAN, which involve a graded property. However, on the dynamic construal approach, contextualized occurrences even of categories of this type involve a specific construed reference point on the relevant scale (see chapter 8 for more detailed discussion).

In conclusion, it is arguable that we do not need the notion of fuzzy boundary: everything can be accounted for by variable construal of a normal, that is, determinate, boundary.

### *4.4.2 Frames*

Frames/ICMs (in some cases cluster ICMs) are presented by Fillmore and Lakoff as more-or-less invariant structures having a stable association with lexical items, which allow for variable boundary construal, presumably in terms of the goodness-of-fit required between perceived reality and aspects of the frame. However, although the frame may be relatively more stable than the boundaries, the

dynamic construal approach allows also for variable construal of the frame itself. The experiments of Barsalou, reported above, where ad hoc categories are formed that have all the characteristics of established categories, suggest that frames may be construed on-line. Also, the type of variation shown by the category DOG in *dogs and other pets* and *Dogs are mammals* seems more convincingly explained by a modulation of the frame, rather than an adjustment in the degree of fit with a constant underlying the DOG frame. In any case, whether or not frames are subject to construal, the mechanism of boundary placement is still in need of elucidation.

### 4.4.3 Levels of categorization

Given that level status is a function of content and relations between contents, it would not be surprising if variation in level construal were to be observed between speakers, and within the usage of a given speaker at different times and in different contexts.

It is not difficult to find cases where different speakers apparently assign items to different levels. Take the case of categories associated with the word *bird*. For some speakers, *bird* denotes a category at superordinate level which we may call AVES. This has ANIMAL, FISH, INSECT and so on as sister categories, and as subcategories at basic level we will find SPARROW, THRUSH, BLACKBIRD and so on. For other speakers, the default denotation of *bird* is a basic level category that contains familiar garden birds, which has as sister categories not only CAT and DOG, but also less familiar birds such as TURKEY, OSTRICH and EAGLE (Jolicoeur et al. 1984). Individual bird species such as THRUSH and BLACKBIRD are subcategories of BIRD at subordinate level. The first picture makes more sense biologically, as the species are aligned at basic level. But many speakers argue strongly that, for them, the difference between, say, a sparrow and a thrush is 'more like' that between a collie and a spaniel, than like that between a cat and a dog. Speakers for whom the default construal of *bird* is BIRD presumably also have a construal of *bird* as AVES. Equally, speakers (like the present author) for whom *thrush* denotes a basic level category, and whose default construal of *bird* is AVES are capable of operating with the other system, if the occasion demands.

Now, the question is: What is the difference between the basic level THRUSH and the subordinate level THRUSH? It seems that an important factor is richness of content, in terms of knowledge, memories, connections and so forth. Basic level categories ideally have rich content and clear differentiation from sisters. While a competent naturalist will have a relatively rich representation of items such as blue-tit, swallow, thrush and so on, town-dwellers may well know the names, but very little else about the different birds, so they will not form satisfactory basic level items: the names will be little more than placeholders for potential knowledge.

They may be able to form an image of a generic (garden) bird, but not have enough experience or knowledge to be able to visualize individual species; their patterns of behavior will be very much the same towards all garden birds. Insofar as they have both a superordinate level and a basic level construal of *bird*, these will not be different level construals of the same category, but two different categories that fit at two levels.

What happens in the case of a speaker who can operate with two different systems? Consider the case of a dog-breeder who in his work environment exhibits basic level characteristic behavior in respect of categories such as SPANIEL, COLLIE, ALSATIAN, TERRIER. What happens when he converses with a non-specialist? Presumably many, at least, will adjust themselves cognitively to the new situation, and revert to the societal default construal of the terms. But do they actually change their categories? Or do they simply construe a new level for them? If they actually restructure the categories, for instance by backgrounding aspects of knowledge that are highly relevant in a professional setting, then they are effectively creating new conceptual categories. It would seem reasonable to assume that level cannot be construed independently of content, that is to say, any observed movement up or down a taxonomic hierarchy will be a consequence of different construals of the category denoted by a lexical item.

## 4.5 The dynamic construal of meaning

A major requirement of a satisfactory account of the relation between words and meaning is to integrate into a coherent picture both the appearance of [illegible] at the same time. [illegible] the flexibility of [illegible] context. A fairly standard way of accounting for this is to locate structure in the lexicon (or the lexical component) and to ascribe variability to mechanisms of pragmatic enrichment or principles of [illegible] are specified in the lexicon, but are constructed on-line in actual situations of use. This is not a new idea. It was first suggested within linguistics by Miller and Charles (1982) and it is now common among cognitive linguists (for instance Lakoff and Brugman [1984] and Croft [2000]); there are also parallels in proposals regarding concepts within cognitive psychology as we have seen. But proponents of this approach in the past have rarely been applied to the sorts of problems that engaged the attention of structural linguists such as sense relations, lexical fields, componential analysis and so on. Polysemy has been extensively studied but arguably such studies pay insufficient attention to conceptual features such as sense boundaries. It is not [illegible] that linguistic expressions provide