

# Chapter 4

## Prototype theory

### Prospects and problems of prototype theory\*

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#### 1. Prototype theory within linguistics

The starting-point of the prototypical conception of categorial structure is summarized in the statement that

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 contrast, it has recently been argued ... that some natural categories are analog and must be represented logically in a manner which reflects their analog structure (Rosch and Mervis 1975: 573–574).

As we shall see in section 2, the exact definition of the concept of prototypicality as used in linguistics is not without problems. The major part of this introduction to the prototypicality-based studies collected here will, in fact, consist of an attempt at clarification of some of the problematic aspects of the way in which the notion of prototype has been used in linguistics. To begin with, however, we shall be concerned with a brief overview of the state of the art in linguistic prototype theory.<sup>1</sup>

The theory originated in the mid 1970s with Eleanor Rosch's research into the internal structure of categories. (Overviews may be found in Rosch 1978, 1988, and Mervis and Rosch 1981; the basic research is reported on mainly in Heider 1972; Rosch 1973, 1975, 1977; Rosch and Mervis 1975; Rosch, Simpson and Miller 1976; Rosch et al. 1976.) From its psycholinguistic origins, prototype theory has moved mainly<sup>2</sup> in two directions. On the one hand, Rosch's findings and proposals were taken up by formal psycholexicology (and more generally, information-processing psychology), which tries to devise formal models for human conceptual memory and its operation, and which so, obviously, borders on Artificial Intel-

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ligence. Excellent overviews of the representational and experimental issues at stake here are Smith and Medin (1981), and Medin and Smith (1984); an interesting sample of current research may be found in Neisser (1987). On the other hand, prototype theory has had a steadily growing success in linguistics since the early 1980s, as witnessed by a number of recent monographs and collective volumes in which prototype theory and its cognitive extensions play a major role (Wierzbicka 1985; Lakoff 1987; Langacker 1987; Craig 1986; Holland and Quinn 1987; Rudzka-Ostyn 1988; Lehmann 1988a; Hüllen and Schulze 1988; Tsohatzidis 1989; Taylor 1989). It is with the latter development that we shall be concerned with here.

Against the background of the development of linguistic semantics, prototype theory may be defined primarily in contrast with the componential model of semantic analysis that was current in transformational grammar and that is stereotypically associated with Katz and Fodor's analysis of *bachelor* (Katz and Fodor 1963); in an early defense of a prototypical approach, Fillmore (1975) called this the 'checklist theory' of meaning. The prototypists' reaction against this featural approach had, however, the negative side-effect of creating the impression that prototypical theories rejected any kind of componential analysis. This is a misconception for the simple reason that there can be no semantic description without some sort of decompositional analysis. As a heuristic tool for the description and comparison of lexical meanings, a componential analysis retains its value (a value that, incidentally, it did not acquire with the advent of componential analysis as an explicit semantic theory, but which had been obvious to lexicographers from time immemorial). Rather, the difficulties with the neostructuralist kind of feature analysis that grew out of structuralist field theory lie elsewhere; it is not the use of decomposition as a descriptive instrument that causes concern, but the status attributed to the featural analysis. Two important points have to be mentioned.

In the first place, as suggested by the quotation at the beginning of this introduction, featural definitions are classically thought of as criterial, i.e. as listing attributes that are each indispensable for the definition of the concept in question, and that taken together suffice to delimit that concept from all others. In contrast, prototype theory claims that there need not be a single set of defining attributes that conform to the necessity-cum-sufficiency requirement.<sup>3</sup>

In the second place, prototype theory is reluctant to accept the idea that there is an autonomous semantic structure in natural languages which can be studied in its own right, in isolation from the other cognitive capacities of man. In particular, meaning phenomena in natural languages cannot be studied in isolation from the encyclopedic knowledge individuals possess; it is precisely the presupposition that there exists a purely linguistic structure of semantic oppositions that enables structuralist and neostructuralist semantics to posit the existence of a distinction between semantic and encyclopedic knowledge. Prototype theory

tends to minimize the distinction primarily for methodological reasons: because linguistic categorization is a cognitive phenomenon just like the other cognitive capacities of man, it is important to study it in its relationship to these other capacities. More specific arguments have also been formulated to show that the distinction between an encyclopedic and a semantic level of categorial structure is untenable.<sup>4</sup> For instance, given that the flexible extendibility of prototypical concepts is a synchronic characteristic of linguistic structure, and given the fact that these extensions may be based indiscriminately on allegedly encyclopedic or on allegedly semantic features, the distinction between both kinds of information loses its synchronic relevance. Take the case of metaphor: before *lion* acquires the meaning 'brave man', the feature 'brave' is not structurally distinctive within the semasiological structure of *lion*, and hence, it has to be considered encyclopedic according to structuralist theories. But if it can be accepted (and this is of course the crucial point) that the metaphorical extension of *lion* towards the concept 'brave man' is not just a question of diachronic change, but is merely an effect of the synchronic flexibility of lexical items, the feature clearly acquires semantic status. If, furthermore, the argument can be repeated in the sense that such synchronic metaphorical extensions may be based on any allegedly encyclopedic attribute, the distinction between semantic and encyclopedic concepts as a whole falls.<sup>5</sup>

The matter need not, to be sure, be settled here. What is important for our introductory purposes is rather to see what exactly prototype theory objects to in componential theories of the Katzian type. First, the suggestion that lexical concepts are criterial in the classical sense, and second, the suggestion that there exists a purely linguistic level of conceptual structuring that is neatly separated from other, 'encyclopedic' forms of conceptual information, and that may thus be studied autonomously, in methodological isolation from other kinds of cognitive research. As against these points of view, prototype theory defends a non-criterial conception of categorial structure, and an interdisciplinary methodological perspective that takes into account relevant research from the other cognitive sciences. (The very transposition of the prototypical approach from experimental psychology to linguistics derives from this attitude.)

But this historical positioning of prototype theory with regard to its immediate predecessors within the field of lexical semantics clearly does not explain why it has turned out to be such a successful alternative. Why did (and does) the prototypical approach appeal to a sizeable part of the linguistic community? On the one hand, the historical development of generative grammar had raised a considerable amount of interest in semantic matters. It should not be forgotten, in fact, that it was only after the incorporation of a semantic component into the transformational framework that Chomskyanism became internationally popular; the universal appeal of the generative Standard Theory was at least partly due to the

promises held by its Katzian semantic component. On the other hand, the promises were not fulfilled. Within the generative paradigm, Generative Semantics (which most strongly embodied the semantic approach) withered in favor of Autonomous Syntax, in which semantics hardly played a role worthy of note. Outside the generative approach, formal semantics of the Montagovian kind was too narrowly restricted to sentential meaning to be able to hold the attention of those who were interested primarily in the internal structure of natural language categories (and not primarily in the way these categories combine into larger unities).<sup>6</sup> In short, as far as semantics was concerned, there was a gap in the linguistic market of the early 1980s that was not filled by the major approaches of the day.<sup>7</sup>

But again, recognizing that there was an interest in the semantics of natural language categories to which prototype theory could appeal does not tell the whole story. Why didn't people simply stick to the componential theory popularized by Katz, or to the rival axiomatic method of representation – even if these gradually moved out of the centre of the linguistic attention as Autonomous Syntax and Formal Semantics took over? In general, there are a number of methodological requirements people nowadays expect of linguistic theories: descriptive adequacy (mainly in the form of a broad empirical scope), explanatory depth, productivity, and formalization. Although prototype theory rates much lower on the formalization scale than either the axiomatic or the featural approach, its assets with regard to the other three points are considerable.

In the first place, it tackles a number of semantic phenomena that had been swept under the rug by the more structurally minded approaches. The fuzzy boundaries of lexical categories, the existence of typicality scales for the members of a category, the flexible and dynamic nature of word meanings, the importance of metaphor and metonymy as the basis of that flexibility – these are all intuitively obvious elements of the subject matter of semantics that were largely neglected by structural semantics. It is true that they were occasionally pointed at as an indispensable aspect of any full-fledged semantic theory: think, for instance, of Weinreich's remark (1966: 471) that a semantic theory should be able to deal with 'interpretable deviance', or Uhlenbeck's plea (1967) for a dynamic conception of word meaning.<sup>8</sup> These remarks did not, however, have much effect as far as theory formation was concerned. In particular, it is only with the advent of prototype theory that contemporary linguistics developed a valid model for the polysemy of lexical items. This is perhaps the single most appealing characteristic of prototype theory: here at last is a descriptive approach to lexical meaning in which our pretheoretical intuitions about gradedness, fuzziness, flexibility, clustering of senses etc. receive due attention.

In the second place, prototype theory appears to be a productive theory not just in the sense that its insights into the structure of lexical categories can be easily applied in various fields of the lexicon, but also in the sense that it may be

extended towards other aspects of linguistics. Whereas prototype theory started with being descriptively fruitful in lexical semantics, it soon became theoretically fruitful in the sense that other areas of linguistics were taken into consideration. A few recent examples of such extensions may suffice: phonology (Nathan 1986), morphology (Bybee and Moder 1983; Post 1986), syntax (Van Oosten 1986; Ross 1987), historical linguistics (Winters 1987; Aijmer 1985), markedness theory (Van Langendonck 1986), theoretical lexicography (Geeraerts 1985c). Through these and similar extensions,<sup>9</sup> prototype theory has become one of the cornerstones of Cognitive Linguistics, which tries to account for the interaction between language and cognition on all levels of linguistic structure: one need only have a look at the prominent place attributed to a prototypical conception of categorial structure in Langacker (1987) (one of the basic works of the Cognitive Linguistic approach) to appreciate its importance.<sup>10</sup> In this sense, the development of prototype theory into Cognitive Linguistics contains exciting promises of a unified cognitive theory of linguistic categorization.

In the third place, the explanatory depth of prototype theory resides partly in its generalizable character, but also in its interdisciplinary nature. The importance of its genetic link with psycholinguistics can only be fully appreciated against the background of the Chomskyan requirements with regard to theories of grammar. Chomsky's methodology is, in fact, in the awkward position of declaring linguistics a cognitive science, but refusing to deal directly with the findings of the other sciences of the mind. Roughly stated, Chomskyan linguistics claims to reveal something about the mind, but imperviously prefers a strictly autonomist methodology over the open dialogue with psychology that would seem to be implied by such a claim. Prototype theory's linguistic application of psycholinguistic findings, on the other hand, takes the Chomskyan ideal of cognitive explanatory depth to its natural consequences, viz. of giving up the methodological autonomy of linguistics in favor of an interdisciplinary dialogue with the other cognitive sciences.<sup>11</sup> Prototype theory takes the cognitive claims of Chomskyanism methodologically seriously by its interdisciplinary openness. This is all the more important at a moment when Cognitive Science is emerging as an interdisciplinary cluster of psychology, neuroscience, Artificial Intelligence, and philosophy. It is probably one of the reasons for the appeal of prototype theory that its interdisciplinary connections hold the promise of linking linguistics to the most important development that the human sciences are currently witnessing.

## 2. Definitional problems, first series: 'Prototype' as a prototypical notion

The appeal of prototype theory should not, however, obscure the fact that the exact definition of prototypicality is not without problems. The purpose of this section (and the following) is to analyze the sources of the confusion by making clear that prototypicality is itself, in the words of Posner (1986), a prototypical concept. As a first step, we shall have a look at four characteristics that are frequently mentioned (in various combinations) as typical of prototypicality. In each case, a quotation from early prototype studies is added to illustrate the point.

(i) Prototypical categories cannot be defined by means of a single set of criterial (necessary and sufficient) attributes:

We have argued that many words ... have as their meanings not a list of necessary and sufficient conditions that a thing or event must satisfy to count as a member of the category denoted by the word, but rather a psychological object or process which we have called a prototype (Coleman and Kay 1981: 43).

(ii) Prototypical categories exhibit a family resemblance structure, or more generally, their semantic structure takes the form of a radial set of clustered and overlapping meanings:<sup>12</sup>

The purpose of the present research was to explore one of the major structural principles which, we believe, may govern the formation of the prototype structure of semantic categories. This principle was first suggested in philosophy; Wittgenstein (1953) argued that the referents of a word need not have common elements to be understood and used in the normal functioning of language. He suggested that, rather, a family resemblance might be what linked the various referents of a word. A family resemblance relationship takes the form AB, BC, CD, DE. That is, each item has at least one, and probably several, elements in common with one or more items, but no, or few, elements are common to all items (Rosch and Mervis 1975: 574–575).

(iii) Prototypical categories exhibit degrees of category membership; not every member is equally representative for a category:

By prototypes of categories we have generally meant the clearest cases of category membership defined operationally by people's judgments of goodness of membership in the category ... we can judge how clear a case something is and deal with categories on the basis of clear cases in the total absence of information about boundaries (Rosch 1978: 36).

(iv) Prototypical categories are blurred at the edges:

New trends in categorization research have brought into investigation and debate some of the major issues in conception and learning whose solution had been unquestioned in earlier approaches. Empirical findings have established that ... category boundaries are not necessarily definite (Mervis and Rosch 1981: 109).

As a first remark with regard to these characteristics, it should be noted that they are not the only ones that may be used in attempts to define the prototypical conception of categorization. Two classes of such additional features should be mentioned.

On the one hand, there are characteristics that do not pertain (as the four mentioned above) to the structure of categories, but that rather pertain to the epistemological features of so-called non-Aristotelian categories.<sup>13</sup> For instance, the view that prototypical categories are not 'objectivist' but 'experiential' in nature (Lakoff 1987) envisages the epistemological relationship between concepts and the world rather than the structural characteristics of those concepts. In particular, it contrasts the allegedly classical view that 'categories of mind ... are simply reflections of categories that supposedly exist objectively in the world, independent of all beings', with the view that 'both categories of mind and human reason depend upon experiential aspects of human psychology' (Lakoff 1982: 99). Such an epistemological rather than structural characterization of natural concepts also has a methodological aspect to it; it entails that prototypical categories should not be studied in isolation from their experiential context. While such an epistemological or methodological conception of prototypical categorization is extremely valuable, we shall take a structural point of view in the following pages; we shall try to determine whether it is possible to give a coherent, structurally intrinsic characterization of prototypical categories.

On the other hand, there are structural characteristics of prototypical concepts that can be reduced to the four basic structural features mentioned above. For instance, in my own work on prototypical categorization, I have repeatedly stressed the flexibility of prototypical concepts (1983, 1985a), together with the fact that a distinction between semantic and encyclopedic components of lexical concepts cannot be maintained in the case of prototypical concepts (1985b). But the flexibility of prototypical categories is linked in a straightforward manner with the fourth characteristic: uncertainties with regard to the denotational boundaries of a category imply that it need not be used in a rigidly fixed manner. Similarly, the absence of a clear dividing line between encyclopedic and purely semantic information follows from this very flexibility together with the first and second characteristic. As illustrated in the previous section, the possibility of incorporating members into the category that do not correspond in every definitional respect with the existing members entails that features that are encyclopedic (non-definitional) with regard to a given set of category members may turn into definitional



features with regard to a flexibly incorporated peripheral category member. The resemblance between central and peripheral cases may be based on allegedly encyclopedic just as well as on allegedly 'semantic' features. In short, features of prototypicality that are not included among the ones mentioned in (i)–(iv) may often be reduced to those four, and this in turn justifies a preliminary restriction of the discussion to the latter.

A second remark with regard to the four characteristics is concerned with the fact that they are systematically related along two dimensions. On the one hand, the third and the fourth characteristic take into account the referential, extensional structure of a category. In particular, they have a look at the members of a category; they observe, respectively, that not all referents of a category are equal in representativeness for that category, and that the denotational boundaries of a category are not always determinate. On the other hand, these two aspects (centrality and non-rigidity) recur on the intensional level, where the definitional rather than the referential structure of a category is envisaged. For one thing, non-rigidity shows up in the fact that there is no single necessary and sufficient definition for a prototypical concept. For another, family resemblances imply overlapping of the subsets of a category. To take up the formulation used in the quotation under (ii) above, if there is no definition adequately describing A, B, C, D, and E, each of the subsets AB, BC, CD, and DE can be defined separately, but obviously, the 'meanings' that are so distinguished overlap. Consequently, meanings exhibiting a greater degree of overlapping (in the example: the senses corresponding with BC and CD) will have more structural weight than meanings that cover peripheral members of the category only. In short, the clustering of meanings that is typical of family resemblances implies that not every meaning is structurally equally important (and a similar observation can be made with regard to the components into which those meanings may be analyzed). The systematic links between the characteristics mentioned at the beginning are schematically summarized in Table 1.

As a third remark, it should be noted that the four characteristics are often thought to be co-extensive, in spite of incidental but clear warnings such as Rosch and Mervis's remark that a family resemblance structure need not be the only source of prototypicality (1975: 599). Admittedly, it is easy to consider them to be equivalent; already in the quotations given above, partial reasons for their mutual interdependence can be found. More systematically, the following links between the four characteristics might be responsible for the idea that prototypicality necessarily entails the joint presence of all four.



Table 1. Characteristics of prototypicality

	NON-EQUALITY differences in structural weight	NON-RIGIDITY flexibility and vagueness
EXTENSIONALLY	degrees of representativity	absence of clear boundaries
INTENSIONALLY	clusters of overlapping senses	absence of classical definition

First, linking the first to the second characteristic is the argument mentioned above: if there is no single definition adequately describing the extension of an item as a whole, different subsets may be defined, but since the members of a category can usually be grouped together along different dimensions, these subsets are likely to overlap, i.e., to form clusters of related meanings.

Second, linking the second to the third characteristic is the idea that members of a category that are found in an area of overlapping between two senses carry more structural weight than instances that are covered by only one meaning. Representative members of a category (i.e., instances with a high degree of representativity) are to be found in maximally overlapping areas of the extension of a category. (In the example, A and E are less typical members than B, C, and D, which each belong to two different subsets.)

Third, linking the third to the fourth characteristic is the idea that differences in degree of membership may diminish to a point where it becomes unclear whether something still belongs to the category or not. Categories have referentially blurred edges because of the dubious categorial status of items with extremely low membership degrees.

And fourth, linking the fourth to the first characteristic is the idea that the flexibility that is inherent in the absence of clear boundaries prevents the formulation of an essence that is common to all the members of the category. Because peripheral members may not be identical with central cases but may only share some characteristics with them, it is difficult to define a set of attributes that is common to all members of a category and that is sufficient to distinguish that category from all others.

These circular links between the four characteristics are, however, misleading. A closer look at some (familiar and less familiar) examples of prototypicality reveals that they need not co-occur.

#### BIRD

The concept *bird* (one of Rosch's original examples of prototypicality) shows that natural categories may have clear-cut boundaries. At least with regard to our own, real world, the denotation of *bird* is determinate; educated speakers of

English know very well where birds end and non-birds begin. They know, for instance, that a bat is not a bird but that a penguin is. Of course, the principled indeterminacy described by Waismann (1952) as ‘open texture’ remains: when confronted with an SF creature (a post-World War III mutant) that looks like a bird but talks like a man, we would not be sure whether it should be called a bird or not. A boundary problem that is typical for a prototypical organization of the lexicon would then arise. As it functions now, however, in present-day English, *bird* is denotationally clearly bounded, the archaeopteryx notwithstanding.<sup>14</sup> As has been remarked elsewhere (Lakoff 1987), the existence of prototypicality effects in clearly bounded concepts such as *bird* implies that a strict distinction has to be made between degree of membership and degree of representativity. Membership in the category *bird* is discrete; something is or is not a bird. But some birds may be birdier than others: the swallow does remain a more typical bird than the ostrich.

### RED

Color terms such as *red* constituted the starting-point for prototypical research; drawing on the views developed in Berlin and Kay (1969), Rosch’s earliest work is an experimental demonstration of the fact that the borderline between different colors is fuzzy (there is no single line in the spectrum where red stops and orange begins), and of the fact that each color term is psychologically represented by focal colors (some hues are experienced as better reds than others) (Heider 1972; Heider and Olivier 1972). These prototypical characteristics on the extensional level are not matched on the definitional level. If *red* can be analytically defined at all (i.e., if it does not simply receive an ostensive definition consisting of an enumeration of hues with their degree of focality), its definition might be ‘having a color that is more like that of blood than like that of an unclouded sky, that of grass, that of the sun, that of ... (etc., listing a typical exemplar for each of the other main colors)’. Such a definition (cp. Wierzbicka 1985: 342) does not correspond with either the first or the second characteristic mentioned above.

### ODD NUMBER

Armstrong, Gleitman and Gleitman (1983) have shown experimentally that even a mathematical concept such as *odd number* exhibits psychological representativity effects. This might seem remarkable, since *odd number* is a classical concept in all other respects: it receives a clear definition, does not exhibit a family resemblance structure or a radial set of clustered meanings, does not have blurred edges. However, Lakoff (1982) has made clear that degrees of representativity among odd numbers are not surprising if the experiential nature of concepts is taken into account. For instance, because the even or uneven character of a large

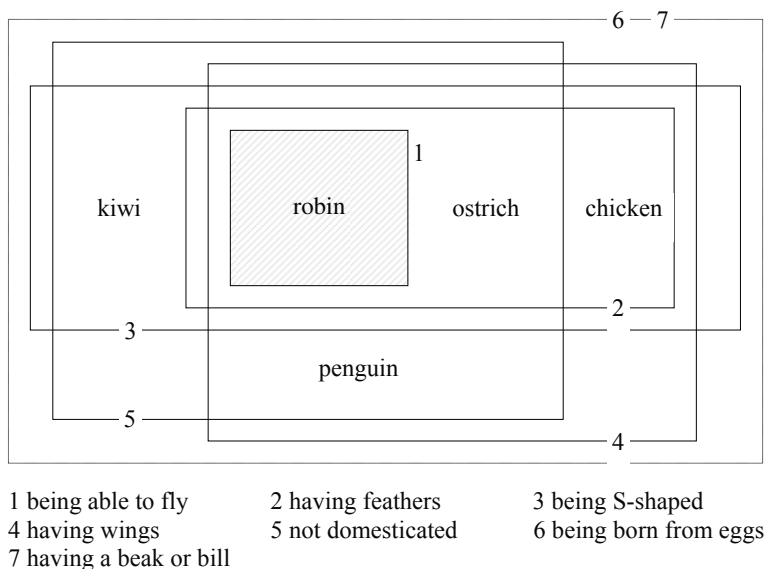
number can be determined easily by looking at the final number, it is no wonder that uneven numbers below 10 carry more psychological weight: they are procedurally of primary importance.

#### VERS

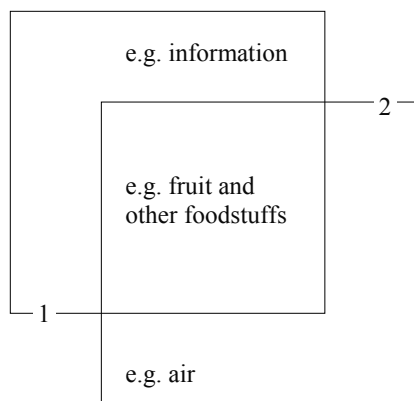
As I have tried to show elsewhere (1988a), the first characteristic mentioned above is not sufficient to distinguish prototypical from classical categories, since, within the classical approach, the absence of a single definition characterized by necessity-cum-sufficiency might simply be an indication of polysemy. This means that it has to be shown on independent grounds that the allegedly prototypical concepts are not polysemous, or rather, it means that prototypical lexical concepts will be polysemous according to a definitional analysis in terms of necessary and sufficient conditions (the classical definition of polysemy), but univocal according to certain other criteria. These criteria may be found, for instance, in native speakers' intuitions about the lexical items involved, intuitions that may be revealed by tests such as Quine's (1960) or Zwicky and Sadock's (1975). In this sense, the first characteristic has to be restated: prototypical categories will exhibit intuitive univocality coupled with analytical (definitional) polysemy, and not just the absence of a necessary-and-sufficient definition.

Once this revision of the first characteristic is accepted, it can be demonstrated that the first and the second criterion need not co-occur. Lexical items that show clustered overlapping of senses may either conform or not conform to the revised first characteristic. An example of the first situation is the literal meaning of *bird*, an example of the second situation the Dutch adjective *vers*, which corresponds roughly with English *fresh* (except for the fact that the Dutch word does not carry the meaning 'cool'). Details of the comparison between both categories may be found in the paper mentioned above; by way of summary, Figures 1 and 2 represent the definitional analysis of both items. The distinction in intuitive status between *vers* and *bird* can be demonstrated by means of the Quinean test (roughly, a lexical item is ambiguous if it can be simultaneously predicated and negated of something in a particular context). Thus, taking an example based on the corresponding ambiguity in the English counterpart of *vers*, it would be quite normal to state that the news meant in the sentence *there was no fresh news from the fighting*<sup>15</sup> is fresh in one sense ('recent, new') but not in another ('in optimal condition'): it makes sense to say that the news is at the same time fresh and not fresh. By contrast, it would be intuitively paradoxical to state that a penguin is at the same time a bird and not a bird (disregarding figurative extensions of the semantic range of *bird*). Nevertheless, the definitional analyses in Figures 1 and 2 make clear that both concepts exhibit prototypical clustering. In both cases, too, the structural position of the instances just discussed (news, penguin) is not in the

central area with maximal overlapping. In short, then, the revised version of the first characteristic need not coincide with the second characteristic.



*Figure 1.* A definitional analysis of *bird*



- 1 new, novel, recent  
 2 in an optimal condition, pure, untainted

*Figure 2.* A definitional analysis of *vers*

The insight derived from a closer look at the four examples just described may be summarized as in Table 2. It is now easy to see to what extent ‘prototypicality’ is itself a prototypical notion. There is no single set of attributes that is common to all of the examples discussed here. Rather, they exhibit a family resemblance structure based on partial similarities. In this sense, the set of prototypical concepts characterized by clustering of senses overlaps with the subset characterized by fuzzy boundaries (because of *vers*), and so on. At the same time, some concepts are more typically prototypical than others. (*Bird* and *vers* are more prototypical than *red*.) Notice, in particular, that the category *fruit* makes a good candidate for prototypical prototypicality, in the sense that it seems to combine all four characteristics. It shares the prototypical characteristics of *bird*, but in addition, things such as coconuts and, perhaps, tomatoes, seem to point out that the denotational boundary of *fruit* is less clear-cut than that of *bird*.

However, although the examples considered above do not have a set of attributes in common, they do share a single feature, viz. degrees of membership representativity. It is highly dubious, though, whether this feature alone suffices to distinguish prototypical concepts from classical concepts. If the possibility of a single necessary-and-sufficient definition is one of the features par excellence with which the classical conception has been identified, it might justifiably be claimed that degrees of representativity are entirely compatible with the classical conception of categorization. It is, in fact, in that sense that Armstrong, Gleitman and Gleitman (1983) deal with a category such as *odd number*. The experiments used by Rosch to measure degrees of representativity are not, they claim, indicative of prototypicality since they occur with classical, rigidly definable concepts such as *odd number*. To say the least, representativity effects are only a peripheral prototypical attribute according to Table 2 (cp. Lakoff 1986). But at the same time, the debate over the status of *odd number* shows that the concept ‘prototypical concept’ has no clear boundaries: it is not immediately clear whether a concept such as *odd number* should be included in the set of prototypical concepts or not.

Table 2. The prototypicality of ‘prototypicality’

	BIRD	VERS	RED	ODD NUMBER
absence of classical definition	+	–	–	–
clusters of overlapping senses	+	+	–	–
degrees of representativity	+	+	+	+
absence of clear boundaries	–	+	+	–

Of course, contrary to the situation in everyday speech, such a boundary conflict should not be maintained in scientific speech. A discipline such as linguistics should try to define its concepts as clearly as possible, and the purpose of this section is precisely to show that what has intuitively been classified together as instances of prototypical categories consists of distinct phenomena that have to be kept theoretically apart. In line with prototype theory itself, however, such an attempt at clear definition should not imply an attempt to define the 'true nature' or the 'very essence' of prototypicality. Determining an 'only true kind' of prototypicality is infinitely less important than seeing what the phenomena are and how they are related to each other by contrast or similarity.

Still, there might seem to be one way in which decent sense could be made of the question what the true meaning of prototypicality would be. To begin with, let us note that the prototypical character attributed to the concept of prototypicality also shows up in the fact that the notion 'prototype' is an extremely flexible one. This can be illustrated in two ways. First, the lexical item *prototypical* is spontaneously used to name a number of phenomena that are linked by metonymy, next to the phenomena linked by similarity that are brought together in Table 2. The lexical item does not only characterize structural features of concepts, and the concepts exhibiting those features themselves, but sometimes even particular (viz., highly representative) instances of the categories in question (the robin as a prototypical bird). Second, context may stress one feature of prototypical organization rather than another (cp. the priming effects in Rosch 1975). The general purpose of one's investigations may lead one to devote more attention to one aspect of the prototypical cluster than to another. To name a few examples: degrees of representativity are important for language development studies (if it is taken into account that most concepts in early language development are acquired via their exemplars), while clustered overlapping of senses will come to the fore in linguistic or lexicographical studies into the structure of polysemy. And a cognitive interest into the epistemological principles underlying natural language will attach more weight to the decoupling of intuitive univocality and analytical, definitional polysemy.<sup>16</sup>

In this respect, the question with regard to the true nature of prototypicality might be transformed into the question what might be the most interesting (or perhaps even the most important) perspective for studying and defining prototypicality. But here again, the 'ultimate essence fallacy' exposed by prototype theory itself lurks round the corner: there will be different preferences for one perspective rather than another, but there will be no single ultimately and eternally most important conception of prototypicality.

In short, the foregoing analysis corroborates Wierzbicka's remark that there are 'many senses' to the notion *prototype*, and that 'the notion prototype has been used in recent literature as a catch-all notion' (1985: 343). However, a more

systematic analysis than Wierzbicka's reveals that this very multiplicity of usage also supports Cognitive Semantics, in the sense that it shows that the same categorization principles may guide common sense and scientific thinking. This is, then, a further indication of the metatheoretical relevance of a cognitive conception of linguistic categorization, which I have explored at length elsewhere (1985b). At the same time, it has become clear that one of the major tasks for the further development of prototype theory is the closer investigation of the prototypically clustered characteristics of prototypicality. A major reference in this respect is Lakoff's attempt (1987: chapter 4–8) to determine which different kinds of conceptual models may lie at the basis of prototypicality effects.

### 3. Definitional problems, second series: 'Prototype theory' as a prototypical notion

Whereas the previous section made clear that prototypicality as used in linguistic semantics is a prototypically structured concept, it should now be noted that the prototype-theoretical movement as well is a prototypically structured approach to semantics. There are, in other words, central as well as more peripheral examples of prototypical theories. In particular, there exist a number of theories that combine aspects of the classical approach to semantic structure with aspects of the prototypical conception. In this section, two approaches will be considered that are to some extent semi-classical as well as semi-prototypical; each of both embodies a strategy for reinstating particular aspects of the classical view against the background of an overall cognitive point of view.

To begin with, some of the clarity and neatness of the classical approach may be recovered by concentrating on the prototypical centre of a category. If the non-classical indeterminacy of lexical concepts stems primarily from the flexible extendibility of concepts, discreteness may be reinstalled by avoiding the problems of clustered polysemy, i.e., by restricting the definitional analysis to the prototypical centre of the category. This approach is vigorously carried through by Wierzbicka (1985), who explicitly defends the discreteness of semantics by introspectively considering only the clear, salient centre of lexical categories. In a discussion of Labov's experimental investigation into the non-classical characteristics of everyday concepts (1973), she notes:<sup>17</sup>

To state the meaning of a word, it is not sufficient to study its applicability to things; what one must do above all is to study the structure of the concept which underlies and explains that applicability. In the case of words describing natural kinds or kinds of human artefacts, to understand the structure of the concept means to describe fully and accurately the *idea* (not just the visual image) of a typical representative of the kind: the prototype. And to describe it fully and accurately



we have to discover the internal logic of the concept. This is best done not through interviews, not through laboratory experiments, and not through reports of casual, superficial impressions or intuitions ... but through methodical introspection and thinking (1985: 19).

It should be noted immediately that Wierzbicka's reinstatement of discreteness does not imply that her definitions do in fact always consist of necessary-and-sufficient conditions, and she acknowledges as much (1985: 60). In this respect, Wierzbicka's approach is only partly a departure from the hard core of prototype-theoretical studies: the absence of necessary-and-sufficient conditions for the definition of certain core concepts is accepted, but the avoidance of the clustered polysemy problem 'tidies up' the semantic description and reinstates some of the classical neatness. Neither does Wierzbicka's approach imply that lexical items are always univocal; in her dictionary of English speech act verbs (1987), several items receive multiple definitions. Each of the definitions does, however, constitute a highly salient meaning, and again, by disregarding peripheral kinds of usage, the clustered or radial structure of the polysemy of lexical items does not enter the picture. The question to be asked, then, is whether Wierzbicka's restriction of the description to the salient meanings of a category is useful and adequate from a cognitive point of view.

From a methodological point of view, the periphery of natural, non-uniquely definable categories is as interesting as their salient centre(s), because it is precisely the relationship between both that typically characterizes natural categories. Cognitive Linguistics is not only interested in what constitutes the centre of a category, but also in how this centre can be extended towards peripheral cases, and how far this extension can go. The mechanisms for incorporating marginal cases into a category at the same time restrict the flexibility of that concept; it is only by studying peripheral cases, for instance, that an answer may be found with regard to the question how dissimilar things can be before they are no longer recognized as basically the same. If, in other words, flexible polysemization is indeed one of the major characteristics of natural language categories, a deliberate restriction of the description to the salient meanings of a category is methodologically less propitious, as it may lead to a neglect of this basic feature.<sup>18</sup>

A second strategy for salvaging aspects of the classical approach is to invoke sociolinguistic mechanisms such as Putnam's 'division of linguistic labor' (1975). According to Putnam, ordinary language users possess no more than 'stereotypical' knowledge about natural kinds, that is to say, they are aware of a number of salient characteristics, such as the fact that water is a transparent, thirst-quenching, tasteless liquid. The technical definition of *water* as H<sub>2</sub>O, on the other hand, is to be located primarily with scientific experts. It is the experts' knowledge that ultimately determines how natural kind terms are to be used. On the one hand,

a 'division of linguistic labor' ensures that there are societal experts who know that water is  $H_2O$ , that there is a distinction between elms and beech, how to recognize gold from pyrites, and so on. On the other hand, laymen attune their own linguistic usage to that of the expert scientists, technicians, etc.. The members of the non-specialized group are not required to have expert knowledge, but if they wish to be considered full-fledged members of the linguistic community, they are supposed to know the 'stereotype' connected with a category. A stereotype is, thus, a socially determined minimum set of data with regard to the extension of a category. Given the similarity between Putnam's stereotypes and the prototypes of Cognitive Linguistics (both consist roughly of the most salient information connected with a category), the division of linguistic labor might be used to rescue the classical view of concepts.<sup>19</sup> Expert definitions being classical (they specify an essentialist 'hidden structure' for natural kinds), the stereotypical concepts of everyday language users might now be seen as hardly more than a sloppy derivative of those classically defined expert categories. 'True' (expert) definitions would be classical, and stereotypical/prototypical concepts might be dismissed as sociolinguistically secondary phenomena.

It should be remarked immediately that such a reinstatement of the classical view is not as obvious for other words than the natural kind terms for which Putnam's theory is in fact intended (what is the expert definition of the preposition *for*?). Moreover, as a sociolinguistic theory about the social factors that determine how lexical items may be used, the 'division of linguistic labor' theory is incomplete to say the least. The primacy of expert definitions would seem to imply that natural language follows the developments and discoveries of science in a strict fashion. In actual fact, however, natural language categorization is not only determined by the state of affairs in the sciences, but also by the communicative and cognitive requirements of the linguistic community in its own right. One of Putnam's own examples may serve as an illustration. Although science has discovered that *jade* refers to two kinds of materials (one with the 'hidden structure' of a silicate of calcium and magnesium, the other being a silicate of sodium and aluminium), ordinary usage continues to refer to both substances indiscriminately as *jade*. That is to say, categorization in everyday language is not entirely dependent upon scientific research, but seems to be determined at least in part by independent criteria: if the classificatory exigencies of everyday communicative interaction do not call for a distinction between the two kinds of jade, the scientific splitting of the category is largely ignored. This implies that an investigation into everyday language categorization as an independent cognitive system is justified. More generally, if Putnam's view is seen as a theory about the sociolinguistic structure of semantic norms, his hierarchical model (with experts at one end and laymen at the other) is only one among a number of alternatives, some of which (such as the one described by Bartsch 1985) link up closely with

a prototypical conception of categorial structure. At the same time, however, it should be admitted that the relationship between classical scientific categorization and prototypical common-sense categorization may be explored in more depth than is yet the case.<sup>20</sup>

To summarize: the confusion associated with the notion of prototypicality is further increased by the fact that more straightforwardly prototypical approaches are surrounded by hybrid theories that contain particular strategies for combining classical discreteness with typically prototypical phenomena. We have discussed two such approaches (one in which the strategy in question is methodological, and another one in which it is sociolinguistic), but this does not mean that these are the only ones that might be mentioned.<sup>21</sup> The two approaches mentioned here are, however, particularly revealing, as they link up with two important currents in the history of Western thought. The first one simplifyingly boils down to the view that the mind is neat (if you look hard enough into it), but that the world is fuzzy: the non-discreteness that Cognitive Linguistics is concerned with arises from the fact that we have to apply clear-cut mental categories to an external reality that is so to say less well organized. The conception that the world of mental entities is somehow better organized than the outside world is obviously an idealistic one (though it does not constitute the only possible kind of idealism); Wierzbicka herself stresses the Platonist character of her approach. On the other hand, Putnam's view that science is neat whereas everyday language is fuzzy, links up with the empiricist objectivism of the Ideal Language branch of analytical philosophy: the objective structure of reality is best described by the language of science, and everyday language is at best a weak derivative of scientific categorization, at worst a conceptual muddle teeming with philosophical pseudo-problems. As the previous discussion suggests that hard-core Cognitive Linguistics steers clear of both the idealist and the objectivist option, we have here one more indication<sup>22</sup> for the necessity of a further investigation into the epistemological, philosophical background of the prototypical conception of categorial structure.

## Notes

1. The discussion in section 2 will make clear that the term *prototype theory* should be used with care, since the theoretical uniformity that it suggests tends to obliterate the actual distinctions between the diverse forms of prototypicality discussed in the literature. The term is used here as a convenient reference mark only, to indicate a number of related theoretical conceptions of categorial structure that share an insistence on any or more of the various kinds of prototypicality effects discussed in section 2.
2. Though not exclusively: see Rosch (1988: 386).
3. Notice that this claim applies just as well to the axiomatic, postulate-based form of

description that developed as the major representational alternative for Katzian componential analysis. The notion of criteriality is just as much part and parcel of the classical versions of the axiomatic alternative as it is of Katzian feature analysis.

4. See, among others, Haiman (1980) and Geeraerts (1985b).
5. The distinction between semantic and encyclopedic concepts against which Cognitive Semantics reacts is often misconstrued. In particular, in the statement that there is no principled distinction between semantic and encyclopedic information, the words *semantic* and *encyclopedic* are not used (as implied by Lehmann 1988b) in the senses 'as may be found in dictionaries' and 'as may be found in encyclopedias', respectively. Rather, the rejected distinction refers to an alleged distinction within an individual language user's conceptual memory; it involves the presupposition that there is an independent level of semantic information that belongs to the language and that is distinct from the individual's world knowledge. The kind of information that is typically found in encyclopedias involves scientific information of the kind 'ovulation triggered by copulation' for the item *cat* (the example is Lehmann's); but while the distinction between scientific and laymen's knowledge is primarily a social one, this kind of 'encyclopedic' information is only relevant for the psychological perspective of Cognitive Semantics if the individual lexicon to be described is that of someone with a certain amount of scientific knowledge of cats (or if, through sociolinguistic idealization, the average language user's lexicon may be supposed to contain that piece of scientific information).
6. There are, of course, exceptions such as Dowty (1979) to confirm the rule. The historical sketch of the advent of prototype theory given here is treated more thoroughly in Geeraerts (1988b).
7. As the semantic interests of the former audience of Generative Semantics were so to say no longer envisaged by the leading theories of the day, it does not come as a total surprise, from this point of view, to find George Lakoff, one of the leading Generative Semanticists, again as one of the leading cognitivists.
8. These antecedents are not the only ones that might be mentioned. I have elsewhere (1988c) drawn the attention to the similarities between the prestructuralist, historical tradition of semantic research and present-day Cognitive Semantics, but there are other (admittedly non-mainstream) traditions of semantic research with which Cognitive Semantics is methodologically related: think, e.g., of the anthropological research of Malinowski, Firth, and the London School in general. Even a structuralist such as Reichling has held views about the structure of polysemy that come close to the point of view of prototype theory: his influential work on the word as the fundamental unit of linguistics (1935) contains an analysis of the Dutch word *spel* that is awkwardly similar to Wittgenstein's remarks about the German equivalent *Spiel*. The point to be stressed is this: as a theory about the (radial, clustered, dynamically flexible) structure of polysemy, prototype theory is to a considerable extent a rediscovery of views that were paramount during the prestructuralist era of the development of lexical semantics, and that lingered on below the surface in the structuralist and transformationalist periods.
9. Because of their large scope, the functionalist approach of Seiler (1986) and the naturalist approach of Dressler (1985) are particularly interesting for the use of prototypicality with regard to various aspects of the formal organization of language.

10. A bibliography of work in Cognitive Linguistics is to be found in Dirven (1988). It is worth mentioning that Cognitive Linguistics is currently in a stage of organization: a first international conference of Cognitive Linguistics was held in Duisburg in March 1989, and a new journal entitled *Cognitive Linguistics*, published by Mouton, is scheduled to start appearing in the beginning of 1990.
11. Next to the link with psycholinguistics, there is a connection with Artificial Intelligence research, through the correspondences between the notion of prototypicality and that of frame; see Fillmore (1977). It needs to be stressed, though, that the link is relatively weak; specifically, the correspondence just mentioned is to a certain extent counterbalanced by Lakoff's criticism (1987) of the objectivist assumptions of mainstream Artificial Intelligence research (but then again, one of Lakoff's current research projects involves a connectionist approach to the formal modeling of Cognitive Semantic notions such as metaphorical image schemata). In general, sorting out the relationship between Cognitive Semantics and Artificial Intelligence-oriented Cognitive Science will be one of the major tasks for the further development of Cognitive Semantics.
12. See Lakoff (1987: chapter 6) for the notion of a radial set, and compare Givón (1986) for a comparison between the views of Wittgenstein and those of prototype theory. The stress Givón places on the distinctions between both is slightly exaggerated, as it tends to obscure their mutual rejection of the so-called classical theory. See also the next footnote.
13. The 'so-called' is added to stress, first, that the views of Aristotle also contain features that correspond rather with a cognitive than with a 'classical' approach, and second (more generally), that the philosophical position of prototype theory is in need of further elucidation. The present situation is rather muddled: while the classical Roschian position is to characterize prototype theory as non-Aristotelian and Wittgensteinian, Givón (1986) has argued that prototype theory is non-Wittgensteinian (see the previous note), but whereas Givón also describes prototype theory as non-Platonic, Wierzbicka (to whom we shall come back in section 3) precisely presents an explicitly Platonic version of prototype theory. More generally, the philosophical position of prototype theory has so far been discussed mainly against the background of classical philosophy (Aristotle and Plato), and against the background of contemporary analytical philosophy (see Lakoff 1987). This means that a large part of the history of Western philosophy passes unmentioned; this is to be regretted, as the post-Cartesian period in the history of philosophy is concerned with epistemological questions that are of immediate interest to Cognitive Semantics. In particular, if it can be accepted that one of the major epistemological aspects of a prototypical conception of categorial structure resides in the fact that categories are interpretive schemata that are used flexibly and dynamically in our encounters with reality, a major philosophical reference point for prototype theory will lie with those philosophical theories that recognize the constitutive role of existing knowledge with regard to new experiences. As I have argued elsewhere (1985b), the Husserlian phenomenological movement (as represented, specifically, by Maurice Merleau-Ponty) provides a good starting-point for a further confrontation with philosophy.
14. The archaeopteryx is probably regarded as a species separate from either bird or reptile.

15. The example is taken from the *Longman Dictionary of Contemporary English*.
16. Considered from this point of view, Lakoff's radial sets as such are not particularly unclassical: structured polysemy as such is entirely compatible with the classical view. Kleiber (1988) offers an insightful discussion of the theoretical consequences of the growing importance of the structure of polysemy in prototype-theoretical research.
17. For a more extended discussion of Wierzbicka's views, see Geeraerts (1988d).
18. Notice that the restriction to the prototypical centre of categories correlates with Wierzbicka's Platonic, introspective methodology: it seems probable that the applications of a category that can be accessed introspectively are only the more salient ones; peripheral cases probably do not always pass the threshold of conscious attention. What is interesting from a cognitive point of view, however, is the way people spontaneously categorize and classify things, not the way in which they introspectively reflect upon their own conceptualizations. Any attempt to describe the peripheral instances of a category together with its prototypical centre can therefore not be restricted to an introspective methodology.
19. This is not say that Putnam actually intended his stereotypical theory as such an attempted rescue: his problems lay with the notion of reference rather than with those of polysemy and categorial structure. My remarks about Putnam are an investigation into some of the possible consequences of the notion of division of linguistic labor, not an attempt to give an account of Putnam's view in its original setting. Further, it has to be mentioned that some of Putnam's later philosophical views open up entirely different perspectives for a confrontation with Cognitive Semantics; in particular, see Lakoff (1987) on Putnam and anti-objectivism.
20. An interesting contribution to such an exploration is found in Lakoff (1987: chapter 12), where it is claimed that scientific categories are far from being as classical as is usually assumed.
21. Again, see Lakoff (1987: chapter 9) for some more examples; they are situated within formal psycholexicology rather than within linguistics.
22. Next, that is, to the remarks made in footnote 13.

## References

- Aijmer, Karen  
 1985 The semantic development of *will*. In *Historical Semantics – Historical Word-Formation*, Jacek Fisiak (ed.), 11–21. Berlin/New York: Mouton de Gruyter.
- Armstrong, Sharon L., Lila R. Gleitman, and Henry Gleitman  
 1983 What some concepts might not be. *Cognition* 13: 263–308.
- Bartsch, Renate  
 1985 *Sprachnormen: Theorie und Praxis*. Tübingen: Niemeyer Verlag.
- Berlin, Brent and Paul Kay  
 1969 *Basic Color Terms*. Berkeley: University of California Press.
- Bybee, Joan and Carol L. Moder  
 1983 Morphological classes as natural categories. *Language* 59: 251–270.

Craig, Colette (ed.)

- 1986 *Noun Classes and Categorization*. Amsterdam/Philadelphia: John Benjamins.

Dirven, René

- 1988 *Bibliography of Cognitive Linguistics*. Duisburg: Linguistic Agency of the University of Duisburg.

Dowty, David

- 1979 *Word Meaning and Montague Grammar*. Dordrecht: Reidel.

Dressler, Wolfgang

- 1985 *Morphophonology*. Ann Arbor: Karoma.

Fillmore, Charles J.

- 1975 An alternative to checklist theories of meaning. In *Proceedings of the First Annual Meeting of the Berkeley Linguistics Society*, Cathy Cogen, Henry Thompson, and James Wright (eds.), 123–131. Berkeley: Berkeley Linguistics Society.
- 1977 Scenes–and–frames semantics. In *Linguistic Structures Processing*, Antonio Zampolli (ed.), 55–81. Amsterdam: North Holland Publishing Company.

Geeraerts, Dirk

- 1983 Prototype theory and diachronic semantics: A case study. *Indogermanische Forschungen* 88: 1–32.
- 1985a *Paradigm and Paradox. Explorations into a Paradigmatic Theory of Meaning and its Epistemological Background*. Leuven: Universitaire Pers.
- 1985b Les données stéréotypiques, prototypiques et encyclopédiques dans le dictionnaire. *Cahiers de Lexicologie* 46: 27–43.
- 1985c Cognitive restrictions on the structure of semantic change. In *Historical Semantics - Historical Word Formation*, Jacek Fisiak (ed.), 127–153. Berlin/New York: Mouton de Gruyter.
- 1988a On necessary and sufficient conditions. *Journal of Semantics* 5: 275–291.
- 1988b Katz revisited: aspects of the history of lexical semantics. In *Understanding the Lexicon*, Werner Hülsen and Rainer Schulze (eds.), 23–35. Tübingen: Max Niemeyer Verlag.
- 1988c Cognitive Grammar and the history of lexical semantics. In *Topics in Cognitive Linguistics*, Brygida Rudzka–Ostyn (ed.), 647–677. Amsterdam/Philadelphia: John Benjamins.
- 1988d Review of Anna Wierzbicka, *Lexicography and Conceptual Analysis*. *Language in Society* 17: 449–455.

Givón, Talmy

- 1986 Prototypes: between Plato and Wittgenstein. In *Noun Classes and Categorization*, Colette Craig (ed.), 78–102. Amsterdam/Philadelphia: John Benjamins.

John Haiman

- 1980 Dictionaries and encyclopedias. *Lingua* 50: 329–357.

Heider, Eleanor R.

- 1972 Universals in color naming and memory. *Journal of Experimental Psychology* 93: 10–20.



- Heider, Eleanor R. and Olivier, D.C.  
 1972 The structure of color space in naming and memory for two languages. *Cognitive Psychology* 3: 337–354.
- Holland, Dorothy and Naomi Quinn (eds.)  
 1987 *Cultural Models in Language and Thought*. Cambridge: Cambridge University Press.
- Hüllen, Werner and Rainer Schulze (eds.)  
 1988 *Understanding the Lexicon. Meaning, Sense, and World Knowledge in Lexical Semantics*. Tübingen: Niemeyer.
- Katz, Jerrold J. and Jerry A. Fodor  
 1963 The structure of a semantic theory. *Language* 39, 170–210.
- Kleiber, Georges  
 1988 Prototype, stéréotype: un air de famille? *DRLAV. Revue de Linguistique* 38: 1–61.
- Labov, William  
 1973 The boundaries of words and their meanings. In *New Ways of Analysing Variation in English*, Charles J. Bailey and Roger Shuy (eds.), 340–373. Washington: Georgetown University Press.
- Lakoff, George  
 1982 Categories and cognitive models. Trier: Linguistic Agency of the University of Trier. Also as: *Berkeley Cognitive Science Report* no. 2. Berkeley: Institute for Human Learning.  
 1986 Classifiers as a reflection of mind. In *Noun Classes and Categorization*, Colette Craig (ed.), 13–51. Amsterdam/Philadelphia: John Benjamins.  
 1987 *Women, Fire, and Dangerous Things. What Categories Reveal about the Mind*. Chicago: The University of Chicago Press.
- Langacker Ronald W.  
 1987 *Foundations of Cognitive Grammar I*. Stanford: Stanford University Press.
- Lehmann, Winfred P. (ed.)  
 1988a *Prototypes in Language and Cognition*. Ann Arbor: Karoma.
- Lehmann Winfred P.  
 1988b Review of R. Langacker, Foundations of Cognitive Grammar. *General Linguistics* 28: 122–30.
- Medin, Doug L. and Edward E. Smith  
 1984 Concepts and concept formation. *Annual Review of Psychology* 35: 113–138.
- Mervis, Carolyn B. and Eleanor Rosch  
 1981 Categorization of natural objects. *Annual Review of Psychology* 32: 89–115.
- Nathan, Geoffrey S.  
 1986 Phonemes as mental categories. In *Proceedings of the Twelfth Annual Meeting of the Berkeley Linguistics Society*, Vassiliki Nikiforidou, Mary VanClay, Mary Niepokuj, Deborah Feder (eds.), 212–224. Berkeley: Berkeley Linguistics Society.
- Neisser, Ulrich  
 1987 *Concepts and Conceptual Development. Ecological and Intellectual Factors in Categorization*. Cambridge: Cambridge University Press.

Posner, Michael

- 1986 Empirical studies of prototypes. *Noun classes and categorization*, Colette Craig (ed.), 53–61. Amsterdam/Philadelphia: John Benjamins.

Post, Michael

- 1986 A prototype approach to denominal adjectives. In *Linguistics across Historical and Geographical Boundaries*, Dieter Kastovsky and Aleksander Szwedek (eds.), II: 1003–1013. Berlin/New York: Mouton De Gruyter.

Putnam, Hilary

- 1975 The meaning of Meaning. In *Mind, Language, and Reality. Philosophical Papers II*, Hilary Putnam, 215–271. Cambridge: Cambridge University Press.

Quine, Willard V.O.

- 1960 *Word and Object*. Cambridge, Mass.: MIT Press.

Reichling, Anton

- 1935 *Het Woord*. Zwolle: Tjeenk Willink.

Rosch, Eleanor

- 1973 On the internal structure of perceptual and semantic categories. In *Cognitive Development and the Acquisition of Language*, Timothy E. Moore (ed.), 111–144. New York: Academic Press.
- 1975 Cognitive representations of semantic categories. *Journal of Experimental Psychology: General* 104: 192–233.
- 1977 Human categorization. In *Studies in Cross-cultural Psychology I*, Warren, Neil (ed.), 1–49. New York: Academic Press.
- 1978 Principles of categorization. In *Cognition and Categorization*, Eleanor Rosch and Barbara B. Lloyd (eds.), 27–48. Hillsdale, NJ: Lawrence Erlbaum.
- 1988 Coherences and categorization: A historical view. In *The Development of Language and Language Researchers. Essays in Honor of Roger Brown*, Frank Kessel (ed.), 373–392. Hillsdale, NJ: Lawrence Erlbaum.

Rosch, Eleanor and Carolyn B. Mervis

- 1975 Family resemblances: Studies in the internal structure of categories. *Cognitive Psychology* 7: 573–605.

Rosch, Eleanor, Carolyn B. Mervis, Wayne D. Gray, David Johnson, and Penny Boyes-Braem

- 1976 Basic objects in natural categories. *Cognitive Psychology* 8: 382–439.

Rosch, Eleanor, Carol Simpson, and Scott R. Miller

- 1976 Structural bases of typicality effects. *Journal of Experimental Psychology: Human Perception and Performance* 2: 491–502.

Ross, John R.

- 1987 Islands and syntactic prototypes. In *Papers from the 23rd Annual Meeting of the Chicago Linguistic Society*, Barbara Need, Eric Schiller, and Anna Bosch (eds.), 309–320. Chicago: Chicago Linguistic Society.

Rudzka-Ostyn, Brygida

- 1988 Semantic extensions into the domain of verbal communication. In *Topics in Cognitive Linguistics*, Brygida Rudzka-Ostyn (ed.), 507–553. Amsterdam/Philadelphia: John Benjamins.

Smith, Edward E. and Doug Medin

- 1981 *Categories and Concepts*. Cambridge, MA: Harvard University Press.

Taylor, John

- 1989 *Linguistic Categorization. Prototypes in Linguistic Theory*. Oxford: Clarendon Press.

Tsohatzidis, Savas L. (ed.)

- 1989 *Meanings and Prototypes. Studies on Linguistic Categorization*. London: Routledge and Kegan Paul.

Uhlenbeck, Eugenius M.

- 1967 The dynamic nature of word meaning. *Actes du Xe Congrès International des Linguistes II*, 679–685. Bucarest: Editions de l'Academie.

Van Langendonck, Willy

- 1986 Markedness, prototypes, and language acquisition. *Cahiers de l'Institut de Linguistique de Louvain* 12: 39–76.

Van Oosten, Jeanne

- 1986 The nature of subjects, topics, and agents: a cognitive explanation. Bloomington: Indiana University Linguistics Club.

Waismann, Friedrich

- 1952 Verifiability. In *Logic and Language (First Series)*, Anthony Flew (ed.), 117–144. Oxford: Basil Blackwell.

Weinreich, Uriel

- 1966 Explorations in semantic theory. *Current Trends in Linguistics III*: 395–479.

Wierzbicka, Anna

- 1985 *Lexicography and Conceptual Analysis*. Ann Arbor: Karoma.  
1987 *English Speech Act Verbs: A Semantic Dictionary*. Sydney: Academic Press.

Winters, Margaret

- 1987 Syntactic and semantic space: the development of the French subjunctive. In *Papers from the Seventh International Conference on Historical Linguistics*, Anna G. Ramat, Onofrio Carruba, and Giulano Bernini (eds.), 607–618. Amsterdam/Philadelphia: John Benjamins.

Wittgenstein, Ludwig

- 1953 *Philosophische Untersuchungen. Philosophical Investigations*. Oxford: Basil Blackwell.

Zwicky, Arnold and Jerry Sadock

1975. Ambiguity tests and how to fail them. In *Syntax and Semantics 4*, John Kimball (ed.), 1–36. New York: Academic Press.