

MEANINGS AND PROTOTYPES

Studies in linguistic categorization

Edited by
S. L. Tsohatzidis

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Contents

Introduction by S. L. Tsohatzidis	1
Part One: On the content of prototype categories: questions of word meaning	15
1 A survey of category types in natural language Cecil H. Brown	17
2 Possible verbs and the structure of events William Croft	48
3 Prototypical considerations on modal meanings Steven Cushing	74
4 Belief ascription, metaphor, and intensional identification Afzal Ballim, Yorick Wilks, John Barnden	91
5 Negated beliefs and non-monotonic reasoning Ryszard Zuber	132
6 Lexical hierarchies and Ojibwa noun derivation Richard A. Rhodes	151
7 Some English terms of insult invoking sex organs: evidence of a pragmatic driver for semantics Keith Allan	159
8 The lexicographical treatment of prototypical polysemy Dirk Geeraerts	195

Part Two: On the content of prototype categories: further questions	211
9 Settings, participants, and grammatical relations Ronald W. Langacker	213
10 On the semantics of compounds and genitives in English Paul Kay and Karl Zimmer	239
11 A notional approach to the French verbal adjective Roger McLure and Paul Reed	247
12 Prototypical uses of grammatical resources in the expression of linguistic action René Dirven	267
13 Toward a theory of syntactic prototypes Margaret E. Winters	285
14 Accent in prototypical <i>wh</i> questions Dwight Bolinger	307
15 Prototypical manners of linguistic action Anne-Marie Diller	315
16 Where partonomies and taxonomies meet Barbara Tversky	334
Part Three: On the context of prototype methods: questions of word meaning	345
17 'Prototypes save': on the uses and abuses of the notion of 'prototype' in linguistics and related fields Anna Wierzbicka	347
18 Prototype theory and its implications for lexical analysis Adrienne Lehrer	368
19 Prototype theory and lexical semantics D. A. Cruse	382
20 Representation, prototypes, and centrality Claude Vandeloise	403

21	A few untruths about ‘lie’ S. L. Tsohatzidis	438
	Part Four: On the context of prototype methods: further questions	447
22	On ‘folk’ and ‘scientific’ linguistic beliefs Roy Harris	449
23	Gestures during discourse: the contextual structuring of thought Nancy L. Dray and David McNeill	465
24	Why words have to be vague Roger McLure	488
25	Schemas, prototypes, and models: in search of the unity of the sign John R. Taylor	521
26	Psychologistic semantics, robust vagueness, and the philosophy of language Terence Horgan	535
	Bibliography	558
	Index	582

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Introduction

S. L. Tsohatzidis

There are fewer distinctions in any natural language than there are distinct things in the universe; if, therefore, the languages people speak are ways of representing the universe their speakers live in, it is not unreasonable to suppose that one central function of the various kinds of element constituting a natural language is to allow the much more varied kinds of thing populating the universe to be categorized in specific ways.

A prototype approach to linguistic categories is a particular way of trying to answer the question as to how this categorization proceeds. It involves two central claims. First, that, for the most part, linguistic categorization exploits principles that are not specific to language but characterize most, if not all, processes of cognition. Second, that one of the basic principles according to which cognitive and (under their influence) linguistic categories are organized is the prototype principle – that is to say, a principle whereby elements are assigned to a category not because they exemplify properties that are absolutely required of each one of its members, but because they exhibit to a greater or lesser extent (or are simply *expected* to exhibit to a greater or lesser extent) certain types of similarity with a particular category member that has been (naturally or culturally) established as the *best example* (or prototype) of its kind.

There are two fairly simple reasons why the prototype approach should be of interest to students of language. The first is that there is a significant amount of *prima facie* evidence suggesting that it is correct. The second is that if it is correct, then the view of linguistic categorization promoted by the dominant linguistic and philosophical schools of thought does not seem to be correct, since, on that view, linguistic categories are certainly *not* mere reflexes of general cognitive strategies (if they are cognition dependent at all), and they certainly *are* founded on principles which ensure ‘yes or no’ decisions on most (if not all) questions of category membership.

Now, prototype theory is fairly young by any standards, it is therefore not the case either that all the evidence that its practitioners could

legitimately hope to produce has been produced, or that all the conclusions they have derived from the evidence that they have already produced are the best conclusions one could possibly derive. So, the best way of serving the interest the theory naturally arouses would consist in trying, on the one hand, to enrich its empirical base, and, on the other hand, to clarify its conceptual foundations. These are precisely the areas where this volume intends to make original contributions: the first two parts contain chapters where various linguistic phenomena are analysed in ways that make essential use of the notion of prototypicality or of closely related notions. The last two parts contain chapters where the notion of prototypicality or closely related notions become themselves the object, rather than the instrument, of inquiry, and provide the opportunity for detailed statements of a variety of methodological attitudes towards several aspects of linguistic description.

The division between Part One and Part Two, as well as that between Part Three and Part Four, are much less sharp, and will be made clearer in the course of this introduction. Thematically, these divisions tend to reflect the fact that, within linguistics, the prototype approach was first of all presented as a novel way of dealing with matters of word meaning, and was only later extended to additional levels of linguistic representation. Accordingly, the papers in Part One present some new results of adopting the prototype approach in areas where questions of word meaning figure centrally, if not exclusively, whereas those of Part Two extend the same approach to areas where matters of word meaning arise incidentally, if at all. Similarly, the primarily methodological chapters in Part Three evaluate prototype theory specifically as a theory of word meaning, whereas those of Part Four assess it in ways that are both more indirect and more liberal as to what they take its potential range of application to be.

In what follows I will try to sketch some of the connections between the twenty-six chapters, trusting that the reader will not, at this stage, object to the amount of oversimplification that such an attempt may involve.

Part One

Most of the best known results on prototypically organized word meanings have been obtained, indirectly, from psychological studies of categorization of various kinds of concrete objects. Although the choice of such objects was probably necessary given the psychologists' experimental concerns, they are evidently not sufficient for supporting general statements on the nature of word meaning. For one thing, one might wish to know to what extent can prototype categories be relied upon even in the analysis of terms with ostensibly 'concrete' referents. For another thing – and most importantly – one might wish to know whether

prototypes show any promise of being involved in the analysis of terms whose referential targets are certainly not 'concrete' in the above sense. The first chapter of Part One offers a comprehensive answer to the former question, while the next four provide important elements of an answer to the latter.

In 'A survey of category types in natural language', Cecil H. Brown proposes to show that the development of names for concrete objects in natural languages follows eight routes, which correspond to the logically possible combinations of positive or negative valuations that a set of objects may receive with respect to three properties: artificiality of its members, configurational clues ensuring the identification of its members, and prototypicality of some of its members relative to others. The least that this proposal entails, then, is that the absence of prototypicality is just as much structurally important as its presence when a systematic description of concrete object categorization through language is sought. Brown, however, is interested in much more than the merely taxonomic significance of the three properties. He advances and defends various hypotheses as to why some of their logically possible combinations are more frequently instantiated in natural languages than others, why some of them are more likely to be superseded in the course of linguistic evolution than others, and why some of them are characteristically unstable in a way that others are not. As one might expect, each one of these hypotheses throws new light on questions regarding the nature of prototype categories. In this sense, the picture that emerges from Brown's survey is one in which such categories are perhaps less extensively involved in the development of concrete object naming than has been supposed, but where it is much clearer how and why they are involved, when they are.

One might think that, in moving away from names for concrete objects, one is diminishing one's chances for convincingly arguing that linguistically encoded meanings are, in any literal sense, organized prototypically. This, however, might well be a mistake. After all, saying that a concrete object is the 'best example' of its kind is an elliptical way of saying that humans tend (or, in some cases, decide) to regard it as the best example: in a world without perceiving minds, no object could possibly be a better, or a worse, example of anything than any other. If this is so, then it may also be that humans tend to conceptualize even the most abstract of ideas in ways that force them to regard some of their instances as best examples of their kinds, and to evaluate the rest on the basis of how well they resemble – or can be expected to resemble – the prototypical instances. Each of the next four chapters of Part One interprets this possibility as creating constraints on semantic representation, and the range of linguistic phenomena that they purport to be able to elucidate by thus interpreting it is quite remarkable.

In 'Possible verbs and the structure of events', William Croft argues that the familiar semantic trichotomy between inherently causative, inchoative, and stative verbs fails to account for the fact that every verb can systematically manifest each one of the supposed 'senses'. He then proposes that the non-rigid nature of the trichotomy should be viewed as a reflection of three types of perspectivization that are possible within a *single* cognitive model for events, which represents them as consisting of a cause, a process, and a state, and thereby prohibits the total exclusion of any one of these elements to the benefit of the others. He shows finally that this cognitive prototype is responsible for two types of interesting typological facts. First, that events conforming to it are given grammatical expression that is uniform across languages, whereas those that do not tend to be encoded idiosyncratically by each one of them. And second, that a verb whose intrinsic semantic value in a given language makes it especially suitable for the expression of a causative or of a stative event-view is morphosyntactically unmarked with regard to the expression of that view, whereas it becomes the domain of various marking processes when it expresses event-views that are less congruent with its intrinsic semantic value.

In 'Prototypical considerations on modal meanings', Steven Cushing argues that necessity and possibility modals in a natural language (in either their 'descriptive' or their 'prescriptive' readings) are in fact understood (and should be represented) as making an implicit appeal to prototypes of a higher order, in particular, to what speakers of that language understand as best theories of the (physical or moral) world. He then sets out to make the formal structure of that appeal explicit, and he thus arrives at a system of definitions that are significantly different from those obtainable from standard logical treatments of the modalities. He finally shows that these definitions make possible an orderly explanation of a variety of phenomena that were poorly understood or virtually unnoticed (for example, the difference between strong and weak modals of both the descriptive and the prescriptive varieties, the existence of non-accidental gaps in modal vocabularies, and the peculiarities of scope ambiguities in modal contexts).

In 'Belief ascription, metaphor, and intensional identification', Afzal Ballim, Yorick Wilks, and John Barnden describe an intelligent system which, in successfully ascribing beliefs to agents, uses an algorithm that treats the system's beliefs as prototypical – in other words, that takes the agents' beliefs to be identical with the system's own, unless there is evidence to the contrary. They then show that since, in successfully interpreting metaphors, the system can make use of precisely the same algorithm (which then amalgamates properties of the metaphor's 'vehicle' with those of the metaphor's 'tenor' unless there is evidence to the contrary), it could be plausibly maintained that metaphor interpretation

relies on the same fundamental process that is responsible for the ascription of beliefs and other propositional attitudes. They argue finally that belief ascription itself should in its turn be viewed as a phenomenon that is essentially metaphorical in nature (in the sense that it involves the treatment of an agent's mental states as a field for the metaphorical projection of other agents' mental states), and they conclude that, thus construed, the metaphoricity of belief casts serious doubt on some fundamental assumptions of formal semantic approaches to the analysis of propositional attitudes.

In 'Negated beliefs and non-monotonic reasoning', Ryszard Zuber examines the special behaviour that a wide variety of families of predicates (for example, factive, opaque, and emotive ones) are known to manifest with regard to negation, and seeks, on the one hand, a unified treatment of these peculiarities, and, on the other, an explanation of their existence. The former task he accomplishes by defining a notion of intensional negation that is noticeably different from those inherited from standard logical systems, and by characterizing each type of predicate in its terms. Concerning the latter task, he suggests that the explanation must be sought in the fact that, in their prototypical uses, all these predicates are associated with subjects denoting human beings, and that their special behaviour in negative contexts is a reflection of an implicit assumption to the effect that, because of what a prototypical human being is, certain forms of reasoning on its subject may be taken to be locally valid, although they are not of general validity.

What the above four contributions jointly suggest, then, is that, far from being relevant only to the analysis of processes of concrete object naming, prototype considerations are instrumental in characterizing far more abstract semantic domains, and that, in doing so, they provide original answers to questions that any of the currently available semantic theories would recognize as central (and that few of them could claim to have answered satisfactorily). The last three chapters in Part One deal with questions that are less central from the point of view just indicated (essentially because orthodox semantic theories do not seem particularly interested in systematically raising them) but are just as interesting in their own right. In 'Lexical hierarchies and Ojibwa noun derivation', Richard A. Rhodes shows how the idea that the senses of a morpheme may be organized in a way that is analogous to (and, at certain points, directly reflects) the categorization of physical entities around cognitive prototypes leads to a uniform account of the apparently unpredictable semantic contributions of a derivational suffix in an Algonquian language. In 'Some English terms of insult involving sex organs', Keith Allan shows how some seemingly inexplicable constraints governing the interpretation of non-literal uses of certain vocabulary items can be satisfactorily explained when the use of such items is viewed as a

manifestation of conventionalized beliefs related to the prototypical referents of their literal counterparts. Finally, in 'The lexicographical treatment of prototypical polysemy', Dirk Geeraerts argues that if their ability to make sense of lexicographical practice is one condition of adequacy for semantic theories, then prototype views of word meaning meet that condition better than their classical alternatives, since it is the prototype rather than the classical view that can be shown to motivate the solutions to problems of complex categorization implicit in traditional lexicography.

Part Two

The idea that grammatical constructions, *qua* grammatical constructions, carry a kind of meaning that is irreducible to the sum of the meanings of their constituents is not controversial. What has been, and still is, the subject of controversy is whether all the grammatically important properties of a construction can be ultimately explicated in semantic terms. While many influential grammatical theories have decided to proceed on the assumption that it is unlikely that this will turn out to be possible, the more ambitious project of trying to show that it may, after all, be possible has never failed to attract devotees. Prototype theory is currently giving new impetus to this project, for reasons that shouldn't be difficult to understand: if one can legitimately claim that some instantiations of a grammatical category are *better* instantiations than others, then one is implicitly claiming, first, that grammatical categories have a cognitively salient semantic basis (since it is only by reference to a basis of this sort that the relative representativity of their members could be realistically assessed) and second, that the claim that they have a semantic basis does not entail that they impose necessary and sufficient conditions for membership (and are therefore not open to some simplistic kinds of counterexample that have been raised against proposals for semantically based grammars in the past). Although neither of the above claims can be taken as conclusively established in all relevant respects, they seem to be well supported by much ongoing research, some aspects of which are represented in the first five chapters of Part Two of the volume.

In 'Settings, participants, and grammatical relations', Ronald W. Langacker outlines a grammatical theory where only cognitively motivated categories are recognized, and sets out to examine how basic grammatical relations could be best represented in its terms. He claims that such relations can be successfully accounted for by reference to a cognitive model representing the normal observation of a prototypical human action, and incorporating a fundamental distinction between the setting and the participants of an action scene. The subject- and object-

properties of constituents of various sentence types are then explicated as resulting from operations whose effect is to selectively accord linguistic representation to the various elements mentally instantiating the model, to vary the relative prominence with which the selected elements are encoded, and to respect or to reverse, in the course of the representation, the notional priorities implicit in the model underlying it.

In 'On the semantics of compounds and genitives in English', Paul Kay and Karl Zimmer note that genitive and nominal compound constructions in English are not always interchangeable, in spite of their fundamental structural similarity. They suggest that these differences should be semantically accounted for by associating the two constructions to prototype schemata which differ only in that the one representing genitives stipulates that their modifier nouns be individual terms, while the one representing compounds stipulates that their modifier nouns be class terms. They then show that observed deviations from these patterns are precisely the ones that one would expect, if the patterns were indeed prototypical: some proper nouns can exceptionally act as modifiers in compound constructions, but they are then interpreted as class terms; and some common nouns can exceptionally act as modifiers in genitive constructions, but they are common nouns with special conceptual ties with entities denoted by individual terms.

In 'A notional approach to the French verbal adjective', Roger McLure and Paul Reed show how a construction whose description seems to have been a consistent source of grammatical frustration – adjectival modification of nouns by present participles in French – can be satisfactorily analysed when it is viewed as a solution to the semantic problem of ascribing to an entity characteristic properties that cannot be regarded either as merely contingent or as strictly necessary. After eliminating a variety of possible alternative explanations of their distributional properties, they claim that it is precisely this intermediate conceptual region that French verbal adjectives prototypically grammaticalize, and they explain the different types of semantic effect that their permissible combinations with nouns may produce as different ways in which this prototypical meaning can, given a context, be exploited.

In 'Prototypical uses of grammatical resources in the expression of linguistic action', René Dirven draws attention to the striking variety of innovative syntactic frames within which a basic English speech activity verb may be used, and argues that these syntactic novelties have a conceptual basis (the same basis, in fact, that, in a morphologically richer language like German, would tend to activate equally diverse derivational processes): they are, he suggests, symbolic means for highlighting particular aspects of the folk model in terms of which the speech event denoted by the verb is understood – and, to this extent, they provide a basis for claiming that metaphorization is a phenomenon that is

manifestable not only on the lexical but also on the syntactic level.

Finally, in 'Towards a theory of syntactic prototypes', Margaret E. Winters identifies six features that could plausibly be regarded as jointly conferring prototypicality on grammatical constructions, argues that these features may themselves be organized prototypically (in the sense that some of them may be more prominent signals of conceptual centrality than others), and suggests that their relative prominence in any given language may itself be a function of diachronic pressures.

Varied as they obviously are, the applications of prototype notions to the analysis of lexical and grammatical meaning do not exhaust the range of linguistic phenomena in the description of which such notions might be fruitfully employed, any more than the use of the notion of prototype in psychological studies of concrete object categorization exhausts the range of psychological phenomena that could be analysed interestingly in its terms. Part Two of the volume concludes with three chapters, of which the first two exemplify realizations of such further possibilities in linguistics, and the last one in psychology. In 'Accent in prototypical *wh* questions', Dwight Bolinger argues that there are good reasons for claiming that one among the various stress patterns followed by *wh* interrogatives constitutes a prototype in terms of which the function of the others is understood, in much the same way in which instances of a conceptual category are said to constitute prototypes by reference to which the category status of less characteristic instances is determined. In 'Prototypical manners of linguistic action', Anne-Marie Diller argues that certain formal properties distinguishing performative from non-performative occurrences of speech act verbs can only be accounted by reference to conventionalized beliefs regarding the mental dispositions of prototypical performers of the speech acts that these verbs denote. Finally, in 'Where partonomies and taxonomies meet', Barbara Tversky reviews some recent psychological evidence which suggests that, just as categories are perceived as being organized around prototypical members, so individual category members are perceived as consisting of prototypical parts, and argues that this latter phenomenon opens an area of investigation that is not only interesting in itself, but adds a new dimension along which the analysis of the former could be further refined.

Part Three

The undeniable heuristic value of the notion of prototypicality should not obscure the fact that its exact theoretical shape is less clear than one might have wished, especially when it is transferred from purely psychological to specifically linguistic domains of investigation. Since the first domain that has been affected by such a transfer is the domain of

lexical semantics, and since lexical semantics is a research area that is sustained by important theoretical traditions, one would expect lexical semanticists to be less than unreservedly prepared to embrace the new idiom and all its apparent consequences. The first three chapters of Part Three of the volume confirm this expectation, and they thus delineate one dimension along which more clarity could be systematically sought. Starting from independent considerations, these papers can be viewed as arguing for three main conclusions: that the range of semantic phenomena to which the notion of prototype could in principle be applied is more restricted than one tends to believe; that its successful application even in this properly delimited area cannot, at present, be taken to be unproblematic; and that even if it should turn out to be unproblematic it would not have the subversive effects that it is supposed to have on orthodox conceptions of word meaning.

In ‘“Prototypes save”: on the uses and abuses of the notion of prototype in linguistics and related fields’, Anna Wierzbicka argues that many descriptions of word meanings that are directly inspired from prototype theory constitute in fact manifestations of either conceptual confusion or inadequate attention to linguistic facts. She then claims that reference to prototype representations is indeed necessary for the analysis of certain types of word meaning, but that it can be satisfactorily incorporated into standard forms of semantic description, without forcing them to abandon their claims to definitional adequacy. She concludes that the belief that such an incorporation could not be successfully implemented is an illusion, probably deriving from the mistaken assumption that definitionally adequate semantic descriptions should be entirely cast in non-mentalistic vocabulary.

In ‘Prototype theory and its implications for lexical analysis’, Adrienne Lehrer notes that there are aspects of word meaning which do seem to vindicate prototype theory, but which are neither unknown to nor inexplicable within fairly traditional theoretical frameworks. Turning then to certain hypotheses about word meaning which seem to follow specifically from prototype theory, she argues that, in some cases, they are, despite their interest, insufficiently precise to be tested, and, in some other cases, falsified by the relevant facts. She concludes by recommending that the semantic relevance of prototypes should not be taken to follow automatically from their psychological plausibility, and that the search for a specifically linguistic motivation of their occasional involvement in semantically sensitive areas would be well worth undertaking.

In ‘Prototype theory and lexical semantics’, D. A. Cruse draws attention to some important respects in which both the purely cognitive and the specifically linguistic interpretation of prototypicality is in need of serious reconsideration. Concerning the cognitive interpretation of the notion, he suggests that, among other things, it illegitimately conflates at

least three different respects in which a category member may be exemplary, it risks confusing two different conceptions of the opposition between gradable and non-gradable category membership, it underestimates the extent to which category boundaries may be sharp, and it overestimates the extent to which merely typical and properly prototypical category features can be strictly separated. Concerning the linguistic interpretation of the notion, he argues that, apart from inheriting most of the problems connected with the cognitive one, it pays insufficient attention to the fact that, alongside semantic properties that could plausibly be thought of as relating to prototypical conceptual representations, there are important classes of semantic properties for which no such relation could be postulated, since, despite appearances, these properties are radically word-specific (in the sense that they are properties of the words themselves and not of the concepts – prototypical or otherwise – that words may mediate).

The last two chapters of Part Three choose to concentrate not on general problems that a prototype approach to lexical semantics does or may have to face, but on some no less serious problems arising from specific analytical proposals that have been taken to be representative instances of the prototype approach at its best. In ‘Representation, prototypes and centrality’, Claude Vandeloise claims that a well-known analysis of the preposition *over* within a broadly prototype framework is in fact a good example of how some intuitively plausible notions may lead to wildly implausible theoretical conjectures when they are employed in a methodologically undisciplined way. And in ‘A few untruths about “lie”’, I suggest that an equally well known analysis of the verb *lie*, in terms of a set of prototype features that are allegedly essential for characterizing both cases of clear applicability or inapplicability and cases of intermediate applicability of this term, rests in fact on highly questionable assumptions both with regard to what the clear cases are and with regard to what the proper explanation of the apparently intermediate cases should be.

Part Four

If the use of the notion of prototype in linguistics is indeed, as many of its advocates seem to believe, one among many signs of a paradigmatic shift that is currently under way in the study of language, then it may well be that attempts to emphasize the real or apparent shortcomings of prototype theory *vis-à-vis* more standard approaches to aspects of linguistic description miss (or, at least, misconstrue) the real issue. It would be much more appropriate, from that point of view, to emphasize instead the similarities between the prototype approach and certain other recent approaches which are just as sceptical as prototype theory has

become about standard views as to what a proper linguistic description should be; and, given this background of similarity, it would then be interesting to examine whether these approaches could be mutually reinforced in pursuing their partially overlapping goals. The five chapters of Part Four reflect very divergent research interests, but they are united in their refusal to take for granted some basic assumptions of linguistic analysis, as it is standardly practised; in doing so, they are led to implicitly or explicitly raise questions that have been at the centre of prototype research since its introduction in linguistics; and they thus offer some new perspectives within which the answers to those questions could be profitably sought.

In 'On "folk" and "scientific" linguistic beliefs', Roy Harris attacks a central thesis of modern linguistics which would seem to underlie a familiar kind of objection to prototype theory. The objection is, roughly, that, by taking speakers' untutored beliefs about the universe (including their linguistic universe) as a phenomenon that linguists not only should not disregard but should rather take as the basic force behind linguistic categorization, prototype theory encourages its practitioners to abandon the neutral stance that they should at all costs maintain towards their assigned objects of study. And the assumption behind the objection is, presumably, that there is a reliable basis for drawing a sharp distinction between 'folk' and 'scientific' linguistic beliefs, and for systematically preferring the latter when they appear to be in conflict with the former. Through a series of important arguments, however, Harris shows that the correctness, and, indeed, the coherence, of that assumption is highly questionable, and concludes that it is only by fully acknowledging (and by appropriately exploiting) its lay foundations that the study of language could adequately proceed. To the extent that prototype theory is one step in that direction, it would seem, then, to be reasonably strong in an area where it might have been thought to be particularly vulnerable.

In 'Gestures during discourse: the contextual structuring of thought', Nancy L. Dray and David McNeill outline a decidedly naturalistic approach to linguistic description which seems to have significant additions to suggest to prototype accounts of linguistic categories. The distinctive feature of that approach (which is exemplified by some insightful analyses of gestural activity during discourse) is its claim that the value of linguistic elements should be viewed as a result not only of conventionally determined but also of contextually arising oppositions. And the systematic study of these latter could help, according to Dray and McNeill, not only to explain some linguistic choices that seem to lie outside the predictive power of prototype theory, but also to simplify the accounts of certain other choices that prototype theorists have already given.

In 'Why words have to be vague', Roger McLure proposes a

reinterpretation of some prototype phenomena in the context of hermeneutic phenomenology, and claims that this reinterpretation makes possible a deeper understanding of these phenomena, in two ways. First, by permitting their dissociation from certain unselfconsciously solipsistic philosophical views in terms of which they have been understood. Second, by providing a framework within which the essential instability of linguistic categorization that these phenomena highlight can be seen as a presupposition of, rather than as an obstacle to, the possibility of linguistic communication. Once the full implications of this reinterpretation are drawn, McLure suggests, prototype theory will be recognized as constituting a challenge to accepted modes of linguistic theorizing that is far more serious than has been supposed, even by its supporters.

In 'Schemas, prototypes, and models: in search of the unity of the sign', John R. Taylor examines the relation between prototype accounts of linguistic categorization and certain recent alternative accounts where schematic representations far more abstract than those sanctioned by prototype theory are claimed to make possible a more comprehensive account of linguistic facts, while at the same time doing justice to their cognitive basis. He suggests that, as far as their descriptive capabilities are concerned, the schematic and the prototypical view of categorization cannot be regarded as real alternatives, since all the basic results obtainable through the one could, in more or less complex ways, be translated into the idiom of the other. He argues, however, that, from the point of view of their overall plausibility, it is the prototype rather than the schematic view that is to be preferred, since the prototype idiom accommodates more naturally a greater number of types of linguistic category than the schematic idiom does.

Finally, in 'Psychologicistic semantics, robust vagueness, and the philosophy of language', Terence Horgan draws attention to some important wider implications that past research on prototype categorization might have, as well as to some more refined ways in which it could itself be conducted in the future. He first outlines certain basic limitations of both the realist and the anti-realist conceptions of meaning in contemporary philosophy of language, and argues that these limitations can be transcended within a theory of meaning where the notion of cognitive prototype would play a central role. He then notes that the psychological modelling of that notion thus far has not been entirely satisfactory, essentially because it proceeded through minor emendations to classically inspired models of categorization, which are inherently ill-adapted to the representation of vagueness (and, hence, of an important aspect of prototypicality). He finally argues that there are good reasons for expecting that the radical departure from classical conceptions of categorization that is characteristic of the emergent connectionist paradigm in cognitive science will provide the means of constructing

models of prototypicality that will be not only philosophically suggestive, but also psychologically adequate.

I hope that the preceding remarks have sufficiently clarified the organizing principle of this volume, namely, to provide a view of prototype research that is appropriately balanced, first by maintaining proper proportions between analytical proposals and critical reflections, and second by making room for a significant degree of variation both in the choice of analytical objects and in the choice of critical targets. I also hope that, having been sufficiently aroused by these preliminaries, the reader will now wish to be in personal contact with the arguments of the individual chapters. What remains for me to do is to express my gratitude to those who, apart from the contributors, have made this volume possible. Henrietta Mondri and John Taylor played an important role in its inception. Jonathan Price took an even more significant part in the process leading to its completion. And Clelia Kachrilas was my unfailing source of support from beginning to end. To all of them, my sincere thanks.

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On the content of prototype categories: questions of word meaning

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A survey of category types in natural language

Cecil H. Brown

The treatment of two or more distinguishable entities as if they were the same creates a category (cf. Mervis and Rosch 1981: 89). People create categories by assigning the same name or label to different things. When speakers of a language are in general agreement with respect to the different entities to which a single term applies, the pertinent category is a component of natural language. This chapter surveys types of category lexically encoded in natural language. Specifically, it focuses on categories whose membership is restricted to concrete objects such as plants, animals, toys, weapons, and tools, as opposed to abstract things such as war, love, religion, poetry, knowledge, and lies.

The present work attempts to show that categories of natural language can be profitably analysed by relating them to a system of category types defined in terms of three factors. These are (1) artifactual versus non-artifactual reference (+ AR vs. - AR); (2) Gestalt versus non-Gestalt motivation (+ GM vs. - GM); and (3) prototype/extension versus non-prototype/extension (+ P/E vs. - P/E). For example, as explained in detail presently, categories such as *screwdriver*, *cup*, *pen*, *chair*, *rope*, *button*, and *train* all belong to a single type of natural language category since all are plus for artifactual reference (+ AR), plus for Gestalt motivation (+ GM), and plus for prototype/extension (+ P/E). On the other hand, categories such as *raccoon*, *robin*, *black walnut tree*, and *dandelion* belong to a different category type since all are minus for artifactual reference (- AR), plus for Gestalt motivation (+ GM), and minus for prototype/extension (- P/E). There are, then, eight category types defined by all logically possible combinations of variables of these factors:

Category Type 1: - AR + GM - P/E

Category Type 2: - AR + GM + P/E

Category Type 3: - AR - GM - P/E

Category Type 4: - AR - GM + P/E

Category Type 5: + AR + GM - P/E

Category Type 6: + AR + GM + P/E

Category Type 7: + AR – GM – P/E

Category Type 8: + AR – GM + P/E

Artifactual reference

Concrete objects grouped in categories of natural language are either manufactured by humans (artifacts) or are natural kinds (non-artifacts) such as plants, animals, body parts, clouds, mountains, and rocks. A possible absolute universal of language is that artifacts and natural kinds are *never* included in the same category (putting aside ‘categories’ generated by metaphorical equations such as dipstick = penis). Thus, there is a clear distinction between categories which involve reference to artifacts (+ AR) and those that entail reference to non-artifacts (– AR).

Gestalt motivation

Concrete objects rarely are morphologically continuous, i.e., typically there is no continuum of objects grading from one to another with respect to similarity. Rather, there is usually a great deal of distinctiveness, making for obvious breaks or gaps among things. Hunn (1977) calls such gaps, when they apply to biological entities (non-artifacts), ‘discontinuities in nature’. Clearly, discontinuities perceived by humans are not restricted to natural kinds. Cups, mugs, and glasses are no more or no less discontinuities than are maples, oaks, and walnuts.

Hunn (1977: 41–75) focuses on psychological processes through which discontinuities are translated into natural language categories. He notes that discontinuities in nature are underlain by feature or attribute clustering. Bruner, Goodnow, and Austin (1956: 47) illustrate this by citing the example of birds in general, creatures possessing feathers, wings, a bill or beak, and characteristic legs. Any one of the latter features is highly predictive of the others. For example, if a creature possesses feathers, it will invariably also have wings, a bill or beak, and characteristic legs. Thus attributes of the discontinuity ‘birds in general’ cluster together, or in other words are highly correlated with one another.

Hunn, following Bruner *et al.* (1956: 47), proposes that the mutual predictability of clustering features can lead to an expectancy in the minds of humans that attributes involved will be found together. For example, through exposure to different kinds of bird, people build up in their minds an expectation that feathers, wings, and so on, go together. Such an expectation underlies the conceptual development of the configurational or Gestalt property of ‘birdness’. When such a property develops, inclusion of any particular object in a labelled bird category is contingent upon whether or not the object demonstrates the single feature ‘birdness’. As a result, clustering features pertaining to the bird discontinuity become psychologically subordinated to the single Gestalt property.

A Gestalt property arises through the *recoding* of features or attributes (Hunn 1977: 46). The concept of recoding, borrowed from information theory, involves the notions of 'chunks' and 'bits' of information. Data organized by a restricted number of immediate or simultaneous judgements constitute chunks (Miller 1967). The amount of information which each chunk contains is described as a number of bits of information. Recoding essentially consists in taking a great number of chunks, each of which contain but a few bits, and reorganizing them into fewer chunks with more bits per chunk. Miller (1967: 24) gives the following example:

A man just beginning to learn radio-telegraphic code hears each dit and dah as a separate chunk. Soon he is able to organize these sounds into letters and then he can deal with the letters as chunks. Then the letters organize themselves as words, which are still larger chunks, and he begins to hear whole phrases . . . I am simply pointing to the obvious fact that the dits and dahs are organized by learning into patterns and that as these larger chunks emerge the amount of message that the operator can remember increases correspondingly. In the terms I am proposing to use, the operator learns to increase the bits per chunk.

Bruner, Goodnow, and Austin (1956: 46) illustrate the recoding of attributes into a single Gestalt property by using the following biological example (cf. Hunn 1977: 47):

The student being introduced for the first time to microscopic techniques in a course in histology is told to look for the *corpus luteum* in a cross-sectional slide of rabbit ovary. He is told with respect to its defining attributes that it is yellowish, roundish, of a certain size relative to the field of the microscope, etc. He finds it. Next time he looks, he is still 'scanning the attributes'. But as he becomes accustomed to the procedure and to the kind of cellular structure involved, the *corpus luteum* begins to take on something classically referred to as a *Gestalt* or configurational quality. Phenomenologically, it seems that he no longer has to go through the slow business of checking size, shape, colour, texture, etc. Indeed, 'corpus luteumness' appears to become a property or attribute in its own right.

Hunn (1977) restricts his discussion to the development of Gestalt properties relating to biological categories. However, it is clear that attribute recoding and resulting Gestalten are not limited to natural kinds. For example, as discussed in the above quotation of Miller, letters of radio-telegraphic code are recoded into words. Each word, then, constitutes a single Gestalt property. Words expressed in radio-telegraphic code are, of course, human artifacts. Such words differ from artifacts such as cups, mugs, and glasses, since they are not concrete objects. If words expressed in code can possess Gestalt properties, it seems clear that so

can concrete objects manufactured by humans, so long as these objects fall into discrete discontinuities (a point discussed at length presently).

An important assumption of the present discussion is that Gestalt properties typically motivate categories which relate to discontinuities. This is not to propose that such categories are always motivated by Gestalt properties. As noted in the above quotation, a student learning to identify the *corpus luteum* in a rabbit ovary may begin to do so by 'scanning the attributes', so at first the category is defined in terms of several features rather than in terms of a single configurational property. However, objects pertaining to most categories of natural language relating to discontinuities, especially *folk* categories known to all or nearly all speakers of a language (as opposed to specialist categories such as *corpus luteum*) ordinarily do not require close scrutiny (for pertinent attributes) for the purpose of class inclusion. In addition, I do not mean to imply that for any one category relating to a discontinuity, a Gestalt property *alone* motivates the category (another point to be discussed at length presently).

Not all categories in natural language relate to discontinuities. This is particularly clear when abstractions such as lies (falsehoods) are considered. There are, of course, no perceptual things that belong to the category called *lie* and, consequently, no perceptual discontinuity with which it is connected. Lies, then, do not have in common a certain Gestalt property, rather they relate to what Lakoff (1987: 113) calls a 'propositional model': 'Propositional models specify elements, their properties, and the relations holding among them.' Coleman and Kay (1981: 28), for example, have proposed a propositional model relating to the category *lie* involving a speaker (S) who asserts some proposition (P) to an addressee (A):

- (a) P is false.
- (b) S believes P to be false.
- (c) In uttering P, S intends to deceive A.

Thus, a lie is characterized by the properties (a) falsehood, which is (b) intentional, and (c) meant to deceive. None of these properties, of course, is a perceptual property of a thing.

Some categories of natural language encompass concrete objects but, none the less, are not underlain by discontinuities. Rather, they are motivated solely by propositional models. This is true of categories such as *toy* and *weapon*. For example, membership of the class *toy* belongs to a highly heterogeneous group of objects (artifacts) such as dolls, rattles, spinning tops, jump ropes, and toy soldiers, none of which bear much perceptual similarity to one another. Toys, then, do not relate to a single perceptual discontinuity and, consequently, are not underlain by a single Gestalt property which could be called 'toyness'. Mere observation of a

sample of different objects called *toy* cannot lead to a conception of 'toyness' in the way that observation of a sample of birds can lead to a conception of 'birdness'. This is so because toys have little in common other than that they are used by people to play with. Consequently, the category *toy* is defined solely in terms of a propositional model in which 'object to play with' is a necessary element. (Lakoff [1987: 51] would identify the latter attribute as an 'interactional property'. 'Interactional' refers to relationships between humans and things, e.g., 'a chair is a thing to be sat upon by humans', or 'a knife is used by humans for cutting'.)

To propose that some categories are motivated by Gestalt properties is not to suggest that propositional models do not pertain to them as well. For example, while the category *squirrel* is typically Gestalt motivated, a propositional model also pertains to it which takes account of facts such as squirrels (a) 'store things to eat'; (b) 'are light and quick in their movements'; (c) 'are afraid of people and run away from them'; (d) 'people think of them as nice and a little amusing' (Wierzbicka 1985a: 165–6). Also included in such a propositional model are properties that reflect perceptual attributes of squirrels: (e) 'they have a big bushy tail'; (f) 'they have pointed ears'; (g) 'they are furry' (ibid.); and (h) 'they are brown in colour'. It is assumed in the present discussion that propositional models pertain to *all* categories of natural language.

In summary, some categories of natural language are underlain by Gestalt properties (+ GM) and some categories are not (– GM). Those which are not are defined solely in terms of propositional models.

Prototype/extension

Kronenfeld (1988; with Armstrong and Wilmoth 1985) proposes a general theory of semantics of word meaning centred on the concepts of category prototype (cf. Anglin 1977; Berlin and Kay 1969; Carey 1982; Fillmore 1978; Kay and McDaniel 1978; Kempton 1978, 1981; Rosch 1975d, 1977; Rosch and Mervis 1975) and category extension (influenced strongly by Lounsbury 1964a, 1964b and 1965). A prototype is the best exemplar of a category or, in other words, is most representative of things included in a class (e.g., the reddest red or the most cup-like cup). The prototype, then, is the core of a category which is 'surrounded by' other members that are not as representative of that class (Dromi 1987: 52).

Kronenfeld proposes that a category typically develops its membership by expanding or extending its boundary from a prototype to entities (non-prototypes) which are not identical to the prototype but which are perceived as relating to it in some manner (e.g., through perceptual similarity). Thus, for example, it is possible that penguins and ostriches are included in the category *bird* because they are similar in appearance to prototypic birds, i.e., probably robins for many speakers of American

English: penguins and ostriches, like robins, have feathers, wings, and a beak, but they differ from robins since they do not fly. A 'bird' category may be further extended from the prototype through inclusion of bats, although such an inclusion would not be based primarily on perceptual similarity but rather on behavioural similarity: robins fly and so do bats, but bats do not have feathers and a beak (or, for that matter, birdlike wings).

The essential tenet of Kronenfeld's theory is that prototypes are *a priori* to their corresponding non-prototypes. While the evidence Kronenfeld musters to support this contention is impressive, one cannot at present say that his theory has been proved. However, I am convinced of its validity mainly because my own recent research in ethnobiological classification (Brown 1984, 1985b, 1986, 1987a) reveals patterns that fit Kronenfeld's scheme. Some of these are discussed presently.

Kronenfeld's theory basically addresses the question of category development. 'Category development' in this paper is understood in three ways. First, development may be taken to refer to how a category has arisen in a particular language. Second, it may be taken to refer to how a category is acquired by children learning language or by people learning a second language. Third, it may be taken to refer to processes leading to the inclusion in a category of newly encountered potential exemplars.

In terms of Kronenfeld's theory, a category develops in a language by expanding its boundaries from a prototype to related non-prototypic exemplars. Thus, a word which in the past was referentially restricted to a prototype acquires a more comprehensive referential application. With respect to child language acquisition or second language learning, Kronenfeld's theory implies that learners will first apply a category label only to its generally recognized prototype and only later to non-prototypic members. With respect to deciding if a newly encountered thing is to be included in a category, Kronenfeld's theory implies that an inclusive decision will be based on a comparison of a new thing to a generally recognized prototype. If it relates in some way to a prototype (e.g., is perceptually similar to a prototype), it may be included; if not, it will not be included.

Category extension from a prototype to non-prototypes can involve relationships motivated by: (1) similarity; (2) metaphor; or (3) metonymy (Brown 1979; Lakoff 1987: 113–14). With respect to similarity, non-prototypes may be related to a prototype (a) if they are perceptually similar to a prototype or (b) if their propositional models specify some property or properties which are also possessed by a prototype. Thus, for example, assuming the robin to be a prototypic *bird*, a penguin may be included in the class *bird* by right of being perceptually similar to a robin (robins and penguins share feathers, wings, etc.), cf. (a) above. With respect to property specifications of propositional models, bats may

be included in the category *bird* based on the acknowledgement that bats, like robins, 'fly and eat insects' (in addition, typical bats are relatively similar in size to robins).

A relationship based on metaphor also entails some similarity between things, but similarity of a minimal kind. For example, the word *bird* is used in British slang to refer to a young, pretty woman. It is possible that this metaphorical usage is based on some perceived or propositionally specified similarity between attractive young ladies and a prototypic bird. Whatever this similarity may be, it is not obvious, at least to this author. Metonymy involves contiguity associations such as part to whole. Thus, for example, the English word *tube* labels a (prototypic?) part of a television set, which has become expanded in reference to the whole appliance (at least in slang).

In the following discussion I focus only on associations based on perceptual and propositional similarity to the exclusion of those based on metaphor and metonymy. One reason for this is that I do not believe that unions of referents through metaphor and metonymy represent instances where united referents belong psychologically to the same category. For example, intuitively it does not seem appropriate to regard robins and attractive young women as members of a single class despite the fact that they are both called *bird*. Similarly, the union of a picture tube and the appliance of which it is a part does not constitute a category for me. In these cases use of a single term to denote two different things creates *polysemy*, not a category. Metaphor and metonymy, then, really relate to another area of linguistic enquiry which is, by the way, vast in its dimensions (cf. Lakoff 1987; Lakoff and Johnson 1980; Witkowski and Brown 1983, 1985; Witkowski, Brown, and Chase 1981; Brown 1979, 1983, 1985a, 1987a, b, 1989; Brown and Witkowski 1981, 1983). Thus, in this essay, the word *category* is restricted in use to labelled groupings of referents which are related only through perceptual and propositionally specified similarity.

Nowhere in his outline of prototype/extension theory does Kronenfeld discuss the essential nature of a prototype. Is a prototype simply a single exemplar? If a robin is the prototype of bird, do particular examples of robin constitute that prototype for different people? I think not. Rather, prototypes are themselves categories. Thus, to say that a robin is a prototypic bird is to propose that a class of similar creatures called *robin* is a prototype of bird.

Categories which constitute prototypes, like all categories, relate to propositional models and, in specific instances, may also relate to Gestalt properties. Above, in passing, I assume that a propositional model ordinarily specifies only the properties of a prototype of the class to which it relates rather than attributes of all possible members of the category. In making this assumption, I am following Wierzbicka (1985a). Thus, the

propositional model outlined for squirrel above lists those properties of squirrels that pertain to a prototypic squirrel. Most of the listed attributes also happen to pertain to squirrels in general, for example, squirrels 'store things to eat' and 'have a big bushy tail'. One of them, i.e., squirrels 'are brown in colour', does not pertain to squirrels in general, but rather only to my thoughts concerning the colour of a prototypic squirrel. Throughout this chapter, propositional models are to be understood as specifying properties of prototypes of categories rather than attributes of categories (although in some instances, such as *robin*, properties of prototypes and properties of categories turn out to be exactly the same).

Categories which serve as prototypes, then, are always underlain by propositional models which specify attributes of prototypes of those categories. In addition, categories which constitute prototypes, in some cases, may also be underlain by Gestalt properties. Thus, the prototypic bird, i.e., robin, relates to the Gestalt property of 'robinness' in addition to a propositional model which specifies the properties of a prototypic robin. An important implication of these observations is that prototypes themselves may have prototypes. An example of this is cited presently. Robin, however, is not such an example since the attributes of robin and the attributes specified in a propositional model relating to robin are the same.

While it is possible, it is highly unlikely that any significant portion of English-speaking people recognize a variety of robin among all birds called *robin* that they consider most robin-like. Little introspection is required to convince oneself that there is no prototypic robin and that this must be true for the vast majority of English-speaking people (specialists in ornithology possibly excepted). This is to suggest, then, that some labelled categories, such as *robin* and *raccoon* and others mentioned below, do not have prototypes at all, and, consequently, probably have not developed through prototype/extension.

In summary, some categories of natural language involve prototypes and extensions from prototypes resulting in inclusion of non-prototypes (+ P/E), and some categories do not have prototypes and probably have not developed through extension from prototypes (– P/E).

The survey

Category Type 1: – AR + GM – P/E

Above I propose that the category *robin* does not have a prototype and probably did not develop through prototype/extension. Consequently, it is assigned to a category type of natural language having the feature – P/E. In addition, *robin* is a biological category and, hence, shows the

feature – AR (non-artifactual). Finally, since *robin* relates to an unambiguous discontinuity in nature, it is almost certainly motivated by a Gestalt quality, i.e., ‘robinness’, and, hence, shows + GM. The features – AR, + GM and – P/E define a Type 1 category to which *raccoon*, *black walnut tree*, and *dandelion*, as well as many other categories of living things, in addition to *robin*, belong.

The reason why categories such as *robin*, *raccoon*, *black walnut tree*, and *dandelion* lack prototypes is threefold. First, exemplars of these categories in nature are very homogeneous. This point is underscored by the fact that these folk biological categories, with the exception of *dandelion*, bear a one-to-one relationship to scientific species for which biotaxonomists recognize no varieties. Since varieties of robin (the North American version, *Turdus migratorius*), raccoon, and black walnut are not identified by scientists, it should not be surprising to learn that ordinary folk do not recognize them either and, consequently, do not have a basis for distinguishing respective prototypes.

Second, relative lack of human interest in exemplars of such categories combines with class homogeneity to produce prototypeless groupings. For instance, even if scientific varieties of robins exist, humans may pay these creatures so little attention that varietal or other distinctions are not noticed. Consider *dandelion*. Most speakers of American English would be temporarily lost for words in response to the question ‘What is the most dandelion-like dandelion you can think of?’ An eventual response typically given might be ‘All dandelions are alike, silly!’ In fact, all things called *dandelion* by ordinary speakers of American English are not the same scientifically, since three species, one having two varieties, are recognized (at least in north-eastern and north-central North America, cf. Peterson and McKenny 1968: 170). That there is no prototypic dandelion for most people is linked to the fact that they do not distinguish differences among dandelions mainly because they have little positive interest in them and, consequently, pay them precious little attention.

Third, and, perhaps, most important is that these categories lack prototypes in part because prototypes have not been and are not now necessary to their development (as category development has been defined above). For example, dandelions are so similar to one another (homogeneous) that experiencing just a few exemplars should rather rapidly lead to the recoding of their attributes into the Gestalt property ‘dandelionness’. This configurational quality, rather than a prototype, would underlie the diachronic development of the category in languages, the acquisition of the category by children and second language learners, and the decision of individuals to include in the class or exclude from the class potential exemplars.

When the membership of a category is especially homogeneous and people pay it little attention, prototypes are rarely, if ever, involved in category

development since a Gestalt property can, if you please, 'handle it all'. On the other hand, when a category which relates to a distinct discontinuity is *not* particularly homogeneous and/or is paid considerable attention by humans, both a prototype and a Gestalt property may be involved in category development.

A good example of the latter is the category *dog*. Dogs, of course, constitute a distinct discontinuity in nature and the Gestalt property 'dogness' is readily apparent. However, unlike the category *robin*, *dog* shows considerable heterogeneity since ordinary people recognize many varieties of *Canis familiares*, many of which have folk names, for example, *poodle*, *beagle*, *German shepherd*, *chihuahua*, and so on. It is also clear that humans are especially interested in dogs and this helps to explain why so many varieties are recognized (and, of course, have been bred).

Most mature people have little difficulty in identifying newly encountered examples of dog as being *dog* because 'dogness' is a clearcut Gestalt property. However, reliance on the presence or absence of 'dogness' in a potential exemplar alone will not always lead to correct identification since wolves also manifest 'dogness' (Wierzbicka 1985a: 173). People, of course, can easily distinguish dogs from wolves, but this distinction must involve more than the pertinent Gestalt property. A propositional model that specifies that a prototypic dog interacts with people in a certain way while wolves do not is also needed (Wierzbicka 1985a: 173). Nevertheless, I would argue that prototypes rarely, if ever, are involved in the process of mature people deciding whether or not a newly encountered potential exemplar of dog is in fact a dog.

On the other hand, given the heterogeneity of dogs and their considerable interest for people, it would not be surprising to discover that a prototypic dog has figured into the diachronic development of dog categories in many different languages and/or that a prototypic dog more than occasionally facilitates acquisition of dog categories by children learning language. Unlike robin, people do recognize varieties of dog, any one of which can serve as a dog prototype. In the case of children learning language, it is plausible that they sometimes first encounter the word *dog* used in connection with only one or maybe two varieties. These varieties could then constitute prototypes defined in a propositional model for extending the category to other varieties encountered. The assumption underlying this observation is that a well-formed or complete Gestalt property of 'dogness' will not emerge until a sufficient number of varieties of dog have been encountered. (I do not know what 'sufficient' may actually entail in this example.) Consequently, until that concept emerges, use of a prototypic dog could constitute an effective, if not necessary, strategy for deciding what are and what are not dogs.

A similar strategy may have occasionally related to the development of

labelled dog categories in different languages. For example, a name for a certain variety of dog (prototype) may be referentially extended to one or two other similar varieties encountered. This may result in the modification of the propositional model associated with the prototype such that it comes to relate to all varieties concerned (and, in effect, all of the latter constitute prototypic dogs). If so, and the term is further extended to still other varieties of dog, the propositional model associated with prototypes may be further modified. This may help to facilitate the emergence of a Gestalt property of 'dogness' that perfectly mirrors a real world dog discontinuity. At such a developmental point identification of dogs through reference to prototypes is no longer necessary since reference to a Gestalt property of 'dogness' is now possible. Presumably, a prototype strategy would be given up in lieu of a Gestalt strategy since, as Garner (1970: 357) notes, processing 'information as wholistic or gestalt stimuli rather than as separate elements is an efficient thing' to do.

If the English category *dog* developed through prototype/extension, it is clear that a prototype strategy used in deciding whether or not potential exemplars are dogs has been replaced by a Gestalt strategy. For me, the prototypic dog is a collie. However, when I identify creatures as dogs, I do not think of collies, I simply identify them (and I am correct almost 100 per cent of the time). My dog prototype, while it exists, has nothing to do with category extension. It is also possible that the category *dog* did not develop historically through prototype/extension and that children may not refer to a prototypic dog or dogs when learning the category. Thus, it is possible that the feature – P/E pertains to the English class *dog* and, hence, that it belongs to the same category type as *robin*, *black walnut*, and *raccoon*. However, there are biological categories similar to *dog*, in that they relate to discontinuities, have heterogeneous membership, and are of interest to people, whose development has unambiguously involved prototype/extension.

Category Type 2: – AR + GM + P/E

If it should be determined that prototype/extension has pertained and/or does pertain to the development of English *dog*, then it would constitute a Type 2 category of natural language having the features – AR, + GM, and + P/E. While the status of *dog* is unclear at present, there is much linguistic evidence from many different languages that similar biological categories have developed through prototype/extension and, consequently, belong to Category Type 2. This evidence is in the form of *polysemy*.

Berlin (1972) cites several examples of polysemy involving biological classes wherein a word for a folk generic category, such as English *oak*, *begonia*, *trout*, and *deer*, is also used more restrictively to refer to a

specific member of that category, for example, use of a word for oak in reference to a white oak. Such a nomenclatural relationship is called *generic/type-specific polysemy* (Brown 1986). One example mentioned by Berlin comes from Navajo. The Navajo word *kat* denotes junipers in general. Three folk species of juniper are lexically encoded, one of which, the common juniper, is also labelled by the term *kat*. (Labels for the two other species are binomials consisting of the term for the generic class in which they are included plus a modifier, for example, *kat-nee-ay-li* 'strained juniper'.) When a generic category and a specific category are labelled by the same term such as in this example, the specific category is identified as a 'type-specific' (Berlin 1972). Berlin also points out that the type-specific is invariably the most important or salient of the folk species involved.

I have assembled a considerable body of evidence (Brown 1986) strongly indicating that instances of generic/type-specific polysemy *always* develop through expansion of reference, wherein a term for a folk species, for example, *kat* 'common juniper', is extended in referential use to the more comprehensive category to which its referent belongs, for example, 'junipers in general'. I would now argue further that such examples are the nomenclatural by-products of category development entailing prototype/extension. Plausibly, such a development proceeds in the following manner (using the Navajo juniper example):

Stage 1 Through exposure to examples of common juniper a Gestalt property of 'common juniperness' develops. (This may be facilitated by a general recognition that the common juniper has some particularly useful attribute. If so, the latter utilitarian property becomes specified in a propositional model relating to common juniper.)

Stage 2 Exemplars demonstrating the property 'common juniperness' come to be called *kat* and a labelled category is created. This also entails development of a propositional model relating to common juniper. (It is possible that Stages 1 and 2 are simultaneous events.)

Stage 3 Other less important species of juniper are recognized as being perceptually similar (and, possibly, propositionally similar as well) to the common juniper. In terms of this recognition, the word *kat* is extended to other juniper species, but also continues to be used more restrictively in reference to common juniper (the prototype).

Stage 4 The wider application of *kat* leads to the development of the Gestalt property 'juniperness' with which the term becomes associated while also maintaining its original association with the property 'common juniperness'. With this development, a second propositional model which relates to junipers in general emerges.

If generic/type-specific polysemy is truly indicative of prototype/extension, then there are abundant examples of Type 2 categories. Some of

these examples involve categories that are considerably more heterogeneous than Navajo *kat* or English *dog*. Specifically, I refer to so-called 'life-form categories' (cf. Berlin, Breedlove, and Raven 1973; Brown 1984; Atran 1985) of which English *bird*, *fish*, *tree*, and *plant* (i.e., a category limited to small herbaceous plants) are good examples. Polysemy indicative of prototype/extension relating to life-form categories is more appropriately called life-form/type-generic polysemy.

A well-explored example of life-form/type-generic polysemy involves the life-form 'bird' as lexically encoded in Shoshoni (Hage and Miller 1976). Shoshoni's term for bird, *kwinaa*, also denotes a generic category (type-generic) that includes the Golden Eagle as its focus (prototype) and a number of different hawks. The term is actually three-ways polysemous since it is also used to refer to big birds in general, a category that contrasts semantically with a labelled small bird category. Hage and Miller (1976: 482) write that the 'bird' category is 'indirectly derived from' the generic class focused on the Golden Eagle. Presumably, *kwinaa* was restricted in reference in the past to the generic category, eventually expanding in reference to 'big birds in general', and finally expanding to encompass 'birds in general'.

The three-way polysemy of *kwinaa* attests to details of the developmental process by which the Shoshoni life-form 'bird' was derived through prototype/extension. First, *kwinaa* was applied to birds showing the Gestalt quality of 'hawk/eagleness'. This category then served as a prototype in terms of which the label was extended to other large birds in the Shoshoni habitat. This extension helped to facilitate the emergence of a Gestalt property of 'big birdness'. A category labelled by *kwinaa* based on the latter configurational property then served as a prototype for a category extended to birds in general, this probably facilitating the emergence of the Gestalt property 'birdness'. A particularly interesting aspect of this example is that the term *kwinaa* through prototype/extension has become associated with *three* different, but hierarchically and contiguously related Gestalt properties, these being 'hawk/eagleness', 'big birdness', and 'birdness'. This is the promised example wherein a prototype, i.e., 'big bird' which is the prototypic 'bird', has a prototype, i.e., 'hawk/eagle'.

Berlin (1972) calls attention to another example of life-form/type-generic polysemy first reported by Trager (1939) involving the category 'tree'. Trager notes that a number of different Amerindian languages of the US Southwest use a single term to refer to both the cottonwood tree specifically and to trees in general. As in other examples cited above, such a polysemous relationship has developed through expansion of meaning, in this case involving referential expansion of a term originally restricted in reference to the cottonwood tree. Thus, in these examples, the cottonwood tree has served as a prototype in terms of which 'tree'

life-form categories have developed.

In discussing Navajo *kat*, I propose above that development of a 'juniper in general' category through use of a 'common juniper' class as a prototype probably helped to consolidate a Gestalt property of 'juniper-ness'. It might be similarly proposed that use of a 'cottonwood' category as a prototype in the development 'tree' has led to the consolidation of a configurational property of 'treeness'. A problem with such a proposal, however, is that no discontinuity exists in nature corresponding to 'tree' and, apparently, there is no natural basis for the development of the Gestalt property 'treeness'. As Hunn (1987: 148) notes, 'plants vary continuously in terms of size, woodiness, and multiplicity of stems with no discontinuity between 'tree', 'shrub', and 'herb' . . . ' Thus, it is possible that a Gestalt property of 'treeness' cannot emerge because there is no discontinuity in nature to motivate it.

Hunn (1987: 148) refers to my cross-language study of folk botanical life-forms (Brown 1977) to underscore the point that despite the lack of association of 'tree' with a discontinuity in nature, the category is none the less perceptually fetching. I have determined that 'tree' is virtually always the first botanical life-form to be lexically encoded by languages (see also Brown 1984). As Hunn notes (1987: 148), this implies that 'tree' is the most salient botanical life-form class 'and thus in a sense, the most "natural" '. He concludes, 'Perhaps we should recognize an intermediate category of concepts that lack [sic] the configurational integrity enhanced by natural discontinuities characteristic of folk generics but that are [sic] nevertheless perceptually compelling. "Tree" is such a concept.' He writes further:

The configurational integrity of 'tree' is not due to phylogenetic relatedness but to evolutionary convergence in response to common adaptive challenges constrained by laws of form. Just as dolphins strongly (if superficially) resemble fish and bats birds (and animal life forms frequently include both), so also do trees of divergent phylogenetic lines exhibit a perceptually compelling, repetitive pattern. Add the fact that woody plants produce wood, a useful substance in all cultures, and it is not hard to understand why folk biologists nearly everywhere are motivated to give trees nomenclatural recognition.

While Hunn's arguments are cogent and reasonable, the fact remains that there is no 'tree' discontinuity in nature. Yet, even so, people behave as if there were a 'tree' Gestalt. For example, most children can draw a reasonable representation of a tree (that, in fact, is no particular kind of tree) with little hesitation or difficulty. The present paradox disappears when it is realized that Gestalt properties are not always associated with discontinuities in nature. Rather, they are sometimes associated with what I call 'deductive discontinuities'.

A deductive discontinuity exists when a segment of a continuity (e.g., trees blending into shrubs blending into small herbaceous plants constitutes a continuity) is made the focus of human attention and when exemplars of that segment share certain attributes among themselves that they do not share, or only partially share, with other items relating to other segments of the continuity. The shared attributes of exemplars of the pertinent segment can be recoded such that a configurational property emerges. Deductive discontinuities contrast with 'inductive discontinuities'. The latter are natural breaks or gaps found in the habitats of people, i.e., those discontinuities which underlie categories such as 'robin', 'black walnut', and 'bird'. On the other hand, deductive discontinuities are gaps *imposed* on things in the world by people (cf. Hunn's [1977] discussion of deductive versus inductive categorization). 'Tree' is an excellent example of a deductive discontinuity. (A good case can be made that basic colour categories [Berlin and Kay 1969] are additional examples of deductive discontinuities. Another possible example is Shoshoni 'big bird' discussed above.)

As Hunn notes in the above quote, an important attribute of trees for people everywhere is the wood they produce. Clearly, for most people this attribute is specified in a propositional model relating to 'tree'. Such a propositional model for prototypic trees has been worked out in detail by Wierzbicka (1985a: 182-3). A few specifications of this model (paraphrased by me) include: (a) trees produce wood which can be used as fuel; (b) trees produce wood which can be used to make things; (c) trees provide shade for people which is pleasant when it is hot; and (d) trees produce substances (nuts, fruits, or seeds) that can be eaten by either people or other creatures.

Wierzbicka's propositional model also includes specifications in addition to those concerning the utilitarian value of trees for people. For example, there are properties relating to size: (e) trees are taller than people; properties relating to appearance: (f) trees have trunks; properties relating to growth: (g) trees grow for a long time, no less than several years; and so on. I would argue, as does Wierzbicka (1985a), that specifications of propositional models are not equally weighted, that some are more important to humans than others. Specifically, I would argue that, at least when 'tree' categories are consolidating in languages, utilitarian properties of prototypic trees are by far more significant than specifications entailing size, appearance, growth, and so on.

Those botanical entities in nature that produce wood which can be used as fuel or in construction, and *also* provide shade for creatures the size of people, and *also* produce substances which can be eaten by people and/or other creatures, tend strongly to include an array of things that happen to share certain perceptual properties: trunks, bark, leaves or needles, branches, large size (bigger than people), and so on. These

particular things constitute a segment of a botanical continuity which people focus on because all things associated with that segment have *all* the utilitarian properties listed above (plus others listed presently). This segment is singled out for special attention when a name or label is assigned to all those botanical things having all of the noted utilitarian properties. It just so happens that most botanical things so named also share a number of perceptual properties. As a consequence, naming produces or, better, imposes a discontinuity on the world which, in fact, is not naturally there. This, of course, is a deductive discontinuity. The deductive discontinuity relating to 'tree', then, underlies the consolidation of a Gestalt property of 'treeness'.

Once the Gestalt property of 'treeness' emerges, it can form the basis for extending the boundaries of 'tree' to non-prototypic exemplars. For example, English speakers refer to palms as *trees* despite the fact that palms do not produce wood. On the other hand, palms do resemble true trees since they have a trunk, branches, leaves, and are bigger than people. It is also probably the case that 'treeness', at least for some human groups, becomes more important than the utilitarian attributes of trees which originally motivated the category. Most speakers of American English, for example, probably do not think about the usefulness of wood when they identify a botanical object as being a *tree*, rather, they simply attend to whether or not the Gestalt property of 'treeness' pertains to the object. This is probably due to the fact that most people in American society are not regularly involved in 'wood manipulation activities' such as gathering wood for firewood, felling trees for lumber, processing timber, carpentry, and so on. On the other hand, in societies in which most people participate in such activities, the utilitarian aspects of trees may be psychologically more salient than the Gestalt property of 'treeness'.

The priority of utilitarian aspects of trees in the development of 'tree' categories is strongly attested by the widespread occurrence of wood/tree polysemy in languages. Witkowski, Brown, and Chase (1981) have assembled evidence from a very large sample of languages which indicates that roughly two-thirds of the world's languages use a single term to refer to both 'wood' and 'tree'. They also present evidence strongly suggesting that wood/tree polysemy always arises through referential expansion of a word for 'wood' to the life-form category 'tree', and never *vice versa*. Thus, most languages have developed 'tree' categories by extending a term for an especially useful product of trees to trees in general. This finding also suggests that conceptually wood has typically been more important than the phylogenetically unrelated group of botanical organisms that produce it.

Category Type 3: – AR – GM – P/E

Some biological categories, similar to 'tree', are not underlain by (inductive) discontinuities in nature, but, unlike 'tree', are also not associated with deductive discontinuities. Hence, development of such categories has not entailed Gestalt properties. English examples of these classes, which show the features – AR and – GM, include *vegetable*, *weed*, *pet*, and *mutt*. In addition, there is little empirical evidence that development of these categories has involved prototype/extension, so that – P/E is postulated for them. (However, this postulation is reconsidered below in the discussion of Type 7 and 8 categories.) The three features shared by these classes, – AR, – GM, and – P/E, define Category Type 3 of natural language. Type 3 classes have been recognized by ethnobiologists who call them 'special purpose' categories (Berlin *et al.* 1966; Brown 1984: 10; Bulmer 1970: 1084–7; Hays 1982, 1983; Hunn 1982). Special purpose biological categories are distinguished from 'general purpose' categories which are underlain by discontinuities (Category Types 1 and 2).

The counterparts of Type 3 categories in the realm of artifactual classification are categories such as *toy* and *weapon*. As noted earlier, mere observation of a sample of different things called *toy* cannot lead to a conception of 'toyness' since toys are highly heterogeneous and have little in common perceptually. Similarly, encountering exemplars of vegetables cannot result in a conception of 'vegetableness' since things called *vegetable* have little in common perceptually, for example, carrots, peas, spinach, Brussels sprouts, corn, and so on. Above, it is noted that the definition of *toy* relates to an interactional property specified in a propositional model, i.e., that a toy is 'an object to play with'. Similarly, the definition of *vegetable* relates to a propositional model specifying (in part) that vegetables are 'grown by people', are 'good for people to eat', and are 'not eaten with sweet things' (cf. Wierzbicka 1985a: 301). Similarly, things called *pet* have little in common other than the specification in a propositional model that they are 'creatures kept by humans for amusement and/or companionship', and things called *weed* have little in common other than the specification that these are 'things that grow in places that people do not want them to grow'.

The category *mutt* traditionally has not been regarded as a special purpose class, but, rather, as a 'residual category' (Hays 1974; Hunn 1977: 57–8). Mutts are all those dogs that do not fit into named varieties of dogs such as *German shepherd*, *poodle*, *pit bull*, and so on. Other than the fact that all mutts are dogs, they show no perceptual commonalities, for example, such as do all beagles. Rather, things called *mutt* are categorically united in terms of the specification that mutts are 'dogs that do not have varietal names'.

Above I note that there is little empirical evidence that development of *vegetable*, *weed*, *pet*, *mutt*, and similar categories has ever involved prototype/extension. Clearly, there are prototypic vegetables, weeds, and pets. For me these are respectively carrots and peas, dandelions, and dogs, but I cannot recall ever consulting such prototypes for the purpose of judging whether or not potential exemplars are in fact respectively vegetables, weeds, or pets. On the other hand, for example, I may very well have enquired whether or not a certain cultivated plant was ordinarily eaten by people in deciding whether or not it were a vegetable.

Mutt for me is different from *vegetable*, *weed*, and *pet* since I cannot imagine what a prototypic mutt might be, and I doubt that many speakers of English familiar with the category can readily do so either.

As noted earlier, a propositional model associated with a category specifies properties of prototypes of that category rather than attributes pertaining to all of its members. Thus, since the dandelion is for me a prototypic weed, my propositional model relating to the latter specifies that a prototypic weed (a) grows in places that people don't want it to grow; (b) has a yellow flower; (c) has broad, jagged-lobed leaves; (d) has fluffy globular white seedballs, etc. I, of course, could refer to these features of prototypic weed when deciding whether or not to extend the term *weed* to some potential exemplar, for example, to the polk milkweed (*Asclepias exaltata*). As it happens, the latter plant has little in common with the dandelion other than that it sometimes grows where it shouldn't and, consequently, is bothersome to people. Nevertheless, I could extend *weed* to it on the basis that it shows at least one feature of my prototype, i.e., item (a) above, as defined in my propositional model.

As Wierzbicka (1985a) makes very clear, propositional models are analytically important only to the extent that their specifications are widely agreed upon. If propositional models are not widely shared by people who speak the same language, they have nothing whatsoever to do with *natural language*. Since my propositional model relating to *weed* is almost certainly not widely held (surely many different people recognize many different prototypic weeds), it has very little to do with prototype/extension as this relates to natural language. On the other hand, one element of my weed model is widely shared, i.e., the attribute that a prototypic weed grows where it shouldn't. Thus, there is a propositional model relating to *weed* that is widely held, but it does not relate to perceptual properties of individual plants that individual people may regard as being prototypic weeds. And this model is indeed pertinent to natural language. Thus, the expression 'propositional model' is to be understood here, unless otherwise specified, as used only in reference to those models widely shared within a language community. In addition, prototype/extension is viewed to be in evidence only when it involves prototypes defined in widely held propositional models.

To use Hunn's (1977) terminology, Type 3 categories are deductive. Similar to the category 'tree', they *impose* groupings on things that are not mirrored by perceptual structures in the real world, for example, by inductive discontinuities. They differ from 'tree' in that such imposed groupings do not unite things that happen to share several perceptual features. The reason they do not relates to the fact that propositional models which pertain to them are, relatively speaking, impoverished: these models specify very few properties for prototypes.

For example, prototypic vegetables are merely 'grown by people', are 'good for people to eat', and are 'not eaten with sweet things'. A huge array of diverse plants fit the 'vegetable' bill. In comparison, the propositional model pertaining to prototypic 'tree' is relatively rich in specified attributes; just to mention only some of the interactional properties: prototypic trees (1) produce wood which can be used (by people) as fuel; (2) produce wood which can be used (by people) to make things; (3) provide shade for people; (4) produce edible substances; (5) provide people some protection against the wind; (6) provide structures for people to hang large things on (e.g., hammocks, washlines, swings); (7) produce bark for making things (paper, cloth, rope), and so on. As the number of properties pertaining to prototypes is increased, the range of things that satisfy those criteria atrophies and those things involved become more and more perceptually similar. Consequently, that a relatively large number of properties pertain to prototypic 'tree', means that a relatively small number of reasonably similar things, i.e., different kinds of tree, will be recognized as being prototypic trees. Conversely, that relatively small numbers of properties pertain to propositional models associated with *vegetable*, *pet*, and *weed*, means that a relatively large number of considerably different things will be included in these deductive categories.

Category Type 4: - AR - GM + P/E

It is possible that prototype/extension has pertained to the development of one or more of the English categories *vegetable*, *weed*, *pet*, and *mutt*. If so, one or more of these classes belong to Type 4 categories of natural language defined by the features - AR, - GM, and + P/E. I have encountered very few examples of deductive categories, i.e., those classes defined by - AR and - GM, for which hard evidence attests to development through prototype/extension. Those few examples known to me involve the zoological life-form categories *wug* and *mammal* (Brown 1984). (*Wug* is a portmanteau [*worm* + *bug*]. American English uses *bug* and *insect* in reference to 'wug'. The common word for 'mammal' in American English is *animal*.)

'Wug' and 'mammal', which I have shown to be lexically encoded in

many unrelated languages (Brown 1984), are similar to *mutt* since they are residual categories. Cross-language evidence attests to the fact that languages typically encode zoological life-form categories in a certain order, first by developing categories corresponding to the natural discontinuities 'bird', 'fish', and 'snake'. After these three major zoological discontinuities are encoded as life-form classes, there remains a large and varied group of creatures none of which unambiguously fit into any life-form classes based on discontinuities in nature. These left over or 'residual' creatures often include mammals, lizards, frogs, turtles, snails, worms, and bugs to mention just the more obvious ones. Life-form encoding beyond 'bird', 'fish', and 'snake' regularly involves lexical recognition of large subgroupings of these creatures. These life-form categories are clearly not based on discontinuities in nature since the organisms so grouped are extraordinarily perceptually diverse. As a consequence, languages regularly resort to a common classificatory strategy that need not involve inductive discontinuities, that is, use of binary opposition based on the salient dimension size. Thus, the lexical encoding of 'wug' and 'mammal' creates the contrast 'small residual creature'/'large residual creature'.

A classic example of the 'wug'/'mammal' contrast is described by Evans-Pritchard (1963) for the Azande. He reports the following extensions for Azande 'mammal' (*anya*) and 'wug' (*agbiro*), respectively: 'Reptiles, except the snakes, tend to be described as *anya* . . . if they are large and as *agbiro* . . . if they are small' (1963: 139). Thus Azande *anya* encompasses such creatures as iguanas in addition to mammals. Evans-Pritchard also notes that Azande *agbiro* encompasses toads and tortoises in addition to bugs and small non-snake reptiles.

Examples of polysemy indicating reference expansion attest to the probability that prototype/extension has pertained to the development of 'wug' and 'mammal' in some languages. For example (Brown 1984: 72), the Marquesan word for 'wug' is *i?o* which happens to be a reflex of the Proto-Polynesian word for maggot (**iLo*). This indicates that Marquesan (or a language directly ancestral to Marquesan) expanded its 'maggot' term to the residual life-form class 'wug'. Other Polynesian languages have derived 'wug' classes in similar ways by using specific small residual creatures as a 'wug' prototype such as lice (Rennellese), sandflies or midges (Tikopian), fleas (Easter Island), and moths (Maori).

Several languages surveyed by me (Brown 1984: 72) have developed 'mammal' categories through expansion of reference of words originally designating meat. For example, 8 languages of 144 surveyed for zoological classification have 'mammal' terms that also mean 'meat' or refer more restrictively to the special purpose category 'game animal', or, in other words, to mammals sought for their flesh. Thus, in some instances, 'game animal' has served as a prototype around which

'mammal' categories have been constructed. In addition, the polysemous relationship of 'meat' and 'mammal' in some of these languages also suggests the prototypic status of 'game animal' within the category 'mammal', since 'meat' and 'game animal' are designated by the same term in many languages.

Type 3 and 4 categories of natural language have in common the fact that they are deductive. In addition, these two types of category share the attribute of encompassing sets of highly heterogeneous biological things, so that Gestalt properties do not pertain to them. What potential exemplars may or may not be included in them depends *solely* on the propositional model with which they are associated. It is, then, somewhat surprising to discover that an example of these categories, specifically 'wug', has apparently developed through use of prototypes which relate to Gestalt properties, for example, maggots, lice, flies, etc., since use of such prototypes would seem to be insufficient for category development.

For example, comparison of the *perceptual* attributes of a potential exemplar of *vegetable* with those of a prototypic vegetable, for example, a carrot, alone cannot supply me with enough information for correctly including the potential exemplar in *vegetable*. I must, of course, determine whether or not the potential exemplar, like the carrot, is eaten. However, in order to make this determination, I do *not* have to refer mentally or in any other way to a carrot. I merely need enquire whether or not the potential exemplar is eaten. The Gestalt-based prototype alone in this instance (the carrot) simply cannot do the job (and, in addition, as implied in an above argument, would not relate to natural language). On the other hand, the associated propositional model which prompted me to ask about the potential exemplar's edibility is clearly necessary.

So why, then, have some Type 4 categories used Gestalt-based prototypes in class extension? A plausible explanation is that the only apparent example of a Type 4 class extended from a Gestalt-based prototype so far determined, i.e., 'wug', is a special case and, perhaps, is actually only one of a very few examples of such categories that occur in natural language.

The propositional model pertaining to prototypic 'wug' specifies at least the following critical attributes: 'a "wug" is a small creature' and 'is neither a bird, fish, nor snake'. The prototype of the Marquesan 'wug' category, i.e., the maggot, is small and is neither a bird, fish, nor snake. Smallness, of course, is a perceptual property. In addition, that a maggot is a creature that is neither a bird, fish, nor snake is *also* a perceptual property – a property that can be determined simply by looking at a maggot (assuming, of course, that the perceiver knows what birds, fish, and snakes are). Consequently, a well-formed 'wug' category could develop simply by comparing potential exemplars to a Gestalt-based

prototype, be it a maggot, fly, mite, or what have you. Those exemplars which resemble such a prototype by similarly *not* possessing the distinctive features of birds, fish, and snakes will be included, and those that do not will not be included.

Finally, it should be noted that examples of polysemy attesting to development of 'mammal' categories through prototype/extension, unlike those pertaining to 'wug', do not suggest that 'mammal' classes have been developed in terms of a Gestalt-related prototype, since the prototype indicated, i.e., 'game animal', does not relate to a discontinuity in nature. Consequently, it is unlikely that a Gestalt property of 'game animalness' could develop. The prototype 'game animal', then, is specified in propositional models relating to 'mammal' categories.

Category Type 5: + AR + GM – P/E

To my knowledge, no one before now has developed in significant detail an argument to the effect that some artifactual categories of natural language relate to discontinuities and, hence, have been motivated by Gestalt properties. That such a proposal has not been forthcoming is understandable in part since the utilitarian motivation of artifactual categories is so obvious. Thus, as observed earlier, a toy is a toy not because it has certain perceptual characteristics, but rather because it has a certain use, i.e., a toy is a thing that people, primarily children, play with. Similarly, pennies, dimes, nickels, and quarters (US coins) are not important to most people because they are small, flat, round objects which are made out of metal, with images, words, and numbers engraved on both sides, but rather because they can be used to purchase things.

On the other hand, since US pennies, for example, like robins, are so perceptually homogeneous (and, also, so ubiquitous), they clearly constitute a US penny discontinuity. Undoubtedly, continual exposure to exemplars of this discontinuity results in the consolidation of a Gestalt property of 'US pennyness' to which people normally refer when deciding whether or not a thing is a penny. Clearly, then, configurational qualities pertain to some artifactual categories.

The category *US penny* is similar to *robin* in another way: just as there are no prototypic robins, for most people there are no prototypic pennies. This is so for the same three reasons outlined above which explain lack of a prototypic robin. First, exemplars of US pennies are exceptionally homogeneous; second, most people are not particularly interested in them and, hence, do not notice differences among them that might constitute a basis for the development of a prototypic penny; and third, the category *US penny* lacks a prototype in part because it is not necessary to category development: a thing is a penny because it demonstrates the Gestalt property of 'US pennyness', not because it

compares favourably to a thing that is exceptionally a penny.

The category *US penny*, then, shows the features + AR, + GM, and – P/E which define Category Type 5 of natural language. Other categories possibly affiliated with Category Type 5 might be found to relate to such things as postage stamps, traffic signs, automobile models, and national flags.

Type 5 categories are both deductive and inductive in nature. Obviously, US pennies do not naturally occur in the same way that things such as robins do. The US penny is a human invention that is *imposed* on the universe of things and, hence, the category *penny* is deductive. However, once pennies are so imposed, people respond to them in the same way that they respond to other discontinuities, that is, by developing a sense of a Gestalt property which is employed in identification of potential exemplars. Thus, people develop a *US penny* category by reading from the facts relating to the universe of things, that is, through induction.

Category Type 6: + AR + GM + P/E

Plausibly, child acquisition of the category *coin* more than occasionally involves comparison of potential exemplars of coins to a prototype, for example, a US penny. In addition, things pertaining to the category *coin* perceptually have much in common so that coins, like pennies, may constitute an artifactual discontinuity, one which could underlie a Gestalt property of 'coininess'. Thus, it is possible that the category *coin* shows the features + GM and + P/E in addition to + AR; features which define Category Type 6 of natural language.

Instances of polysemy attest to the empirical occurrence of Type 6 categories. For example, the English word *screwdriver* denotes both (1) a class of perceptually similar tools that are used to turn screws, and (2) a type of screwdriver with a flat tip. The latter, which I will call a 'typical screwdriver', is one among several kinds of screwdriver including the Phillips screwdriver (whose tip is structured to match a screw with two perpendicular grooves in its head). This nomenclatural evidence suggests that the term *screwdriver* originally designated only the typical screwdriver and that it became referentially extended to screwdrivers in general including the Phillips screwdriver. If so, a class relating to the Gestalt property 'typical screwdriverness' has served as a prototype for the development of a category relating to the property 'screwdriverness'.

Another, somewhat more complex example, comes from Finnish (Brown *et al.* 1976: 77). The word *sukset* is three-ways polysemous. It denotes (1) skis in general including both one-ski and two-ski types; (2) all skis of the two-ski variety; and (3) common skis of the two-ski variety which are multi-functional. The common ski is one among several

different types of two-ski skis which are named in Finnish, including *makisukset* 'down-hill ski', *maastosukset* 'cross-country ski', *kilpasukset* 'racing ski', and *lastensukset* 'children's ski'. This nomenclatural evidence attests to the likelihood that *sukset* originally denoted only the common ski, was subsequently expanded referentially to all skis of the two-ski variety, and, finally, was extended to skis in general. Thus, *sukset* through prototype/extension has become associated with three different, but hierarchically and contiguously related Gestalt properties, these being 'common skiness', 'two-ski skiness' and 'skiness'. (This artifactual example is strikingly similar to the Shoshoni bird example described above.)

In the two examples just reviewed, pertinent prototypes relate to Gestalt properties, i.e., respectively to 'typical screwdriverness' and 'common skiness'. There are reasons for believing that such Gestalt-related prototypes are not necessary to consolidation of Type 6 categories and, in some instances, not sufficient as well. Consider first the question of necessity. The propositional model relating to the category *screwdriver*, for example, specifies that a prototypic screwdriver is 'a tool used by people for turning screws'. Thus potential exemplars of screwdrivers can be correctly judged pertinent to the category merely through reference to the latter specified property of screwdriver's propositional model: thus, if an object is observed to be an efficient screw turner, it is a screwdriver. Reference to a Gestalt-related prototypic screwdriver, then, is not necessary. The propositional model also specifies physical properties of a prototypic screwdriver, so that other objects sometimes used to turn screws, such as coins, are excluded. However, the prototypic screwdriver specified in the propositional model is ontologically different from a Gestalt-related prototypic screwdriver.

As for sufficiency, while reference limited to a Gestalt-related prototypic screwdriver can result in extension of a 'screwdriver' category to many things that are actually screwdrivers, some things that are actually screwdrivers, e.g., electric screwdrivers, may not compare favourably with the prototype and, hence, might be incorrectly excluded.

If Gestalt-related prototypes are neither sufficient nor necessary in the formation of Type 6 categories, why, then, do they apparently figure into the category extensions cited above for English screwdrivers and Finnish skis? I believe the answer to this question relates (1) to the fact that Type 6 categories are plus for Gestalt motivation, and (2) to the probability that reference to Gestalt-related prototypes is a more efficient classificatory strategy than reference to propositional models.

In the earlier discussion of Type 4 categories, I propose that Gestalt-related prototypes of categories such as *vegetable* do not play a role in extension of Type 4 categories. This proposal is motivated by the observation that a prototypic vegetable, for example, a carrot, cannot alone supply me with enough information so that I can successfully

identify potential exemplars as being vegetables. The reason for this, of course, is that different things called *vegetable* do not have much in common perceptually. On the other hand, comparison of potential exemplars to a Gestalt-related prototypic screwdriver, for example, the typical screwdriver, *can* supply me with enough information for correctly including most things that are actually screwdrivers in the category *screwdriver*. The reason for this is that, unlike vegetables, most things called *screwdriver* have much in common perceptually.

When a situation exists in which reference to a Gestalt-related prototype and reference to a propositional model will *both* yield acceptable category extensions, there is little doubt that mature humans virtually always extend classes by means of Gestalt-related prototypes. This is so because Gestalt reference is vastly less complex than propositional model reference since it involves a cognitive manipulation entailing only one attribute. On the other hand, reference to a propositional model involves calling the model to mind and, then, a conscious scanning of a potential exemplar for attributes that are specified by the model. In the case of Type 6 categories, the number of attributes involved is likely to be relatively large. For example, the propositional model relating to a prototypic screwdriver might specify the following: (1) tool used by people to turn screws; (2) small enough to be held in one hand; (3) but large enough to produce the leverage needed to turn a standard size screw; (4) is elongated in appearance; (5) is rigid; (6) has an elongated handle at one end which is of an appropriate size to be grasped by a single hand; (5) has an elongated metal stick which emerges from the handle; (6) which has a flattened tip at the end, and so on. Clearly, given the complexities of such models, classification through reference to a Gestalt-related prototype is a vastly more efficient strategy than consultation of a propositional model when both strategies can produce much the same correct results.

I do not mean to imply here that when both strategies yield the same results people consciously choose to use one or the other. Thus, for example, if I am presented with a potential exemplar of a screwdriver which manifests the Gestalt property of a prototypic screwdriver, it would never occur to me to consult a propositional model relating to 'screwdriver', since I have developed an understanding of the property of 'screwdriverness' that facilitates immediate identification. On the other hand, if I have yet to have developed such a concept, I would, then, consult the propositional model either through introspection or by asking others about the object under consideration.

There are instances in which a Gestalt-related prototype and a propositional model *both* play roles in decision-making processes pertaining to category extension. For example, I may be inclined to decide that an electric screwdriver overall does not resemble a Gestalt-

related prototype of a screwdriver (typical screwdriver) close enough to be called *screwdriver*. However, upon further reflection, by consulting my propositional model specifying properties of a prototypic screwdriver, my initial inclination may be changed. I may observe that the electric screwdriver (1) at one end (the power end) is not elongated but rather is bulky and that this is not a feature specified for the prototype by my model, and (2) has a metal stick emerging from the non-elongated end which is flattened at its tip and that these features are specified for the prototype by my model. Given these observations I decide (correctly) that the electric screwdriver is indeed a screwdriver. The reason I do is because the propositional model specifies not only what properties pertain to a prototype but *also* which properties are especially criterial and which properties are not (Lakoff 1987: 115; Wierzbicka 1985a). In the case at hand, the propositional model specifies that the metal stick flattened at the end is especially important to 'screwdriverness', while an elongated handle is not. Thus, with respect to 'screwdriver', and other Type 6 categories of natural language, a Gestalt-related prototype considered alone cannot always lead to appropriate extensions since such a prototype does not inform of important versus less important prototypic attributes. While Gestalt-related prototypes can do the job most of the time, occasionally reference to propositional models is necessary as well, especially when marginal exemplars are involved.

This discussion of Type 6 categories focuses almost exclusively on English *screwdriver*. Analysis of other Type 6 categories such as *cup*, *rope*, *chair*, *button*, and so on, would yield much the same results.

Finally, it should be noted that Type 6 categories resemble Type 5 categories in that they too are both deductive and inductive.

Category Types 7 and 8: + AR – GM – P/E and + AR – GM + P/E

Type 7 and 8 categories of natural language share the features + AR and – GM. They are treated together in this section since they are indeterminant with respect to prototype/extension. I am aware of no examples for which there is empirical evidence that prototype/extension pertained to their development. For example, *toy* in English is not polysemous, in the sense that it does not designate some specific example of a toy such as a doll in addition to toys in general. If English *toy* or comparable terms in other languages were found to be thusly polysemous, this, of course, would be evidence of prototype/extension. However, lack of such evidence is no certain indication that categories such as *toy* never develop through prototype/extension. Thus, *toy* and other classes, such as *weapon*, *utensil*, *tool*, and *vehicle*, all show the features + AR and – GM, but are indeterminant with respect to the factor prototype/extension versus non-prototype/extension.

Type 7 and 8 categories are similar in that they label groupings of highly heterogeneous objects, lack Gestalt-related prototypes, and are deductive. One Type 7 or 8 category, *toy*, has been discussed at several junctures in this chapter. Rather than repeat at length discussions pertaining to *toy* which in essence describe in detail salient features of Type 7 and 8 categories, I focus here instead on the possibility that categories sharing the features + AR and – GM sometimes develop through prototype/extension.

If such a category does develop through prototype/extension, the prototype involved is only apparent in a propositional model since a Gestalt-related prototype is not pertinent. For example, a propositional model related to *toy* might specify that a prototypic toy is (a) something to play with; (b) looks like a human baby; (c) but is not as big as a typical human infant; (d) really is not a human baby; (e) is made out of wood and/or plastic and cloth; (f) is purchased at a store, etc. In this case, then, the prototypic toy is a baby doll. However, such a prototype cannot be pertinent to natural language since it does not pertain to a widely shared propositional model relating to the English category *toy*. (Which is merely to observe that different people recognize different objects as being prototypes of *toy*.)

Of course, there is a widely shared propositional model relating to *toy* which specifies attributes of a prototypic toy. One such attribute is (a) above, that a prototypic toy is something to play with. Another possible property of a prototypic toy specified by a widely held model is that it is an object that is manufactured for the explicit purpose of being played with. Such a model, then, would restrict prototypic toys to objects such as skipping ropes, tops, baby dolls, and toy soldiers. Not included among prototypic toys would be objects that are sometimes used as toys, for example, a thread spool, a cardboard box, a pocket knife, etc., but which are manufactured for other purposes.

It could be proposed that propositional models relating to *toy* which specify that a prototypic toy is *made* to be played with are not widely shared and, hence, that the defined prototype does not relate to a category of natural language. However, since manufactured toys are typically the first things called *toy* that children encounter, at least in modern nation-state societies, it is probable that things made to be toys develop as prototypic toys for most people. If so, such a prototype could constitute the basis for extending *toy* to those things that people play with but which are manufactured for other purposes.

All manufactured things have in common the fact that they are made for some specific purpose or purposes. They also have in common that they can all be used for some purpose or purposes other than the intended ones: for example, a coin (made for exchange) can be used to turn screws, a wine bottle (made to contain a liquid) can be used to hold

a candle, and so on. In most instances, one would presume, when people first become aware of any particular manufactured object, it is in the context of that object being used in the manner its manufacturers intended. This is so since things tend to be used in their intended manner far more frequently than they are used in unintended ways. Thus, it would not be particularly surprising to learn that people ordinarily first come to associate labels for things of artifactual categories (+ AR) with things manufactured for a specific use and only secondarily with things used in ways other than those for which they are intended. Thus, it is plausible that propositional models relating to all artifactual categories (Category Types 5–8) specify prototypes that have the attribute ‘is made to be used for (something)’.

As it happens, some non-artifactual categories (– AR) may also relate to propositional models which specify that prototypes have certain intended uses. For the most part, these are probably restricted to non-artifactual categories that are deductive in nature such as *vegetable* and *pet*. For example, the propositional model for *vegetable* specifies in part that a prototypic vegetable is ‘grown by people’ for the purpose ‘to be eaten’. In other words, vegetable’s propositional model proposes that any particular vegetable is prototypic only if people grow it with the purpose or intention in mind that it will be eaten. Wild small herbaceous plants that are eaten, then, are not prototypic vegetables; however, through prototype/extension they may come to be included in *vegetable*. Similarly, certain dogs, cats, and birds are bred to be pets and, thus, may constitute prototypic pets in terms of which the category *pet* is extended to other creatures that are not bred to be pets, for example, pet snakes. In view of these considerations, it might be necessary to reconsider the earlier postulation that categories such as *vegetable* and *pet* do not relate to prototype/extension. Rather than being Type 3 categories, then, they may instead be grouped with categories of Type 4.

Clearly, however, not all deductive categories which are non-artifactual relate to propositional models that specify an ‘intentional’ attribute for a prototype. For example, a prototypic weed is a plant that grows where people do not wish it to grow. Of course, people do not grow weeds on purpose to produce plants which grow in places they do not want them to grow. Similarly, a prototypic mutt could be, but clearly is not, a dog bred by people for the purpose of producing a type of dog that does not have a varietal name.

While the system employed in this chapter results in the identification of four types of artifactual categories (Category Types 6–8), such classes are primarily distinguished in terms of the presence or absence of Gestalt motivation. The latter in turn relates to whether or not the membership of these classes is perceptually heterogeneous. Clearly, an important attribute of all artifactual classes is that ultimately all are motivated by

utilitarian considerations: things called *coins* are important primarily because they are used to purchase things; things called *screwdrivers* are important primarily because they are used to turn screws; and things called *toys* are important primarily because they are used as playthings. These observations raise the question why should some 'utilitarian' categories encompass highly diverse objects and, consequently, lack Gestalt motivation (Types 7 and 8), while others encompass relatively similar objects and, hence, show Gestalt motivation (Types 5 and 6)?

As proposed earlier, the nature of the membership of a deductive class (be it heterogeneous or otherwise) is positively correlated with the number of attributes specified for a prototype in a propositional model, wherein heterogeneous membership relates to few attributes and homogeneous membership to many attributes. Presumably, then, toys are perceptually heterogeneous because only a few attributes (possibly only two) pertain to a prototypic toy, and screwdrivers are perceptually homogeneous because a fairly large number of properties pertain to a prototypic screwdriver. This is so despite the fact that in both instances only *one* use or function is specified: respectively, a prototype screwdriver is used to turn screws, and a prototypic toy is used as a plaything. However, the entailments of these two uses are very different, and these ultimately determine the number of properties specified for the two prototypes concerned.

Consider, first, entailments relating to the function of screwdrivers (the following discussion parallels closely Wierzbicka's [1985a: 10–36] treatment of *cup* and I am indebted to her for providing it as a model). The screw that a screwdriver typically turns is made in such a way that the most efficient and effective way of turning it is by using an object that fits a groove in its head. Furthermore, that object must be rigid in order to provide sufficient transfer of energy from an energy source to the item that is to be turned. In addition, it must be elongated in order to provide appropriate leverage, but not so long that it becomes difficult to insert the object in the screw's groove. Also, it must be slim so that it can be used in confined places where screws are often to be turned. For efficiency, the part of the object that inserts in the groove should be no wider than the groove. On the other hand, since the object is typically turned by a human hand in order to turn a screw, the end of the object which is distal to the screw should be wide enough to comfortably accommodate the human hand. As a result, the object is not uniformly slim. Manufacturing an object that is elongated, but not uniformly slim, is most easily achieved by attaching a slim elongated object to a less slim elongated object so that the object is made out of two elongated pieces, one attached to the other.

While the above is not a complete listing of the entailments relating to the function of a screwdriver, it gives a pretty good idea of what is

involved. These entailments, of course, constrain the number of different objects which are reasonable screwdrivers to a relative few different things that are perceptually similar. As a consequence, the class of things called *screwdriver* is relatively homogeneous, this leading both to a Gestalt property of 'screwdriverness' and to a propositional model that specifies numerous properties of a prototypic screwdriver.

Consider now entailments relating to the function of toys. When people play with an object, they almost always manipulate it in some way or another. Typically manipulation involves some aspect of moving the object or moving part of the object, either by picking it up, holding it, carrying it, riding it, turning it, pressing it, squeezing it, pushing it, knocking it, twirling it, and so on. Thus the object or part of the object must be movable. Other than these, I cannot think of other entailments relating to toys, although I do not doubt that there could be more. In any case, it seems likely that the entailments of the function of toys are so circumscribed that they do not constrain objects which are reasonable toys to a few different things that are perceptually similar. Consequently, the class of things called *toy* shows considerable heterogeneity, this resulting in a propositional model that specifies very few properties for a prototypic toy and the impossibility that a Gestalt property of 'toyness' might emerge.

Conclusion

I offer the preceding survey of category types in natural language as a systematic attempt to bring clarity to an area of academic interest that is rapidly developing, and for which a unifying framework of even a preliminary nature has yet to be offered (although Kronenfeld [1988, with Armstrong and Wilmoth 1985], Lakoff [1987] and Wierzbicka [1985a] might be viewed as significant steps towards a preliminary framework). Clarity is hopefully achieved in part by restricting analysis to categories encompassing only concrete objects, those things familiar to most people, and with which they interact on a daily basis. How can we begin to understand the complexities of linguistic classification involving abstract things such as knowledge, love, religion, history, and so on, until we grasp the fundamental nature of categorization involving ordinary concrete objects? The system of categories used in the survey hopefully provides clarity by proposing that while categories of natural language relate to a small number of underlying factors, they none the less are relatively diverse in nature due to the fact that their development entails virtually all logically possible ways in which variables of such factors can be combined. While I do not claim to offer a unifying framework in this chapter, I do believe that the approach adopted is of a kind that may eventually lead to such a formulation. Finally, if nothing else, this survey

indicates that human categorization involving linguistic labels is an extremely complex phenomenon, even when only simple, concrete objects are involved.

Note

A precursor to this chapter, but not a true earlier version, entitled 'The structure of folk biological categories and the perceptual basis of life-form classes', was circulated widely and commented upon by several scholars. Many of their comments have been helpful to me in drafting the present chapter. Thus, thanks are due here to Pierre Cabalion, Suzette Haden Elgin, Joe Malone, Robert Randall, and Ralph Gardner White. These scholars and others who read the aforementioned paper should be advised that ideas expressed here are intended to displace many wrong-headed notions developed in the earlier treatment.

Several individuals have read and responded to the present chapter. For this, I am grateful to Gene Anderson, Mary Douglas, Igor Mel'čuk, Nancy J. Turner, and Ralph Gardner White.

Possible verbs and the structure of events

William Croft

Introduction

This chapter will explore the question, ‘what is a possible verb?’ from a prototype and cognitive semantic perspective. The problem of possible verbs requires a cognitive approach to semantic analysis even more directly than the problem of possible nouns, i.e. possible categorizations of objects. The reason for this is simple: most objects come already individuated. The external world spatially isolates objects, and objects move or can be manipulated in space as autonomous entities. Thus, a crucial prerequisite for categorization is already satisfied in most cases without any necessary appeal to cognition, other than our mental receptiveness to this external fact. Consequently, cognitive semantics has focused mainly on the higher-level issue of the grouping of individuated objects into similarity sets (‘classification’), and on those objects for which individuation is problematic, such as mass nouns and *pluralia tantum* (see Wierzbicka 1985b) and relational nouns.

Verbs, on the other hand, are a much more difficult problem from the point of view of categorization. Verbs represent a categorization of events. Events do not come clearly individuated in space or time (the latter dimension being relevant for events but much less so for objects). The world appears to be made up of an extremely complex causal network of which we encounter just fragments. Nor can events be physically manipulated, in space or in time, in the way that objects can. Thus, the two basic criteria for individuating objects cannot be used to individuate events. The individuation of events becomes the first problem that must be addressed in this realm of linguistic and cognitive categorization. Because the individuation of events does not ‘come naturally’, it is likely that there is a strong cognitive element to the individuation of events; that is, the process of isolating a fragment of the causal chain and naming it with a verb involves more cognitive processing than the isolating of an object and naming it with a noun.

The problem of the analysis of verbs is interesting only if one takes a

decompositional view of verbal semantics, that is, that verb meanings have structure. More precisely, events – our cognition of events – have structure, and that structure determines in part what verb meanings are possible. Thus, we begin with a model of event structure in order to address the problem of possible verbs. Next a prototype model of events based on causal-aspectual structure and its application to verbs is described. The phenomenon of the flexible conceptualization of events is then analysed (p. 52) and its impact on the prototype model of events given earlier. Finally, further prototype effects generated by the phenomenon of flexible conceptualization are examined (p. 58).

Verbs and event structure

The model of event structure that I will use here is based on prior research on the role of verbal semantics in surface case marking (Croft 1986), which in turn represents a synthesis of various proposals on verbal semantics and event structure in the linguistic and philosophical literature. Following Davidson (1969), I argued that the primary framework for understanding event structure and verb meaning is causation, and that event definitions based on spatial and/or temporal regions were neither necessary nor sufficient conditions for individuating events. This position was presupposed in my earlier remark that the structure of events in the world was a vast causal network that human beings must break down in some way for apprehension.

The causal hypothesis is accepted tacitly or explicitly in much of the philosophical literature on events and the linguistic literature on verbal semantics. There are significant differences in the exact representation of causal relations, however. There are essentially three models: events cause other events (Davidson 1967), individual entities (henceforth 'individuals') bring about events (Gruber 1976; Dowty 1979), and individuals act on other individuals (Talmy 1972; 1975). These three models can be illustrated in the following representations of *The rock broke the window*:

Events cause events:

Rock(r) & Window(w) & Contact(e₁, r, w) & Become-Broken(e₂, w)
& Cause(e₁, e₂)

Individuals bring about events:

Cause(r, Become(Broken(w)))

Individuals act on individuals:

rock		window		(window)
•>	•>	(•)>
	cause		become	broken