Ana Cristina Pelosi

FUZZY CATEGORIES

A Cross-Cultural Semantic Analysis of Brazilian Portuguese and American English

encontrografia

Ana Cristina Pelosi

FUZZY CATEGORIES

A Cross-Cultural Semantic Analysis of Brazilian Portuguese and American English

encontrografia

Scientific Editor
Décio Nascimento Guimarães

Deputy Editor
Gisele Pessin

Technical Coordination
Gisele Pessin
Fernanda Castro Manhães

Design
Carolina Caldas
Book cover: Carolina Caldas

This book was proofread by the author.

Cataloging-in-Publication Data

Dados Internacionais de Catalogação na Publicação (CIP)
(Câmara Brasileira do Livro, SP, Brasil)

Pelosi, Ana Cristina
Fuzzy categories [livro eletrônico] : a cross-cultural semantic analysis of brazilian portuguese
and american english / Ana Cristina Pelosi. -- Campos dos Goytacazes, RJ : Encontrografia Editora, 2022.
PDF.

Bibliografia.
ISBN 978-65-88977-63-7

1. Inglês - Estudo e ensino 2. Linguística - Análise 3. Português - Estudo e ensino 4. Semântica - Estudo e ensino I. Título.

22-100815 CDD-410.7

Índices para catálogo sistemático:

1. Linguística : Estudo e ensino 410.7

Aline Graziele Benitez - Bibliotecária - CRB-1/3129

encontrografia

Encontrografia Editora Ltda
Av. Alberto Torres, 371 - Sala 306 - Centro - Campos dos Goytacazes - RJ
28035-581 - Tel: (22) 2030-7746
www.encontrografia.com
editora@encontrografia.com

Scientific/Editorial Board

This book was evaluated and approved by two or more referees in a blind process.

Contents

Contents (cont'd.)

Contents (cont'd.)

Contents (cont'd.)

Contents (cont'd.)

List of abbreviations

CB = Context-bound.

CL = Context-loose.

CN = Context-neutral.

GOE = Goodness of example.

SD = Semantically dissimilar

SS = Semantically similar.

SDI = Semantically dissimilar item

SSI = Semantically similar item

SDR = Semantically dissimilar but related.

SSR = Semantically similar and related.

SSU = Semantically similar but not necessarily related.

TDI = Typical dissimilar item.

TSI = Typical similar item.

RT = Reaction Time

RTs = Reaction times.

WCRTs = Word-choice reaction times.

List of figures

List of tables

List of tables (cont'd.)

List of tables (cont'd.)

Acknowledgments

I am most grateful for all the help and guidance received from my supervisors, Mr. Derrick Pritchatt from the Department of Psychology and Dr. Tsutomu Akamatsu from the Department of Linguistics, throughout the course of my research. Their valuable comments and suggestions as they, patiently, read and reread drafts of the various chapters have, I believe, helped to improve the quality of the work.

I must also thank members of the academic staff of the Department of Psychology and the Department of Linguistics of the University of Brasilia and all those who participated as subjects in my study.

Finally, I must register my sincere gratitude to my husband and children. I have certainly been very fortunate to have always had, throughout the years I dedicated to this work, the love and encouragement of my family. Without their so much appreciated support, I sometimes wonder whether this work would ever have come to its completion.

Chapter one
Introduction

1.1. Aim of the Study

The aim of the present research is threefold. It primarily investigates the manner in which the phenomenon known as graded (or fuzzy) category membership varies across cultures. This is achieved by comparing the semantic structures of nine categories of common nouns in Brazilian Portuguese and American English. In order to perform the analysis, the psycho-semantic model of category structure proposed by Markovitz (19'77) is partially utilized.

A second concern of the research is to explore some of the effects of context on category structure and typicality shifts. This is achieved by the application of two sets of experiments which made possible the generation of diverse goodness-of-example (GOE) distributions in the presence of specific context environments.

The findings from the present study as a whole and especially those emerging from the context experiments point to some aspects of prototype theory and models of semantic memory which would have to be expanded or modified in order to provide a more satisfactory account on how categorization systems are organized and accessed in memory.

Finally the research to be reported in the following chapters partially assesses the universality of the model proposed by Markovitz (1977) as far as **Rung One, Rung Two** and the variable **Context** on **Rung Four** are concerned. This I do for the data accommodated on **Rung One** and **Rung Two** by comparing responses gathered through the interviews and ranking tasks carried out with the help of 30 Brazilian subjects with the responses gathered by Markovitz in the study she carried out with the help of 76 American subjects.

As for the variable **Context** on **Rung Four,** I compare responses given by 70 Brazilian subjects for categories generated under specific contexts and word-choice tasks in three specific context environments with the responses for the same tasks given by 24 American subjects.

1.2. The Theoretical Background

Traditional lines of thought, such as the Aristotelian view of categories, have regarded category membership as an all-or-none phenomenon. More recently, classical semantic theory has put forth the view that the hierarchical organization of concepts is so precise that it can be described by the mathematics of set theory. Generally it has been assumed that the human mind works according to set theoretic principles. According to this position, an entity either belongs to a category or it does not. For example, *a dog is either a dog or it is not a dog.* Classical semantic theory therefore posits that the lexicon of human languages reflects the nature of the world in an objective and straightforward way.

Such a view of semantics was originally challenged by Wittgenstein (1953). According to him, membership in a given category could be translated in terms of family resemblances rather than by an item's possession of a set of essential and sufficient properties. For example, if one considers the conceptual category **Games,** we know that solitaire and football are both games, but although this is the case, they could hardly be said to have any common properties. Both are, however, included under the category **Games** due to the fact that solitaire and football share some of the properties of a more typical game such as poker.

Rosch's (1973a, 1975a) research provided evidence for Wittgenstein's (1953) theory. She conducted a series of experiments to find out what conceptual categories were like. Contrary to what the classical theory had for long implied, i.e., that no member of a category will have a special cognitive status, Rosch believed that category membership was fuzzy. That is, category members shared varied degrees of membership in the category. Category members would be, according to Rosch's theory, organized by degrees of proximity or distance from the categories' best types (i.e., the category's prototypes). Membership in a category would therefore be a matter of degree. There would be those members that would more precisely resemble the category's prototype by sharing many attributes with it. Those would be considered more typical of the category. On the other hand, there would be those members that would not share many attributes with the

category's best exemplars. Those, although still part of the category, would be ranked as poor exemplars of it. The results from Rosch's (19'73a, 1975a) research confirmed her assumptions. She was able to ascertain through a series of experiments that people often consider some members of a category more typical of or central to, the category than others. For example, robins and sparrows are typical birds but not penguins and ducks. Results such as these led Rosch to conclude that conceptual categories such as **Bird, Pet, Fruit,** etc., are not organized in memory according to principles of set theory where all members of a category share essential and sufficient properties and are given equal membership status. On the other hand, Rosch (1973a, 1975a) found that categories are organized around a prototypical member. Entities can be members of a category to the degree that they share the properties of the pro typical member (or members) of the category.

The present research is based on the assumptions about category membership put forward by Rosch (1973a, 1975a). The methodology applied to the collection of data is aimed therefore not only at gathering information about the semantic structure of the categories but also in obtaining typicality orderings for the various category items included under the categories investigated.

1.3. Relevance of the Study

The type of analysis carried out through the present research is, I believe, more productive than traditional semantic analysis for at least four reasons:

1. The methodology I employ is not based on traditional structural approaches such as componential analysis or field theory which rely heavily on the analyst's intuitions. The analysis carried out in this study is an objective one aimed at accounting for concrete data which have emerged from the folk definitions produced by the subjects.

2. I do not presuppose that category membership is an all-or-none phenomenon expressed by an item's possession of a set of essential and sufficient attributes. Rather, my position is in line with the evidence gathered by cognitive psychologists, mainly Rosch and Mervis (1975), that semantic categories are structured around a prototype (the category's best exemplars) and distance from the prototype. The present analysis is therefore based on the premise that members of semantic categories are not equally equidistant from the category's superordinate.

3. By assessing category structure on the basis proposed by prototype theory and by cross-culturally comparing the data gathered, the present analysis sheds some light on the universality of the lexical components and semantic relations explored on **Rungs One** and **Two** of the model adopted for the research. Such assessment, though not exhaustive, contributes, I believe, to increase our present knowledge of some of the psycho-semantic processes which appear to be universally shared by the human mind.

4. Finally, by analysing the role that context plays on category structure and typicality shifts, I hope to highlight some aspects of prototype theory which appear to be inadequate to account for category membership gradation in the presence of specific contexts. Rosch, for instance, emphasizes semantic-relatedness on the basis of shared structural attributes in the generation of typicality effects. According to her. a category member would be ranked as more representative or less representative of a given category on the basis of overlaps of attributes with the best exemplars of the category. Typicality ratings of items included under a category name would, under this view, be a more or less fixed constraint imposed on the basis of similarity or difference to the category's best types. This seems to imply that structural attributes would be the only or at least the main factor dictating GOE distributions, no matter the context in which instances of the category occurred. The experiments, which have been set up to explore the role that context can play on typicality shifts, are designed to expose other factors which appear to play a part on categorical behaviours involving the assignment of category membership in specific contexts.

1.4. Summary

The present research aims at attaining a better insight into how the phenomenon known as graded category membership varies across cultures. This is achieved, albeit to a minimal extent, by analysing responses given during the folk definition interviews and ranking tasks by Brazilian subjects and American subjects.

A second concern of the present study is to examine how the presence of specific types of contexts can affect category structure causing the generation of GOE distributions which differ from those obtained in the absence of explicit contexts. In order to achieve this aim, two sets of context experiments have been designed. In the first set of experiments, subjects were asked to re-organize a

number of categories presented in context. The experiments included in the second set involved word-choice tasks for possible lexical items presented in three different types of context environments.

The analysis carried out in the present research is conducted by plotting the data gathered from Brazilian subjects and American subjects against **Rungs One** and **Two** and the variable **Context** included on **Rung Four** of the model of category structure proposed by Markovitz (1977). By so doing, I have also tried, though only partially, to assess the universality of the cited model.

Chapter two
Review of the Literature

2.1. Introduction

Categorization is essential to human cognition. Without the ability to segment the infinite array of stimuli one encounters in the world into manageable easily accessible categories, life would be chaotic. Categorization, thus, allows the individual to impose order into her/his environment by treating non-identical, but related, stimuli as equivalent. Such organization of the environment is both cognitively advantageous and economical. Without the ability to categorize, the individual could not interact meaningfully with the infinitely diverse number of objects and situations s/he is exposed to. Moreover, the ability to categorize is also cognitively economical. It would be virtually impossible to cope with the number of new objects and events one is faced with through life if it were not for the brain's ability to "treat new stimuli as equivalent to other stimuli already categorized therefore reducing the infinite differences among stimuli to behaviourally and cognitively usable proportions" (Rosch, Mervis, Gray, Johnson and Boyes-Braem, 1976a).

Due to the importance of categorization to human cognition, researchers have long been interested in the processes which govern category acquisition, the criteria which determines membership within a category and in the nature of the mental representation generated from exposure to a category name. With a view to expanding on these aspects, a discussion of some recent proposals on category acquisition as well as some of the main categorization and semantic memory models are included in the next sections.

2.2. Category Acquisition

A category is formed whenever two or more objects or events can be labelled by the same category name.

Categories of naturally occurring objects or more abstract categories such as types of emotions and any other type of categories are perceived by the individual's experience with the given stimuli. Therefore, one of the fundamental requirements for category formation is that exposure to relevant stimuli takes place so that experiences with examples of the category are acquired and our conception of the category develops.

What kind of conceptions about categorical knowledge are the first to develop? The next section describes one type of category called **slot-filler** (Lucariello and Nelson, 1985; Nelson, 1982, 1983, 1988) which, according to recent evidence brought about by research on category acquisition, appears to be the first type of category to develop.

2.2.1. Slot-Filler Categories

Evidence from recent research on category acquisition (see Blewitt and Toppino, 1991; Krackow and Blewitt, 1989; Lucariello, Kyratzis and Nelson, 1992; Lucariello and Nelson, 1985; Nelson, 1988; Rosner and Smick, 1989) reveals that children of pre-school age form categories in which items do not hold together by relations of class inclusion in a taxonomic hierarchy. Pre-schoolers thus appear to form categories which are context-bound and derive from experiences with objects and events. Items in these categories are included together and "can substitute for one another within slots in events" (Nelson, 1988). Lucariello, Kyratzis and Nelson (1992) found that while traditional taxonomic knowledge involving sub-categories and superordinates was present in categorization tasks such as category production and word association performed by 7 year olds and adults, pre-schoolers appeared to rely heavily on schematic knowledge. Their categories therefore were formed by items which did not necessarily display a measure of perceptual or semantic similarity but that shared functions within an event. Slot-filler categories thus incorporate items which hold together by a spatio-temporal association. Such categories derive from event schemas. Different from thematic related categories in which items share a complementary (functional) relation (e.g. toothbrush - paste) or a situational relation such as "objects to be

found in the kitchen" (e,g. fridge - microwave), slot-filler categories comprise items which come from the same event-bound superordinate category in which items do not violate category borders. For example, the slot-filler category "things you can take on a picnic" is restricted by what items are conventionally acceptable for one to take in such an outing (Lucariello, Kyratzis and Nelson, 1992, p. 979). It appears thus that before conventional categorical knowledge based on the similarities of features or the associated function of items develops, schema-based categories are the first to develop. Evidence from the present research (see Section 5.1.4; Section 6.1.5 and Section 6.2.1.5) reveals that rather than mutually exclusive, the two types of categorical knowledge may be complementary and help explain performance behaviour in categorization decision tasks. In fact, Lucariello, Kyratzis and Nelson (1992) did find that schematic categories appear to be salient at all ages.

How then does the move from schematic (event-constrained) knowledge to conventional taxonomic knowledge which involves class inclusion relations based on overlaps of perceptual features or abstraction of common functions take place?

Apparently this move happens gradually. Lucariello et al. (1992, p. 980) propose that as the child approaches school age, slot-filler categories may combine to form conventional superordinate categories. For example, explaining how the general concept "food" may be acquired, the above mentioned authors propose that a slot-filler category such as "things eaten for breakfast" may, as the child's conceptual system broadens, combine with another set of items such as "things eaten for lunch". The combination of these sets will form the superordinate category "food". Two principles which may operate in isolation or together seem to be at play in accounting for the formation of conventional taxonomic categories. The first, according to Lucariello et al. (1992), is the cognitive process of being able to detect that there is a more abstract functional relation which holds across slot-filler categories. For instance, they posit that the child may come to appreciate that the concept "eat" holds for both "eat for breakfast" and "eat for lunch" and can thus interpret this as a basis for treating objects as equivalent. The second principle may be, in their opinion, language based, inasmuch as the child comes to recognize that the same superordinate term is used across slot-filler sets. For example, the term "food" can be applied for "eat for breakfast" and "eat for lunch". Such recognition may be fundamental in merging slot-filler categories to form the superordinate category "food" (Lucariello et al. 1992, p. 980).

It seems therefore that at a certain point of conceptual development the mind is able to make the move from event-constrained categorical knowledge to the more encompassing taxonomic knowledge under which items hold together in the various categories on the basis of unconstrained functions, feature similarity or logical constraints. This move, however, is by no means exclusive since slot-filler categories continue to co-exist with conventional taxonomic categories. Evidence for this is found in the fact that categorical knowledge of the slot-filler type was also relied upon by school age children and adults in Lucariello et al.'s (1992) research. Moreover, some of the subjects who participated in the present research seem to have displayed a behaviour based on a schematical view of the various categories they had to rank (see Section 5.1.4). Also, Barsalou (1983) noted that adults were able to construct, with ease, event-constrained goal derived categories. Along these lines Rosch (1983) proposes that human perception and thought appear to be anchored not only on a logical interpretation of the stimuli the individual encounters and their subsequent classification into logically bound categories but to be organized in terms of event-constrained reference points in which concepts develop not as isolated entities but form parts of structured wholes or schemas. Further, Ward (1994) has also gathered evidence which indicates that both creative and non-creative aspects of cognition rely on structured acceptable boundaries based on previously acquired categorical knowledge.

2.2.2. Perceptual versus Semantic Categories

Once the conceptual system has been enlarged to encompass conventional superordinate categories (i.e. those which are not event-constrained but are based on the abstraction of common functions, feature similarity or logical constraints) evidence points to the emergence of two other sub-types of categories which seem to come to the fore at a later stage of development of the human conceptual system. These are perceptual categories and semantic categories.

Perceptual categories are those in which items hold together on the basis of physical similarity. For example, stringed instruments such as violin, guitar, banjo form a perceptual sub-category within the more encompassing category **Musical Instrument.** Conor is also another example of a perceptual category.

On the other hand, semantic categories are those in which items do not necessarily share similarity features. A superordinate category such as **Furniture**

which is composed of so many physically dissimilar items is an example of a semantic category. In these categories, function (what roles, or functions the items fulfil) and not shared physical similarity is the driving force which dictates category membership. Findings from research carried out on category acquisition (Duncan and Kellas, 1978; Horton and Markman, 1980; Sperber, Davies, Merrill and McCauley, 1982) appear to indicate that perceptual categories are amongst the first to be acquired by the child. Also, studies investigating pre-preschoolers generalization of artificial concepts have shown that children often attend to shape (Ward, Becker, Haas and Vela, 1991; Becker and Ward, 1991). Such evidence seems reasonable in view of the fact that perceptual categories rely much more on visual information than non-perceptual ones. Thus, it appears logical that before the child is able to extract information of a more abstract semantic nature about members of certain categories, s/he will interact with more ease with those categories where items are held together on the basis of visual feature similarities at the basic taxonomic level. Interestingly, Markman and Horton (1980) found that children were able to acquire basic-level concepts in perceptual categories only by exposure to exemplars at this level thus suggesting that a process of comparison of perceptual features of exemplars with prototypical members of the category was at play in this instance. Moreover, semantic priming tasks to assess the automatic activation of category-instance relationships and category verification reaction time tasks have been facilitated for perceptual categories as opposed to non-perceptual ones (see Duncan and Kellas, 1978; Sperber et al., 1982). Some evidence that perceptual categories continue to be more accessible in memory also for adults can be ascertained from the fact that individuals appear to rely more heavily on comparison of physical features than on semantic relationships when faced with membership decision tasks (see Malt and Johnson, 1992).

It thus appears that categorical knowledge develops first to encompass event-constrained sets of items which form slot-filler categories. These then merge, as the individual's conceptual system broadens, to encompass superordinate taxonomic categories. As this move occurs though, knowledge about subordinate-superordinate relationships appear to develop for perceptual categories before those for non-perceptual ones. Only at a later stage will categories in which membership is determined on the basis of more formal descriptions of criterial properties, emerge.

How are categories structured and what are the criteria for membership in them? Further, what is the nature of the mental representation retrieved from exposure to a category label in category verification decision tasks or semantic memory tasks? The next sections will address these questions.

2.3. The Classical View of Categories

Traditionally categories have been regarded as rigid logically bound domains. Membership of any items into a given category would thus, according to this view, be determined in terms of necessary and sufficient criteria. From such a viewpoint, category membership would be an all-or-none phenomenon. That is, an item would either be a full member of the category or not a member at all. Traditionally, research on concept acquisition and identification has thus placed emphasis on the learning and identification of "artificial" stimuli. Usually, in such experiments the subject is faced with a number of stimuli such as squares, circles and triangles each type of stimuli occurring once as red, once as blue, and once as green, each colour for each of the different sets of stimuli occurring once with one border, once with two and so on. It is the individual's task to learn which of these stimuli are, and which of these stimuli are not, part of the concept highlighted in the experiment. For example, the concept may be formed of various combinations of features; "all green things", "blue and round things", etc. (see Bourne, 1968 for a review). The concepts explored in tasks such as the one briefly outlined above are rigid, by the nature of the experiment itself, so that category boundaries are kept well defined. After all, the subject has only to learn the contrast sets (i.e. green versus blue; triangle versus circle) and learn the rule(s) defining the positive subset to be able to sort out the stimuli successfully. Categories organized in this fashion have no internal structure. In other words, any one stimulus that fits the rule is as good an exemplar of the concept as any other. Although the data which have emerged from strictly controlled concept learning experiments such as the one discussed have been relevant to shed light on how learning and problem solving may take place under laboratory conditions, more recent evidence gathered seems to point to the fact that this is not the way people acquire concepts in the real world. The work carried out notably by Eleonor Rosch as well as by other cognitive psychologists and linguists, has time and again revealed that category membership rather than being "digital" is graded and that categories of natural concepts and even artificial categories display a prototypical structure. We now turn our attention to such evidence.

2.4. The Prototypical View of Categories

According to this view categories are regarded as structured around a prototype (the clearest cases, best exemplars of the category) and non-prototype members which tend towards an order from better to poorer exemplars (see Rosch et al., 1976a, for a review). One line of evidence favouring such a view comes from the colour domain. Conor categories rather than displaying a rigid structure have boundaries which are fuzzy rather than well defined. Research carried out on colour categories has pointed to the fact that such categories display a prototype structure where members share varying degrees of membership within the categories. For example, people may describe the colour blue as a "genuine" blue or a "faded" blue. Moreover, in making judgement about category membership for colour categories people appear to rely on salient areas of the colour space (see Berlin and Kay, 1969; Heider, 1971, 1972; Kay and McDaniel, 1978). Research carried out on categories of form and dot patterns has also demonstrated that such categories are structured around a prototype (Franks and Bransford, 1971; Reed, 1972; Rosch, 1973; Rosch and Mervis, 1975 and Rosch, Simpson and Miller, 1976c). Evidence for fuzziness has also been found for categories of naturally occurring objects. Lakoff (1972), for example, points to the existence of linguistic hedges (e.g. "a whale is **a sort of** fish" or **"strictly speaking,** a whale is a mammal") as proof of the fuzzy nature of semantic categories (see also Rosch, 19'75b). Moreover, the prototypical structure of categories has been evident in studies concerned with language acquisition (Rips, Shoben and Smith, 1973; Rosch et al., 1976a; Rosch, Simpson and Miller, 1976c), category acquisition (Hupp and Mervis, 1982; Mervis and Pani, 1980), category verification tasks (McClosky and Glucksberg, 1978; Rosch, 1973, 1975d; Rosch and Mervis, 1975), sentence production (Kelly, Bock and Keil, 1986) and expectations generated by priming with category names (Rosch, 1975c, 1975d; Rosch, Simpson and Miller, 1976c). Even goal-derived categories (i.e. categories constructed to achieve goals, such as "things to take on a camping trip") have been demonstrated to display a prototype structure (see Barsalou, 1983).

Category membership, thus, rather than all-or-none, as predicted by the classical view, appear to be graded. People are, therefore, reliably able to rate the extent to which a member of a category fits their idea or image of the meaning of the category name (Rosch, 1973, 1975d). Research on category structure and development has also indicated that the extent to which an item is judged to be typical of a category is an important variable in the cognitive processes involved

in categorization tasks (see Duncan and Kellas, 1978; Hines, Czerwinski, Sawyer and Dwyer, 1986; Jolicoeur, Gluck and Kosslyn, 1984; Rosch, 1973, 1975b, 1975d). The evidence therefore appears to favour the prototypical view rather than the classical view of categories. This is so because according to the classical approach all members of a category are equal since they must all have the same set of defining features to be included in the category. This view, however, simply does not harmonize with the way categories appear to be organized.

2.5. Prototype Formation

Rosch et al. (1976a) have posited that differences in degrees of typicality appear to indicate that categories are structured around a prototype (i.e. the central or best exemplar(s) of the category). The prototype would thus encompass the attributes most representative of the members included in the category. Prototypes have been more specifically defined as forming the core of the category (see Mervis, 1980). This indicates that the most representative attributes or features associated with the category would be present in the prototype. Such core features would serve as the criteria against which category membership decisions are made. As to the nature of the prototype, Mervis (1980) proposes that this could be either an actual best exemplar of the category or an idealized best exemplar (a mental image) which has come to be formed from exposure to category members. Whichever the view, the prototype appears to be a way to represent summary information about the category or clusters within the category. Prototype theory suggests that the abstraction of such summary information is based on a family resemblance principle. That is, while typical members will share many features in common with one another, atypical members will share only a few and may even share attributes with members of other categories (Keller, 1982; Rosch and Mervis, 1975). Traditionally, prototype formation has been considered to reflect invariable context-free abstractions generated from exposure to relevant stimuli. The prototype would thus incorporate the central tendency of the main attributes or features considered critical for membership within a category. According to this view the emphasis was on the abstraction of "relevant" (core) features as opposed to "irrelevant" or "surface" features. Analytic generalization was considered the main variable in the abstraction of summary information about a category (see Jacoby and Brooks, 1984). Abstracted features, though, did not have to be defining but only characteristic of the concept. Therefore, for an item to be considered a member of a given category it merely needed to possess a

degree of similarity to the prototype by reason of displaying some criterial number of features included in the representation of the concept. Has the evidence, though, always harmonized with such a view or have studies on categorization, at times, demonstrated that people do not always base their categorical behaviours simply on abstracted core features but may, at times, hold only a belief in the existence of such cores? As we shall next consider, the actual identification of analytic core features is not always the main variable which dictates subjects' behaviour on categorization tasks.

Evidence from research on concept cores has at times identified core features associated with certain categories as one of the main determinants of category membership. For example, for well-defined concepts such as bachelor and island core features such as "unmarried male" or "surrounded by water" proved to be crucial for inclusion of the items into the respective categories (see Keil and Batterman, 1984; Landau, 1982). For other types of categories, however, category membership decisions based on cores have not been so straightforward. Malt (1990), for instance, argues that categorical behaviours assumed by subjects, rather than reflecting reliance on the existence of actual concept cores may demonstrate only the subject's belief in the presence of such cores. Through a series of experiments involving judgements of sentence acceptability in the use of linguistic hedges Malt found that, especially for categories of natural kinds, such as **Bird** and **Flower,** subjects appeared not to be able to specify exactly what the core features were but rather to hold a belief in the existence of such features. Such a belief allowed them to differentiate unimportant factors from information more central to category membership (see also Carey, 1985; Keil, 1986, 1987, 1989; Medin and Ortony, 1989; Putnam, 1975; Rips 1989). People therefore, appear to feel that items which belong to certain categories can be used in a loose way based on their existing knowledge whereas items in categories which have more clear boundaries have to be defined by specific knowledge which the subject might or might not have. This fact was demonstrated by the fact that for the three types of categories analysed in Malt's (1990) study (i.e. natural kinds, artefacts and well-defined concepts such as bachelor and grandmother), certain hedges were considered more acceptable with one type of category than with another. The hedge **"loosely speaking",** for example, was much more acceptable with categories of artefacts than with categories of natural kinds. In this instance, the hedge **"according to experts"** proved to be much more acceptable. Although the idea that people possess knowledge about cores which form the main criteria against which category membership decisions are made may seem

appealing it does not always seem to harmonize with the facts (see Malt, 1994; Smith and Sloman, 1994). Knowledge of cores or reliance on them may suffice for certain types of categories only. For example, for concepts with easily verbalized definitions such as some kinship terms, individuals may indeed have knowledge of core attributes which form the main criteria against which they will include or exclude items within the category. For other categories, however, category membership decisions may be guided by their beliefs in the existence of some attribute(s) or feature(s) which they may regard as crucial for inclusion into the category. Prototype formation will thus encompass more than the sole abstraction of core features which would be equally known by individuals in general. It may rather, sometimes, only include a belief in the presence of cores, not actual knowledge of them. Such a line of evidence points to the fact that, at least for concepts of natural kinds, prototype formation must encompass more than only an analytic process. The fact that individuals might not have the actual knowledge of core features but yet believe that these must exist and that expert individuals will possess such knowledge appears to indicate that rather than containing only static lists of characteristic features, the prototype encompasses more than just a summary of features. A more satisfactory account of prototype formation will, therefore, take into account both feature representation and the types of beliefs and theories people hold about the criteria for items' inclusion into categories. Murphy and Medin (1985) propose, in a similar vain, that it is actually people's background knowledge or their "naive theories" about the world which allows for concept coherence. They view categorization approaches which are solely based on similarity or feature correlations as inadequate accounts of conceptual coherence because none of these provide enough constraints on possible concepts. According to Murphy and Medin (1985), it is people's world knowledge (i.e. their life experiences, which incorporate social and idiosyncratic beliefs as well as cultural and/or environmental constraints) which will contribute to structure the attributes that are internal to a concept and help relate concepts within a domain. Prototype formation, thus, rather than solely reflecting an analytic process of abstraction of criterial features should be viewed, as argued by Richards (1988), as "dynamic and context-sensitive". The idea behind this view is supported by Richards and Goldfarb's (1986) episodic memory model. According to this model, a concept's representation does not solely display an invariable structure (a list of core features, for instance) but is malleable and will reflect the interaction between the environmental context and the strengths and interconnections of the associates of the concept that the individual has stored in episodic memory as a

result of previous encounters with concept instances within a meaningful context. This view, rather than favouring a unique prototype representation which would stand for the category as a whole at all times, allows for the accessibility in working memory of a number of prototype representations. The retrieval of the relevant representation will, in this case, depend on the interaction between the experimental context and the associates of the concept which are stored in episodic memory. Since concepts emerge and are formed by experiences with items and events one encounters as part of a social group in a given cultural setting and may also incorporate environmental and/or idiosyncratic factors, it appears thus more reasonable to conceive of prototype formation as a non-analytical process which will reflect such dynamic variables.

The nature of the representation generated from exposure to a category name and the cognitive processes involved in instance categorization and retrieval from semantic memory have given rise to the formulation of various models of categorization. I next include a discussion of two of the main categorization approaches (i.e. prototype based models and exemplar based models) and provide a conciliatory view by commenting on empirical findings which rather than favouring one or the other of the above mentioned approaches appear to harmonize with both.

2.6. Models of Categorization

Categorization models have been generally divided into two main groups. Those which favour the prototype approach to categorization on the one hand, and those which favour the exemplar based approach, on the other.

Prototype based models are probabilistic in nature. According to these models a concept representation will reflect a central tendency of the most representative attributes which are shared by the members of a category. These models, therefore, assume that people form an abstraction of an ideal best type of a category and that real instances are included or excluded from the category on the basis of their similarity or lack of similarity to the abstracted representation (Franks and Bransford, 1971; Reed 1972).

Models which favour the exemplar view of conceptual representation propose, by contrast, that no abstracted summary of the category representation exists. The basic assumption is, therefore, that the individual will, at least in part,

store in memory a different representation for each separate instance (Brooks, 1978; Hintzman and Ludlam, 1980; Medin and Schaffer, 1978).

2.7. Prototype Models

Prototype models can be divided, depending on their treatment of features, into 1) **featural models** and 2) **dimensional models.** Whereas featural models propose that concepts are represented by abstracted representations which can be decomposed into a collection of discrete features, dimensional models hold that conceptual representation preserve stimuli information that can vary continuously along several dimensions.

Despite the fact that both featural models and dimensional models allow for the inclusion in the concept representation of non necessary features which are salient and have a high probability of occurrence, the two types of prototype models differ in one basic aspect. While, in the former type of models, features included in the concept representation, will contain only weights associated with their probability of occurrence, in the dimensional approach such features, besides having weights, will also display different values on the dimensions associated with them. The value of a dimension will, as stated by Smith and Medin (1981), be "the (subjective) average of the values of the concept's subsets or instances on this dimension". (p. 102)

Although the featural approach and the dimensional approach favour a summary conceptual representation which will incorporate the central tendency of the category, the most striking contrast between the two approaches resides in the different way features are treated by the two approaches. While in featural models the abstracted concept representation will display the modal (i.e. the most frequent) features of the category, in the dimensional models such representation will depict the average or mean dimension values of the category. Therefore, while in the former type of models, the value of the feature associated with a concept is the feature itself, in the latter such value will be represented as a psychologically continuous dimension. For example, dimensions, such as [size] and [predacity], associated with the concept 'bird', will be treated differently by the two approaches. While these dimensions, in the featural approach, will only have weights associated with them, in the dimensional approach, besides having weights, they will also display values which will reflect the features' varying degrees of salience as part of the concept and their probability of occurrence. Thus,

category judgements will be moulded by different parameters depending on the approach followed. If the feature approach is being used, an item such as robin will display a much higher chance of being classified as a member of the **Bird** category, solely on the basis of possessing an appropriate (or expected) size value. On the other hand, if the dimensional approach is being followed, dimensions such as [size] and [predacity] will be treated as psychologically continuous ones and will be taken in conjunction in determining the item's membership into the category. Therefore, whereas in the featural approach, an item's inclusion into a given category will be determined in isolation by its displaying one or more features whose likelihood of occurrence is high (i.e. modal features) for the category concerned, in the dimensional approach, category membership will be a matter of continuous degrees. As Smith and Medin (1981) note, the fact that, in the dimensional approach, dimensions are treated as continuous variables, may allow the individual "to combine the values of various instances or subsets by taking their mean on each dimension". Such a difference in feature treatment allow for the generation of conceptual representations which will differ on a critical psychological aspect. As Smith and Medin (1981, p. 104) rightly point out,

> "If a concept contains average properties, it may be maximally similar to an instance whose properties are totally novel but happen to match the average values for that class; in contrast, an instance with totally novel properties will be maximally dissimilar to a concept that contains modal properties, since every feature of the instance will mismatch those of the concept."

Another fundamental distinction between the featural approach and the dimensional approach is related to the way concepts have, most often, been represented by researchers who favour the latter approach. These have, basically, contended that concepts which share the same relevant dimensions can be represented in a geometric model which consists of a set of points embedded in a multidimensional metric space.

2.7.1. Featural versus Dimensional Models

Since the featural approach and the dimensional approach are in opposition as regards the nature of the conceptual representation generated, some of the

main models which favour either one or the other approach will be discussed in the next sections.

2.7.2. Smith, Shoben and Rips' Feature Comparison Model

Smith, Shoben and Rips (1974) point out that concepts are represented in memory by bundles of semantic features. These are viewed as part of a continuum where some features will be more or less defining (cf. Smith et al., 1974, p. 216).

Defining features are those features considered essential for concept membership, while characteristic features are those commonly associated with the concept but that are optional. An instance does not have to have a certain characteristic feature in order to be a member of the concept. *Wings,* for example, might be a defining feature of birds, while flying might be considered a characteristic feature since all birds have wings but not all fly.

Such treatment of features correspond to the notion introduced by Rosch and Mervis (1975) of family resemblance. However, unlike Smith et al., Rosch and Mervis do not set an explicit boundary between defining and characteristic features. This is an advantage to their proposal since, as it will be discussed below, the semantic processing involved in categorization decision tasks cannot rely on such a strict dichotomy.

Although the Smith et al.'s model conforms with the general featural approach on two basic aspects (i.e. the generation of a summary representation and weighted features), it departs from featural models in general in its main assumption about processing. Instead of postulating that a weighted sum of features is involved in categorization tasks, they propose that, in categorization decision tasks, the subject ignores all weights and just determines the number of feature matches between the test item and the target concept. According to the assumptions made by the model, comparison of two concepts in a categorization task will occur in two stages. First, the concepts will be compared with respect to all features, both characteristic and defining. If the match is above a positive criterion, the subject answers `yes'; if it is below a negative criterion, the subject answers 'no'; and if it is in between, the subject makes a second comparison in stage two, on the basis of just the defining features. If the instance possesses all the defining features for category membership, the subject answers 'yes' but otherwise says 'no' (see Figure 2.1).

Collins and Loftus (1975), while agreeing that some categorical judgements occur in the way the Smith et al. model predicts, argue that not all of them do. They argue that, in making decisions about similarities between concepts, people use whatever evidence they find including superordinate links. Another difficulty Collins and Loftus point to regarding the Smith et al.'s model is that people seldom know the defining properties of concepts. People generally have no idea what the defining properties of a mammal, an animal, a bird, or a sparrow are. How then, as the model's staged process imply, could people solely rely on such properties when comparing concepts? Along these lines Collins and Loftus (1975, p. 426) write:

> "Neither of the authors has any idea what properties of a sponge make it an animal, but if asked in an experiment whether a sponge was an animal, we would answer 'yes'."

According to Smith, Shoben and Rips (1974), their model is capable of satisfactorily accounting for typicality. They view the 'characteristic features' associated with certain category members as the main cause of typicality. They refer to characteristic features as dimensions. Each dimension consists of a range of values, and each category member has one value on each dimension. This approach shares certain similarities with the notion of cue validity as expressed by Rosch et al. (1976a).

Smith, Shoben, and Rips' Feature Comparison Model For Semantic Categorization Task

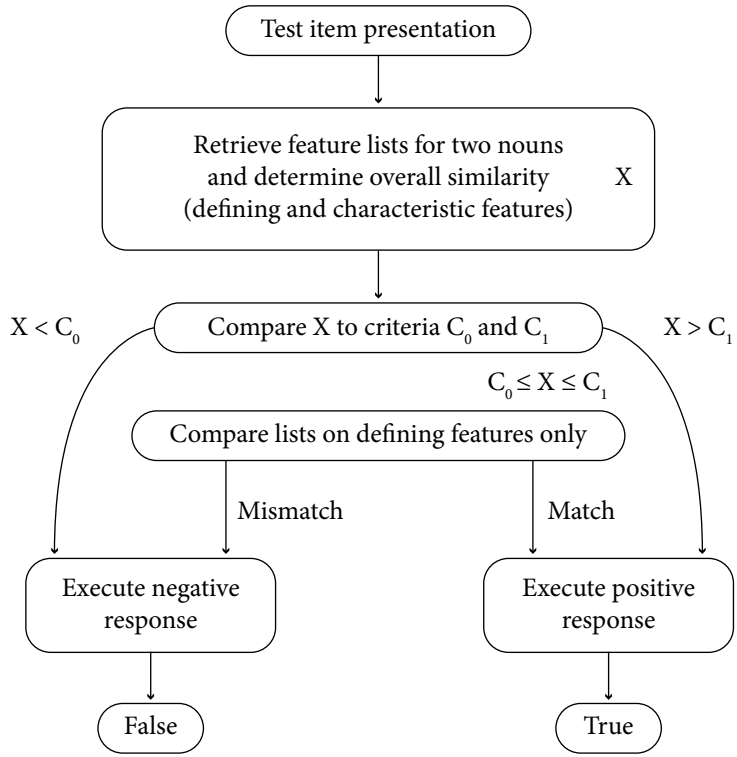


Figure 2.1

(taken from Smith, Shoben and Rips, 1974)

2.7.3. Collins and Loftus' Network Model

Collins and Loftus' model assumes that concepts are represented in memory as summary descriptions which contain many non necessary features. Each feature is, in turn, weighted by its importance in conferring concept membership. As an extended version to the Collins and Lillian's (1972) network model, Collins and Loftus' (1975) model displays many features of that model but agrees in some aspects with that of the Smith et al.'s (1974). Their approach, called "Spreading Activation Theory of Semantic Processing", assumes that typicality is in part

determined by "accessibility". Differences in accessibility are determined by the numbers of nodes which intervene between concept nodes and by the weighting of the links which connect the nodes (see Figure 2.2).

Part of a network model in the spreading activation model

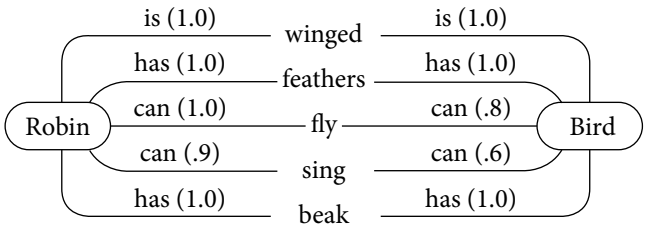


Figure 2.2

(taken from Smith and Medin, 1981)

While emphasizing that the processes involved in concept comparisons and category decision tasks are mainly to be described in terms of semantic relatedness existing between concept nodes at any level of the hierarchy, Collins and Loftus do recognize that, at least at some stage of the process, the comparison of certain features related to the concept might be involved, as the Smith et al.'s model predicts.

Collins and Loftus' model contains two networks. One is to account for semantic similarities, and the other to handle concept names. The latter, called a lexical network, contains all the phonological information about a word. Lexical nodes are related by one or more links to concept nodes in the network structure. Within the semantic network of the model, concepts are linked by means of properties (or features) they have in common. This is somewhat similar to the notion of family resemblance promoted by Rosch and her associates (see Rosch, I 975a; Rosch and Mervis, 1975). The more properties two concepts have in common, the more links there are between the two nodes and the closer the concepts are (as illustrated by Figure 2.2).

2.7.4. The Feature-Set Model of Hayes-Roth and Hayes-Roth

Hayes-Roth and Hayes-Roth's (1977) model also referred to as "the schematic model" (Hayes-Roth, 1974; Hayes-Roth and Hayes-Roth, 19'73) assumes, in a

fashion similar to the Smith et al.'s (1974) model, that exemplars are encoded in memory as a set of properties. The preference of the authors for the use of the term "properties" as opposed to "features", however, renders the present model more powerful than the one proposed by Smith et al. (1974). This is so because, while the latter authors posit that concepts are represented in memory in terms of bundles of semantic features which are dichotomously labelled as defining or characteristic and, as such, play either a primary or secondary role in categorization, Hayes-Roth and Hayes-Roth take a more dynamic view of the role played by sets of properties in conceptual representation. They use the term property to include more than just features (i.e. unitary predicates) but also any higher-order predicates that can be asserted about the exemplar. According to the model, the properties encoded for any given exemplar will, thus, depend upon the individual's prior knowledge, the choice of encoding strategies, and the context in which the exemplar is presented, among other variables. An exemplar's representation will, according to the authors, be made up by what they term property-sets. Property-sets, in turn, encompass the frequency of occurrence of all the exemplar's single features plus all possible combinations of these features. The frequence with which a property-set occurs among all the encoded exemplars of a category determines its associative strength to that category. Recognition of a given exemplar is assumed to be determined by the associative strengths of the property-sets of the exemplar in relation to the category as a whole. Categorization, on the other hand, is determined in terms of diagnosticity. That is, an exemplar will be classified as belonging to a given category by means of its most diagnostic property-set. The diagnosticity of a property-set for a given category is defined as an increasing function of its associative strength to that category and a decreasing function of associative strength to other categories. The notion of diagnosticity of property-sets put forward by Hayes-Roth and Hayes-Roth allows for the creation of stimulus sets in which items that are more distant from the category's central tendency display higher property-set diagnosticity. This may result in categorization behaviour which is governed, not by prototypicality, but by diagnosticity.

2.7.5. The Property Comparison Model of McCloskey and Glucksberg

On assumptions similar to those put forward by Smith et al. (1974), and Hayes-Roth and Hayes-Roth (1977), McCloskey and Glucksberg (1979) assume that concepts are represented in terms of sets of meaning components. They,

however, completely reject the prediction of the Smith et al.'s model that, when a category verification task takes place, sets of features common to hyponyms included under a superordinate term are weighted according to definingness. According to McCloskey and Glucksberg's model, concepts are represented by sets of property dimensions which specify one or more values characteristic of exemplars of the concept. Category membership decisions are thus determined by shared resemblances among category members. According to such a notion, each category member shares at least one attribute with one or more members, but there are few (if any) attributes shared by all members. Membership in a category is assumed to be graded according to degrees of family resemblance. The most prototypical members will display the greatest number of attributes in common with other members in the category. Typicality thus reflects degrees of family resemblance, and the cognitive representation of a category is more similar to the representation of typical members than of atypical ones. McCloskey and Glucksberg's proposed model reflects, to a large extent, the proposals of category structure which have been empirically tested by Rosch and Mervis (1975).

2.7.6. The Semantic Distance Model of Rips, Shoben and Smith

Favouring the dimensional approach to categorization, Rips, Shoben and Smith's (1973) model assume that category verification processes can be explained in terms of semantic distance which holds between concepts. This assumption is based on the idea that typical items will be closer to the concept they represent than atypical ones. Such proximity or distance relation holding between category items and a category name will determine the ease or difficulty with which category verification statements are verified. To test the above mentioned assumption Rips et al. (1973) conducted experiments where subjects had to decide whether or not sentences from related domains such as, "A robin is a bird" or "A robin is a mammal" or from unrelated domains such as, "A bear is a bird" or "A bear is a car" were true or false. Reaction times obtained demonstrated that, on the whole, true sentences which contained typical items and false sentences which contained unrelated items were verified faster. By devising other experiments Rips, Shoben and Smith were also able to obtain semantic distance ratings which not only confirmed the RTs previously obtained but also indicated that semantic distance could predict choices in an analogies task. The ratings were plotted against a multidimensional space which suggested that semantic distance can be represented as Euclidean distance on a semantic space (cf. Rips et

al., 1973). The results of the experiments led Rips et al. to propose a model of categorization which closely resembles their more recent Feature Comparison Model (see Section 2.7.2; Smith, Shoben and Rips, 1974) and also the Set-Comparison models of Meyer (1970) and Schaeffer and Wallace (1970). The Semantic Distance Model though, departs from the previously mentioned models in assuming that all features which are compared and weighted in category verification tasks are to be treated, not as static attribute lists, but as continuous variables along given dimensions. As in the Smith, Shoben and Rips' (1974) model, category verification involves a two-stage comparison process in which features are compared and weighted. While first stage comparison determines the degree to which all functional features are shared by an instance and a category, the second stage discriminates between defining and characteristic features and a second comparison is made on the basis of defining features alone. Speed in RTs is explained in terms of the time required for feature comparisons to be made. Second stage processing may be shortened or omitted altogether when first stage comparison determines either a very high or a very low degree of functional features. Since semantic distance is represented as the degree of similarity determined by first stage processing, fast confirmations or disconfirmations of instance-category relations can be detected at this stage and the model is thus able to handle satisfactorily the results of either True or False RTs. Note that the shortening or the omission of the second stage comparison proposed by Smith et al. (1974) allow for semantically unrelated concepts to be easily disconfirmed in category verification tasks which results in faster RTs. This is in striking contrast with Collins and Quillian (1972) and Collins and Loftus (1975) network models which assume that semantic distance is reflected in terms of the number of nodes and planes which intervene between concepts. Thus, while the latter models assume that the more unrelated two concepts are the longer it takes for them to be disconfirmed due to the number of intervening nodes which separate such concepts in the network. Rips et al.'s model, on the other hand, predicts exactly the opposite (i.e. that the more unrelated two concepts are the faster they will be disconfirmed and, by the same token, that the more related two concepts are the longer it will take for them to be disconfirmed). Evidence from other studies is inconclusive. Sometimes it has favoured the prediction of the feature-comparison view (see MacCloskey and Glucksberg, 1989), other times it has supported the assumptions of the retrieval view. Holyoak and Glass (1975), for example, found that contrary to what feature-comparison models assume, highly related but clearly contradictory concepts, such as "a dog is a cat" are verified relatively quickly (see also

Glass et al. 1974; Lorch 1978, 1981; Schvaneveldt, Durso, and Mukherji 1982). Based on the results from additional research, Lorch (1981), thus, takes a more balanced view and suggests that both comparison and retrieval processes may be employed in category verification tasks. This leads one to conclude that both the .assumptions made by feature-comparison models such as the one proposed Rips et al. (1973) and the assumptions made by network models can be taken into consideration as plausible explanations of categorization behaviours employed by subjects in categorization tasks.

Models based on the metric assumption, such as the one by Rips et al. just described, have been criticized, on the one hand, by their apparent violations of metric axioms and more specifically by their inefficiency in representing feature correlations in multidimensional space (see Twersky, 1977; Smith and Medin, 1981).

Krumhansl's (1978) model, to be outlined in the next section, provides a reply to such criticisms by suggesting that the geometric approach may be able to cope with apparent violations of the metric assumptions. In order for this to be so, she suggests that traditional multidimensional scaling models be augmented to accommodate the notion of spatial density as a variable capable of affecting the similarity measure holding between concepts. In discussing the model, I will, in view of the relevance to the topic of this thesis, focus on how the distance-density model copes with the problem of representing feature correlations in metric space.

2.7.7. Krumhansl's Distance-Density Model

Concept features may be correlated (i.e. the existence of one feature may be a good predictor of the existence of another), for example, considering the features "size" and "singing ability" for the **Bird** category. It is generally the case that smaller birds will also be the ones more likely to display singing ability. According to the multidimensional approach to concept representation such a correlation can be expressed in terms of the metric distance between the category item and the given features. Metric distance, on its part, is assumed to be kept symmetric, that is, the distance measured from the category item to the correlated features taken in conjunction, should vary equally. Any asymmetries found would be an inconvenience for such an approach. The fact is, however, that counter examples do appear. There may be small birds which do not sing or big

ones that do. How will the distance holding between the representation and the correlated features be kept symmetric in cases like these? The traditional multidimensional scaling model thus seems, at the very least, incomplete to cope with the above mentioned difficulty.

Krumhansl's (1978) model, although seminal in nature, provides a more promising approach to representing feature correlations in geometric space. The model assumes that the similarity between two concepts is a function of both interpoint distance and the spatial density of other stimulus points in the surrounding region of the metric space. Thus the distance between two concepts depends not only on the metric distance between them, but also on the density of feature points in the region of the two concepts under analysis. If two category instances display correlated features which vary along given dimensions, the points which represent the concepts in the dimensional space may form clusters or dense regions. To illustrate, if 'bird' is the concept under analysis, many points under the regions of "small" and "sings" will tend to cluster together and the same would occur for the contrasting features "large" and "doesn't sing". This way the psychological distance between items with correlated features will differ from that of items with uncorrelated features since density will be greater when correlated features occur. However, since the notion of spatial density allows for asymmetries between points represented in the metric space, the distance between correlated features, taken in conjunction, or between such features and category items does not necessarily need to vary symmetrically. This allows for the representation in multidimensional space of any counter examples which may display some feature or features but not others in a cluster of correlated values.

Krumhansl's (1978) model is also able to explain variations observed in similarity judgements arising from context effects. According to her, subjects may weight dimensions differently depending on stimulus context and probably even the specific pair of items under analysis. The notion that different weights are assigned to specific features in classification tasks depending on context variables is also explored by the exemplar model proposed by Medin and Schaffer (1978) to be discussed in Section 2.8.1.

2.7.8. Critical Review of Featural and Dimensional Models

Although the featural models and the dimensional models so far discussed no doubt provide some insight into the cognitive processing of categories and serve

to explain, at least in part, what kind of strategies individuals use in categorization decision tasks, I feel that they fail on at least three interconnected aspects. Most of these models, for example, with the exception of Hayes-Roth and Hayes-Roth's model and the model proposed by Krumhansl where context effects are taken into consideration although superficially, have generally ignored the ways in which context can affect category membership assignments. Both network models (Collins and Quillian, 1972; Collins and Loftus, 1975) and set-theoretic models (Smith, Shoben and Rips, 1974; McCloskey and Glucksberg, 1979), for example, place great emphasis on sets of attributes shared by various category members as the underlying basis for category membership and typicality effects. On the one hand, network models explain membership and typicality effects in a given category in terms of the permanent structural relation between the item given as an instance and the category terms within the network (the concept of semantic relatedness). On the other, set-theoretic models explain category membership and typicality effects in terms of the number of shared attributes between category terms. Both approaches imply, however, that category membership and typicality effects result from a process of comparison and weighting of structural characteristics or attributes between an instance and the category term. But suppose an instance in which, due to contextual constraints, a category member has had some of its most obvious defining attributes suppressed. If, for example, a chicken, in the process of being prepared as food, has had its wings chopped off and its feathers plucked off. How would such models fare in explaining the psychological processes involved by means of which one still assigns category membership under such circumstances? I can see no provision for this kind of problematic situation in the models as they are currently proposed.

The second handicap I detect in the models here discussed is again a consequence of their lack of concern for the effect context can have in constraining the representation accessed for a category. Instead of integrating context as one of the variables affecting the psychological processes which are involved on category verification tasks, such models have solely focused on explaining how representations are accessed for category terms presented in isolation. The models have thus, in general, been unable to provide a comprehensive framework capable of coping with the evidence which suggests that the representation accessed when a category name is presented in isolation may change with context (cf. Anderson and Ortony, 1975; Potter and Faulconer, 1979). For example, in the absence of an explicit context sparrow is a more typical bird than penguin in a sentence such as "I saw some birds as I looked through the window this

morning." However, penguin would seem to be more representative of **Bird,** were the sentence uttered by an individual on some sort of scientific expedition to the North Pole. Though the models discussed in this section have been able to explain, at least to some extent, the processes involved in the retrieval and comparison of word-meanings as well as in their organization in the memory structure. I feel, however, that they ought to be expanded in order to account for the role that context plays in memory representations accessed for semantic categories presented in contextualized situations. Such a lack of concern for context effects on memory representations leads us to the third and final difficulty I encounter in these models. Categorization models (either network models or set-theoretic models) have generally assumed that category structure remains stable. That is, in order to account for variability in typicality ratings (goodness-of-example distributions), these models have assumed that characteristic attributes shared by typical category members are included in the memory representation for the meaning of the category name. This assumption, in turn, carries the implication that semantically closer items (on the basis of shared attributes) remain more readily accessible regardless of the context in which they occur. The implication is further that typicality orderings originally generated in the absence of an explicit context should continue to exert strong influence on category membership decisions across contexts. One has only to think of contextualized situations where the set of likely referents is consistently restricted to understand that typicality ordering may, under such circumstances, be altered. GOE distributions will most likely, in contextualized situations, be a function of the context elicited. Contrary to what has been implied by the models of categorization under discussion (i.e. that a graded typicality ordering is generated solely on the basis of possession of a number of shared attributes), as soon as context is brought into the picture typicality shifts are likely to occur. The eliciting of a specific context may give rise to new GOE distributions which do not necessarily reflect a relation of semantic similarity holding among category members but which may strongly reflect the context in which the GOE distribution occurs. This leads us to conclude that, rather than stable, category structure is rather fluid and reflects context constrains imposed at the time a category verification task is performed. The experiments conducted in the present study under the sub-heading **Context,** one of the variables included on **Rung Four** of the psycho-semantic model of category structure investigated in the present research, add support to the above claim. The results of the context experiments reported in Chapter Six of the present study indicate that context

has an effect on the representativeness ordering of exemplars of a category. This finding indicates that current models of categorization need to cater for findings in context. Since the main objective of this thesis is to gain insight on how category membership varies in two different cultures, the assumptions these models could develop in order to account for context-dependent results are beyond the scope of the present study.

2.8. Exemplar versus Mixed Models

Empirical findings have often demonstrated that although some categorical behaviour displayed in categorization tasks reflect a process of comparison of the category item presented with an abstracted category prototype (Franks and Brandsford, 1971; Posner and Keele, 1970; Reed, 1972; Rosch and Mervis, 1975) not all do. Instead of always displaying a prototype-based behaviour during categorization verification tasks, subjects have, at times, appeared to base their classification decisions on similarity comparisons with stored individual exemplars or exemplar-based information (Dewey and Medin, 1984; Hintzman and Ludlam, 1980; Medin and Schaffer, 1978; Nosofsky, 1991). Moreover, in some experimental contexts subjects' decisions have appeared to reflect neither a prototype-based behaviour nor an exemplar-based behaviour but to be governed by both (Estes, 1986; Homa, Sterling and Trepel, 1981; Malt, 1989; Medin and Alton, 1984; Medin Dewey and Murphy, 1983). In view of such apparently conflicting evidence, the present review now proceeds with a discussion of one of the main exemplar models, the **Context Theory of Classification Learning** proposed by Medin and Schaffer (1978) and some of the mixed (i.e. prototype plus exemplar) models which have been recently proposed. Finally, a conciliating view is presented which suggests that rather than mutually exclusive, prototype-based behaviour and exemplar-based behaviour may be complementary and be displayed even within a single experimental task.

2.8.1. The Context Theory of Classification Learning of Medin and Schaffer

According to Medin and Schaffer's (1978) model, categorization judgements, rather than reflecting category level information, are based solely on the retrieval of exemplar information. Central to the assumptions put forward by the model is the idea that the representation accessed for a given category in a classification

task will not display the central tendency for the category but will reflect stored exemplar information. The main proposal of the model, therefore, is that people do not abstract a central tendency (or prototype) from experience with the various exemplars of a category and then base category judgements on such abstracted information but that classification decisions are based entirely on stored exemplar information. In order to test such a proposal, Medin and Schaffer (1978) conducted a series of experiments in which the distance of transfer items to the prototypes of two well-defined categories was controlled while the similarity of the transfer item to the individual category members was varied. The results of the experiments demonstrated that the inter-item similarity of training exemplars affected learning time. Moreover, the recognition and classification ratings of new instances, rather than proving to be a function of their distance from category prototypes, varied as a function of their similarity to individual training exemplars. Based on such results, Medin and Schaffer proposed that categorization of a new item is based on its similarity to all the stored exemplars. In other words, the probability of categorizing a new item into Category A increases with the similarity of the item to stored exemplars in Category A, and decreases with the similarity of the item to category B. Although exemplar information is assumed to dictate categorization behaviour, the model does not assume that an actual stored exemplar is retrieved when a categorization task is performed. As in the case of prototype models, the context model also allows for the abstraction of summary-type information. The striking difference between the former models and the latter is that such abstraction will, according to the context model, reflect exemplar-based information rather than embody a representation of the category's central tendency.

In a similar fashion to the encoding specificity principle (Tulving and Thompson, 1971, 1973; Watkins, Ho and Tulvig, 1976) which assumes that the presence of specific contexts can affect which stimulus information is accessed, Medin and Schaffer' s model takes context into consideration by assuming that classification judgements depend on contextual factors. In other words, depending on the context elicited, some features will be more heavily or less heavily weighted in classification assignments. Selective attention can, thus, shift from one cue along a dimension to another depending on contextual constraints. As Medin and Schaffer (1978, p. 234) recognize:

> "a rather strange looking four legged animal may be much more likely to be classified as a dog when seen

walking down the street on a leash than when running through the woods."

Seemingly prototype effects in categorization tasks can, according to the model, still be explained in terms of exemplar-based information. In this regard, Medin and Schaffer suggest that prototype effects actually reflect experimental constraints. This is so, according to them, because in most classification learning experiments, stimuli is generated to force the prototype to be the transfer item most similar to members of its own category and least similar to members of other categories. The model is also able to account for the fact that prototype classification seems to decline much less over a period of time than does the ability to classify the previously seen exemplars themselves. This is so, according to Medin and Schaffer, because even when some specific exemplars are forgotten, other exemplars similar to the prototype will remain. This proposal was tested and confirmed by Hintzman and Ludlam (1980). They were able to simulate the differential forgetting of prototype and old exemplars with a computer model that used stored exemplar traces as the only basis for generalization. Under such condition, the forgetting of stimulus properties occurred as an all-or-none basis and only a single exemplar was retrieved from each category at the time of transfer.

Criticisms to the exemplar model proposed by Medin and Schaffer (1978) and confirmed by Hintzman and Ludlam (1980) have been voiced as regards three aspects, namely: the type of categories employed, the limited time of exposure to the categories and the lack of manipulation of learning variables (see Homa, Sterling and Trepel, 1981, for a review). Homa, Sterling and Trepel (1981) thus contend that the results obtained by Medin and Schaffer, and which led them to propose an exemplar-based approach to categorization, was actually a result of the type of categories and methodology employed in their experiments. Using ill-defined categories in a category abstraction paradigm which involved classification and transfer of old, new, prototype and unrelated exemplars, Homa, Sterling and Trepel (1981) found evidence that exemplar-based generalization may occur only under conditions of minimal category exposure and immediacy of test. The results obtained also led them to conclude that with prolonged category exposure, a prototype-based behaviour determines classification accuracy. Similarly, Whitney and Kellas (1984), based on the results of a series of experiments they conducted to verify whether category terms processed in context are encoded as particular exemplars, concluded that processing of semantic categories in context entails activation of summary representation. Whitney and

Kellas, however, do not argue that instantiations never occur (1984, p. 102). In fact, results emerging from the experiments carried out as part of the present research demonstrate that, in classification tasks, subjects can display both an exemplar-based behaviour (which I term, schema-directed)[1] and a prototype-based behaviour to category verification tasks performed in context. (see Sections 6.1.5; 6.2.1.5 and 6.2.2.4.)

2.8.2. Mixed Representations

As stated earlier, subjects' behaviour in categorization tasks has, at times, seemed to indicate that concepts representations may contain both prototypical and exemplar components.

Medin, Murphy and Alton (1984), for example, noted that when subjects were taught ill-defined categories composed of geometric forms which differed along four binary valued dimensions of colour, size, form and number, by direct presentation of prototypical values or even by training on prototype values concurrently with exemplar experience, their performance, in the categorical judgements they performed after such training, appeared to be based on a mixture process of comparison to prototypes and to stored exemplars. Similar results have also been reported by Eli and Anderson, 1981; Homa, Sterling and Trepel, 1981; Malt, 1989; Medin Dewey and Murphy, 1983. Based on the results of their experiments, Medin, Murphy and Alton (1984) have put forward the view that subjects' performance in categorization tasks reflect neither a prototype-based behaviour nor an exemplar-based behaviour but that can be actually mixed. As an appropriate fit for their results, Medin et al. (1984) propose a mixture model which they term **Relational Coding Model of Categorization.** Basically, the model accommodates assumptions made by both prototypical models and exemplar models. Their mixture model assumes that both prototype based processing and exemplar-based processing can be taken into account and combined in analysing subjects' behaviour in categorization tasks. For example, prototype models

1. I believe the term schema-directed is more appropriate to describe exemplar-based strategies in categorization tasks. This is so because schemas incorporate whole chunks of individual world knowledge in which exemplars come to be experienced. Therefore, when an exemplar or exemplars are retrieved in a categorization task, the representation accessed will most likely include context sensitive information which forms part of the schema or schemas in which the exemplar or exemplars were originally experienced. This view is parallel to Tulving's (1972) dichotomy on episodic and semantic memory.

generally assume that a category representation will display the "central tendency" of the category members along each of the component attribute dimensions. Under such a view, classification of a novel item is based on its relative similarity or psychological distance to the category's central members (or prototypes). Similarity to the prototype is, in this case, determined by a weighted, additive combination of evidence from each attribute composing the prototype. Therefore, as Nosofsky (1992) explains, when a target probe **t** is to be classified in either one of two given categories, let's say Category 1 and Category 2, for example, ". . . the probability that probe **t** is classified in Category 1 is found by computing the similarity between t and the Category 1 prototype and then dividing by the sum of the similarities between t and both category prototypes."

Exemplar models, on the other hand, assume that categorization judgements are based on retrieval of information about specific category members rather than on the abstraction of summary information about typical instances of the category. Exemplar models are in sharp contrast to prototypical models in assuming that the similarities of various attribute values comprising two exemplars are combined in a multiplicative manner rather than processed independently (i.e. in an additive manner) like prototype models, in general, propose. Thus, exemplar models assume a multiplicative similarity rule to compute the similarity of a probe t to all stored exemplars.

The mixture model proposed by Medin et al. (1984) encompasses assumptions of these two types of models (i.e. prototype models and exemplar models). The prototype component of the mixture model by Medin et al., however, departs from traditional prototype models by assuming, like exemplar models do, that the overall similarity of an item to a prototype is to be regarded as a multiplicative function of the similarity along the component dimensions. Media et al., thus, assume that with probability **e,** judgements are based on similarities to stored exemplars, and with probability 1 - **e,** judgements are based on similarities to the category prototypes.

Geometric shapes which varied along four binary-valued dimensions which referred to colour, form, number and size were presented as probes to three groups of subjects in Medin et al.'s (1984) study. While two groups of subjects learned either prototypical values alone or were taught both prototypical values and exemplars simultaneously, another group received training on only exemplars. The two groups who were taught either prototypical values or who learned prototypical values followed by exemplar experience, displayed a classification

behaviour which appeared to reflect both prototype and exemplar information. On the other hand, the other group who were trained on exemplars only, relied solely on exemplar based information in classifying novel stimuli.

The fact that the group trained on prototypical values only, nevertheless, appeared to rely on both exemplar and prototype information was made apparent by the production of intermediate values of e. Such a result held true no matter whether a geometric pattern or a description of the pattern was presented as a probe. On the other hand, subjects who were trained on exemplars only appeared to rely on exemplar information in their classification judgements. Such a behaviour, however, as Medin et al. (1984) found out, did not mean that such subjects were not able to determine prototype values. Indeed, when tested on prototype values, their performance proved to he accurate. This seems to imply that, although categorization may sometimes be based on stored exemplar representations, this does not mean that no abstraction, at some point, takes place. In fact, as Medin and Schaffer (1978) and, more recently, Medin and Florian (1992) propose, exemplar models do allow for the abstraction of summary-type information.

As the following discussion highlights, however, finding evidence that such two staged strategy (i.e. classification based on stored exemplars and abstracted summary information) reflects within subjects' behaviour and is thus part of an integrated strategy which holds true in most categorization tasks is not an easy endeavour.

As Medin et al.'s (1984) rightly point out, the fact that in their experiments, subjects trained solely on prototypical values demonstrated a mixture of prototype plus exemplar based behaviours give rise to the question as to whether such behaviour held across subjects or were a reflection of within subjects' performance. That is, did the results indicate that individuals were using a mixed strategy (i.e. prototype and exemplar based behaviours) simultaneously, or did they sometimes employed one approach and sometimes, the other? It might also have been the case that, amongst subjects, there were those who consistently favoured a prototype based behaviour whereas others might have consistently favoured an exemplar based behaviour but not a mixture of both. Unfortunately, these are not easily answered questions in any experimental setting thus far designed. Medin et al. (1984), for example, based on strategy reports by participants in their experiments came to the conclusion that mixed behaviours (i.e. prototype and exemplar based information) held across but not necessarily

within subjects. They found this to be disappointing since one of their goals was to see how these two types of information are integrated. As Medin et al. (1984) recognise, it may be the case that the type of stimuli used may have forced such a result. The categories they used were composed of stimuli which differed only in their combination of values and this fact may have made it very difficult for subjects to have distinct representations for each training exemplar. Medin et al. (1984), thus, suggest that the use of stimuli composed of more idiosyncratic details (such as natural semantic categories) could be more conducive to detecting within subjects mixtures of behaviours. This might be so, in view of the fact that such categories differ in so many ways and display correlations of attributes which can vary in a number of dimensions. Subjects may, thus, when confronted with such stimuli, use two different but integrated categorization strategies. One based on the abstraction of mean attribute values when no individual exemplar information is available and one which makes use of exemplar based information. Such an environment would, possibly, be more appropriate at reflecting how real world categorizing takes place and may yield more conclusive evidence as to whether mixed categorization behaviours reflect within subjects' strategies to categorization.

Malt (1989) has also attempted to gather evidence which could more clearly indicate whether subjects' classification strategies were indeed mixed. In order to reflect more closely real-world categorization strategies, Malt (1989) used natural and artificial animal pictures in a series of categorization tasks. While the pictures shared enough attributes to be grouped into different categories, they were at the same time clearly distinguishable from each other. For the actual classification judgements, an on-line priming technique, which has often been used in semantic priming experiments, was employed. Such technique is based on the assumption that processing one piece of information causes another piece of information to be activated. Based on such a premise, Malt (1989), thus, assumes that when subjects were presented with a new exemplar, their responses, if based on the retrieval of a similar stored exemplar, would be speeded up if they had been exposed to a similar exemplar shortly before seeing a new similar exemplar. This is so, according to her, "because the exemplar and its category membership will have just been accessed and should be highly available." (1989, p. 540). By the same token, if classification is indeed based on the retrieval of a similar stored exemplar, the presentation of a dissimilar new exemplar should delay subjects' responses. On the other hand, if categorization is based on prototype retrieval subjects' classification responses to a similar new exemplar would not necessarily

be faster than to a dissimilar one. This is so, according to Malt (1989), because if a prototype of the prime is what is actually stored, accessibility of the category membership to any one subsequently seen exemplar (either similar or dissimilar to the prime) would not be affected by the prototype retrieved. If, however, subjects' strategies in classifying new stimuli gave evidence that individuals follow not just one of the above mentioned strategies (i.e. exemplar-based behaviour or prototype-based behaviour) but a mixture of both, this could be taken to indicate that there is not an all-or-none answer to the issue of categorization.

As has already been discussed, Medin et al. (1984) found some evidence that a mixed strategy may indeed be employed by subjects in classification tasks. They, however, failed to identify whether such a mixed behaviour reflected a strategy which had been employed across subjects or if it indeed indicated that subjects were individually making use of both exemplar and prototype representations in classifying new stimuli.

Malt (1989) also found evidence that subjects' strategies in classification may be mixed. However, as it will next be discussed, she also found it hard to pinpoint whether such evidence indicated that subjects were individually employing a mixture of strategies. As we will recall, Medin et al. (1984) highlighted that the artificial stimuli they used in their experiments may have been a disadvantage as to precisely detecting whether mixed strategies held across subjects or were, in fact, a reflection of within subjects' behaviour. The fact that Malt (1989) uses categories which more closely resembles those an individual encounters in the real world does not seem to have improved that situation, though.

Malt (1989) conducted a series of experiments in which subjects mainly had to classify new stimuli into different categories by sometimes using only an exemplar retrieval strategy and other times a prototype or exemplar retrieval strategy.

The main finding which emerged from her study seemed to indicate that rather than displaying either an exemplar based behaviour or a prototype based behaviour, subjects' strategies in classification may be mixed. Strategy reports for Malt's experiment 3, for example, revealed that subjects' behaviours may have been guided by the typicality of an exemplar. That is, subjects may follow different behaviours (i.e. prototype-based or exemplar-based) when faced with typical or atypical exemplars in a categorization task such as the priming experiments Malt's subjects participated in. It may be the case, as Malt suggests, that a typical item, presented as a new stimulus, will be judged as belonging to the category on

the basis of a general rule (or prototype), whereas an atypical instance may be classified into the category by the activation of an exemplar-based strategy.

The lack of significance for the positive correlation obtained between priming and condition in Malt's study, prevented her from drawing any more definite conclusions about the possible simultaneous use of a mixed strategy among her subjects.

Although both Malt's (1989) findings and those of Medin et al. (1984) do not rule out the possibility that subjects may have simultaneously employed a prototype-based behaviour and an exemplar-based behaviour in classification, they do not show clearly that this is indeed the case. In fact, as Malt (1989, p. 552) recognizes:

> "Whether a mixture of strategies, if it does occur, is more within-subjects or between-subjects remains to be resolved through further studies."

Next, I present a conciliatory view as to whether categorization behaviour will reflect either an exemplar-based strategy or a prototype-based strategy or whether it may involve both.

2.9. Conciliatory View

It may be the case that the issue of concept representation involves more than meets the eye. It would be nice if one could point the finger and say, for certain, that in a given categorization task either an exemplar or a prototype-based strategy has been used or even that a mixture of both seemed to have been used. Unfortunately, as the discussion contained in the preceding section has highlighted, things are not as clear cut. The complexity of the human cognitive system coupled with numerous other factors such as the individual's world knowledge, idiosyncrasies and past life experiences to mention a few, makes the task, in my opinion, a rather elusive one. Whereas it seems reasonable to assume that concept representation may involve a mixture of strategies, finding conclusive evidence that within subjects' behaviour in categorization tasks is indeed mixed has proved to be difficult. (see Medin, Alton and Murphy, 1984 ; Malt, 1989).

However, despite the difficulty in finding conclusive evidence that within subjects behaviour may, in fact, be mixed, I believe that it is only logical to assume

that the representation of some concepts may, indeed involve a prototype and an exemplar strategy. The evidence gathered through the present research and which is discussed in Chapter Five, for example, points to the fact that the group of Brazilian subjects, while performing the ranking task included in Chapter Five (see Section 5.1.4.), appear to have employed a mixed strategy. Undoubtedly, though, it would be precipitate to say that in every categorization task a subject performs, a mixed strategy is at play. The results from the context experiments included in Chapter Six of the present research, for instance, appear to indicate that while the group of Brazilian subjects relied more on a prototype-based approach in categorizing items presented in context, the American subjects preferred an exemplar-based approach (which I term, schema-directed).

I would like now to make some comments about factors such as the type of stimuli presented, the methodology employed and the subjects themselves which need to be taken into consideration in any experimental procedure. This is the case because such factors can, to a large extent, influence subjects' choice of strategy. These will be discussed next.

2.9.1. Type of stimuli

There are categories such as artificial ones or even basic level and subordinate natural categories in which the various members' common attributes may be either numerous or vary along fairly well defined dimensions. We can think, for example, of a category of schematic faces in which the stimuli composing it may vary solely as regards nose length and distance between eyes. In such a case, a subject may, when faced with the task of classifying new stimuli into the category, find it advantageous to abstract from the various previously seen exemplars, a summary representation (or prototype) which s/he will use as a guide for including or rejecting new stimuli into the category. (Franks and Bransford, 1971; Posner and Keele, 1970; Whitney and Kellas, 1984). It may be the case, however, that even in circumstances such as this, a subject may still favour exemplar retrieval. For example, the subject may classify a new item into the category solely on the basis of its resemblance to a specific previously seen exemplar.

Categories in which shared perceptual attributes among members are very few or simply do not exist, will most probably favour an exemplar based behaviour on the part of subjects engaged in categorizing stimuli into such categories. For example, superordinate categories such as **Furniture** and **Mammal** are

composed of various items which share few or no common perceptual attributes. Since it is impossible, due to the lack of perceptual similarities amongst all members, to establish a summary abstraction (i.e. a prototype) which will encompass the whole of the category, the representation of the various members composing such categories will most likely be exemplar. It must be highlighted, though, that certain properties such as function, in the case of man-made categories or biological criteria in the case of animate categories can be pervasive amongst all members or at least the majority. It can be the case, thus, that when classification of a new stimulus into such categories is performed, the subject will put into operation a mixed strategy in which s/he first abstracts a summary representation of the category based on what properties or criteria are considered crucial for membership into the category and then retrieves a salient (typical) exemplar to be used as the touchstone to reject or include the new stimulus into the category.

2.9.2. Methodology

The methodology employed is another factor which can influence whether the subject will most likely assume a prototype-based behaviour or an exemplar-based behaviour in performing a categorization task. (see Homa, Sterling and Trepel 1981, for a criticism of this type). I feel, for this reason, that findings emerging from data which are obtained under experimental environments where a lot of constraints are imposed can always be, to a considerable extent, mainly a reflection of the training imposed on the subjects. Such results may, therefore, betray what actually happens in real situations. Therefore, I believe that, although, training on either exemplar or prototype information may be included before a subject performs a categorization task, such training should not be given to such an extent as to prevent or highly manipulate the individual's freedom of strategy choice.

2.9.3. Subjects

Individuals' world knowledge and backgrounds may also have some influence on their preference of strategies in a categorization task.

It may be the case that young subjects, possibly those of pre-school age, will lean strongly towards an exemplar-based behaviour (see Krascum and Adams, 1993). At this stage in life the individual's experience with various categories may

be greatly restricted to encounters with different exemplars in given contexts. Exemplar representations are more concrete in nature and require relatively simpler processing. These may, therefore, be the type of representations an individual, at the early stages of the development of her/his categorical system, most often retrieves when faced with the task of classifying new stimuli. At a later stage, the individual is exposed, specially through schooling, to formal criteria, such as function and biological characteristics common to the various members of given categories. At this point, the individual may start to abstract a summary (or prototype) of the category based on such formal criteria. S/he will then have these two modes of categorization at her/his disposal. These may be employed either separately, as already discussed, depending on the nature of the category involved and the individual's preference of strategy-choice, or concomitantly, as the evidence discussed in the previous sections partially points to. In line with what has been stated above, evidence from the present research also suggests that both the Brazilian subjects and the American subjects used in this study appear to have employed more than one strategy in the categorization tasks they had to perform. As will be discussed in Chapter 5 and Chapter 6, evidence emerging from the statistical analysis performed on the data suggests that both in the absence and in the presence of context, the subjects appear to have been operating both under prototype and/or exemplar-based information.

Chapter three
The Study

3.1. How the Study is Structured

The study here reported is divided into two parts. The first part includes a cross-cultural analysis of the semantic structure of nine categories of common nouns taken from the category response norms of Battig and Montague (1969). The analysis and comparisons included in this part of the study were possible by contrasting the data obtained from the folk definition interviews and ranking tasks carried out with 30 native speakers of Brazilian Portuguese with the data gathered by Markovitz (1977) from her 76 American subjects (see Sections 5.1 and 5.2.). The first part of the study also includes a reaction time experiment involving category membership judgements in which the same nine semantic categories which are cross-culturally compared are utilized. The aim of this experiment is to provide an alternative measure of prototype effects on subjects' decisions when these have to assign category membership to items presented under correct or incorrect category names. Twelve American English speaking subjects contacted through the Psychology department of the University of Leeds participated in this experiment.

The second part of the study explores further the nature of the structure and organization of semantic categories by analysing some effects of context on category structure and typicality shifts. The data for this part of the study were collected from 70 Brazilians contacted through the University of Brasilia in Brasilia, D.F., Brazil, and 24 American students at the University of Leeds in England (see Section 4.3.). A cross-cultural analysis is attempted in both the first and second parts of the study. This is possible by comparing the responses obtained by both the Brazilian subjects and the American subjects from the tasks which involved the assignment of category membership in context-bound categories.

In order to perform the analysis, I partially utilize the model of category structure proposed by Markovitz (1977). The reasons why I do so are discussed in the following section.

3.2. Justification of the Model Adopted

The adoption of the model was motivated mainly by the fact that the cross-cultural comparisons which are drawn between Brazilians and Americans are partially based on the data gathered by Markovitz. I therefore felt that by utilizing the same model, I would be able to more accurately analyse how the fuzzy semantic categories here investigated are structured in the Brazilian culture and the American culture and also how graded category membership varies in the case of the two cultures. Moreover, the adoption of the model in a cross-cultural study, such as the one here reported, would contribute to shedding light as regards its universality.

3.3. The Model

Despite the fact that the model adopted is only partially assessed in the present study, this section contains a description of the entire model. This is because I feel that, by having a complete view of the psycho-semantic nature of the model, the reader will more readily appreciate its appropriateness in coping with the kind of analysis here undertaken.

The model is composed of four rungs which are hierarchically organized (see Figure 3.1). The first two rungs cater for the basic semantic structure of each category. **Rung Three** and **Rung Four,** on the other hand, contain information of a psychological nature regarding variables involved in categorization tasks and the generation of goodness of example (GOE) distributions.

Rung One of the model contains a list of ***lexical items.*** These include the category names and any other terms which have been used by the subjects to describe the category names. **Rung Two** lists a set of ***semantic relations*** which link the lexical items of **Rung One** to each other.

The variables contained on **Rung Two** are described as follows.

Taxonomy: this relation translates both hyponimy and category membership. An example of the **Taxonomy** relation would be; *An elephant is an animal.*

The Model

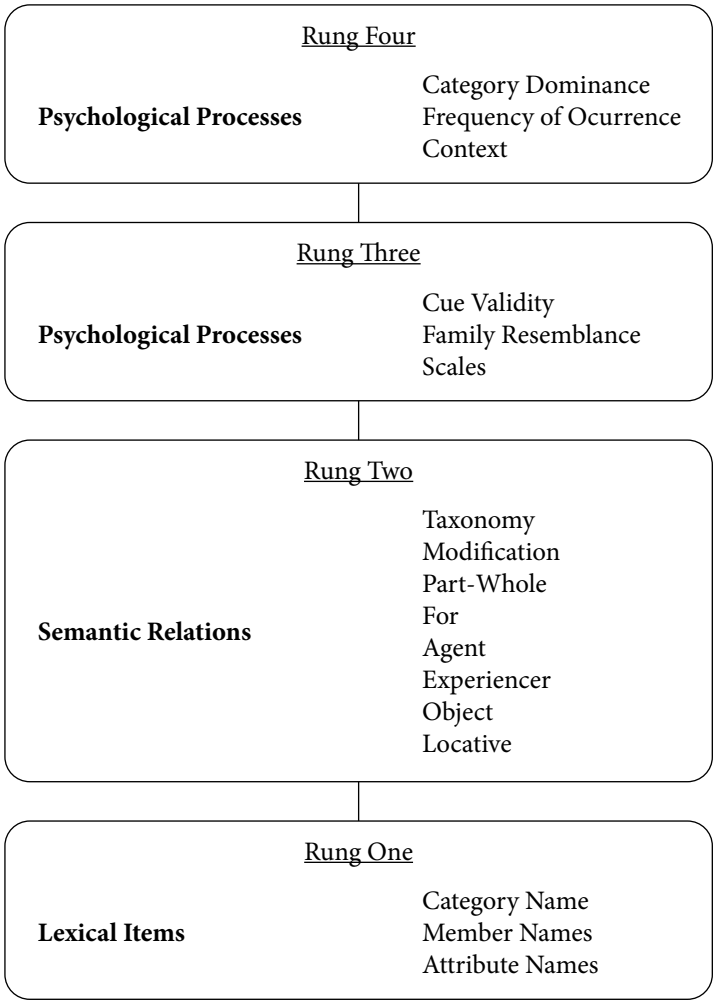


Figure 3.1

(Taken from Markovitz, 1977)

Modification: this relation is often expressed by adjectival attributes most commonly attached to individual category members. It includes descriptive qualities and properties such as size, colour, and material.

Part-Whole: like **Modification** the **Part-Whole** relation is also attributive. It is used to express inalienable possession by 'to have' as in *Birds have wings.*

For: the **For** relation expresses the functional aspect which is many times linked to a category. Due to its nature, the **For** relation is primarily associated with categories of man-made objects. Linguistically it is overtly expressed by the word for as in *Tools are for repairing things*.

Agent: this is a relation strongly associated with the volitional behaviour of intelligent beings. It is therefore limited to animate categories whose members display volitional behaviour. Such relation expresses the lexical link between an animate category and its behaviour. Ex.: *Birds fly*.

Experiencer: like the **Agent** relation, the **Experiencer** relation also describes behaviour. The distinction between the two is that while the **Agent** relation is associated with the volitional behaviour of intelligent beings, the **Experiencer** relation is most often used to describe the non-volitional behaviour of certain animate categories. Ex.: *Trees bear fruit*.

Object: this is a relation present in instances where the category or category member is the recipient of an action. It is associated with the **For** and **Agent** relations. Consider, for example, the sentence *Cabinet-makers use tools for making furniture*. In this case the phrase 'cabinet makers' constitutes the typical agent, whereas 'for making furniture' can be described as the typical function of the object (tools).

Locative: this relation provides a connection between a location and the members of a category or the category itself. Ex.: *Tigers are found in jungles.*

The two remaining rungs of the model are composed of variables of a psychological nature which influence category structure and membership gradation. These are described as follows.

Rung Three is the first rung where variables affecting graded membership are found. **Cue Validity, Family Resemblance,** and **Scales** are psychological variables whose function is to modify, group and assign weights to the relations of the network found in **Rung Two.**

Cue Validity, the first variable of **Rung Three,** can be described as a measure of the strength of the relationship which exists between a given attribute and a category name. Cues which are most frequently used in determining the category membership of items presented as stimuli during category verification tasks are assigned the highest validity. A cue such as 'swims', for example, will certainly

be crucial in determining a given item's membership into the category **Fish** since most fish swim. For this reason 'swim' is given a high validity or weight.

Family Resemblance: together with **Cue Validity, Family Resemblance** constitutes an important psychological variable which appear to influence subjects' behaviour in ranking, grouping or excluding items under a given category name. Items included under categories of naturally occurring objects as well as those which are part of man-made categories may tend to form clusters on the basis of a family resemblance which is translated by a number of common characteristics or attributes which are shared between these items and the best types of the category. On the other hand, items which have few characteristics in common or none at all with good exemplars of a given category will be regarded as poor members or even as non-members of the given category (see Rosch and Mervis, 1975).

Scales: the third variable of **Rung Three** is a range composed of values which are linked to a given attribute. Height is an example of a scaled attribute. This is so because such an attribute has a gradation of values associated with it. For example, in describing the height of a concrete object, a judgement will have to be made as regards which point of the height dimension has to be attributed the object.

Context, Frequency of Occurrence, and **Dominance** are the remaining psychological variables which are included on **Rung Four** of the model. Such variables can exert an influence on those found on **Rung Three** by modifying or dictating subjects' behaviours on ranking decisions or category verification tasks.

The variables listed above can be described as follows.

Context: this variable is responsible for shifts on GOE distributions within a category. Due to **Context,** ranking decisions can be affected. Items ranked as very typical of a given category for example may, in the presence of context, be considered poorer members causing a restructuring of the category to occur. Categories can therefore have more than one prototype depending on the context in which they occur. As Markovitz (1977) found in her study, subjects were able to assign two major contexts for the category **Weapon:** the battlefield and city streets. Bomb was ranked as the most weapon-like **Weapon** when the context of war was evoked, whereas in the context of everyday life it was judged to be less weapon-like and even eliminated from the category.

Context in the present study is investigated to a greater extent than in Markovitz's. In order to do so, two experiments designed to explore the effects of context on typicality shifts and category structure have been introduced.

The first experiment investigates how the introduction of specific contexts can affect choices made by individuals as regards typicality when these are faced with the task of reorganizing category items in context (see Section 6.1).

The second experiment explores further the effects of context on category structure by analysing how goodness-of-example (GOE) distributions are generated in the presence of three specific context-bound sentences (see Section 6.2).

My goal is to broaden the understanding of the role context plays in altering the category representation accessed for a category name whose membership is verified in context.

Frequency of Occurrence, another variable of **Rung Four,** is to be understood in the model here described in the sense of absolute word frequency typically based on written material such as the Kucera and Francis (1967) and the Thorndike and Lorge (1944) frequency counts.

Dominance: this variable can be described as an indication of the dominance (or salience) of given items within a category. Response norms such as Battig and Montague's (1969) have made clear that when subjects are presented with item production tasks, certain members are more often reported as being part of the category than others. These items are therefore the most dominant or salient within the category. Factors such as frequence of occurrence as well as ecological and/or cultural constraints besides other variables can play a part in Dominance.

Only the variables included on **Rung One** and **Rung Two** of the model and the variable **Context** on **Rung Four** are utilized in the analysis reported in this study. This is the case because a cross-cultural comparison of the entire model would render the present research far too long, beyond the limits of acceptable length. **I** felt therefore that the partial utilization of the model so far as **Rung One, Rung Two** and **Context** on **Rung Four** are concerned would, for the purposes of the study here reported, be sufficient. The present study is concerned with providing a cross-cultural appreciation of the structure of fuzzy semantic categories and with shedding some light on the decision-processes utilized by the subjects in ascribing category membership both in the absence of context and in context. The processes included on the first two rungs and **Context,** included on

Rung Four, are appropriate to elicit the necessary data to perform the analysis proposed in a satisfactory way.

3.4. The Categories Investigated

This study uses a total of eleven semantic categories of common nouns selected from among the fifty-six categories used by Battig and Montague (1969) to obtain category response norms. Since this is a word list specific to American English, it has been modified for the purposes of the present research, in the following way: Nine of these eleven categories and exactly the same category items as used by Markovitz were presented to thirty Brazilian-Portuguese native speakers who took part in a pilot study conducted prior to the ranking task. The category items included under **Disease,** not present in Markovitz study, were also presented to the Brazilians who participated in modifying the original categories. These assessed the extent to which the category items reflected Brazilian-Portuguese categories, by eliminating items which were considered not to be part of the categories and/or by adding, if necessary, other items considered more familiar to reflect their own native language categories. In order that interesting borderline cases of category membership might not disappear from the original categories, only items eliminated in a frequency of 100% were to be left out from the original categories. Since none of the items were eliminated by all the subjects, all the items which appear in the original categories remained.

Only those items most frequently added were incorporated in the final version of the categories. An item had to have been added by at least 20% of the subjects in order to be added to the category. This frequency was mainly chosen because the number of items per category was to remain small (5 to 8 items) and also because items mentioned within a frequency lower than 20% were viewed as not very representative as a category item. Only the highest and the immediately lower frequency were considered for each of the categories. Only one to two items were added per category. When two or more items appeared within the same frequency range, the one most diverse (semantically speaking) to the items in the original category was chosen. An item frequently added but semantically very close to another item already present in the original category was rejected in favour of an item considered semantically more diverse which had been added within an immediately inferior frequency. Only the items added within a frequency of 20% to 100% were incorporated in the final version.

The Battig and Montague's categories were preferred for the following two reasons.

1. It is a word frequency based on category dominance having a bearing on membership gradation and typicality, and was therefore felt to be more suitable for the purposes of the investigation carried out in the study.

2. Among other concerns, the present research is aimed at testing the universality of the model proposed by Markovitz (1977). It was therefore felt, that the use of some of the categories she used would more accurately fulfil this aim.

The categories chosen for investigation are: **Animal, Disease, Drink, Fuel, Furniture, Insect, Seasoning, Toy, Tree,** and **Weapon.** Nine of these categories (i. e., **Animal, Drink, Fuel, Furniture, Insect, Seasoning, Toy, Tree,** and **Weapon)** were also used by Markovitz (1977). These are used in the first part of the present study as the source for the comparisons I draw between the performances of the Brazilian subjects who took part in the ranking task and folk definition interviews and the 76 American subjects in Markovitz's study. The category **Disease** which is added in the present study, has been included with the purpose of shedding some light on the structure of a category which is of a different nature from the remaining nine categories. Whereas all the other categories are composed of concrete, tangible objects, the category **Disease** is made up of items of an abstract nature. It was therefore my aim to analyse how the Brazilian subjects I used in the first part of the study behaved in ranking and defining the various category items included under **Disease.**

The category **Musical Instrument,** is used only in the second part of the present study. The category items, electric guitar, Guitar, cello, and synthesizer included under **Musical Instrument** in the present study, are not exactly the same items used by Markovitz. The inclusion of different items under this category was necessary, however, due to the hypotheses tested under the context experiments included in the second part of the study (see Section 6.2.1.).

3.5. Summary

The study reported in this chapter is divided into two main parts. The first part contains a semantic analysis of ten fuzzy semantic categories which have been defined and ranked by 30 Brazilian subjects. The data gathered through

this part of the study were compared with the data gathered by Markovitz (1977). The second part of the study explores further the nature of the structure and organization of semantic categories by investigating some effects of context on category structure and typicality shifts. A cross-cultural analysis is also performed in this part of the study. This is possible by comparing responses given by 70 Brazilian subjects in tasks involving the assignment of category membership in context-bound categories on the one hand with responses given by 24 American subjects for the same tasks on the other.

The model used for the analysis of the data is the same as the one originally proposed by Markovitz (1977). The adoption of the same model made it possible, in the first place, that a cross-cultural analysis be performed by utilizing the data I gathered from the Brazilian subjects and the data gathered by Markovitz from her American subjects. Secondly, by adopting the model, I could explore further the role played by context on category structure and typicality shifts. Finally, by partially utilizing the model with a culturally diverse population, I hoped to be able to shed some light as regards its universality.

The eleven semantic categories used in the study were selected from among the 56 categories used by Battig and Montague (1969) to obtain category response norms. Because these categories were specific to American English, they had to be subsequently modified for the purposes of the present study. The modification of the categories was made possible by means of a pilot study in which 30 Brazilian-Portuguese native speakers took part. Their task was to eliminate items which they did not consider part of the categories and/or add other items which they thought should be included under the category names.

The experimental procedure used to obtain the data analysed on **Rung One** and **Rung Two** of the model will be discussed in Chapter Four. The results of the cross-cultural analysis attempted for the data incorporated on **Rung One** and **Rung Two** will be included in Chapter Five. The experimental procedure to gather the data for the experiments dealing with the variable **Context** of **Rung Four** and the results emerging from these experiments will be discussed in Chapter Six.

Chapter four
Experimental Procedure for the Collection of the Data Analysed on Rung One and Rung Two

4.1. Experimental Procedure for Data Collection

The experiment here reported is divided into two main sub-parts: a ranking task and an interview. The ranking task is designed in order to provide goodness-of example (GOE) distributions for a small sub-set of items listed under a given category name. The interview is aimed at obtaining information about the semantic structure of the various categories under investigation.

4.2. Stimulus Materials

Cards which measured 3cm x 5cm were used as stimuli. These were grouped into thirteen sets. Each set consisted of one category name and seven to eight member cards. Three of the sets **(Clothing, Sport** and **Vehicle)** were used as demonstration sets to introduce and explain the ranking task. These were not included in the analysis.

The ten test sets and the demonstration sets were selected originally from the Battig and Montague (1969) category response norms (see Table 4.1). These, with the exception of the category **Disease,** constituted a sub-set of the total number of categories used by Markovitz (1977). The categories chosen to be cross-culturally compared were subsequently modified for the purposes of the present study by 30 native speakers of Brazilian Portuguese (see Section 3.4.).

Table 4.1
Modified Categories Used In The Study

Category	Stimulus Items
Animal	dog, cow, deer, squirrel, turtle, snake, *elephant*
Disease	cancer, tuberculosis, malaria, deafness, drug addiction, cold, *a.i.d.s.*
Drink	milk, coffee, juice, cider, soup, *beer, tea*
Fuel	oil, coal, wood, paper, steam, *alcohol, gas,*
Furniture	chair, lamp, dresser, stool, picture, *bed, table*
Insect	fly, ant, grasshopper, flea, centipede, *cockroach, spider*
Seasoning	salt, pepper, garlic, ketchup, nuts, parsley, *herbs*
Toy	doll, block, soldier, balloon, swing, paint set, *teddy bear, ball*
Tree	oak, pine, birch, ash, weeping willow, palm, bamboo, *mango*
Weapon	gun, bomb, bow and arrow, stick, rock, *grenade, knife*

Category Stimulus Items Used as Demonstration Sets

Clothing	shirt, socks, hat, jacket, pyjamas, necklace, *pants*
Sport	tennis, baseball, basketball, fencing, chess, *football*
Vehicle	car, bus, motorcycle, boat, ski, *bicycle*

The categories include one stative category **(Disease),** one collection of mass nouns **(Fuel),** and eight sets of concrete objects. The object categories comprised three groups of living things **(Animal, Insect** and **Tree),** two food categories **(Drink, Seasoning)** and three groups of man-made objects **(Furniture, Toy** and **Weapon).** These categories, with the exception of **Disease,** had already been investigated by Markovitz (1977). This fact, therefore, rendered such categories appropriate for use in this part of the present study where a cross-cultural comparison is made between the data obtained by Markovitz and the data I obtained.

4.3. Subjects

Thirty native speakers of Brazilian Portuguese were contacted for this part of the study. Eleven of these subjects were contacted through the University of Leeds. Five of them had either finished a university course or were university students. The remaining six were postgraduates. All the nineteen subjects contacted in Brazil through the University of Brasilia had also been exposed to university training. One was a postgraduate, eleven graduates and seven undergraduates. Their ages varied from 17 to 43 years. The thirty Brazilian subjects had expertise in various fields in humanities and sciences. I felt that by working with a varied population such as the subjects described above, I would be able to gather a richer array of information about the semantic structures of the various categories which might otherwise have been unavailable.

The reason why the subjects had to be contacted both in Leeds, England, and in Brasilia, Brazil, was that it would have been impossible to contact all the thirty subjects through the University of Leeds in England.

All the subjects participated in the interview and ranking task as unpaid volunteers. The nineteen Brazilians contacted in Brazil also participated in the context experiment described in Section 6.1.

4.4. Procedure

All subjects were interviewed individually. Before taking part in the interview and ranking task, each subject was asked to complete a questionnaire (see Appendix A.). The questions were aimed at determining age and sex and assessing the social cultural background and the academic training of each subject.

Once the questionnaire had been answered, the subject was told that s/he would take part in an experiment whose aim was to provide an insight into how people organize things into different categories. The subject was also told that s/he would be asked to decide on how well certain category items represented the categories.

To help the subject to understand what the ranking task involved, s/he was shown the demonstration set cards composed of the category name and individual cards of some of its members. S/He was then asked to select the category member or members which best fitted the category name and align it or them

below the card containing the category name. S/He would then be asked to align the remaining category member cards according to the same concept of how well they represented the category name, from best to least representative of the category. The subject was allowed to eliminate any item or items which s/he did not consider to be a member of the category. Tied ranks were accepted and the subject was told accordingly. Once what was involved in the ranking task had been clearly understood, the subject was told that the interview in which s/he was about to take part would consist mainly of the same sort of ranking judgements s/he had just made concerning the demonstration sets.

Prior to the ranking task, the subject was asked to define the category name. This procedure called "folk definition" was aimed at constructing from the various definitions a generalized definition of the category name. During this phase, I encouraged each subject to give me as much information as possible. The subject's definition was followed by a series of specific questions regarding the category name. These questions varied according to the category for which information was being elicited. More or fewer questions regarding a given category could also be asked. This would vary according to how well the subject had defined the category name initially. An example of some of the questions which were asked is as follows:

1. What is X usually made of?
2. Can you divide X in sub-categories? If so, what sub-categories?
3. How do these sub-categories of X compare?
4. What is X usually used for?
5. Where is X usually found?

With regard to some of the categories, I asked the subjects whether or not some possible category members were, in their opinion, part of the category. For instance, when talking about **Furniture,** I asked the subjects whether items such as curtains, telephone, or carpets were, in their opinion, members of the category.

When sufficient information had been obtained about the category, the subject was asked to rank the various items included under the category just defined. The member cards were then displayed and the subject was asked to align them according to degrees of representativeness. Rank l was to be assigned to the item or items which the subject considered the most typical. When two or

more items fitted the subject's conception equally well, these could be tied. Once the ranking of the various items was completed, the subject could eliminate any card or cards which s/he thought were not part of the category. The subject was asked, at this point, to explain why s/he did not consider the given item or items to be part of the category.

4.5 Summary

The experimental procedure described in the previous sections is divided into two main parts: an interview and a ranking task.

The interview was conducted with a view to eliciting information about the intensional and extensional aspects of the categories investigated. During the interview, the subjects were asked to provide, based on their own conception, a definition of each of the categories and answer additional questions aimed at eliciting further information about the categories and their members.

The ranking task was aimed at providing a graded goodness of example distribution for ten sub-sets of category members selected originally from Battig and Montague (1969) response norms or included as additional items when the original categories were modified (see Section 3.4.). The subjects saw the member cards simultaneously and these were compared with each other as they were ranked. When the ranking for each category was completed, the subject could eliminate any item or items s/he thought were not part of the category. When an item or items were eliminated, the subject was asked to explain why.

By using virtually the same experimental procedure as employed by Markovitz (1977), I hoped to be able to gather information which would make possible a cross-cultural comparison of the categories involved and therefore fulfil one of the aims of the present study (see Section 1.1.).

The analysis of the findings from both the interview and the ranking task is reported in the next chapter.

Chapter five
Results of the Analysis Performed on the Data Collected for Rung One and Rung Two

5.1. General Discussion of Findings for Rung One

Whereas the internal factors affecting typicality and category membership will be considered in Section 5.2, where the findings for **Rung Two** are discussed, this section focuses on variables affecting the subjects' behaviour during the ranking task (i.e. the subjects' ability to perform the task and other possible variables influencing their behaviour).

As stated in the introductory chapter, one of the goals of the present study is to investigate the manner in which the phenomenon known as graded category membership varies across cultures by drawing comparisons, whenever possible, between my findings and those reported by Markovitz (1977) in her study about fuzzy categories. The emphasis which **Rung One** places on the extensional aspect of the categories analysed in this study will contribute, I believe, to the attainment of such a goal. On this rung, further insight into the extensional aspect of categories is made possible by the analysis of information gathered during the interviews and the ranking task. In order to cope with such data, **Rung One** contains three distinct lists of lexical items: the first two are composed of the category name and its extension, that is, the list of the various members originally listed under the category name, whereas the third list is made up of the attributes used to define the various categories during the "folk definition" part of the interview. At this stage of the analysis, attention will be paid to the influence that typicality might have on the actual ordering of category members and categorization processes involved in ranking decisions will also be discussed.

5.1.1. Subjects' Performance on the Ranking Task

All of the subjects were able to rank all ten categories used in the present study. This apparent ease of ranking the categories differs from what Markovitz (p. 74, 76) reports in her study in which five of the seventy-six subjects she uses failed to rank entire categories and one of these five could not rank any categories at all.

Only one of the thirty subjects who took part in this study ranked all ten categories without tied ranks. The remaining twenty-nine subjects produced at least one instance of tied ranks. In total, these subjects produced 346 instances of tied ranks. Most of the subjects, nineteen in total (or nearly 63%) produced instances of ten or more occurrences of tied ranks. Three of the remaining ten subjects produced nine occurrences of ties each, two had eight occurrences of ties and the remaining five subjects had at least one occurrence of four, three, or two ties, respectively.

Therefore, over 90% of the subjects made large use of tied ranks during the ranking of the members of the various categories. This finding is in sharp contrast with what Markovitz observed in her research. Over 50% of the 76 subjects she used were able to rank all the 21 categories used in her study without tied ranks. Moreover, among the subjects who produced ties in her study, Markovitz (p. 71) computes only 112 instances of tied ranks. She views such results as evidence that most of her subjects were able to perform the task of ranking the various stimulus items with ease. Immediate acceptance of Markovitz's conclusion without further consideration of the material I used, might lead one to believe that as contrasted with Markovitz's subjects, my subjects found the ranking of the stimulus items extremely difficult. However, before such a conclusion may be reached a consideration of the type of stimulus items that have been added to the original categories for the purpose of this study is needed. A comparison of Table 5.1, where the original stimulus items for nine of the ten modified categories used in this study are listed,[1] with Table 5.2 where the stimulus items for the nine modified categories used in this study are shown, reveals that the process of modifying the categories for the purpose of the present study has resulted in the inclusion of items which are conceptually very close to the ones which were already part of the original categories.

1. The category **Disease** is not included in Markovitz's study; therefore it does not appear in the lists of either Table 5.I or Table 5.2

Table 5.1
List of the Original Categories

Category	Stimulus Items
Animal	dog, cow, deer, squirrel, turtle, snake
Drink	milk, coffee, juice, cider, soup
Fuel	oil, coal, wood, paper, steam
Furniture	chair, lamp, dresser, stool, picture
Insect	fly, ant, grasshopper, flea, centipede
Seasoning	salt, pepper, garlic, ketchup, nuts
Toy	doll, block, soldier, balloon, swing, paint set
Tree	oak, pine, birch, weeping willow, palm, bamboo
Weapon	gun, bomb, bow and arrow, stick, rock

Table 5.2
List of the Modified Categories

Category	Stimulus Items
Animal	dog, cow, deer, squirrel, turtle, snake, *elephant*
Drink	milk, coffee, juice, cider, soup, *beer, tea*
Fuel	oil, coal, wood, paper, steam, *alcohol, gas*
Furniture	chair, lamp, dresser, stool, picture, *bed, Table*
Insect	fly, ant, grasshopper, flea, centipede, *cockroach, spider*
Seasoning	salt, pepper, garlic, ketchup, nuts, parsley, *herbs*
Toy	doll, block, soldier, balloon, swing, paint set, *teddy bear,* ball
Tree	oak, pine, birch, ash, weeping willow, palm, bamboo, *mango*
Weapon	gun, bomb, bow and arrow, stick, rock, *grenade, knife*

For example, in the category **Animal,** Markovitz originally includes the items dog, cow[2], deer, squirrel, turtle and snake. The modification of this category resulted in the inclusion of elephant which can be considered, conceptually speaking, quite close to dog and/or cow already included in the original category. The addition of conceptually close items not only in the **Animal** category but in others as well might have had a bearing on the number of tied ranks produced and the frequency with which these were produced. During the ranking task, the subjects appear to have been ranking the various category members according to a concept of each of the categories. Therefore, they consistently tied conceptually similar items together according to varying levels of typicality. This may have been the reason why the occurrence of tied ranks has been so widespread amongst the Brazilian subjects.

Table 5.3 shows, the number of occurrences of ties produced for all ten categories by the Brazilian subjects. As in Markovitz's study (p. 74), most of the ties were in twos. Very little overlap exists between the categories listed in my study as the ones providing the least difficulty in the ranking task and those listed by Markovitz in her study. **Insect** is the only category mentioned in both studies which appears to have been ranked with some ease by both my subjects and those of Markovitz. However, when the actual number of ties produced by the 76 subjects Markovitz used is compared with the number of ties produced by the 30 Brazilian subjects, one has to admit that her subjects still appear to have performed the ranking task for this category with more ease than mine have.

2. Elephant is conceptually close to dog and cow on the basis of a number of overlapping attributes. For example, they are both four-footed creatures, live on land, are or can be domesticated, suckle the young, etc.

Table 5.3
Frequence of Occurrence of Tied Ranks

Type of rank	Number of occurrences	Number of subjects
TWO-TIES	233	25
THREE-TIES	68	24
FOUR-TIES	22	19
FIVE-TIES[3]	38	14
NO RANK FOR CATEGORY	-	-

Table 5.4 contains a listing of the categories and the number of two, three, four and five ties produced for each of the categories. If one assumes that the increased number of tied ranks is indeed also a reflection of the level of difficulty encountered in performing the ranking task, and not only because of the inclusion of conceptually very close items in the modified categories, it becomes evident that some categories presented a higher degree of difficulty to be ranked than others. In fact, on this basis, all nine categories here compared appear to have been more difficult to rank for the Brazilian subjects than they have been for the American subjects in Markovitz's study (p. 75). Thus, categories such as **Toy, Animal, Insect,** and **Fuel** which display the smallest number of tied ranks in the present study, and could, therefore, be considered the least difficult, would still be regarded as having posed greater difficulty for the Brazilian subjects, when compared with the categories which Markovitz lists as the least difficult. The above mentioned categories display a total of nineteen, twenty-eight, thirty-two and thirty-three occurrences of ties, respectively. By contrast, categories with ties varying from one to four are listed in Markovitz's study (p. 75, 76) as the ones which display the smallest number of tied ranks.

3. This type of rank applies only to categories with five or more stimulus items.

Table 5.4
Number of Occurrence of Tied Ranks by Category and Type

Category	Two-ties	Three-ties	Four-ties	Five-ties[4]	No Rank	Total
Animal	16	6	2	4	NONE	**28**
Disease	25	7	4	4	NONE	**40**
Drink	27	6	1	2	NONE	**36**
Fuel	20	6	2	5	NONE	**33**
Furniture	26	8	4	6	NONE	**44**
Insect	20	6	2	4	NONE	**32**
Seasoning	23	7	NONE	5	NONE	**35**
Toy	15	3	NONE	1	NONE	**19**
Tree	29	9	1	5	NONE	**44**
Weapon	28	7	NONE	NONE	NONE	**35**
Totals	**229**	**65**	**16**	**36**	**0**	**346**

Based on the number of ranks produced , some of the categories which appear to have presented the greatest difficulty were: **Disease**, which had many ties between cancer and A.I.D.S.; **Furniture** in which many tied ranks were given to table, chair and bed and also to dresser and stool; and **Seasoning,** which displayed many ties between parsley and herbs as well as salt, pepper and garlic.

The widespread presence of tied ranks in the present study and the consensus with which such ties were produced appear to indicate that while performing the task, the subjects were doing more than simply listing the various member cards. A process of comparison and consistent ordering of the various category members according to the subjects' conceptions of the categories appear to have been at play. Moreover, a comparison between my findings and those reported

4. This type of rank applies only to categories with five or more stimulus items.

by Markovitz also confirms the fact that more than a simple random ordering of category members was performed by both my Brazilian subjects and the American subjects Markovitz used in her study. In categories such as: **Animal, Drink, Fuel** and **Furniture** among others, the mean rank for at least one of the members is very similar in both studies. For example, for **Animal,** Markovitz reports a mean rank of 1.7 for dog. This is very close to 1.8, the mean rank reported in my study. **Weapon** is another category in which the mean ranks for items such as gun, and bow and arrow are very close in both studies (see Table 5.5). Interestingly, the opposite trend occurs when category items for culturally very specific taxonomies are analysed. For example, there is little similarity between most of the mean ranks reported for **Insect.** Moreover, most of the mean ranks reported for **Tree** are quite diverse in the two studies. Oak, the most typical of the category members for the American English subjects of Markovitz's study, loses its place to the added item mango in the ranking performed by the Brazilian subjects. Such contrasting results, obtained when culturally specific categories are cross-compared, is one more factor to consider as an indication that in both studies the subjects appear to have ranked the member cards according to universally shared or otherwise culturally specific concepts.

Table 5.5
Mean Ranks for the various Category Items in Both Studies

Category Items	Present Study	Markovitz's Study[5]
dog	1.8	1.7
cow	1.6	2.2
deer	2.7	2.4
squirrel	3.8	3.6
turtle	3.9	5.1
snake	4.3	5.8
elephant	2.2	-
milk	2.5	2.1
coffee	3.1	2.3
fruit juice	2.0	2.1

5. Mean ranks from Markovitz's study have been changed to the nearest decimal point.

Table 5.5 (cont'd.)
Mean ranks for the various categories members in both studies (cont'd.)

cider	3.5	3.8
soup	5.4	4.7
beer	2.7	-
tea	3.0	-
oil	1.8	1.7
coal	2.4	1.8
wood	3.6	3.1
paper	5.0	4.2
steam	4.1	4.0
alcohol	1.7	-
gas	2.2	-
chair	1.4	1.4
dresser	2.4	1.8
lamp	3.5	3.8
stool	2.5	3.1
picture	4.2	4.9
table	1.3	-
bed	1.2	-
fly	1.5	2.0
ant	3.3	1.9
flea	2.8	3.4
grasshopper	3.2	3.7
centipede	4.5	3.9
spider	3.1	-
cockroach	1.9	-
salt	1.8	1.3
pepper	1.7	1.9
garlic	1.7	3.0
ketchup	4.1	3.8
nuts	4.9	5.0
parsley	2.6	-
herbs	3.0	-

Table 5.5 (cont'd.)
Mean ranks for the various categories members in both studies (cont'd.)

doll	1.8	1.7
block	3.5	2.2
soldier	4.0	2.8
balloon	3.7	4.0
swing	3.4	5.2
paint set	3.8	4.9
teddy bear	2.6	-
ball	1.6	-
oak	2.1	1.2
pine	2.3	3.1
birch	5.1	3.4
weeping willow	3.8	2.7
palm	3.1	4.7
bamboo	4.8	5.8
ash	5.3	-
mango	1.5	-
gun	1.6	1.3
bomb	2.3	2.9
bow and arrow	3.8	3.2
stick	4.9	3.8
rock	4.5	3.8
knife	2.6	-
grenade	2.8	-

Further evidence in support of the claim that subjects performed the ranking task according to a concept of each of the categories and not randomly comes from assessment of the level of intra-group agreement. This is the concern of the following section.

5.1.2. Intra-Group Agreement

This section contains a statistical analysis of the findings for **Rung One.** The degree of intra-group agreement was calculated using Kendall's Coefficient of Concordance (Kendall's W). Each score corresponds to a percentage (equal to W squared x 100) of agreement for each category.

Intra-group agreement was first calculated for all categories. The result showed that despite a lot of individual variation in the way ranks were assigned, there was a systematic agreement among the subjects as a whole (Chi-Square = 38.04; $p < .001$, $df = 9$). Also, before calculating the Kendall's Coefficients of Concordance for the group of thirty Brazilian subjects as a whole, I conducted the same test for the group of eleven Brazilians contacted in Leeds and the group of nineteen Brazilians contacted in Brasilia, Brazil. The group contacted in Leeds, I called group A, and the group contacted in Brasilia, I called group B. Such a procedure was necessary for me to decide whether it would be appropriate to treat the two groups of subjects as one large group. Due to the fact that the eleven Brazilians contacted in Leeds had already spent at least three months in England at the time they performed the ranking task, I felt that as these subjects were in a different cultural setting from their native one, their behaviour in ranking the items included under the various category names might somehow have been affected. Table 5.6 shows the W scores for group A and group B. These were all above chance level at $p < .001$. This result thus showed that it was appropriate to treat the two groups as a global homogeneous group.

Table *5.7* (see p. 70) displays both the W scores and the corresponding percentages of agreement for the 30 subjects. All of these scores are above chance at $p < .001$. Such a result shows that the ranks produced for all the categories used in this study were not random. Examination of this table reveals a great diversity of levels of intra-group agreement. The levels vary from 9% for **Toy** to 52% for **Furniture.** Although these findings partially harmonize with what Markovitz finds in her study, the levels of agreement she reports are, on the most part greater than the ones achieved through this study (p. 78, 79). **Toy** and **Drink,** particularly, displayed the lowest coefficients of intra-group agreement. Some explanations as to why this may be so are thus tentatively given below in Sections 5.1.2.1. and 5.1.2.2., respectively. It must be borne in mind, however, that the factors **I** will highlight here as possible reasons for the low agreement found for **Toy** and **Drink** are mainly intuitive, and additional empirical research will have to be conducted in order to provide more conclusive data.

Table 5.6
Intra-Group Agreement For The Two Groups of Brazilian Subjects

Category	Kendall's W Scores	Percentage of Agreement
Group A		
Animal	0.47	23
Disease	0.73	53
Drink	0.41	17
Fuel	0.65	42
Furniture	0.86	73
Insect	0.59	35
Seasoning	0.74	54
Toy	0.34	12
Tree	0.69	47
Weapon	0.60	36
Group B		
Animal	0.50	25
Disease	0.49	24
Drink	0.38	15
Fuel	0.62	39
Furniture	0.65	42
Insect	0.36	13
Seasoning	0.64	41
Toy	0.32	10
Tree	0.46	21
Weapon	0.48	23

Table 5.7
Intra-Group Agreement

Category	Kendall's W Score	Percent of Agreement
Animal	0.47	22
Disease	0.59	34
Drink	0.36	13
Fuel	0.63	39
Furniture	0.72	52
Insect	0.41	17
Seasoning	0.65	42
Toy	0.29	09
Tree	0.53	28
Weapon	0.52	27

5.1.2.1. Lack of Agreement for the Category Drink

As a native speaker of Brazilian-Portuguese, I feel that, in ranking members of the category **Drink**, at least some of the Brazilian subjects could be reasoning according to the concept most frequently linked to the term 'drink' in our culture, i. e. that of associating the term 'drink' mainly with alcoholic beverages. Therefore, while ranking the **Drink** category, they seem to have been governed by their prototypical concept for the category, assigning more typical ranks to member cards such as beer and cider. Interesting to note in this regard is the fact that some of the Brazilian subjects reported that alcoholic beverages were the first items they would think of as belonging to the category. On the other hand, there appear to have been other subjects who did not let this salient concept among Brazilians influence the way they ranked. The two rationales, that of viewing drinks mainly as alcoholic beverages or that of equally accepting non-alcoholic members into the category, seem to have been responsible for the lack of agreement among the group of Brazilian subjects.

5.1.2.2. Lack of Agreement for the Category Toy

The low agreement among the Brazilian subjects for the category **Toy** may be due to the fact that, different from most of the other categories used in the present study, the concept of what constitutes a toy and what attributes an object should display in order to be sharing a degree of membership in the category is to a great extent a matter of personal experience. Whereas the concepts of what constitutes a tree, an animal, of what is or is not seasoning, etc., appeared to be more or less generally agreed upon among the Brazilian subjects, they did not always appear to enjoy the same consensus as to what for them constituted a toy. Feedback coming from some of the subjects made clear that **Toy** had been in their opinion one of the hardest categories to be ranked. Moreover, the fact that the subjects in this study were all mature adults appears to have established a certain gap between them and the category. In this regard, three of the subjects reported that, in ranking the category, they had to think of their children's toys before deciding on how they should rank the various member cards included in the **Toy** category. Interestingly, **Toy** is also among the categories displaying rather low agreement, less than 50%, in Markovitz's study (p. 78). The reasons I have given above as a tentative explanation for the low level of agreement found for the category **Toy** among the Brazilian subjects may also, by implication, be responsible for the low correlation found for the category in both studies.

The findings from the present study contrast with those reported by Rosch (1973a, 1975d) regarding levels of intra-group agreement. Rosch reports levels of agreement for both her studies which were above 90% for all categories. Markovitz also, although she does not report levels of intra-group agreement as high as those reported by Rosch, obtains levels of agreement which are much higher than the ones I have obtained. An explanation of the diversity of levels of intra-group agreement in the present study might be found in the hypothesis that the subgroups, composed of 10 males and 20 females, respectively, who took part in this study, behaved differently due to sex or age differences or different social-economic, educational or geographical backgrounds.

The subgroups of subjects were, therefore, compared with each other through the use of the Chi-Square test for independent samples for each one of the variables mentioned above. Such variables were assessed by means of the questionnaire the subjects had to complete before the interview and ranking task (see Appendix A). This was done in order to assess whether or not the subgroups of

subjects behaved differently due to the above mentioned factors, or similarly as if they came from the same population.

The observed frequencies with which individual subjects assigned ranks to the various items included in the ten categories were thus structured into contingency tables and the expected frequencies calculated for each of the cells for the various variables. The ranks which varied from 1 to 8 were grouped as follows: **R1** to **R2** = very typical, **R3** to **R4** = typical, and **R5** to **R8** = atypical. The grouping of the various ranks had to be done in order to increase the actual observed frequencies included in the various cells of the contingency tables and therefore to increase the validity of the Chi-Square test to an acceptable level. The results obtained for all ten categories show that the subgroups of subjects behaved as if they came from the same population. ($p > .05$; see Appendix B). The lower levels of intra-group agreement found in this study can not therefore be attributed to sex or age differences, socio-economic, educational or geographical backgrounds. They must, therefore, be due to the fact that the Brazilian subjects represent a more diverse group of individuals with varied life experiences when compared with the college sophomores Rosch uses in her studies or even with the group of subjects of Markovitz's study (p. 61).

5.1.3. Inter-Group Agreement

Since one of the aims of the present study is to compare how individuals belonging to different cultural backgrounds express membership gradation in the way they organize their semantic categories, it was felt that the data emerging from my Brazilian subjects should be statistically tested against the one produced by Markovitz's subjects. As an attempt to do this, the mean ranks given by both groups of subjects for each member of the nine semantic categories common to both studies were analysed. The Spearman's Rank Correlation Coefficient test was used to assess the level of significance of the mean ranks obtained for the two groups.

The basic hypothesis underlying the use of such a test was that despite the fact that the two groups of subjects came from culturally distinct environments, their common life experiences as members of two modern westernised nations would act as a cohesive factor in making their behaviours uniform.

As Table 5.8 shows, the correlations obtained for most of the categories, with the exception of **Insect** and **Toy** proved to be significant at $p < .01$. This finding

appears to confirm the hypothesis stated above. The fact that for all the remaining categories significant correlations are obtained seems to indicate that, from among the nine categories which are cross-culturally compared, these are, in the case of the present analysis, the categories for which the concept of membership gradation appears to be consistently shared by both the Brazilian and the American subjects. The nature of at least some of these categories stands out, I believe, as a positive factor in obtaining such a result. Consider the category **Weapon**, for instance. It is easy to verify that the items included in this category are quite universally common and used for the same purposes in different cultures. The same line of reasoning may also apply for categories such as **Furniture**, **Fuel** and **Seasoning**. On the other hand, the **Insect** category is more susceptible to environmental or cultural constraints, such as the flora and fauna found in one part of the world but not so common in another. As regards the category **Toy**, I believe that, as in the case of the low level of intra-group agreement found previously for this same category, the age range of the two groups of subjects may, once again, be the reason why a significant correlation is not obtained.

5.1.4. Subjects' Behaviour in Ranking

This section is primarily concerned with categorization processes which appear to have motivated the subjects' behaviour during the ranking task. Secondly, it is aimed at comparing my results with those of Markovitz. In order to do so, I have submitted the ranks obtained through the present study to two non-parametric statistical tests of significance. Initially the Friedman two-way analysis of variance (ANOVA) was used for all ten categories in order to verify whether the ranks assigned by the various subjects to all the items in the ten categories were significantly different. The probability obtained (Chi-Square = 35.7, df = 9) proved significant at $p < .001$. This result demonstrated that there was a significant difference in the way ranks were assigned for the ten categories as a whole. The same test was then applied to the categories individually in order to verify whether the subjects' behaviour had differed in the ranking of the various items listed under specific category names.

Table 5.8
Spearman Correlation Coefficients for Mean Ranks in Both Groups

	Studies
Categories	**Correlations**
Animal	0.91
Drink	0.93
Fuel	0.98
Furniture	0.95
Insect	0.65
Seasoning	0.89
Toy	0.53
Tree	0.89

The results obtained showed that the ranks assigned to the individual categories were also significantly different at $p < .001$. Once this first overall assessment was carried out, the ranks obtained for individual pairs of items belonging to all the categories were submitted to the Wilcoxon statistical test of significance. This additional test needed to be done, in the first place, to assess whether differences between mean ranks would indeed prove to be statistically significant. Furthermore, it would provide statistical evidence which would allow me to assess whether there were any similarities between the performances of the Brazilian and the American subjects in assigning ranks to the various category items.

The results of the Wilcoxon test for matched pairs indicated a significant difference at $.001 < p < .05$ between the means of most of the members used in this study. Table 5.9 provides a list of member items whose mean ranks were not significantly different. The number of such items varied from five in **Fuel and Seasoning to ten in the Weapon category**. A comparison of Table 5.9 with Table 5.10, which shows the members whose mean ranks were not statistically different in Markovitz's study, reveals that similarities among mean ranks were more frequently detected in the present study.

Table 5.9
Members Whose Means were Not Statistically Different from Each Other

Category	Member	Means
Animal	dog	1.8
	elephant	2.2
	deer	2.7
	elephant	2.2
	cow	1.6
	dog	1.8
	squirrel	3.8
	turtle	3.9
	snake	4.3
Disease	A.I. D.S.	1.4
	cancer	1.5
	measles	3.1
	cold	3.5
	malaria	2.7
	measles	3.1
	drug addiction	4.2
	deafness	5.1
Means		
Drink	beer	2.7
	coffee	3.1
	fruit juice	2.0
	beer	2.7
	beer	2.7
	milk	2.5
	coffee	3.1
	tea	3.0

Table 5.9 (cont'd.)
Members Whose Means were Not Statistically Different from Each Other (cont'd.)

Category	Member	Means
Fuel	oil	1.8
	gas	2.2
	coal	2.4
	oil	1.8
	alcohol	1.7
Furniture	bed	1.2
	table	1.3
	chair	1.4
	dresser	2.4
	stool	2.5
	lamp	3.5
	picture	4.2
Insect	flea	2.7
	spider	3.1
	grasshopper	3.2
	ant	3.3
	fly	1.5
	cockroach	1.9
Seasoning	pepper	1.7
	garlic	1.7
	salt	1.8
	ketchup	4.1
	nuts	4.9
Toy	ball	1.6
	doll	1.8
	swing	3.4
	block	3.5
	paint set	3.8
	balloon	3.7
	soldier	4.0

Table 5.9 (cont'd.)
Members Whose Means were Not Statistically Different from Each Other (cont'd.)

Category	Member	Means
Tree	oak	2. 1
	pine	2.3
	palm	3.1
	weeping willow	3.8
	birch	5.1
	ash	5.3
	bamboo	4.7
Weapon	bomb	2.3
	knife	2.6
	knife	2.6
	grenade	2.8
	rock	4.5
	stick	4.9
	grenade	2.8
	bow and arrow	3.7
	rock	4.5
	stick	4.9

Table 5.10
Members Whose Means were Not Statistically Different from Each Other in Markovitz's Study

Category	Member	Means
Animal	cow	2.2
	deer	2.3
Drink	milk	2.1
	coffee	2.3
	fruit juice	2.1
Fuel	oil	1.7
	coal	1.8
Insect	fly	2.0
	ant	1.9
Toy	swing	5.2
	paint set	4.9
Tree	pine	3.0
	birch	2.8
	weeping willow	3.1
Weapon	stick	3.8
	rock	3.8

Moreover, very little overlap occurs between pairs which were not significantly different in both studies. One possible reason why this may be so is that the number of additional items incorporated in the original categories might have been conducive to the more frequent appearance of non-significantly different mean ranks. Such additions were, however, necessary in order to render the original categories more suitable for the purposes of the cross-cultural analysis here attempted (see Section 3.4.) as well as to make possible a more detailed study of the role played by context on typicality shifts. Furthermore, the presence of added items contributed to a closer appreciation of some of the psychological behaviours which seem, at least partially, to govern the decision processes involved in a ranking task such as the one carried out by the subjects. Rather than arbitrary, ranking decisions appear to be in part motivated by well-established contrast sets which divide up whole categories into smaller

clusters of member items viewed as similar on the basis of some shared attribute or attributes. Such attributes may not necessarily be of a perceptual nature but may actually include criteria which are related to the various mental schemas in which the items are included. The **Animal** category, for instance, serves as an example of what has just been discussed above. In this category items whose mean ranks are not significantly different appear to be fairly well organized into well-defined clusters. Therefore, pairs of typical wild animals such as squirrel/snake, deer/elephant, turtle/snake and pairs of domestic animals such as cow/dog[6] do not reach a significant level of difference in the way they are ranked. An An apparent contradiction is is found in the pair dog/elephant whose mean ranks are are equally not statistically different. At this point the contrast set domestic/wild[7] appears to be, at least partially, suppressed in favour of the apparently more salient concepts such as, land animal, four-footed, mammal, etc. The results of the Cluster Analysis which I have performed for the mean ranks assigned to the various category members by the Brazilian subjects provide graphical evidence of this fact (see Appendix C). **Tree** is another category which appears to be structured along fairly well-defined lines. This is reflected in the way pairs of member items are ranked as very similar, therefore rendering their mean rank as not significantly different. In this instance, some general characteristics common to the items to be ranked appear to govern the decision process involved. Thus, trees such as pine and oak[8], which are strong and possess a central trunk and branches, receive mean ranks which do not reach a significant difference. Other items within the **Tree** category, ash and birch, receive along with bamboo, which physically is quite different from them, mean ranks which do not attain a significant difference at the level of analysis. Here, lack of familiarity with ash and birch, trees not frequently found in the subjects' homeland, rather than the actual physical characteristics of the items involved, appears to be the driving force behind the assignment to the pairs birch/bamboo ash/bamboo of statistically similar mean ranks.

---

6. Interestingly cow/dog is the most frequently occurring tie for the category **Animal** in both studies.

7. The fact that dog and elephant receive mean ranks which are not significantly different can also be an indication that, in deciding on how to rank such items, at least some of the informants might be operating on the premise that although typically classed as wild animals, elephants can be and are indeed domesticated in certain parts of the world.

8. Since pine and oak are trees commonly found in the southern region of Brazil, geographical factors may also have played a part in their receiving of similar ranks.

From what has been discussed above, individual ranking decisions appear to be equally based on a more encompassing category structuring principle than mere contrasts sets established by sets such as, for instance, wild/domestic (in the case of the category **Animal),** or tall central trunk/several weak trunks (in the case of **Trees).** In this regard, Langacker (1987) assumes that extension from a prototype coexists with the elaboration of a schema. In other words, category membership decisions are governed, on the one hand, by degrees of resemblance between a category item and the category prototype and, on the other hand, by a schema, which is an abstract characterization fully compatible with all members of the category. This is so because while categorization by prototype focuses on a prototypical item, which might not be necessarily a literal instance of the category but actually a mental construct, categorization by schema makes use of all pieces of knowledge available to an individual about the category or category cluster and involves the retrieval of exemplars which are compatible with the mental schema elicited.

On ranking decisions, such as the one performed by the subjects in the present study, individuals appear to have displayed a mixed categorization behaviour. That is, they made use of prototype information as well as the schematic representations available to them about the categories due to private or world knowledge.

Because schemas are representations of pieces of individual knowledge which can be broader or narrower, depending on various degrees of world knowledge which are most frequently not shared equally by individuals, categorization by schema does not rely on degrees of membership based on degrees of shared characteristics for an item's inclusion in a category. Rather, schemas evoke integrated structures which embody the commonality of the various category members and are, therefore, fully compatible with all the members of a given category (cf. Langacker, 1987). In other words, while categorization by prototype focus on a typical instantiation of a category (the prototype) and category membership is thus a matter of linear distance based on degrees of resemblance between a category best type and other category items, categorization by schema is global and all encompassing. An item is, thus, given membership status to the extent that an individual's experiential schema allows that item to be included in the given category.

The dichotomy, categorization by prototype and categorization by schema is not clear-cut, though. In a ranking task such as the subjects in this study were asked to perform, how are we to decide whether individual decisions were moti-

vated by categorization by prototype or by categorization by schema? Indeed, as Taylor (1989, p. 66, 67) comments;

> "whether in a particular instance the analyst invokes prototype or a schema would appear to depend on the degree of abstractness which he is willing to attribute to a speaker's mental representation."

Although I agree in part with Taylor's observation, I am tempted to argue that, at least in tasks involving naturally occurring or man-made semantic categories of concrete objects, categorization by prototype and categorization by schema are actually aspects of a common phenomenon and can not, therefore, be taken separately. That is, in most, if not all, categorization tasks, the individual will be making use of both categorization modes. This is so because of the flexibility with which concepts are acquired and enlarged to accommodate new information available to the language user. To illustrate how categorization by prototype leads to categorization by schema and vice versa, let us think about how the concept 'animal' might be acquired. Initially an individual may associate the word animal with specific instances of large, four-footed creatures, such as horses, bulls, big dogs, etc. S/He then extracts from these instances a schematic representation of what such instances might have in common. This representation, $ANIMAL_1$, now functions as a prototype. As the individual's knowledge of the world increases, her/his concept of animal is enlarged to include other types of animals such as snakes. These get associated with $ANIMAL_1$ on the basis of similarity along some biological criteria with the prototype. For example, live and/or breathing objects, which display volitional behaviour. Once these are included, the individual can now extract a further schema, $ANIMAL_2$, which represents what is common to $ANIMAL_1$ and snakes. $ANIMAL_2$ now functions as a prototype for the extension of the category to include other reptiles. The commonalities between $ANIMAL_2$ and reptiles allow for the extraction of a more abstract schema still, $ANIMAL_3$. Further elaboration is still possible and other types of animals such as, fish and birds may be included in a further schema, $ANIMAL_4$ (Langacker, 1987, gives a parallel example). Finally, external factors, i. e., those not found in the nature of the item itself, such as environmental, cultural or idiosyncratic constraints, may also come to be incorporated in a mental representation for the category. The schema generated is again incorporated as a prototype and prototypical schemas are thus generated for the category (see Figure 5.1).

From what has been discussed above, it appears, therefore, that categorization by prototype and categorization by schema may actually be interchangeable aspects of a common phenomenon which are brought into play in most categorization tasks, or at least in tasks where categories of naturally occurring objects or man-made objects are used. When we bear this fact in mind and take into consideration the role that schemas play in concept development for a given category, it is not surprising to find category items, which are apparently quite different, sharing equivalent degrees of membership. Some examples taken from Table 5.9 include; squirrel and snake in **Animal,** beer and coffee in **Drink,** and weeping willow and palm in **Tree.**

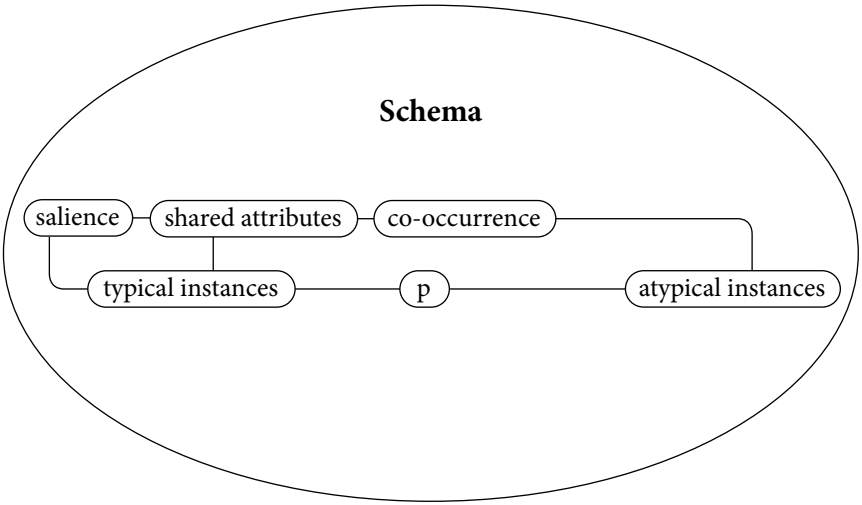


Figure 5.1

p = prototype
Schema = global representation of an individual's knowledge which will influence categorization

Further evidence for the above contention is discussed in Section 6.1. and Section 6.2. where context effects on category membership verification involving the reorganization of context-bound items and word-choice tasks are discussed, respectively.

The second reason why the number of member items displaying not significantly different mean ranks is greater in the present study may be linked with the choice of statistical test. Whereas Markovitz uses a parametric procedure (the t

test) to identify statistical differences between mean ranks, I adopt a non-parametric procedure (the Wilcoxon matched-pairs signed-ranks test). I do so because I feel that the very nature of the ranking task, the population involved and the kind of scores drawn do not satisfy the conditions for the application of the t test. The procedure involved in ranking the various category members, for example, is rather subjective as it is influenced by a number of less than objective variables such as personal preferences, varied individual experiences in life as well as other idiosyncrasies. The population performing the ranking task and producing the various rank-scores can not therefore be assumed to be normally distributed nor can the ranks produced be objectively plotted against an interval scale. It is therefore felt that the Wilcoxon test more accurately satisfies the requirements of the data emerging from the ranking task. The use of such a procedure in the present study, I believe, has contributed to a more precise analysis of the data than it has been possible in Markovitz's study.

5.1.5. Category Boundaries

During the ranking task, the subjects were asked whether the various member cards included under the various category names were in fact members of the semantic categories under investigation. This was done because, like Markovitz, I also felt that the subjects would not necessarily view all member cards to be in fact part of the categories. As a direct response to this question, 262 non membership statements were produced. The number of responses produced by my subjects represent only about 16% of the 1,627 non-membership statements reported by Markovitz. However, this is to be expected in view of the lower number of subjects who took part in the present study. The total number of Brazilian subjects (30 in total) represent less than 40% of the total number of 76 subjects who took part in Markovitz's research. However, the non-membership statements produced by the Brazilian subjects provide additional evidence, though on a smaller scale, that the above-mentioned contention has to be taken into consideration in any study involving fuzzy sets. This is something which, prior to Markovitz's study, had not been done (p. 87). Such non-membership statements also contribute positively to demonstrating that individuals from different cultural and linguistic backgrounds share a number of common views regarding category boundaries. This fact will become more evident when some of the more frequent reasons for rejecting category items given in both studies are discussed later in this chapter.

Table 5.11 provides the list of items which were either rejected, considered borderline, or of which the subjects were not sure as to their membership. Unlike in Markovitz's study (p. 86, 87), the items most frequently rejected as category members by the Brazilian subjects (soup in **Drink,** deafness, in **Disease,** paper in **Fuel** and nuts in **Seasoning),** are not among the ones displaying greatest intra-group agreement. As Table 5.12 shows, greatest agreement occurs, in the present study, only for members which were assigned rank 1, the most typical of the ranks. This fact appears to indicate that in general the Brazilian subjects were more consistent than the American subjects when deciding about typical members of the categories than when rejecting certain category members. Despite this contrast, a comparison of my results with Markovitz's still indicates that in spite of the high level of intra-group agreement for extreme ranks reported in Markovitz's study, she still reports a high proportion of intra-group agreement for items viewed as typical (compare Tables 5.12 and 5.13) This is an interesting observation inasmuch as it supports Rosch et al.'s claims regarding the universality of the structure of semantic categories (Rosch et al., 1976a).

In a similar fashion to the behaviour observed in Markovitz's subjects, my subjects also frequently produced borderline statements such as "I don't know whether an **X** is a **Y".**

In fact, contrary to what was observed when the number of non-membership statements produced by both groups of subjects was compared, the Brazilian subjects appear to have been more productive in using borderline statements.

Table 5.11
Number of Times Items were Listed as Non-members or Borderline

Category	Item	Not a Member	Borderline	Don't Know
Animal	deer	1	0	0
	squirrel	2	0	0
	turtle	2	2	0
	snake	3	6	0
Disease	measles	1	0	0
	cold	2	1	0
	deafness	17	6	0
	drug addiction	14	6	0

Table 5.11 (cont'd.)
Number of Times Items were Listed as Non-members or Borderline (cont'd.)

Category	Item	Not a Member	Borderline	Don't Know
Drink	coffee	1	0	0
	tea	1	0	0
	fruit juice	1	0	0
	cider	2	1	0
	milk	2	0	0
	soup	25	5	0
Fuel	paper	16	8	1
	steam	13	4	0
	wood	7	1	0
Furniture	stool	1	0	0
	picture	13	12	0
	lamp	13	12	0
Insect	ant	3	1	0
	flea	3	0	0
	centipede	9	3	0
	spider	5	1	0
	grasshopper	0	2	0
Seasoning	herbs	1	0	0
	salt	1	0	0
	nuts	18	4	0
	ketchup	10	4	0
	parsley	0	1	0
	garlic	0	1	0
Toy	teddy bear	1	0	0
	balloon	2	0	0
	swing	2	3	0
	paint set	3	3	0
	block	4	4	0
	soldier	8	3	1
Tree	palm	1	1	0
	weeping willow	3	0	2

Table 5.11 (cont'd.)
Number of Times Items were Listed as Non-members or Borderline (cont'd.)

Category	Item	Not a Member	Borderline	Don't Know
Tree (cont'd.)	ash	9	0	9
	birch	10	0	10
	bamboo	11	1	1
Weapon	bomb	1	0	0
	grenade	1	1	0
	knife	1	5	0
	bow and arrow	4	8	0
	rock	5	6	0
	stick	9	4	0

Table 5.12
Members Showing Greatest antra-Group Agreement

Category	Member	Rank	No. of Subjects Giving Rank
Animal	dog	1	19
	cow	1	15
Disease	A.I.D.S.	1	24
	cancer	1	18
Drink	beer	1	14
Fuel	oil	1	18
	alcohol	1	20
Furniture	table	1	23
	chair	1	20
	bed	1	24
Insect	fly	1	24
Seasoning	salt	1	21
	pepper	1	17

Table 5.12 (cont'd.)
Members Showing Greatest antra-Group Agreement (cont'd.)

Category	Member	Rank	No. of Subjects Giving Rank
Toy	ball	1	20
	doll	1	20
Tree	mango	1	21
Weapon	gun	1	19

Table 5.13
Members Showing Greatest Intra-Group Agreement in Markovitz's Study

Category	Member	Rank	No. of Subjects Giving Rank
Bird	robin	1	66
Clothing	necklace	6	75
Flower	rose	1	72
Footwear	shoe	1	73
	ice skate	4	66
	flipper	5	66
Fruit	apple	1	68
Musical Instrument	piano	1	67
Seasoning	nuts	5	73
Sport	fencing	4	67
Tool	hammer	1	67
Tree	oak	1	67
Vehicle	ski	5	71

The group of 30 Brazilians thus reported 120 times that specific items were borderline category members. Compared to the total of 136 borderline statements

reported by Markovitz for her 76 subjects, these 120 borderline statements produced by the 30 Brazilian subjects represent a much larger proportion. The Brazilian subjects thus appeared to be at more ease in expressing uncertainty as to whether certain items belong to given categories than in totally excluding such from the categories. This trend appears to be somehow the contrary of that observed among Markovitz's subjects.

When the reasons given for rejecting member cards from certain categories or for viewing other items as borderline cases are compared for the two groups of subjects, interesting similarities emerge. For example, as reasons for rejecting soup from **Drink,** both the Brazilian and the American subjects give answers such as "because it has solids in it" and "because you have to eat it with a spoon". Moreover, very close responses are observed in, for example, rejecting or in conferring doubtful membership on snake in the **Animal** category. In this instance, my subjects mention "has no legs" three times, whereas Markovitz's subjects say "doesn't have four legs". Additionally, subjects from both groups feel that the fact that turtles are found in water is a good reason to consider them as borderline or non-members of the **Animal** category. Such similarities in responses given for either rejecting certain items as category members or for considering others borderline members provide positive evidence that concepts regarding poorer exemplars of semantic categories are to some extent cross-culturally shared. Also, as Appendix D shows, negative part-whole statements were at times employed by the Brazilian subjects to reject or confer doubtful membership on certain category items. Although the American subjects Markovitz uses do not appear to be as dynamic as the Brazilian subjects in overtly producing part-whole statements as a rationale for doubtful membership or for an item's rejection, Markovitz observes that items frequently rejected as category members were those lacking some structural attribute (p. 127, see also Section 5.2.3.). This exposes lack of structural attributes, several times reflected by the use of negative part-whole statements in the present study, as an important reason for category membership rejection in the case of both the Brazilian and the American groups of subjects. Interestingly, Lakoff et al. (1980, p. 69 - 71; and p. 81 - 86) posit that human concepts are characterized in terms of experiential gestalts. In other words, as our concepts for a given category are gradually acquired, they tend to form structured conceptual wholes for the category. These, though stable, are not rigid. This is so because deviant instantiations of the concept will still be accepted into the category, albeit marginally. Prototypical items, i.e., those which fit our concept of the category in its entirety or almost entirely will capture the most

important elements of our experiential gestalt for that category. Such items will therefore share a fuller degree of membership as best representatives. Less representative items, those failing to display certain essential attributes will, on the other hand, be classed as borderline cases or even non-members. The findings emerging from the present study and those of Markovitz provide positive evidence in support of the above-mentioned argument.

Markovitz (1977, p. 91) also notices that lack of familiarity on the part of her subjects with the item laurel included in the **Flower** category resulted in this item often being assigned questionable membership. Similarly, in the present study, both ash and birch, included in the **Tree** category, were several times either eliminated or given doubtful membership status. The Brazilian subjects often produced responses of the type "I don't know whether ash (or birch) is a tree. That's why I have put it last of all" or "that's why I have eliminated it." Therefore, lack of familiarity with category items provides, in both studies, sufficient reason for an item's rejection or very poor membership in a given category.

Both my findings and those of Markovitz add support to the claim that semantic categories have fuzzy boundaries. Moreover, the similar nature of the responses provided by both the Brazilian subjects and the American subjects constitutes evidence that such boundaries are at least to some extent universally shared.

5.1.6. Definitions Elicited During the Interview

The experimental procedure adopted for the ranking task and the interview carried out with the various subjects has been virtually the same as that employed by Markovitz (1977, Chapter 4). It has been felt that a cross-cultural comparative study of category structure, which uses the research carried out by Markovitz as the main basis for comparisons on how individuals belonging to distinct cultural backgrounds behave in the way they categorize and express membership gradation within the various semantic categories analysed, could only benefit by the adoption of such a procedure. The interview to which the Brazilian subjects were submitted followed, therefore, the same approach as used by Markovitz. Subjects were shown a category name and asked to explain its meaning. This process, known as "folk definition", is capable of capturing facts about the categories and their members which are spontaneously provided by each subject as well as specifically elicited through the questions posed by the experimenter during the

interview. Allowing the subjects, in the present research, to express themselves quite freely about the meaning of the category name brought about a considerable variety of definitions. Like the American subjects, the Brazilians also resorted to definitions which varied from dictionary-like in nature, such as "Animals are living things which breathe" to mere affective ones of the type; "Snakes! I hate them. What a loathsome thing!". Often, in a very similar behaviour to Markovitz's subjects, the Brazilian subjects would also define by extension, i.e. by listing a number of what in their opinion were category members. Since all of my 30 subjects had a considerable degree of formal education, several of them being postgraduate students, Markovitz's comment that "only subjects with little formal education resorted to affective definitions." (p. 92) as an initial response, was disconfirmed by this study. At least 10% of my subjects made use of this kind of definition as their initial attempt to define category names.

Folk definitions, such as the ones both my subjects and the ones used by Markovitz were encouraged to provide, are fundamental in shedding light on the most important aspects of the concepts associated with the various categories. To illustrate, I give below a few examples of viewpoints expressed by both groups of subjects regarding certain categories and their members which show important aspects of apparently cross-culturally shared concepts. Animals, for example, are viewed by both the Brazilian and the American groups of subjects, mainly as four-footed land creatures which move volitionally. Insects are most often viewed as undesirable creatures, transmitters of disease. Drinks are essentially liquids which are taken orally as food. The more liquid a substance is, the more drink-like it will be.

5.1.7. Private and Shared Knowledge

In a similar fashion to what is observed in Markovitz's study, most of the Brazilian subjects display in their definitions of the various category names a mixture of private and shred knowledge. Their awareness of biological taxonomy was therefore mostly superficial. It consisted of portions of generally or privately accepted information which was at times based on definitions such as those found in scientific textbooks or dictionaries. Most of the subjects would thus on several occasions start their definitions by giving their own conception of the meaning of the category. They would, for example, produce statements of the kind, "Animals, for me, are land creatures." Then they might complement it by saying, "but I know that even insects are also animals, because they are alive and

breathe." One of the subjects also demonstrated greater knowledge of the category **Insect.** He eliminated both centipede and spider from the **Insect** category because these items were not really insects, the former being a myriapod and the latter an arachnid. Expertise in areas related to a specific field of study was felt in the definitions of three of the subjects who were familiar with the area of engineering. In defining the term 'fuel' or ranking the items included under the term, these subjects provided more information about the category than the remaining subjects. For example, a chemical engineer eliminated wood from the category because, in his opinion, it was no good as fuel since it contains much water and therefore does not burn satisfactorily. Another subject, also a chemical engineer, eliminated steam from the category because, in his words, "steam only carries energy, it does not generate it." The third of these subjects, an undergraduate student of electronic engineering, provided a more expert definition of the term 'fuel' saying that "Fuels are substances used in the production of both thermical and mechanical energy." These pieces of information, though brief, highlight the fact that these subjects were apparently more familiar, because of their field of enquiry, with the **Fuel** category. Markovitz (p. 98) observes a similar trend in her study. Unlike one of Markovitz's subjects, none of the Brazilian subjects consistently operated on scientific classification in both defining and ranking (p. 95, 96). Four of the Brazilian subjects, however, did appear, at least to some extent, to be operating on scientific criteria more than all other subjects. These subjects thus produced more instances of tied ranks than all the others. On average, they produced nineteen instances of ties, a considerably higher figure than eleven, which are the average of occurrences of tied ranks for the remaining twenty-five subjects. Their definitions were, on the whole, very inclusive. The term 'animal', for example, included all living beings which were not vegetables. It would therefore include subcategories of living things such as human beings, insects and bugs. These subjects were thus evidently allowing less fuzzy, more formal scientific, criteria to influence the way they defined and ranked the various categories.

5.1.8. Reaction Time Experiment

As an attempt to provide more insight into the categorization behaviours displayed by the subjects who took part in the ranking task and in order to understand more clearly about the role familiarity plays in typicality, a reaction time experiment for typical and atypical items presented under correct and incorrect categories was set up. The experiment was carried out with the help of a group of

twelve American students contacted through the Department of Psychology of the University of Leeds.

5.1.8.1. Purpose of the Experiment

The experiment was set up to provide an alternative measure of the typicality of the items ranked as more central to the categories used in the ranking task discussed in Sections 5.1.1 to 5.1.3. As demonstrated by the significant levels of inter-group and intra-group agreement, the subjects who took part in the ranking task were quite consistent in deciding on how best an exemplar fits their idea of the category. It might be argued, though, that in doing so the subjects were simply deciding on the basis of how familiar or unfamiliar the various items were to them. If this were the case, ranks obtained might be simply reflecting degrees of familiarity with the various category members rather than reflecting degrees of typicality based on the distribution of properties among category items. Alternatively, it might be the case, as other previous studies seemed to indicate (McCloskey, 1980; Malt and Smith, 1982), that both a familiarity-based account of typicality based on frequency of item occurrence in the real world and a structural-based account of typicality based on semantic relatedness may have played a part in the way subjects behaved in the ranking task. The experiment to be reported in this section addresses these two possibilities. The present experiment, has attempted to establish whether semantic-relatedness, on the basis of attributes shared between the various items included under a category name, was the main variable dictating the generation of goodness of example distributions in the ranking task. The need for the experiment sprang from the possibility that, despite the instruction subjects received (which was to rank according to their concept of the category and not according to familiarity), subjects might have been strongly influenced by such a variable. If this had been the case, then any claim that items had been ranked according to semantic relatedness based on attributes shared amongst category members might be called into question.

Previous research (McCloskey and Glucksberg, 1979; Rosch 1973b, 1975c; 1975d; Rosch and Mervis, 1975; Smith Shoben and Rips, 1974) has generally assumed that speed of category verification reflects varying degrees of item-category relatedness. According to such a view, the time it takes for an item to be confirmed or disconfirmed as a category member will be a function of the strength or lack of strength between a given item and the prototype (i.e. the abstracted concept representation accessed for the category). Thus, in reaction time

category verification tasks, items which share more attributes with the prototype and thus are more typical in the category should be confirmed faster than items which are less typical. Typicality, thus explained strictly in terms of shared attributes with the prototype, is the product of category structure. According to this view the frequency of occurrence of the items in the real world would not necessarily be the main variable for the generation of typicality gradients. By contrast, it was assumed that if subjects' familiarity with the items they had to rank had indeed played a part in their categorization decisions some positive evidence would be found by correlating reaction time with frequency of item production as assessed by the Battig and Montague (1%9) category norms.

In order to test the above hypothesis, category items which had received low mean ranks in the seven point scale used in the ranking task and those which attracted higher mean ranks were selected from the thirteen categories previously used in the ranking task. These "typical" and "atypical" items were then presented under correct or incorrect categories on a tachistoscope screen. Subjects were instructed to confirm or disconfirm the items membership by responding either 'yes' or 'no' as quick as possible when the items were flashed on the screen (see Section 5.1.8.2).

Moreover, it was also assumed that if item frequency of occurrence was the main variable in the generation of typicality effects, than typical items when presented under incorrect categories, would still be disconfirmed faster than atypical items. This should be the case because subjects' high familiarity with the item would facilitate speed of access to the summary representation for the item's correct category and this would result in faster negative responses for familiar items. By the same token, lack of familiarity with atypical items should hinder the representation accessed for the atypical items. This should slow down the time required for negative responses. If, however, there was no significant difference as regards speed of reaction time when either typical or atypical items were disconfirmed, this would indicate that frequency of occurrence, was not the main variable influencing item categorization.

5.1.8.2. Design and Materials

A total of thirteen categories previously used in the ranking task and folk definition interviews were used in the experiment. These were: **Bird**, **Clothing**, **Musical Instrument**, **Vehicle**, **Animal**, **Drink**, **Fuel**, **Furniture**, **Insect**, **Seasoning**,

Toy, **Tree**, and **Weapon**. The first four categories listed were used as part of a training session which preceded the actual experiment. Four members from each of the thirteen categories were chosen to be presented both under their correct categories and under incorrect ones. These were selected to be included under the various categories on the basis of the mean ranks obtained during the ranking task so as to include both items which had been ranked as typical and those ranked as atypical members of the categories investigated.

5.1.8.3. Subjects

Twelve American speaking subjects whose ages varied from eighteen to twenty-four years took part in the experiment as unpaid volunteers. These were 7 females and 5 males who were spending a year in England as part of their academic training from several American and Canadian universities. They belonged to several departments in either arts or sciences.

5.1.8.4. Procedure

Category names and category items appeared on the screen of a tachistoscope which was connected to a timer (accurate to 1 millisecond) and a microphone, the function of which was to stop the timer once subjects responded as to whether the category item they saw belonged to the category or not. First a category name appeared on the tachistoscope screen and subjects were asked to fixate on it. After a few seconds, the experimenter would say "ready" to indicate that a category item, which could be a member or not a member of the category, was going to be flashed on the screen for two seconds. Immediately after the experimenter said "ready", she pushed the timer button to start the timer. Subjects were asked to verify or disconfirm the item's membership by saying either 'yes' or `no' as quickly as they could. Their responses, which were to be given in a firm clear voice into the microphone, stopped the timer and response times were taken for each subject. The order in which the categories and items were presented was randomly distributed among subjects (see Appendix E for complete set of instructions).

5.1.8.5. Results and Analysis

The overall percentage of incorrect responses was very low (2.8%) and will not, therefore, be discussed here at any length. The mean reaction times for

decisions on typical and atypical category items are presented in Tables 5.14, 5.15, 5.16, and 5.17 on pages 97 - 99. As it already had been made evident in the ranking task, the results of the analysis performed on the data collected through the present experiment provide additional support for the contention that certain category items will be more central to the concept entailed by the category name. In evidence of this, the percentage of correct responses was much higher for typical items (99%) as opposed to only 65% for atypical ones. Moreover, speed of reaction time for correct responses was improved (mean RT 698 msecs) for central category items than for peripheral ones (mean RT 838 msecs) as Tables 5.14 and 5.15 show.

Despite the fact that such evidence suggests that individuals react faster and more accurately to central category items, it could be argued, nonetheless, that the centrality of such items simply reflects the subjects' familiarity with them. In other words, it could be said that subjects' improved performance in deciding that a typical item is part of a given category or in assigning varying degrees of membership status within a category might simply reflect the frequency of occurrence of such item in the real world. If this was the case, typicality rather than reflecting a structural basis which involves the distribution of perceptual features amongst category members, could be conceived entirely in terms of the individuals' familiarity or lack of familiarity with the items. Item typicality thus conceived conflicts with the position taken by proponents of orthodox prototype theory (see Rosch et al., 1976a) who posit that item membership status within a category is mainly determined by a family resemblance based on the degree to which perceptual features are shared between the categories best exemplars and the remaining items.

In view of the above contention, I was particularly interested, in ascertaining whether the subjects' facilitated speed of reaction time in categorizing central items was mainly a reflection of the familiarity of such items. In order to do so, the Spearman Correlation Coefficient was obtained by correlating the mean RTs for the various items with their frequence of production in the Battig and Montague (1969) category norms. It was felt that if item familiarity indeed played a part in determining typicality, then a significant correlation between these two variables should be found.

In harmony with the above hypothesis, the correlation obtained (-0.869) for typical items proved to be significant at $p < .01$, as opposed to the non-significant correlation (-0.218) found for atypical items. This reveals an inverse

relation between RT and frequency of item production. That is, the higher the frequency of an item the smaller the amount of time required for the item to be categorized and vice-versa. The fact that frequency of production correlates significantly with mean RT for typical items but not for atypical ones, suggests that item familiarity can actually influence an item's status within a given category. In other words, it appears to be the case that the more frequent a category item is in an individual's past life schemas (her/his world knowledge) the quicker such an item will be categorized as belonging into a given category. By the same token, the less frequent an item is for an individual the longer it will take for a decision to be taken as regards its membership status.

The fact that item frequence of occurrence plays a part in determining typicality, does not, however, rule out the possibility that typicality might also spring from a structural basis. As previous studies (Malt and Smith, 1992; Schwanenflugel and Rey, 1986; Segalowitz and Paulin-Dubois, 1990) have demonstrated, despite the fact that item familiarity does seem to influence variations in typicality, feature similarity relations holding amongst the various items to be categorized also seem to play a part in determining item membership status. In order to ascertain whether this latter variable had also influenced the categorization decisions in the present study, speed of reaction time for typical and atypical items to be either confirmed or disconfirmed was compared by means of the Wilcoxon test of significance for matched pairs.

It was assumed that if frequency of occurrence was indeed the main variable in determining variations in typicality, then a significant difference as regards speed of reaction time when typical items were either confirmed or disconfirmed as opposed to atypical ones should be found. The assumption was therefore that, if the individuals' high familiarity with certain items was the main variable dictating typicality, such familiarity should allow for improved speed of reaction when central items were to be confirmed or disconfirmed. This should be so because the individuals' high familiarity with the central items presented should facilitate speed of access to the summary representation stored for the item regardless of the category under which they were presented. If, on the other hand, no significant difference as regards speed of reaction time for typical items as opposed to atypical items to be disconfirmed was found, then it should be concluded that item familiarity could not be considered the main variable dictating typicality.

The results of the Wilcoxon test show that whereas a significant difference is obtained ($p < .01$) between the mean RTs for typical items and atypical items to be confirmed, the same does not occur when typical items and atypical ones are disconfirmed. When both typical and atypical items were presented under incorrect categories, there was a non-significant difference ($p > .05$) in the time it took for such items to be disconfirmed. These results, thus, suggest that item familiarity can not be the sole or main variable dictating typicality. If item familiarity was to be regarded as the main variable accounting for item centrality it should also be evident when category items are to be disconfirmed. The fact that there is no significant difference in the time it takes for typical items and atypical ones to be disconfirmed (mean RT 776 msecs. for typical items and mean RT 777 msecs. for atypical ones) demonstrates that, although being one of the factors involved in typicality, item frequency of occurrence is not the sole variable.

Table 5.14
Mean Reaction Times in Milliseconds for Typical Items Presented under Correct Categories

Items	Mean RTs
bomb	744
coal	686
coffee	677
dog	596
doll	695
dresser	821
gun	680
oak	657
pepper	725
Total	6,281

Mean RT = 698

S. D. = 62.23

Table 5.15
Mean Reaction Times in Milliseconds for Atypical Items Presented under Correct Categories

Items	Mean RTs
centipede	782
ketchup	906
lamp	828
nuts	1,004
paper	907
spider	733
swing	849
turtle	753
wood	778
Total	7,540
Mean RT = 838	
S. D. = 88.14	

Table 5.16
Mean Reaction Times in Milliseconds for Typical Items Presented under Incorrect Categories

Items	Mean RTs
block	884
chair	725
cow	795
flea	847
fly	729
milk	726
oil	756
pine	857
salt	671
Total	6,990
Mean RT = 777	
S. D. = 72.77	

Table 5.17
Mean Reaction Times in Milliseconds for Atypical Items Presented under Incorrect Categories

Items	Mean RTs
ash	846
balloon	722
cider	815
palm	742
picture	723
rock	712
snake	800
soup	729
stick	894
Total	6,983

Mean RT = 776

S. D. = 65.29

5.1.8.6. Discussion

The low percentile of errors and the improved speed of RT for typical items to be categorized under correct categories harmonize with the significant levels of intra-group and inter-group agreement found in the ranking task. (see Sections 5.1.2 and 5.1.3). Such a finding adds support for the contention that in assigning ranks, the Brazilian subjects who took part in the ranking task were doing more than simply providing lists of items. Such evidence suggests that individuals are, on the whole, quite consistent when making categorization decisions which involve central category members.

The fact that the subjects who took part in this experiment consistently reacted faster and more accurately to central category items presented under correct categories than to central items presented under incorrect categories shows that subjects' consistency in deciding whether or not an item is part of a given category or in assigning varying degrees of membership status within a category do not simply reflect the frequency of occurrence of such item in the real world.

Typicality, thus, rather than being conceived entirely in terms of the individuals' familiarity or lack of familiarity with given items, must also have a conceptual basis which relies on perceptual and/or functional feature overlap amongst the various members in a category.

5.1.8.7. Conclusion

The results of the present experiment , thus, suggests that variation in typicality reflects both a familiarity-basis and also a structural-basis which relies on degrees of feature distribution amongst category members.

By extension, these results also add support to the contention that in ranking the various items included in the ranking task, the Brazilian subjects' consistent decisions were governed by more than merely familiarity with the given items. The instructions the Brazilian subjects received, to rank not according to personal preference or familiarity with the various category items but according to a concept of the category, thus, appear to have been followed.

5.1.9. Summary Discussion for Rung One

The cross-cultural comparison of my findings with those of Markovitz for **Rung One** of the model has demonstrated some interesting similarities as well as differences in the behaviours of the two groups of subjects.

Graded category membership proved to be a cross-culturally shared phenomenon in the sense that both the American subjects and the Brazilian subjects found the task of ranking the various category members according to degrees of representativeness a meaningful one. The mean ranks produced for many of the category items included in both studies were therefore many times very close (see Table 5.5). Moreover, both groups produced various instances of identical tied ranks. The fact that ties such as dog/cow in **Animal,** salt/pepper in **Seasoning,** and stick/rock in **Weapon,** for example, were produced by both groups of subjects demonstrated that concepts regarding the various category members were many times shared between the two culturally distinct populations analysed in the study. The number of tied ranks produced in the present study was, however, much larger than the number of tied ranks reported by Markovitz. The inclusion of semantically very close additional items to the one already included in the original categories may have been one reason for the

increase in the number of tied ranks produced by the Brazilian subjects. Another possible reason for the increase in the number of tied ranks produced by the Brazilian subjects may have been the fact that my subjects as a whole had a higher level of academic training. Their increased education may have contributed to the inclusion of non-fuzzy formal criteria into the ranking task which resulted in the production of more ties.

Intra-group agreement was first calculated for the group of 11 subjects contacted in Leeds, England, and then for the 19 subjects contacted in Brasilia, Brazil. The W scores obtained for both groups proved to be above chance level. This demonstrated that despite the fact that the two groups of subjects had been contacted in different environments, they were nonetheless homogeneous. The intra-group agreement for the 30 Brazilian subjects (the two sub-groups as a whole) was again calculated and the W scores obtained proved again to be above chance level. Although the Kendall coefficients of concordance (W scores) were significant for the group of 30 Brazilian subjects as a whole, it failed to reach 90%, the level reported by Rosch (1973a, 1975d), in any category. Moreover, the levels of agreement obtained in the present study were not even as high as the ones obtained by Markovitz (1977). However, as was ascertained by the use of the Chi-Square test for independent samples, the low levels of intra-group agreement could not be attributed to differences due to sex, age, socio-economic, educational or geographical backgrounds. The low levels of agreement found for the present study may therefore be due to the fact that the population of individuals who participated in this study reflects more precisely the different behaviours which can be expected from a group of mature individuals with varied life experiences such as the ones who took part in the study when compared to the college sophomores used by Rosch in her studies or even with the group of subjects Markovitz uses.

Inter-group agreement was calculated for both groups of subjects by means of the Spearman Rank Correlation Coefficient. This was done by correlating the ranks given by both the Brazilian group and the American group to the various category members in each of the categories. The aim in calculating these correlations was to assess whether both the Brazilians and the Americans would display a homogeneous behaviour in the way they had assigned the various ranks. The correlations obtained for most of the categories were significant. Categories for which significant correlations were obtained (**Animal**, **Drink**, **Fuel**, **Furniture**, **Seasoning**, **Tree** and **Weapon)** seem to be therefore, the categories for which,

in the case of the present analysis, the concept of membership gradation is consistently shared by the two culturally distinct populations. On the other hand, the **Insect** category, which is rather culturally specific due to environmental constraints, displays a low correlation, thus suggesting that the concepts shared about the category may be confined to the members of the individual cultures and not shared among individuals belonging to different cultural backgrounds. The low levels of intra-group agreement resulted in non-significant differences between the mean ranks assigned to various category members. The number of non-significant differences between pairs of items was indeed much larger in the present study than in the study conducted by Markovitz. For example, I found, by the application of the Wilcoxon matched-pairs signed-ranks test of significance, a total of 51 pairs whose mean ranks were non-significant at $p > .05$. On the other hand, Markovitz, by the application of a **t** test, found only 22 pairs of items whose mean ranks proved non significant. Since the number of categories I use (10 in total) was much smaller than the number of 21 categories used by Markovitz, the much greater number of non significant pairs of items found in this study appeared to be a discrepancy. To solve such difficulty, however, the choice of the statistical test employed in each case and the nature of the category items included in the categories I used had to be considered. While I used a non-parametrical test, Markovitz employs a parametric procedure. The data which emerged from the ranking task in both studies, however, favoured the application of a non-parametric statistical test such as the one used in the present study rather than a parametric one such as the **t** test Markovitz employed in her study (see Section 5.1.4.). The use of a more appropriate statistical test such as the Wilcoxon test of significance might have contributed to the exposure of a greater number of non significant differences between the various pairs of ranks assigned to the various category items. Another possible reason why a larger number of pairs of category items do not reach a significant difference in the present study might reside in the fact that with the modification of the original categories, a considerable number of semantically very close items to the ones originally present were added. This may have resulted in the assignment of the same ranks or even very close ranks to a number of items. When the Wilcoxon test was applied, pairs of items which were ranked in the same way or which received very close ranks turned out to be non-significantly different. Interestingly, the application of the Wilcoxon test served to identify a non-significant difference between pairs of items which were semantically quite different. For example, ash and birch in the **Tree** category received, alongside with bamboo which

is physically quite different from the other two items, mean ranks which did not attain a significant difference. This apparent inconsistency can be explained by the fact that in ranking the various category members, the Brazilian subjects appear to have used more than one categorical behaviour for approaching category structure. In ranking the various category items, the subjects appear to have employed both a prototypical approach and a schema-directed approach to category structure. The use of a prototypical approach resulted, on the one hand, in the non-significant levels of difference detected for pairs of items such as dog/cow, coffee/tea which are semantically close on the basis of a number of characteristically shared attributes. Whereas, the use of a schema-directed approach, on the other hand, resulted in pairs of semantically more distant items such as squirrel/snake, beer/coffee, also proving to be statistically non-significant. It is interesting to note that, in Markovitz's study as well, semantically distant items such as coffee/fruit juice in the **Drink** category and swing/paint set in the **Toy** category receive mean ranks which also prove to be statistically non-significantly different. This appears to indicate that the American subjects used by Markovitz may also have made use of a schematic approach when ranking the various category items in her study. If this has indeed been the case, categorization by schema may be a phenomenon which is universally employed. Additional evidence that this is indeed the case is presented in Sections 6.1.5 and 6.2.1.5, where the results of the experiments dealing with context effects on category structure are discussed.

Like the American subjects used by Markovitz, the Brazilian subjects produced a considerable number of borderline or non-membership statements to express doubt about the membership of certain category items or to eliminate others. When the statements produced are cross-compared, one finds a number of similarities. For example, the fact that snakes have no legs or that soup has solids in it was for both groups of subjects a good reason for either rejecting such items from the **Animal** and **Drink** categories, respectively or for conferring doubtful category membership. In this regard, the behaviour guiding both groups of subjects appears to be universal. Both the American and the Brazilian subjects appear to have their ranking decisions motivated by certain experiential gestalts. That is, both groups form expectations regarding those category members which fit their concept of the category in its entirety or near entirety. Any member that does not display all the attributes which best exemplars of the category are expected to possess will be considered poor representatives of the category or be eliminated.

The statements produced by the Brazilian subjects which make up the folk definitions elicited during the interviews to define the various category members also demonstrate varying degrees of knowledge about the categories and their members. As in the case of the American subjects, their definitions ranged from affective to dictionary-like in scope. Some of the Brazilian subjects, however, appeared to have a more specialized knowledge of the categories. These provided evidence of specialized knowledge or expertise about certain fields of inquiry.

The cross-cultural analysis performed for the findings on **Rung One** provided evidence that graded category membership is a universal phenomenon. Moreover, it also demonstrated that speakers of different languages make use of similar definitions to describe the categories and their members. Also, when the responses of the two groups of subjects are compared, the two groups significantly agree as regards what constitutes evidence for category membership or as regards what contradicts such evidence. When faced with the ranking task, both groups appear to make use of simultaneous categorization processes, namely categorization by prototype and categorization by schema to confer category membership on the various category members. Finally the presence of elaborated definitions highlights the existence, among both groups of subjects, of varying degrees of private or specialized knowledge about the categories.

The extensional aspect of the various category members analysed on **Rung One** is insufficient, however, to provide a deeper cross-cultural insight into the semantic structure of such categories. For this reason **Rung Two** of the model, to be discussed in the next section, provides a detailed analysis of the semantic relations utilized by the two groups of subjects in describing the various category members.

5.2. General Discussion of Findings for Rung Two

The inter-lexical relations of **Taxonomy** (T-relation), **Modification (M**-relation), **Part-Whole, For** (Function relation), **Agent, Experiencer, Object** and **Locative** are included in **Rung Two** of the psycholinguistic model proposed by Markovitz on the basis of their widespread presence throughout the responses elicited from her subjects. These inter-lexical relations are also quite frequent and the most widespread amongst my subjects' responses.

An examination of the following tables and relevant appendixes as well as the accompanying comments will reveal that when folk definitions, non-membership

reports and borderline statements produced by the subjects who took part in this study are analysed, it is evident that to a large extent they frequently make use of the same above-mentioned relations to express their views and concepts about members of the various semantic categories examined here. Moreover, when the actual expressions that both groups of subjects use as a means to translate their concepts or even emotive reactions about some of the categories investigated are considered, one finds them to be rather similar. Such a correspondence, both at the linguistic level (assessed by the frequent use of the same inter-lexical relations) and at the emotional and conceptual levels (signalled by the similar responses found in both studies), places the model in a favourable light, rendering it capable of coping with data emerging from subjects who belong to different linguistic and cultural backgrounds. This, though on a superficial scale, contributes positively to the assessment of the model as a universal one. More evidence for the universality of the model will be provided in the discussion of the data analysed under context in **Rung Four.**

The following section contains a discussion of the various lexical-semantic relations found in the data.

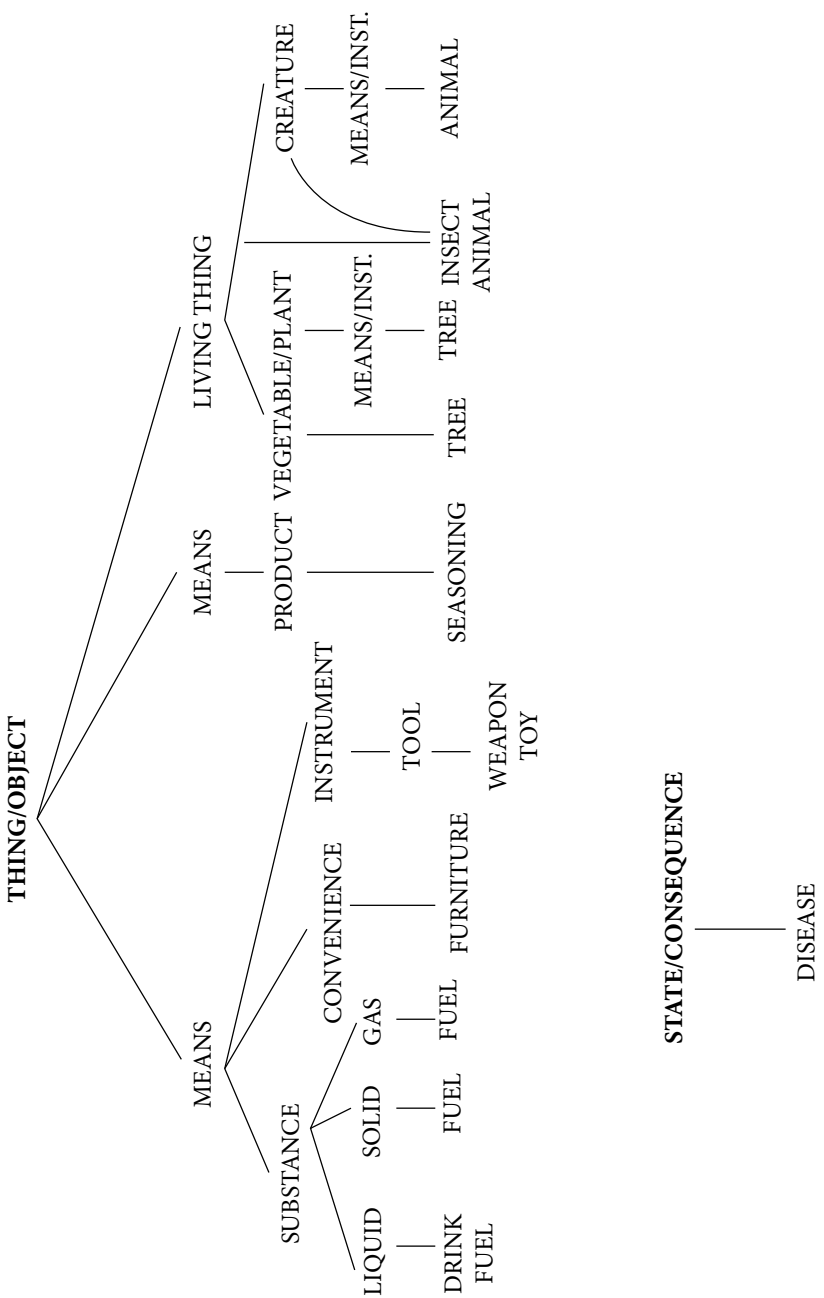
5.2.1. Discussion of Findings for the Taxonomy Relation

All of the subjects' reports contain such a relation. This is used to indicate hyponimy and category membership. It can be applied to assign full category membership such as in statements which translate class inclusion of the type; "An **Animal** is a living being" as well as in statements where linguistic hedges are used to express doubtful or fuzzy membership. The data provided by the subjects in this study reveal that, most times when this is the case, the statement containing the T-relation is modified by the presence of an intensifier such as **more,** and/or a comparative conjunction such as **like** which, in Brazilian Portuguese, always precedes the superordinate term. Statements of these types are: "A lamp is more a type/kind of **Decoration**". It is interesting to note that the hedge 'a type/kind of' can be suppressed if a comparison between the opposing category **Decoration** and the originally assigned category is established. Such a comparison can appear either overtly, as in the sentence "A lamp is more **Decoration** than **Furniture,** I think"; or covertly, as in "A lamp is more **Decoration"** where the comparison with the alternative category **Furniture** is implied by the context of situation in which the sentence is produced. Or further, as in "Bow and Arrow is like a **Sport";** or as in "Soup is more like solid

Food". The widespread use of taxonomic statements throughout the data identifies **Taxonomy** as a fundamental relation. Along with **Modification** (M-relation), the T-relation appears to be the only other relation found in statements regarding subjects' conceptions of all ten categories used in the study.

Markovitz (1977, p. 103) states that from all the inter-lexical relations explored in **Rung Two** of the model, only **Taxonomy** and **Modification** appear to be universally important, given their widespread use in connection with the various categories she analysed. Evidence from this study confirms this fact. All my thirty subjects, without exception, also made use of either the T-relation or the M-relation, or both to express their views of the ten semantic categories.

As Figure 5.2 shows, each of the ten categories was included within at least one taxonomic superordinate. The various categories appearing in the tree-like structure of Figure 5.2 were grouped under superordinates which were frequently assigned to them in subjects' definitions. A comparison of the taxonomic structure of the ten categories used in this study with the one in Markovitz's study reveals some similarities as well as some interesting differences. As in the case of Markovitz's study, the superordinates **THING/OBJECT** dominate most of the ten categories. In fact, in the case of the present study, nine of the ten categories are included within the scope of such superordinates. This signals an underlying relationship among the nine categories which is not shared by the remaining category Disease, frequently included in a group containing the two ungrouped superordinates **STATE/CONSEQUENCE.** Markowitz finds a similar situation in the case of the taxonomic structure displayed by the twenty-one categories used in her study (p. 108). She, however, does not determine what it is that makes categories of man-made objects and categories of naturally occurring objects tend to group together under the two major superordinates **THING/OBJECT** whereas other categories, such as **Sport** (included as **ACTIVITY)** in Markovitz's study, or **Disease** (classed as **STATE/CONSEQUENCE)** in this study, are dominated by isolated superordinates which are quite different from **THING/OBJECT.** The explanation I offer is that it is the dichotomy **concrete/abstract** that makes such categories either cling together or be isolated in the taxonomic display which translates their conceptual structure.



Taxonomic Display of the Categories
Figure 5.2

Naturally occurring categories as well as man-made categories enter man's categorization system under the two most inclusive unique beginners, **THING/ OBJECT,** superordinates for which no other level of inclusiveness is to be found (cf. Evans et al., 1980, p. 123; Pulman, 1983, p. 83, 84). On the other hand, abstract concepts like **Sport, Disease** and others are included within various abstract and less general superordinates such as **ACTIVITIES** and **STATES.** By 'general' I refer to the ability of superordinates such as the ones previously mentioned **(THING/OBJECT)** to encompass a great number of less inclusive hyponyms within a given taxonomy.

The taxonomic display based on the definitions provided by the Brazilian-Portuguese subjects also reveals important differences from the taxonomic structure presented in Markovitz's work (p. 107). When these two are compared, it is evident that, while there is a clear distinction between inanimate objects, mainly seen as having an instrumental nature, and animate objects, never classed as **INSTRUMENTS** or **MEANS** for the fulfilment of certain specific purposes in the taxonomic display constructed by Markovitz, this does not seem to be the case in my study. Most of the Brazilian subjects made evident in their definitions and in their elicited responses that categories of animate objects such as **Animals** and **Insects** do have associated with them the fulfilment of certain functions such as food production. This is especially observed for the sub-category farm **Animals.** The instrument-like nature of such categories therefore renders them very much similar to **MEANS** or **INSTRUMENTS** under man's control for the realization of necessary purposes. Such instrument-like nature is also observed for the category **Tree,** which Markovitz also mentions in her work in connection with the **For** relation (p. 132, 133). For this reason in the cross-classifications representing the perspectives of different subjects, **Tree** is grouped either directly under the superordinate **VEGETABLE/PLANT** or via the intermediate superordinates **MEANS/INSTRUMENT.** The same happens to **Animal and Insect** which are also at times viewed as **MEANS** or **INSTRUMENTS** in the working out of a purpose. The instrument-like nature of such categories contribute , I believe, to highlight the link or "the underlying relationship" which Markovitz suggests (p. 108) exists among classes of man-made and naturally occurring objects.

Another interesting difference between my findings and those of Markovitz is that her subjects cross-classified the category **Animal** at two distinct levels of inclusiveness. Some included in this category all living things which were not vegetable or mineral, whereas others limited this category to land animals

(p. 109). My subjects, however, consistently favoured the first definition. For all of them, the category **Animal** included all living things which were not vegetable, could move and be seen by the naked eye. This more encompassing view of the category can be related to the fact that all of the subjects who took part in this part of the study had university training and 20 of the total number of 30 subjects were university graduates. They were apparently, therefore, either intentionally or subconsciously allowing their definitions for the category **Animal** to be influenced by the two broad scientific taxonomic divisions of living things which ascribe naturally occurring categories to either the animal kingdom or the vegetable kingdom. It is interesting to notice, however, that, although this was the case, and although all of the subjects were happy to include other subsets of living things such as **Insects, Reptiles,** and **Birds,** within the most encompassing meaning of the superordinate **Animal,** the term 'animal' does seem to have strongly associated with it a more immediate, typical meaning, i. e., that of four-footed land creatures. This became evident when taxonomic statements were, on occasion, used to express the non-membership of the category members considered to be poor exemplars of the category. For example, for four of the subjects, snakes were not really to be considered animals due to the absence of legs. These subjects, therefore, employed negative taxonomic statements of the kind "I think snakes are not really animals", often followed by an explanation such as "because they don't have legs" to express the non membership of the item. (see Section 5.1.5.). In general, taxonomic statements were frequently used to express the non-membership of certain category items. Contrast sets for the ten categories were thus often identified by the presence of taxonomic statements. A list of the originally assigned categories and the alternative categories provided by the subjects appears in Table 5.18.

Statements of the type, "Snakes are reptiles, therefore not animals" or "Snakes are not animals, they're reptiles", were used by some of the subjects to express non membership. The enumeration of such alternative categories, Markovitz asserts, "implies the existence of non-fuzzy category boundaries." (p. 110). Such a statement, however, is to be taken with certain reservations. The assignment of alternative superordinates does not always signal the presence of non-fuzzy category boundaries. This happens because the shifting of a category member into another category does not necessarily confer the shifted member full membership on the alternative category.

Table 5.18
Alternative Category Names Reported for Non-member Items

Category	Item	Alternative Category	Number of Times Reported
Animal	squirrel	Unfamiliar	1
	snake	Reptile	3
	turtle	Fish	1
Disease	deafness	Disability	2
		Results from a disease	3
		Permanent State	9
	drug addiction	Addiction	2
		Acquired Behaviour	3
		Self-Inflicted	7
	headache	Passing Discomfort	1
	toothache	Symptom	1
Drink	soup	Food	13
		Meal	12
	milk	Food	1
Fuel	steam	Results of burning fuel	7
		Power Transmission Means	1
		Ancient Fuel	1
		Obsolete Fuel	1
	paper	Ancient Fuel	1
	hay	Animal Food	6
	picture	Decoration	13
		Accessory	5
		Ornament	1
		Complement	1
		Artistic Object	1
Furniture	lamp	Accessory	7
		Decoration	9
		Electrical Appliance	2
		Lightning Object	1

Table 5.18 (cont'd.)
Alternative Category Names Reported for Non-member Items (cont'd.)

Category	Item	Alternative Category	Number of Times Reported
Furniture (cont'd.)	rug	Decoration	8
		Accessory	3
		Ornament	1
	curtain	Decoration	3
	refrigerator	Electrical Appliance	1
	telephone	Means of Communication	4
		Instrument	1
		Utilitarian Device	1
	television	Electrical Appliance	4
		Utilitarian Device	1
		Utensil	1
		Accessory	1
		Instrument	1
	computer	Working Tool	1
Insect	centipede	Myriapod	1
		Reptile	2
	flea	Parasite	2
	spider	Arachnid	1
	grasshopper	Collective	1
Seasoning	ketchup	Dressing	7
		Sauce	4
	nuts	Fruit	4
		Garnish	3
		Accessory	2
		Decoration	2
		Spice	1
		Complement	1
		Ingredient	1
	cinnamon	Spice	1

Table 5.18 (cont'd.)
Alternative Category Names Reported for Non-member Items (cont'd.)

Category	Item	Alternative Category	Number of Times Reported
Toy	balloon	Vehicle	1
	block	Construction Material	1
	soldier	Army	1
		Man	1
	swing	Instrument	2
	adult toys	Hobby	1
		Pastime	1
		Sport	1
Tree	bamboo	Bush	5
		Plant	3
		Hypertrophic Stem	1
Weapon	bow and arrow	Sport	6
		Hunting Tool	2
		Weapon from different time period	2
		Ornament	1
	knife	Utensil	2
	rock	Building Material	3
		Civil Construction	1
	stick	Obsolete Weapon	2
		Sport	2
		Object	1

An interesting fact which emerged in connection with the way my subjects expressed themselves was that, whereas some subjects would assign full membership to certain items in alternative categories, others would restrict an item's full inclusion in the contrast category by inserting a linguistic hedge to express a certain degree of fuzziness in their taxonomic statements. Thus, when expressing their views about the items lamp and/or picture included under **Furniture,** the

subjects invariably ranked such items as poor members of **Furniture.** On several occasions they would either totally assign the items to a new category, saying for instance, "A picture is an **Ornament**" conferring therefore full membership on the specific item (picture) in the alternative contrast category. Or they would still shift the item to the alternative category but signal a certain degree of uncertainty as to the full extent of the item's membership within the newly assigned category by saying "It (picture) is more a type of **Decoration**" or "These (picture and lamp) remind me more of **Ornaments**". Such a trend was often observed throughout the ranking statements for all ten categories included in this study. The taxonomic hedges '**like**', translatable in Brazilian-Portuguese by 'como' or '**semelhante a**', as in statements of the type "Bow and Arrow is more like a **Sport**" (Arco e Flecha é mais semelhante um **Esporte)** and "a knife is like a **Utensil**" (Uma faca é como um Utensílio**),** and '**more of a**' translatable as '**mais um(a)**' as in "It is more of a **Decoration"** (E mais uma **Decoração)** were the most pervasive hedges throughout my subjects' responses (see Table 5.19). Taxonomic hedges, such as '**like**' and '**more of a**' contrast a given category with an alternative category of the same level of inclusiveness. The term 'picture', therefore, sets **Furniture** against **Decoration** or **Accessory** on the basis of a diminishing degree of functionality or of serving a useful basic purpose. The best examples of the category are always those items which fulfil functions viewed as very necessary within the confines of a house, such as beds, tables and chairs. The hedges, '**like**' and **'more of a**' were also employed to express the fuzzy nature of the category **Toy**. Depending on the existence and complexity of rules and sense of competition for example, **Toy** can fuzz into **Sport**; and depending on the age group involved, they can be viewed more as **Hobbies** or **Pastimes.** This conception of **Toy** is also present among the subjects in Markovitz's study (p. 114).

Although some insight into the structure of the categories has already been obtained by the consideration of the **Taxonomy** relation, it is only by taking into account the attributes linked to the categories and their various members that a deeper understanding of category structure can be arrived at. **Modification,** the next relation to be discussed, will help us grasp such understanding.

Table 5.19
Hedges

Relation	Category	Item	Hedge
Taxonomy	**Animal**	snake	I think it's more mystic.
		turtle	like a fish. I think it's more aquatic.
	Insect	flea	more of a parasite.
	Disease	deafness	more of a disability. more of a handicap.
		drug addiction	more of an addiction. more of a psychological disease.
	Drink	milk	more like solid food.
		Soup	like solid food. almost solid food. more a type of food. more like a meal. more doubtful because of its density. food-like
	Fuel	paper	typically not fuel.
		hay	more of an animal food. more used like animal food.
	Furniture		lamp more of an accessory. more of an ornament. more of a decoration. more of a decorative object. more like an ornament. more of a complement. like an accessory more like an electrical appliance
		picture	more of an accessory. more of a decoration. more of a decorative object

Table 5.19 (cont'd.)
Hedges (cont'd.)

Relation	Category	Item	Hedge
Taxonomy		picture	more of an ornament more of a complement
		stool	more like decoration.
		rug	more of an accessory. more of a decoration more of an ornament type of decorative object very much linked to decoration. more like a cosmetic.
		telephone	more of a means of communication.
		television	more of an appliance.
		curtains	more like a decoration. type of decorative object. more of an ornament.
	Seasoning	ketchup	more like a dressing. more a type of dressing. more a combination of other seasoning more like a sauce.
		nuts	It's more of a decoration. more of an ornament. more like an ingredient. more like spice. I link it more to a fruit food-like.
		salt	more like an ingredient.
		parsley	more like a vegetable.
		garlic	more like a vegetable.
		herbs	more like a vegetable.
Taxonomy	**Toy**	balloon	more like a vehicle. more an ornament.

Table 5.19 (cont'd.)
Hedges (cont'd.)

Relation	Category	Item	Hedge
Taxonomy	**Toy**	block	I link it more to construction.
		paint set	more like art. more adult-like.
		soldier	It reminds me more of violence, fight, weapon. army-like.
		swing	more like an instrument.
		adult toys	like sport. like a hobby. like a pastime.
	Tree	GENERAL	the shape is like a mango-tree or an oak-tree.
		bamboo	it reminds me of a bush. more like a plant. like a bush.
		weeping willow	more ornamental. more like an ornament.
	Weapon	bow and arrow	more like an ornament. more like a sport type of sport type of hunting tool like museum pieces. more defensive tool.
		knife	more like a utensil
		rock	not typically a weapon more of a utensil more for ornamentation
Taxonomy		stick	not typically a weapon

Table 5.19 (cont'd.)
Hedges (cont'd.)

Relation	Category	Item	Hedge
Taxonomy		stick	more like a sport more of a useful object like a working tool
Modification	**Animal**	squirrel	more like a little toy more like a little dummy
	Tree	bamboo	too fragile too little

5.2.2 Discussion of Findings for the Modification Relation

The Modification relation is generally expressed by adjectival attributes commonly attached to individual category members. It is used to describe Qualities or properties such as size, colour, shape, texture, and material. The M-relation comes many times embedded within a taxonomic statement modifying the general superordinate term (the category name). When subjects express their views about the categories and their members, they may often insert within a class inclusion statement (taxonomic statement) a modifier or a modifying or qualitative clause. Some of such examples are:

"**Animals** are living beings" (**Animais** são seres viventes)

"Knives are cutting **Objects" (Facas** são **Objetos** cortantes)

"A **Drink** is liquid **Food**" (Uma **Bebida** é um **Alimento** líquido)

"**Toys** are **Objects** you can handle" **(Brinquedos** são **Objetos** que você pode manusear)

At other times the modifier or the modifying or qualitative clause will appear on its own, dominating the entire set of the category members. This can be seen in subjects' reports such as:

"An **Animal** is a breather" (Um **Animal** é um ser que respira)

"**Trees** are green" (As **árvores** são verdes)

"**Trees** are taller than man" (As **árvores** são mais altas que o homem)

The importance of the M-relation is seen from the fact that, as in the case of **Taxonomy,** it also appears in the definitions or ranking statements for all ten categories. Markovitz also verified its presence in the definitions of all the twenty-one categories she used in her study (p. 114).

Modification is linked with **Cue Validity** and **Family Resemblance** included in **Rung Three** of the model. Although such a relationship is quite a complex one and an in-depth analysis of such a relationship would go beyond the province of the present study, apparently such a link resides in the fact that the scalar or the attributive nature of the properties most frequently associated with certain category members become highly weighted and are therefore of fundamental importance in determining levels of typicality and category membership (Markovitz, 1977, p. 150-171).

I will now discuss some of these scalar attributes which are capable of rendering items very typical if these fall within certain pre-established ranges, or atypical and even non-members if these are viewed to fall beyond the limit of such ranges. Each of such scales will be discussed separately below.

5.2.2.1. Size Attributes

As it was the case amongst Markovitz's subjects (Markovitz 1977, p. 115, 117, 118), my subjects often expressed ranges of size values associated with several of the categories. For the majority of my subjects, **Insects ,** for instance, would range from very little ones such as lice and fleas to those of cockroach size. Other subjects would qualify such a measurement by limiting it to "four or five centimetres". For one of the subjects, **Trees** were only those whose height was one and a half meters or more. Most of my subjects, when expressing their views about the size range for the **Animal** category, mentioned no restriction. The majority viewed as **Animal** any living creature capable of moving and acting no matter how small or big it was. Despite this, four-footed land **Animals** were most often reported as best exemplars of the category. Often, no size restriction was also observed for **Weapon** which could range from the size of rockets or missiles to that of bacteria. It is interesting in this regard that Markovitz's subjects provide very similar responses (p. 117). For most of the Brazilian subjects, **Furniture** would include only those items with a certain volume, of rigid structure and of the size of at least a stool.

Therefore, additional items such as rug and curtain were at times reported as non-members for failing to display such attributes.

Another way to express size specifications which was also noticed among Markovitz's subjects, was some of the subjects' tendency to compare **Tree** sizes with the human body (p. 117). In fact, for most of my subjects **Trees** would be only those of at least the height of a man.

Typical **Toys** were those small enough to be handled. On this basis, big toys were sometimes considered difficult to be viewed as such. Thus, swing was seen as a poor member of the category and viewed more as an **Instrument.**

Markovitz observes that some of her subjects eliminated specific category items on the basis of size range limitations for the various categories (p. 118). A slightly different tendency is observed in the present study. Although my subjects ranked those members which fell outside their expectations for size as poor representatives of their categories, limitation on size range was used only by two subjects as a means for the elimination of items from the categories used in this study. Items which were considered too big and therefore very atypical within their categories were swing as a **Toy** and centipede and big spiders as **Insects.** One of my subjects, for example, eliminated centipede from the category **Insect** because it was too big, in her opinion, to be considered an **Insect**. Another subject divided the set of spiders into two subsets; small ones and big ones. While small harmless spiders were considered to be **Insects,** big ones like the tarantula were to be eliminated in the informant's opinion, because of their size. Lamp was also in one instance listed as a very poor member of **Furniture** because of its too small a size.

5.2.2.2. Material Attributes

Different materials were frequently specified for the various categories. Although subjects could normally list more than one material for each of the categories of man-made objects, they would always specify a typical material for the category. For all thirty subjects, therefore, **Furniture** was typically made of rigid materials amongst which the most typical was wood. **Weapons** were typically made of metal, **Toys** of plastic or some other sort of malleable or light material. For one of the subjects **Toys** could be classified into two major groups: rudimental **Toys** and electronic **Toys**. While the former would be typically those made of wood, the latter included more sophisticated types of

toys, usually those which are made of some kind of man-made materials such as plastic or glass fibre and which would run on batteries, electricity and by remote control or other similar device.

5.2.2.3. Conor Attributes

This was another property frequently associated with some of the categories. **Trees,** for example, were for all subjects predominantly green. The nineteen subjects contacted in Brasilia, D.F., Brazil, however, spoke of the trees found locally (in the region of the scrub-land where the Brazilian capital is located) as brownish in contrast with very green trees found in tropical regions such as the Amazon jungle. Also, for one of the subjects, **Insects** were also predominantly green. **Fuel** was, for another subject, always associated with a yellowish colour. Conor, however, was never a reason for the elimination of any of the items from the various categories, nor was it used as an explanation for non-membership. This differs from what we find in Markovitz's study where subjects sometimes used colour as a reason for item elimination (p. 119).

5.2.2.4. Form Attributes

Certain forms or shapes were strongly related to various members of the categories. This was particularly the case with **Drink, Seasoning,** and **Furniture** where particular forms dominated the entire category and its absence was at times an important reason for the item's elimination from the category. **Fuel,** for example, was typically viewed as liquids, though subjects were aware that these occur in both liquid and solid states. **Drinks,** were also always characterized by displaying a non-rigid consistency. The best examples of this category were, therefore, those most fluid. On this basis, soup was many times eliminated from the category. As some subjects reported "It's more like solid food because of its texture". As for **Seasoning,** although subjects would accept members of the **Seasoning** category to have many consistencies, most of them reported the granular form as the most typical. On this basis, nuts were consistently eliminated from the category several times. Finally, categories such as **Furniture** and **Weapon** were most times viewed as possessing rigid structure. Possible additional category members for **Furniture** such as rugs and curtains were therefore eliminated by some of the subjects for not possessing such an attribute. Also for some, **Weapons** were considered to be penetrating, cutting

or pointed objects. A very similar behaviour is observed amongst Markovitz's subjects (p. 120).

5.2.2.5. Modificational Attributes

Some attributes do not have ranges. These are used to modify and contrast entire subsets of taxonomies. The attributes, 'living' and 'non-living', for example, establish the contrast between categories of naturally occurring objects and those of man-made or manufactured items. Within animate categories, further subsets are to be found contrasting those of non-volitional behaviour or static categories (such as **Tree** in the present study) with those which are described as having volitional behaviour (moving things), like **Animals** and **Insects.**

In the present study, animate categories like **Animal** and **Insect** were further divided into sets of 'wild', 'domestic', 'noxious' and 'less noxious', respectively, depending on the characteristic behaviour of their members. Whereas **Trees** were sub classified into those found in the scrub-land region of Brazil's central plateau, tropical ones and those of colder regions. The criteria used for such sub-classifications was height, shape of the trunk and branches, or colour and quantity of leaves.

The category **Disease,** not present in Markovitz's study, has linked with it modificational attributes which are quite different from those employed to modify the other categories. This is due to the fact that, different from man-made or naturally occurring categories, the **Disease** category is not composed of concrete items. In harmony with this, **Diseases** were often described as abnormal physical or mental states or they were viewed as a consequence of the malfunctioning of the body or mind. **Diseases** were also most times considered temporary states, having a beginning and gradually progressing towards an end, even if this is death itself. On this basis, deafness was eliminated nine times due to its being of a permanent nature. **Diseases** were also considered by most of the subjects to be involuntary acquisitions, and because of this, ten subjects eliminated drug abuse from the category. The seriousness and terminal character of some **Diseases** seem to have a bearing on membership gradation for the category. Therefore, members such as cancer and A.I.D.S. were often ranked as the best exemplars of the category whereas the frequently occurring, but quite simple member, cold, was always ranked as a less typical member.

5.2.3. Discussion of Findings for the Part-Whole Relation

Although not as widespread as the **Taxonomy** and **Modification** relations which were found in practically all of the subjects' definitions and/or ranking statements about the various categories, the **Part-Whole** relation as well as the other remaining relations of **Rung Two** which will be discussed in the following sections are also quite frequent in the data gathered for this study. As we shall see, some of such relations which were predominantly linked in the definitions of Markovitz's subjects either to animate categories or to inanimate categories seem to be more dynamically employed to refer to both animate and inanimate categories by the subjects in the present study. This reveals some interesting conceptual differences between the two groups of subjects.

Table 5.20 shows the list of **Part-Whole** statements produced by the thirty subjects who took part in this study. For clarity, I have organized the **Part-Whole** statements in groups of either structural or functional statements. The structural **Part-Whole** statements are the ones appearing in roman script whereas the functional **Part-Whole** statements are the ones appearing in italics. Although such a dichotomy is not always clear-cut due to the fact that on occasion what could be considered basically a structural statement such as "has wings" will, in an expanded context, fulfil a functional role,[9] I have here considered as a rationale for the grouping of **Part-Whole** statements into either structural or functional only their primary aspect. Cruse (1979) gives some insight into the problems one is bound to face when trying to characterize such a relation. He, for instance, highlights the difficulties of drawing a clear-cut division between structural and functional **Part-Whole** statements by saying that "there is normally some notion of determinate function, understood in a wide sense, inherent in the idea of a part." (p. 31)

9. Wings are part of a body structure but often fulfil a function - that of flying.

Table 5.20
Part-Whole Statements

Category	Statement	Number
1. Animate categories		
Animal	has four legs	23
	has fur	11
	has a head	5
	has a tail	5
	has life	4
	has some intellectual level	3
	has two ears	3
	has a mouth	3
	has claws	2
	has paws	2
	has sharp teeth	2
	has a proportional body	1
	has a body	1
	has no wings	1
	has blood	1
	has a smooth belly	1
	has fangs	1
	has horns	1
	has a skeleton	1
	has whiskers	1
	has limbs	1
	has a brain	1
	has some sense of smell	1
	has movement	1
Insect	has wings	4
	has many legs	3
	has a head	1
	has antennae	1
	has a trunk	1
	has two pairs of legs	1
	has four pairs of legs	1
	has an ecological function	1
Tree	has a trunk	10

Table 5.20 (cont'd.)
Part-Whole Statements (cont'd.)

Category	Statement	Number
Tree (cont'd.)	has branches	8
	has leaves	6
	has a top	4
	has a stem	3
	has fruit	3
	has roots	2
	has sap	1
	has foliage	1
	has a base	1
	has no nerve system	1
	has life	1
	has a life period	1
	has no movement	1
2. Edibles		
Drink	has alcohol	2
	has nutrients	2
	has proteins	1
	has vitamins	1
Seasoning	has a characteristic smell	1
3. Mass noun		
Fuel	has a strong smell	1
4. Man-made objects		
Furniture	has volume	2
	has rigidity	1
	has functionality	1
Toy	none	
Weapon	*has destructive power*	4
	has a wider range	4
	has a pointed end	2
	has a sharp end	1
	has great power	1

Table 5.20 (cont'd.)
Part-Whole Statements (cont'd.)

Category	Statement	Number
Weapon (cont'd.)	has a triggering device	1
	has bullets	1
5. State/Consequence		
Disease	has a beginning	3
	has a cure	2
	has an end	1

Using the categories **Animal** and **Disease** as the source of my example, provide below a brief account of how **I** have distinguished between structural or functional **Part-Whole** statements for the purposes of this study. **I** have considered to be structural **Part-Whole** statements all those which form parts of concrete or abstract wholes, such as "has a head" in the case of **Animal** or "has an end" in the case of **Disease. I** have, on the other hand, classified as functional **Part-Whole** statements all those responses which appear to be derived from an underlying structural statement. For example, **I** have classified "has some intellectual level" in the case of **Animal,** as a functional statement since the response "has some intellectual level" implies a structural **Part-Whole** statement of the type "has a brain". The same is also true of the functional statement "has movement" which implies structural statements such as, "has legs", "has limbs" or even "has a motor system". As in Markovitz's study, the **Part-Whole** relation appears to be more prevalent in the folk definitions of animate categories (p. 127). Markovitz finds this not to be the case only for the categories **Footwear** and **Vehicle** for which **Part-Whole** statements are equally quite frequent (p. 125, 126). As these two categories have not been included in the ten categories analysed in this study, Markovitz's findings in this regard cannot be either confirmed of rejected. Markovitz's subjects rarely employed the **Part-Whole** relation as a rationale for the elimination of members from a category (p. 127). The present study reveals a somewhat dissimilar picture. The subjects in this study produced **Part-Whole** statements for rejecting items from six of the ten categories used here. This is proportionally similar to what is observed in Markovitz's study where her subjects produced **Part-Whole** statements for rejecting items from eleven of the twenty-one categories she used. I have, however, computed a total of twenty-one rejection **Part-Whole** statements for the thirty subjects

in the present study. This represents a higher average of rejection **Part-Whole** statements per subject than in Markovitz's study. Interestingly, the **Part-Whole** statement of highest frequency in Markovitz's study (i. e. "has solids in it") for rejecting soup from the category **Drink,** elicited fifteen times in her study, is also the most frequently given statement for item rejection amongst the Brazilian subjects appearing eleven times in the data. Negative **Part-Whole** statements such as "has no trunk" for rejection of bamboo from **Tree,** and "has no legs" for rejection of snake from **Animal** have, as in the case of Markovitz's study, also been produced by the Brazilian subjects. While a total of seven **Part-Whole** statements for rejecting bamboo, from **Tree** and snake from **Animal** have been computed for the present study, Markovitz reports a total of only eleven **Part-Whole** statements for the rejection of such items. Considering the number of subjects in both studies (seventy-six in Markovitz's and thirty in this study), it is evident that the Brazilian subjects appear to have been more productive in employing **Part-Whole** statements as a rationale for the elimination of such items from the two above-mentioned categories. Interesting to notice is the fact that in both studies structural **Part-Whole** statements such as the ones mentioned above seem to be employed more frequently than purely functional statements for rejecting or conferring doubtful category membership on items included in the various categories. This harmonizes with Lakoff and Johnson's (1980, p. 122-125) comments on gestalts.

According to this view, people categorize things and experiences in terms of structural wholes which are in turn defined by means of our experiences and interactions with the world around us. Any category item, therefore, that fails to display structural properties which constitute strong cues in determining sufficient family resemblance to the category best exemplars will attract low degrees of membership. The fact that snakes "have no legs", something which contradicts what is experientially expected amongst the properties which form the structural gestalt for the category **Animal** is, therefore, sufficient reason for the frequent rejection of snake from the category. The high frequency of the response "has four legs", given sixty-six times by the American subjects in Markovitz's study and twenty-three times by my Brazilian subjects when describing the category **Animal** seem to add weight to the above claim.

5.2.4. Discussion of Findings for the For Relation

Whereas **Part-Whole** statements are predominantly employed in connection with animate categories, the **For** relation is primarily linked to classes of inanimate objects. Used to expose the functional or instrumental nature of such objects, it will on occasion stand on its own as a definition for the entire category. Thus, a subject can define a whole category, say, the category **Weapon,** by simply stating that: **"Weapons** are for harming people or animals." In this regard, Holyoak and Glass (1986) comment that despite the fact that many categories include a visual-spatial representation and that most concepts corresponding to concrete objects (e.g. cat, tree, and rock) are basically defined by perceptual representations, there are a number of categories which are defined by their characteristic functions, or uses. Included among these are categories such as **Weapon, Furniture,** and **Jewellery**. The widespread use of the **For** relation to describe some of the typical functions associated with the inanimate categories used in the present study supports such a comment.

In the Model adopted, the **For** relation, although bearing a striking similarity to the **Agent** relation, is to be distinguished from this one so that the instrumental nature of inanimate categories are emphasized. Therefore, since categories of inanimate objects such as the category **Seasoning** does not possess any form of self-initiated behaviour, the statement "**Seasoning** enhances the taste of food" is to be understood as having its behaviour initiated by an external agent (in this case people) who uses seasoning for the purpose of enhancing the taste of food. The statement can thus be modified as "**Seasoning** is for enhancing the taste of food in order to expose in this way the **For** relation which was originally covertly implied. Markovitz says in this regard:

> ". . . inanimate categories represent a means by which human beings achieve specific goals. This is not true of the self-initiated behaviour of intelligent animate categories. . . Humans play no role in the flying of **Birds** and the walking of **Animals**." (p. 128)

Although I agree with the above statement to some extent, I believe that the sharp dichotomy Markovitz establishes between the **Agent** relation on the basis of the self-initiated behaviour of animate categories as opposed to the **For** relation on the basis of the instrumental nature of inanimate categories has to be softened. This needs to be done in order to account for the data gathered for

the present study. These data indicate that such a strict division is not always possible since certain classes of animate objects, like the ones in this study, display some degree of the instrumental nature which Markovitz solely associates with categories of inanimate objects. For example, when answering questions during the interview aimed at eliciting information about the role that context plays on typicality shifts, some of my subjects stated that farm animals are distinguished from other animals in general on the basis of the typical function these animals fulfil either as food producers or as cargo transporters in the farm context. When one considers that humans can indeed have a role in controlling the self-initiated behaviour of such creatures by, for example, introducing dietary procedures or other means which will enhance the quantity or quality of the raw materials that these animals produce such as milk or meat, these can from then on very well be regarded as tools or instruments subject to the conscious purposeful actions of man. Therefore, although the behaviour of such animals is self-initiated, the animals themselves can be acted upon and used to fulfil diverse ends.

As in Markovitz's study, the **For** relation is also found in connection with the **Tree** category. The thirty subjects in this study produced a total of twenty-six different **For** statements describing the various functions associated with **Tree.** In this regard, they appear to have been more productive than Markovitz's subjects. Markovitz mentions only eight **For** statements produced for the category by her subjects (p. 132, 133). Interestingly, four of the functions mentioned for **Tree** by Markovitz's subjects, i.e. 'give shade', 'provide wood', 'provide shelter', and 'provide food', are equally the most frequently given by my subjects. This seems to indicate that most typical functions for the category **Tree** appear to be salient in different cultural contexts (see Appendix F).

The behaviour of the Brazilian subjects is also similar to that of Markovitz's in another respect. As it happens in her study, the **For** relation is sometimes used to reject members from inanimate categories but never from categories of animate objects (p. 133).

The **For** relation is also covertly employed to define the category **Disease**[10] and to talk about its members. **Diseases** are described as states or consequences of the

10. This is a stative category which also display the instrumental nature of innanimate categories. In connection with this category, however, man is not the typical carrier of action. In this instance, other external agents such as bacteria and other micro-organisms or elements capable of causing disease are to be viewed as the initiators of action..

malfunctioning of the body or mind and as such are viewed as fulfilling wholly negative roles, among which those of bringing suffering, unease, fear, death. etc (for the complete list see Appendix F).

As Markovitz observed in her study (p. 132), the **For** relation also proved to be an important reason for membership rejection or poor ranking in this study. Certain members can thus be rejected by their inability to perform the functions of the category. Soup and milk are considered poor **Drinks** and are eliminated from the category because they do not quench thirst as **Drinks** should. Lamps and pictures are eliminated from **Furniture** because they do not fulfil an essential purpose within the house which beds, tables and chairs do. According to one of the subjects, wood can be used as **Fuel** but it is not very effective as such since it contains much water and therefore does not burn as well as fuels are expected to. Salt for two other subjects was not **Seasoning** because it is used in all sorts of savoury food and does not add a peculiar taste to food as **Seasoning** typically does.

Statements of the type **"X** can be used as **Y"** are also observed in this study. My subjects frequently made use of such a statement when describing certain category members such as paper in **Fuel,** rock and stick in **Weapon,** as well as other additional members elicited during the interview procedure. As Markovitz points out, this type of response is evidently derived from the **For** relation. This can be seen from the fact that the response **"X** can be used as **Y"** is employed to describe objects which are not typically used to perform the function of a given category but, given the necessary circumstances, are still capable of fulfilling that function. Therefore, in a similar fashion to what Markovitz observes in her study, atypical category items such as paper in the **Fuel** category, and rock and stick in **Weapon** as well as additional items elicited during the interview procedure were also at times included by my subjects in the respective categories. Like the American subjects, the Brazilians I interviewed were willing to ascribe a degree of membership to such items provided these were used to fulfil a function or purpose typically associated with the respective category. For example, additional items elicited for the **Weapon** category such as poison and bacteria though not typical **Weapons** can be counted as such, since these are, given the necessary circumstances, capable of performing the typical functions of the category such as attacking, hurting or killing. My subjects as a whole, however, mentioned that the evocation of specific mental contexts were always required for the inclusion of such items within the **Weapon** category. More details about the role context

plays on membership gradation will be discussed in Chapter Six where the effects of **Context** on category structure are analysed.

5.2.5. Discussion of Findings for the Agent Relation

The **Agent** relation is solely associated with categories of animate objects whose behaviour is volitional. In the present study, it is linked to the categories **Animal** and **Insect** since members of such categories behave volitionally and perform as active agents. Table 5.21 provides a list of the **Agent** statements for the two above-mentioned categories. An examination of the various statements produced shows that some of these are more strongly impressed on the subjects' minds than others. Manner of locomotion, for example, is important for both categories and appears eight times as *move* for the category **Animal,** and six times as *fly* for the category **Insect.** Subjects, therefore, often defined **Animals** as living things which can move as opposed to **Trees** which, though alive, are static. Typical **Insects,** on the other hand, are those which *fly,* though the subjects did not eliminate any members from the category on the basis of their not being able to perform such an action. The uncertainty observed among Markovitz's subjects as to whether **Insects** *fly* and **Bugs** *crawl* or vice versa was not observed among the Brazilian subjects (p. 134). For these subjects, all are **Insects** despite the type of locomotion they use to go about. The type of locomotion for the category **Animal** has, however, been the reason why three of the subjects eliminated snake from the category. For these subjects, snakes should be eliminated because they do not walk on legs.

As in Markovitz's finding (p. 134), manner of reproduction was the only other **Agent** relation employed to eliminate items from the category **Animal.** One of the subjects felt that both turtle and snake were not members of the above category because they reproduce by egg.

Table 5.21
Agent Statements

Category	Statements	Number
Animal	protect the young	9
	move	8
	care for young	7
	suckle young	5
	feed the young	5
	reproduce	4
	breathe	3
	display aggressivity	3
	teach the young	3
	eat	2
	act according to instincts	2
	sleep	2
	produce strange noises	2
	play	1
	attack	1
	act spontaneously	1
	cat the offspring	1
	drink	1
	defend themselves	1
	display affection	1
	display maternal instinct	
	display sense of possession	1
	react to stimuli	1
	hunt	1
	feed on other animals	1
	help man	1
Insect	transmit diseases	18
	disturb	9
	make honey	9
	sting	7
	eat leaves	6
	fly	6
	destroy plants	6
	eat man's food	5

Table 5.21 (cont'd.)
Agent Statements (cont'd.)

Category	Statements	Number
Insect (cont'd.)	pollinate flowers	5
	eat crops	5
	crawl	4
	suck blood	4
	eat trash	4
	balance the environment	4
	destroy crops	3
	eat other insects	3
	reproduce	2
	protect the plants	2
	breathe	1
	feed on decomposed matter	1
	make a web	1
	build the hive	1
	make noises	1
	frighten people	1
	contaminate food	1
	help in plant decay	1

5.2.6. Discussion of Findings for the Experiencer Relation

The sole purpose of the dichotomy **Agent/Experiencer** in Markovitz's model is to differentiate between the volitional behaviour of members of the animal kingdom versus the non-volitional behaviour of members of plant categories and those of some inanimate categories. The **Agent** and the **Experiencer** relations are thus very similar insofar as they both describe the actions performed or states befalling members of these various categories. The difference which allows for the dichotomy **Agent/Experiencer** resides only in the fact that, whereas members of the **Animal** category behave as active agents, which play an active role in their behaviour, members of the plant categories such as **Trees, Flowers** and **Fruits** behave as **Experiencers** rather than active **Agents.** Statements like 'Trees grow', 'Trees bear fruits' and others are thus examples of the **Experiencer** relation. The **Experiencer** statement "Fuel burns" produced by ten of the Brazilian subjects was also reported by Markovitz in her study (p. 137).

Although the dichotomy **Agent/Experiencer** is at face value relevant in differentiating between the volitional behaviour of members of the animal kingdom and the non-volitional behaviour of members of the plant categories, the data I gathered show that such a division is not always a straightforward one since entire categories of animate objects such as the **Animal** category can, in certain instances, also behave as experiencers rather than active agents. This is evident in the statements such as "Animals grow" or "Animals die" produced by four of the Brazilian subjects. In this regard Chafe (1970, p. 95-104) makes some interesting observations which highlight the fact that the dichotomy **Agent/Experiencer** can not be determined on the basis of the contrasting volitional/non-volitional behaviour of living things alone. Taking an opposite position from that of Chomsky (1965) and Fillmore (1968). Chafe posits that "it is the verb which dictates the presence and character of the noun rather than vice-versa." He therefore indicates three types of verbs - action. process and state verbs. According to Chafe (1970), action verbs are those which describe actions performed by volitional agents. Such verbs will provide satisfactory answers to the question , "What did N do?" Where N is the noun or pronoun. For example. "What do bees do?" "They produce honey", but not *They die. Process verbs describe "happenings" or events and will answer questions of the type, "What happens to N?" In this case a simple action sentence is not an appropriate answer. The question "What happens to animals?" could, therefore, be answered by "They die", but not *They eat, (an action verb). Note that in the case of process verbs, the noun does not behave as an active agent. It is rather the patient or recipient of an event. State verbs describe states or conditions in which a certain noun is to be found. As in the case of process verbs, state verbs also require nouns to function as patients. In such cases, the verb specifies a state and is accompanied by a noun which is its patient. "The cat is dead" is an example of a state verb sentence. In this sentence the noun 'cat' is the patient of the state or condition of being dead. Based on the data gathered in this study, I will now discuss two of these types of verbs - action verbs and process verbs. Let us consider, for this purpose, three responses produced by the subjects: (I) Animals move; (2) Animals are dying; and (3) Animals die. Sentence (1) describes an action which animals perform volitionally. In this case the noun 'animals', which is the instigator of the action, is the agent of move (an action verb). Other examples of action verbs which determine the presence of active agents found in the data in connection with the category **Animal** are: 'breathe', 'reproduce', 'eat', 'hunt', etc (see Table 5.21 for the complete list). Sentence (2), rather than describing an action performed by animals, denotes an

event which is in the process of taking place. Some subjects, for example, said that "Animals are nowadays dying due to environmental pollution". In the case of a sentence such as this we could not rightly say that the noun 'animals' is instigating any action. On the contrary, the noun is, in this instance, the recipient of an event (death) which is in the process of befalling all members of the **Animal** category. Rather than being an agent, the noun is, in this case, the patient or (in the terminology employed by Markovitz) the experiencer of 'die' (a process verb). Finally sentence (3) is similar to sentence (2) because in this case too the noun 'animals' is once more the recipient and therefore the patient or experiencer of an event to which they are all subject - the event of dying. Based on what has been discussed above it becomes evident that it is indeed the verb which is of primary importance in determining the nature of the lexico-semantic relation holding between noun and verb. Rather than only emphasize the volitional/non-volitional behaviour of living things as the main basis for the dichotomy **Agent/Experiencer**, as Markovitz does, one should therefore be primarily concerned with analysing the verb as the source of such dichotomy.

5.2.7. Discussion of Findings for the Object Relation

Table 5.22 gives a list of the **Object** statements computed in the present study. The **Object** relation is a very pervasive relation in the data and appears in all ten categories used in this study. It is strongly associated with the **Agent** and **For** relations and often appears as part of a statement which contains these relations as well. Thus, in a statement such as "you use it (fuel) to move machines", one finds all three relations: the generic agent **'you',** the object **'it'** (fuel) and the characteristic function that fuel fulfils which is overtly expressed as the **For** relation "**for moving machines**".

Table 5.22
Object Statements

Category	Explanation	Number
Animal	I hate them (snakes)	3
	man eats them	2
	you keep them at home	1
	man uses them for laboratory tests	1
	man hunts them	1

Table 5.22 (cont'd.)
Object Statements (cont'd.)

Category	Explanation	Number
Animal (cont'd.)	man can tame them	1
	man can breed them	1
	you have to look after them	1
	I like them	1
Animal	I fear them	1
	I respect them	1
	things you can see	1
Disease	I don't want to think about it	1
	something you can get rid of	1
Drink	anything you can drink	7
Fuel	you use it to generate power	2
	you use it to move machines	1
	you use it in machines	1
Furniture	you find it indoors or outdoors	4
	objects you use as facilities in the house	2
	objects you need to have at home	1
	you find it indoors	1
	you find it in the house	1
	you use it for specific purposes	1
	you find it in communal areas	1
Insect	I hate them	3
	creatures you can see	I
	I think they're disgusting	1
	I think they're frightening	1
Seasoning	you put it in food	7
	you use it on food	1
	you use it in small quantities	1
Toy	something you can handle	6
	children use them	3
	adults also can use them	2
	something you can use to educate	1

Table 5.22 (cont'd.)
Object Statements (cont'd.)

Category	Explanation	Number
Toy (cont'd.)	something you can use to entertain	1
	something children can dominate	1
	something you use to pass time	1
	parents give them to children	1
	I like them	1
Tree	you can't have them inside the house	1
	I think trees are beautiful	1
	I think trees are delicious	1
	I think trees are decorative	1
Weapon	something you can handle	4
	something you use to defend yourself or to attack	2
	something you use to hurt people	1
	I don't like them	1

The **Object** relation is also linked with the **For** and **Agent** relations in statements explaining non-membership. Paper, for two of the subjects, was not typically **Fuel** because normally "we don't burn it" as **Fuel,** which is typically for burning or generating power. In a similar vein, ketchup was not **Seasoning** for some, because "we use it on food" and **Seasoning** is to be used in food, that is, in the process of preparation of food.

The findings so far reported for the **Object** relation are strikingly similar to those reported by Markovitz (p. 137). This appears to indicate that both her American subjects and my Brazilian subjects employ the **Object** relation as well as the **Agent** and **For** relations in very similar ways when expressing concepts about the various categories in the two languages.

The **Object** relation is used in yet another similar way in both studies. That is, as a "means of expressing typical agents for inanimate categories where the agent is always a person" (p. 140). As in Markovitz's study, categories such as **Toy** and **Weapon** have a specific person or a group of people who acts or act as typical agent or agents. Children are the typical agent of **Toy** whereas for **Weapons**, these are attackers, or people who are defending themselves (p. 140).

Unlike in Markovitz's study, there appears to be a tendency displayed by the Brazilian subjects to confer non-membership on certain category members by using the **Object** relation as a means for the expression of affective definitions. For example, snake was eliminated from the category **Animal** by one subject who reported "I hate them" as the only reason for assigning non-membership. Also, cider, tea and coffee were eliminated four times from the **Drink** category through the report "I don't like it." In Toy, teddy bear, soldier and block were eliminated four times for the same reason. Markovitz also finds affective definitions such as "Insects! I hate them" among her data, but such comments are never used by Markovitz's subjects - at least she does not mention that they are - to assign non-membership (p. 140).

The **Object** relation was also frequently used to eliminate items from the **Tree** category on the basis of lack of knowledge of, or familiarity with, the items. Therefore, ash and birch were each eliminated five times from **Tree,** through the report "I don't know them."

5.2.8. Discussion of Findings for the Locative Relation

Contrary to the trend found in Markovitz's study (p. 141), my subjects often reported that **Insects** were to be found both outside and inside the house. It is interesting to detect in this instance the somehow culturally specific behaviour implied in this response. Since the Brazilian Portuguese subjects come from a tropical country where **Insects** are much more frequently found inside the house as well, the **Locatives** which translate this fact seem to be equally salient in their minds as is its opposite - outside (see Appendix G).

Although the Brazilian subjects who participated in this study did not want to limit the category **Animal** to mammals, as did most of Markovitz's subjects (p. 141), they do seem to be. perhaps unconsciously. linking the term 'animal' to 'land animals' where mainly mammals are to be included. This trend is revealed by the frequency in which places where we typically find mammals are mentioned in my subjects' responses. 'At home', for example, is reported eight times, 'in the jungle' eleven times, and 'on farms' seven times.

Locative statements were not generally used to assign non-membership. The only exception was found for the category **Animal** when one subject rejected turtle from the category because it is associated with water. Seven of Markovitz's subjects also thought the same (p. 141).

The link between the **Locative** relation and the **For** relation which describes the functional aspect of inanimate categories is also evident in the present study. **Drinks,** strongly associated with the function "quench thirst", are for example, most frequently reported as being found 'in bottles', 'in glasses', or 'in tins', which facilitate the realization of such a function (see Markovitz, 1977, p. 142).

Furniture is most times associated with indoor environments such as houses, offices, etc. Some of the subjects, however, reported 'outdoors' as a possible place for **Furniture** to be found in. But outdoor **Furniture** would still have to be confined to the territory boundaries of the building it belonged to. This apparently was the reason why additional items like a park bench was not accepted in the category.

Sometimes a category itself may become part of the locative taxonomy. Markovitz (p. 148), for instance, finds this to be the case for man-made categories such as **Kitchen Utensil**, **Vehicle** and **Toy**. Confirming this fact, some of her subjects would relate the realization of the functions associated with members of such categories to locations within the confines of the member itself. Therefore, **Vehicles** are things we get *into* and ride *in,* whereas **Toys** are things one plays *with* rather than *on* . It is interesting that, for most of the subjects who took part in the present study, **Toys** were also invariably regarded as things you play *with,* not *on*. This was one reason why swing was considered a very poor member of the category. In contrast to Markovitz's study, however, **Locative** statements were never employed to confer non-membership on swing (p.148, 149).

5.2.9. Summary Discussion for Rung Two

The widespread use of the various inter-lexical relations contained in **Rung Two** by the Brazilian subjects has contributed to the assessment of the model as one of universal capabilities.

The data provided by the folk definitions and the ranking task reveal that, to a large extent, Brazilian Portuguese speakers utilized the inter-lexical relations of **Taxonomy, Modification, Part-Whole, Experiencer** and **Locative** in very similar ways to define the ten categories and describe their members as did the American English speakers in Markovitz's study. Such corresponding behaviour on the part of the two groups of subjects indicates that the semantic network of the 10 categories used in both studies is very much the same in the two languages.

The fact that the Brazilian subjects and the American subjects displayed, many times, a corresponding behaviour as they made use of the lexica-semantic relations included on **Rung Two** of the model, appears to indicate that the actual semantic structures of the 10 categories which have been cross-compared are to a large extent shared by members of the two cultures.

On the other hand, the differences observed at times in the way the Brazilian subjects cross-classified the various categories point to the fact that there also exist contrasts in the way the two groups of subjects expressed their views of the categories and their members. In this regard, the way the Brazilian subjects defined certain categories and especially the way they described their various members revealed some interesting differences. Unlike in Markovitz's findings, for example, the Brazilian subjects viewed animate categories such as **Animals** and **Insects** as instrument-like in nature. Therefore, for most of the Brazilian subjects. **Animals** and **Insects** had associated with them the fulfilment of certain functions such as food production, keeping the ecological balance, etc. This fact was often signalled by the use of the **For** relation to describe functions associated with members of such categories (see Appendix F). This behaviour adopted by the Brazilian subjects is different from that of the American subjects in Markovitz's study. She does not include any **For** statements for either the **Animal** category or the **Insect** category in her study (p. 129-131).

Another contrast between my findings and those of Markovitz is found in the tendency the Brazilian subjects displayed of conferring non-membership on certain category items by the use of affective expressions translated by **Object** statements. For example, one of the Brazilian subjects made use of the affective **Object** statement "snakes! I hate them!" to confer non-membership on snake. Other subjects also eliminated items such as cider, coffee, and tea from the **Drink** category by simply using the **Object** statement "I don't like it."

In connection with the use of the **Locative** relation, we also detect a somewhat culturally specific behaviour in the statements made by the Brazilian subjects for the category **Insect.** In contrast with Markovitz's subjects, who always reported that insects were to be found predominantly outdoors, my subjects often reported that insects were to be found both outside and inside houses. Such responses may be linked to the fact that as Brazil is a tropical country of quite warm climate throughout the year, the presence of insects inside the houses is quite common.

The frequent use of the same inter-lexical relations included on **Rung Two** by both the Brazilian subjects and the American subjects to define and express views of the categories and their members points to the fact that linguistically speaking, the categories can be described in rather similar ways in both Brazilian Portuguese and American English. On the other hand, the contrasting behaviours observed at times in the way certain categories were cross-classified and items included under such categories were viewed and described by the two groups of subjects point to the fact that there are culturally specific peculiarities and other conceptual constraints governing **the** frequency in which certain relations occur in the responses of distinct populations. Such differences will, in turn, be apparent on the actual taxonomic grouping of the categories in different cultures.

Chapter six
Context Experiments

6.1. Experiment 1

For this experiment a subset of a total of 10 categories used in the interview and ranking task are examined. The categories examined in Experiment I are: **Animal**, **Weapon** and **Drink**. The goodness of example (GOE) distributions produced under the elicited contexts are compared with those originally generated in the absence of an explicit context.

6.1.1. Purpose

Experiment 1 was devised to verify whether the presence of elicited contexts can cause a restructuring process to take place and thus alter the category representation originally accessed in the absence of an explicit context. The need for the application of such an experiment springs from the fact that proponents of prototype theory (see Rosch and Mervis 1975) have generally put forward the view that category structure centres around a prototype, i.e. the category's central members which best fit individuals' ideas of the representation accessed for that category According to this view, category membership is decided by a process of comparison and weighting of characteristic attributes shared by the various category members and the category best exemplars. Evidence from the work carried out by Rosch and Mervis (1975) has supported the above-mentioned view of category structure. According to them semantic categories display a somewhat static structure in which GOE distributions (or typicality ratings) will remain more or less fixed. Proponents of prototype theory have, however, to a large extent, totally failed to consider context as a possible dynamic variable capable of altering the representation accessed for a category

name at the time a category verification task is performed. If context can indeed cause a restructuring of the category to occur, then the introduction of specific contexts should precipitate the generation of typicality ratings which would differ from those originally obtained in the absence of an explicit context. Experiment 1 aims at verifying the validity of the above-stated hypothesis by comparing typicality ratings generated in the absence of specific contexts with those obtained in the presence of specific contexts. A secondary aim of the Experiment is to verify the extent to which prototype effects are still felt in the presence of context by statistically comparing intra-group and inter-group levels of agreement in the assignment of ranks in context.

6.1.2. Design and Materials

After taking part in the ranking task during the folk definitions interviews, the group of 19 Brazilian subjects contacted in Brazil were asked to consider an explicit context and decide whether such a context would affect the way they originally ranked the various category members. If the context elicited by the experimenter was able to affect the ordering of ranking which the subjects had previously given, they were asked to reorganize the category. The contexts elicited were the following; the home, the farm and the jungle, for the category **Animal;** the city streets and the battlefield for the category **Weapon** and the summer and winter for the **Drink** category. A blank sheet of paper containing the category name and the elicited context on the top left corner was provided for each of the contexts elicited. The subjects could, if they felt that the category needed to be reorganized, use these sheets of paper to write the new category ordering. The same category items used during the ranking tasks were used for this part of the study. Ranks were assigned on the basis of the sequences of items produced. This way the item or items included on the top of the list received rank 1, the item or items included in second place received rank 2, and so on.

Only those responses given in a frequency of at least 10% of the total number of subjects in each group appear in the listings given for the different contexts.

6.1.3. Procedure

Subjects were asked to consider the sequence they originally gave and decide, with one of the above mentioned contexts in mind, whether they would

like to make any changes to the original sequence. They were reminded at this point that the rationale they followed during the ranking of the categories in the absence of an explicit context should also be followed for this part of the experiment. That is, they should reorganize the various category members under a given context from that member which best fitted their idea of the context-bound category to the one that least fitted their idea of the category under the given context. If they wanted to do any reorganizing of the original order given, they could use the blank sheets of paper provided to write the new category items distributions. They were also asked whether they would like to eliminate any item or items they felt did not belong to the category under the given context.

6.1.4. Subjects

The 19 Brazilian subjects who took part in the folk definitions interviews and ranking task also took part in Experiment 1. Twelve American subjects also took part in the experiment as a control group. These were students from various departments of the University of Leeds. All of them had been in England for four months. Their ages varied from 18 to 21 years. They had not taken part in the folk definitions interviews but were asked to perform the ranking task before reorganizing the categories under the elicited contexts.

6.1.5. Results and Discussion

The typicality ratings obtained for both the Brazilian subjects and the American subjects in the presence of explicit contexts provide evidence that context can indeed alter the representation accessed for a category name at the time a ranking task is performed.

The different mean ranks generated by both groups of subjects in the presence of the elicited contexts add support to the hypothesis that the introduction of explicit contexts causes a restructuring of the category to occur. An appraisal of the various mean ranks obtained in the absence of context in comparison with those generated in the presence of context confirms that GOE distributions given in context are, to a large extent, a reflection of the context the subject had in mind when performing the ranking task. This trend is more or less prevalent throughout. Compare, for example the mean ranks given by both groups of subjects for items such as cow, fruit juice, gun and bomb in the various contexts elicited (see

Tables 6.1 and 6.2). Moreover, when the Spearman correlation coefficients were calculated, whenever possible, for both groups of subjects under the no context condition and in the various contexts condition, significant correlations were obtained in most cases. This indicates that both the American subjects and the Brazilian subjects consistently ranked, in the majority of cases, the various category items both in the absence and presence of the various contexts (see Table 6.3).

It is evident therefore that the introduction of a specific context can affect the way both typical and atypical category items come to be ranked, causing typicality shifts to occur. It appears thus that category structure is dynamic rather than being rigid. Best exemplars are, according to this view of category structure, chosen to fit the context elicited rather than to fit an abstract mental construct which reflects the category's central tendency such as prototype theory has generally suggested (Holyoak and Glass, 1986). The different ways in which a single category item was ranked in the presence of context and in its absence serves to confirm this fact. Figures 6.1 and 6.2 contrast the generally accepted view of category structure with what appears to happen when context is evoked in a ranking task.

Table 6.1
Mean Ranks Given by Brazilians in the Different Contexts

Animal	No context	Home	Farm	Jungle
dog	1.7	1.3	1.8	7.7
deer	2.7		7.1	2.5
cow	1.6	6.1	1.2	
elephant	2.1			1.5
squirrel	3.6		7.2	4.8
snake	4.5		5.7	3.3
turtle	3.6	4.1	7.5	6.5
Drink	No context	Summer	Winter	
fruit juice	1.9	1.4	7.0	
milk	2.3	5.3	2.3	
tea	2.6	5.3	2.8	
coffee	3 . 1	7.1	2.6	
beer	3.1	3.2		
cider	3.3	7.2	7.1	
soup	4.0	7.5	6.9	

Table 6.1 (cont'd.)
Mean Ranks Given by Brazilians in the Different Contexts (cont'd.)

Weapon	No context	City streets	Battlefield
gun	1.8	1.2	4.2
bomb	2.2	7.1	1.7
grenade	2.7	7.0	1.5
knife	2.6	1.7	7.1
bow and arrow	3.9		
rock	4.4	4.8	
stick	4.8	7.3	

Table 6.2
Mean Ranks Given by Americans in the Different Contexts

Animal	No context	Home	Farm	Jungle
dog	1.9	1.0	1.9	
deer	2.0	5.7	3.8	
cow	2.3	5.1	1.1	
elephant	2.6			1.8
squirrel	3.2	3.2	3.6	
snake	4.1	3.7	4.1	1.4
turtle	4.2	5.6	5.7	5.4

Drink	No context	Summer	Winter
fruit juice	1.7	1.3	6.3
milk	2.2	5.9	4.7
tea	2.2	5.3	1.2
coffee	2.3		1.4
beer	2.5	3.6	5.1
cider	2.9	4.8	4.1
soup	5.1		4.7

Table 6.2 (cont'd.)
Mean Ranks Given by Americans in the Different Contexts (cont'd.)

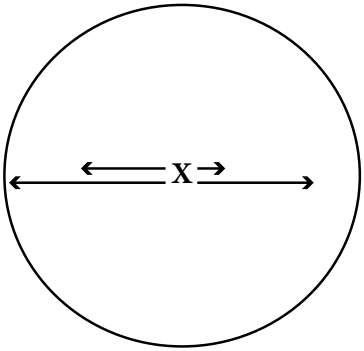
Weapon	No context	City Streets	Battlefield
gun	1.3	1.4	1.6
bomb	2.1	7.0	2.3
grenade	2.3		1.8
knife	2.3	1.7	6.0
bow and arrow	3.5		7.5
rock	4.3	5.8	
stick	4.7	5.7	

Table 6.3
Spearman Rank Correlation Coefficients for the Brazilian and American Subjects

	No context	Home	Farm	Jungle
Animal	0.86	0.86*	0.89	0.90*
	No context	Summer	Winter	
Drink	0.87	0.84	0.66	
	No context	City Streets	Battlefield	
Weapon	0.99	0.95	0.83**	

*Correlation calculated with three variables
**Correlation calculated with four variables

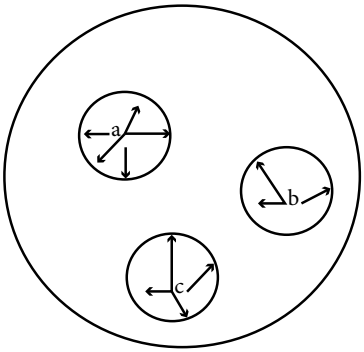
Graded Category Membership as a Function of the Prototype



In the diagram the circle stands for the category. The diagram shows how, in a context-neutral situation, GOE distributions may result from an evaluation of the category's best exemplars (represented by X). GOE distributions will focus on the prototype and the distance (represented by the arrows) from the prototype.

Figure 6.1

Graphic Representation of How Category Membership May be Assigned in Context



In the diagram, a, b, and c, stand for different contexts. The inner circles stand for the category clusters that fit the context. The arrows determine the distance between the context and the category members included in the cluster which fits the context.

Figure 6.2

A second concern motivating the application of the present experiment was to assess whether the process of assigning category membership in context was somehow parallel to the process of assigning category membership in the absence of context. Rosch and Mervis (1975) have, for example, demonstrated that in the absence of context, subjects' responses were highly inter-correlated. In addition, Markovitz (1977) has found significant levels of intra-subject agreement between her 76 American subjects when these were faced with the task of ranking the various category members in context neutral categories. I, for my part, have also found significant levels of inter-subject agreement among the Brazilian subjects used in the first part of the present study and I have found, in many instances, significant correlations between the ranks assigned by my Brazilian subjects and the American subjects of Markovitz. It seemed therefore appropriate to verify whether the agreement, in the way individuals assign category membership in the absence of context, would also be prevalent in the presence of the elicited contexts of Experiment 1. With this aim in mind, I calculated the Kendall coefficient of concordance for the two groups of subjects both in the absence of context and in the presence of the various contexts evoked in Experiment 1 The results of the test have demonstrated that both in the absence of context and in the presence of the various contexts, a level of significant agreement at $p < .001$ was reached for all of the contexts for both the Brazilian subjects and the American subjects (see Tables 6.4 and 6.5). These results, thus, indicate that both in the absence and in the presence of specific contexts, subjects belonging to different cultural backgrounds agree among themselves when assigning category membership in a ranking task. This is an interesting finding since it demonstrates that subjects' consensus about which members of the categories are to be eliminated and which are to be kept in the presence of the various contexts appears to be consistently shared by both the American and the Brazilian subjects. In the same way as the subjects, in each group, agreed about what members were to be included in the context-neutral categories and what ranks were to be given them, they also agreed when context is brought into the picture. The mental schema the subjects have for the different contexts thus appears to be consistently shared by the American and the Brazilian groups. In this instance, the process used for verifying category membership appears to be parallel to the process involved when no context is elicited.

Would the fact that context effects appear to be parallel to prototype effects in the sense that subjects' responses reach a significant agreement indicate that context played only a minor role in the way ranks were assigned? In other words,

when performing the ranking task in context, did both the Brazilian and the American subjects consistently rank the items according to the restrictions imposed by the context given, or did the fact that a context was elicited have little or no effect on their ranking decisions? Would, for that matter, the diverse GOE distributions generated prove to be significantly different in the absence and in the presence of context for most of the ranks assigned for the various pairs of items or could any apparent difference be attributable to chance?

Table 6.4
Intra-Subject Agreement for the Group of Brazilian Subjects in the Various Contexts

No Context

Category		Kendall's W Scores	Percentage of Agreement
Animal		0.50	25
Drink		0.38	15
Weapon		0.48	23

In Context

Category		Kendall's W Scores	Percentage of Agreement
Animal	(home)	0.66	43
	(farm)	0.59	35
	(jungle)	0.66	43
Drink	(summer)	0.52	27
	(winter)	0.57	33
Weapon	(city streets)	0.71	51
	(battlefield)	0.84	70

Table 6.5
Intra-Subject Agreement for the Group of American Subjects in the Various Contexts

No Context

Category		Kendall's W Scores	Percentage of Agreement
Animal		0.41	17
Drink		0.56	31
Weapon		0.66	43

In Context

Category		Kendall's W Scores	Percentage of Agreement
Animal	(home)	0.60	36
	(farm)	0.71	50
	(jungle)	0.83	69
Drink	(summer)	0.54	29
	(winter)	0.56	31
Weapon	(city streets)	0.71	50
	(battlefield)	0.87	75

In order to assess whether context had any effect in the way ranks were assigned, the Wilcoxon matched-pairs signed-ranks test was applied to the ranks given in the absence of context and in the presence of context for both groups. It was felt that the results of such a test not only would shed light on the question addressed above but could also serve as a guide to assessing the kind or kinds of behaviour the subjects displayed in ranking the various category items. The results demonstrated that whereas most of the pairs compared did not reach a significant level of difference at $p < .05$ for the American subjects, the opposite happened among the Brazilian subjects. That is, when the ranks given in the absence of context were compared with the ranks given for the same items in context, most of these pairs were different at $p < .05$. What seemed apparent,

therefore, was that while context was not able to affect the way ranks were given among the Americans, it did have an effect among the Brazilian subjects. How could such seemingly contradictory result be resolved? Apparently the two groups used different approaches to category structure in ranking the various items in the absence and in the presence of context. While most of the Brazilian subjects appear to have followed a prototypical approach, that is, one based on the weighting and comparison of characteristic attributes of the various category members to the category's best types in the various contexts given, the American subjects appear to have followed a schema-based approach based on the instantiation of items prompted by the elicited contexts. Because most of the Brazilians were evaluating how much the item they had to rank, in the presence of a given context, distanced itself from the category's best exemplars in the given context, the mean ranks given for the item in context reached a significant difference. The Americans, on the other hand, were apparently considering the item's fitness to the elicited context on the basis of an instantiation of the given item under the context given. For this reason the mean ranks assigned for the same item in both the absence and presence of context do not reach a significant difference most times they are calculated. It seems clear therefore that the Brazilian subjects and the American subjects adopted different categorical behaviours in the ranking task they had to perform. Whereas the Brazilian subjects appear to have adopted a categorical behaviour based on degrees of semantic relatedness between the prototypical instances evoked by the context and the category items they had to include or exclude from the various context-bound categories, the American subjects based their decisions on a schematic view of the categories. They, therefore, appear to have included or excluded items from the context-bound categories on the basis of global mental schematizations in which items are instantiated simultaneously to fit the context elicited.

However, as discussed in Section 5.1.5., one cannot put forward the view that while the Brazilian subjects followed a prototype-based approach to category structure, the American subjects followed a schema-based approach. In fact categorization by prototype and categorization by schema might be aspects of a common phenomenon and therefore be simultaneously present in any categorization task. All that can be said is that, as the results of the Wilcoxon test of significance demonstrate, most of the Brazilian subjects appear to have followed a prototype based approach to the categorization task they had to perform while most of the American subjects appear to have followed a schema-based approach to category structure.

6.1.6. Conclusion

The results of the experiment reported above add support for the fact that context does have an effect on category structure and on the generation of typicality ratings. The mean ranks obtained in the absence and the presence of the various contexts elicited showed that a single category item can be ranked differently according to the context in which it occurs. This has exposed typicality ratings as a dynamic process dependent not only on degrees of semantic similarity between the category's best exemplars and the remaining category items but also on the context in which the category is generated. The presence of specific contexts has therefore precipitated the generation of GOE distributions by both groups of subjects which reflect the constraints imposed by the context elicited at the time the ranking task was performed. The diverse GOE distributions obtained in the presence of the various contexts in contrast with the distribution obtained when no context was elicited constitute evidence that category structure is dynamic rather than static. Typicality ratings produced for a context-bound category reflect therefore, to a large extent, how well the various category members fit the context elicited. This constitutes evidence that, at least in context-bound categories, category membership will be determined as a function of context. The GOE distributions obtained for both the Brazilian group and the American group have thus demonstrated that, contrary to what has been traditionally implied by proponents of prototype theory, context can indeed cause an alteration of the representation accessed for a category name at the time ranking decisions are made. This causes a restructuring of the category to occur and the GOE distributions thus generated will reflect the items' fitness as representatives of the context elicited rather than as representatives which share degrees of similarity with the category's best exemplars (or prototype).

Despite the fact that context can alter the representation accessed for a category name at the time ranking decisions are performed. the process involved in assigning category membership in the absence of context still appears to be parallel to the one employed in the presence of context. This was made evident in the case of the present study in that both in the absence and in the presence of context, the levels of both inter-subject agreement and intra-subject agreement for both groups of subjects proved to be above chance level. This demonstrated that both in the presence and the absence of context, subjects' ideas as to which members are to be included and which are to be eliminated from the categories are shared by the subjects. This is a significant finding which suggests that de-

spite idiosyncrasies and varied life experiences, individuals appear to form consistent mental schemas which allow for the inclusion of or dictate the exclusion of category items which membership is determined in context. Moreover, the fact that levels of inter-subject agreement reach significance for most of the contexts correlated demonstrates that context-constrained concepts as to which members are to be included and which are to be eliminated from the categories reorganized under the various contexts are, to a large extent, cross-culturally shared.

The application of the Wilcoxon test of significance to the various pairs of ranks obtained in the absence and in the presence of context sheds light on the categorization processes which the two groups of subjects appear to have employed during the ranking decisions they had to make. While among the group of Brazilian subjects most of the pairs of ranks compared in the absence and the presence of the various contexts reached a significant level of difference, the opposite occurred among the American subjects. Rather than being inconsistent as it might appear, these different results simply demonstrated that the two groups of subjects as a whole appear to have employed different approaches to category structure in making their decisions as to which members to include under the various contexts. While the Brazilian group appears to have followed a prototypical approach to category structure based on degrees of similarities between the various members they had to rank and the category's best types in the contexts given (the reason why the majority of the pairs compared reach' a significant difference), the Americans appear to have followed a schema-directed approach based on mental instantiations prompted by the contexts elicited.

In summary, the results of Experiment 1 as a whole seem to indicate that the presence of an elicited context can indeed alter the representation accessed for a category name at the time a ranking task is performed. On the other hand, the significant levels of inter-subject and of intra-subject agreements for most of the contexts elicited served to indicate that ranking decisions in context are to some extent parallel to ranking decisions made in the absence of context. Despite such parallel effects, the results of the Wilcoxon test of significance served to demonstrate that context had a significant influence on the way ranks were assigned to the same pairs of items in the absence and in the presence of context as well as to the most typical items and the remaining items of the various context-bound categories. The greater number of significant differences detected for the pairs of ranks assigned by the Brazilian group in contrast to the smaller number of significant differences in the ranks assigned by the American group revealed that

individuals' behaviour can differ in categorization tasks performed in context. Although these findings shed light on two different categorical approaches which appear to have been adopted by the two groups of subjects as a whole, namely a prototype-based approach and a schema-based approach, categorization by prototype and categorization by schema might be aspects of a common phenomenon underlying any categorization task (Taylor 1989). It seems therefore inappropriate to draw a sharp dichotomy as regards the two different approaches which the majority of the subjects appear to have followed in each case.

6.2. Experiment 2

Experiment 2 is divided into two parts. The same design and materials are utilized for both Experiment 2a and Experiment 2b. In Experiment 2b, however, subjects are seen individually in order for their reaction time to be computed.

6.2.1. Experiment 2a

6.2.1.1. Purpose

As Experiment 1 has already demonstrated, the presence of context is able to affect the representation accessed for a category name and to cause a restructuring of the category to occur. Such effects of context were evidenced by the generation of inverse typicality ratings (GOE distributions) brought about by the presence of different context settings. Experiment 2a explores further the effect of context on the generation of GOE distributions and category structure by utilizing the linguistic concept of privilege of occurrence of words in three types of contexts. The experiment is designed to verify whether the presence of three specific types of sentences (context-bound sentences, context-loose sentences and context-neutral sentences) can affect the representation accessed for a category name at the time an individual is faced with a word-choice decision task.

According to the traditional view expressed by the proponents of prototype theory (Rosch 1973a, 1975a; Rosch and Mervis 1975; Rosch et al. 1976a), category representations have an internal structure which centre around a prototype and distance from the prototype. Therefore, when subjects are asked to rate category items in terms of how well they fit their idea or image of a category superordinate, a graded typicality or goodness-of-example distribution is generated. Such a graded distribution, as classic prototype theory implies, results mainly from a

process of comparison of overlapping characteristic attributes (i.e. those which occur frequently among typical members) between the member being ranked and the category prototype.

If GOE distributions are indeed generated in this fashion, typicality orderings should remain relatively fixed across contexts. Moreover, if category verification time results from this process of comparison of characteristic attributes included in the memory representation for the meaning of a category item, as models of semantic memory have generally assumed (Collins and Quillian 1969, 1972; Smith, Shoben and Rips 1974), then typicality ratings should reflect such a process. Semantically closer items should, according to this view, remain more readily accessible regardless of the context in which such items occurred.

To illustrate, consider a context-bound sentence such as *The rock band musician played the* ***instrument*** *well during the concert,* and the following category items given as possible substitutions for the category name: Guitar, cello, electric guitar, and synthesizer. In a context such as the one implied by the sentence, the item electric guitar would readily figure as a best example. If typicality ratings were solely dictated by a process of comparison of characteristic attributes common to typical exemplars, it would be expected that the other stringed instruments which are included in the set of items given would also receive ratings which reflected a higher degree of typicality than any other non-stringed instruments included as possible substitutions. If this were the case, graded typicality ratings produced for the three stringed instruments included as possible substitutions should proceed in an ascending order from the most typical item, electric guitar to the least typical item, cello. Only after the three semantically similar options were included in the representativeness ordering should the other semantically more distant item, synthesizer, be included. If, on the other hand, the presence of a constraining context such as "rock band" in the above sentence does affect the prediction of such a distribution, and if synthesizer comes to be regarded as a highly typical member of the category in the given context and receives a more representative rank than guitar or cello, it is then evident that the presence of context imposes a constraint on typicality ratings. GOE distributions. rather than remaining relatively fixed across contexts, are reordered due to constraints imposed by the context. Experiment 2a was designed to verify whether such reordering occurs in the presence of three types of context sentences (context-bound sentences and context-loose sentences and context-neutral sentences). As will be explained in the following section, specific predictions

were therefore made regarding the generation of typicality ratings in the three context environments analysed in this experiment.

6.2.1.2. Design and Materials

In order to verify the extent to which three specific context environments can affect word-choice on a category verification task, a total of 36 context-type sentences were constructed. These sentences, and the lists of lexical choices given as possible substitutions for the category name, were originally produced in English. However, these were later translated into Portuguese so that the same set of sentences and lists of word-choices could be used in the cross-cultural analysis here attempted (see Appendix I). For each of the nine categories used in Experiment 2, three types of sentences were produced; i. e. two context-bound sentences (CB-sentence), a context-loose sentence (CL-sentence) and a context-neutral sentence (CN-sentence). In every instance the rankings for the lexical choices in the first CB-sentences for each of the categories constituted additional practice. Therefore the subjects' responses were not taken into account for these sentences. Each context-type sentence was presented in the order specified above for each of the nine categories. However, the order in which the lists of four lexical choices were presented was counterbalanced across the subjects. The four choices of lexical items included under the category name were listed in each of the context-type sentences as possible substitutions for the category name or phrase including the category name appearing in bold italics in the sentences. These choices did not vary for any type of context sentences. Eight of the ten category names already included in the analysis of **Rung One** and **Rung Two** of the model used for the cross-cultural comparison were again used in the context sentences. These are: **Animal**, **Drink**, **Fuel**, **Furniture**, **Insect**, **Toy**, **Tree** and **Weapon**. The category name **Musical Instrument** was added for the purposes of this experiment. The set of four possible lexical choices as substitutes for the category names in each of the sentences were not necessarily the same category items as those included in the original categories used in the ranking task. This modification was necessary in order to introduce both semantically similar but not related items in the context-bound sentences, and semantically dissimilar but not necessarily unrelated items in the case of the context-loose sentences. The category items used were, however, dominant category items which appear in the Battig and Montague (1969) category response norms or which were frequently

produced as category members when the original categories were modified for the purposes of the present study.

In the context-bound sentences, the set of four possible lexical choices was composed of one semantically dissimilar but related item (SDR), one semantically similar and related item (SSR) and two semantically similar but not necessarily related items (SSU). For example, in the sentence *Diana enjoyed getting up early to feed the* ***animals*** *on the farm,* the following four lexical items, dogs, cats, cows, and chickens, were listed as possible substitutions for the category name ***animals.*** Chickens constituted the semantically dissimilar but context-related item. Dogs and cats were the semantically similar but not necessarily context-related items. Cows, on the other hand, constituted the semantically similar and context-related item. The item cows was regarded to be the semantically similar and context-related item both on the basis of overlaps of characteristic attributes which cows shared with dogs and cats and on the basis of the item's relatedness to the early morning farm life implied by the context. The CB-sentences were constructed so as to suggest the target exemplar (the semantically dissimilar item) as a very strong possible substitution for the category name. It was therefore assumed that the semantically dissimilar item would, due to the highly constraining context in which they occurred, tend to be rated as a very typical item within the range of possible choices given. If the presence of a highly constraining context, such as the ones implied by the CB sentences, could indeed alter the representation accessed for the category name favouring the choice of the semantically dissimilar item, then the GOE distribution generated should reflect the constraints imposed by the context on the range of appropriate word-choices. The overall mean ranks for the three types of items (i.e. the semantically dissimilar but related items, the semantically similar and related items, and the semantically similar but unrelated items) would thus, it was predicted, display a GOE distribution in which the SDR items would figure as the most typical items, the SSR items would receive slightly higher ranks and the SSU items would be ranked as the least typical items.

In the context-loose sentences (CL-sentences), although the previous target exemplar in the CB-sentence was less likely a substitution for the category name, it was never an impossible substitution in the sense that it did not violate constraints placed on the other category items included in the range of possible substitutions or those category items which could be logically implied. Because of the less constraining contexts evoked by the CL-sentences, the set of four possi-

ble lexical choices could all be related to the context elicited. There was, however, in the case of the CL-sentences, a gradation as to the degree of context relatedness of the three semantically similar items listed as possible substitutions for the category name. Consider, for example, the CL-sentence *Jane hates being disturbed by* ***insects***. In this sentence the semantically similar items given as possible substitutions for the category name were bees, flies and beetles. The semantically dissimilar item given in this case was ants. The item flies, was assumed to be the semantically similar and most related item to the context, due to its more frequent occurrence and disturbing nature (the SSR1). Bees was considered to be the next most related item in the given context (the SSR2). Finally, the item beetles was assumed to be the least context-related item (the SSR3). The assumption was therefore that the GOE distribution generated for the overall mean ranks of the SSR items in the CL-sentences environment would display a fine gradation of typicality ratings from the semantically similar and most context-related item (SSR1) to the semantically similar and least context-related item (SSR3). As for the semantically dissimilar items, because of the less constraining environment, it was assumed that these would display overall mean ranks which would approximate the average of the 7-point scale used in the experiment.

The context-neutral sentences were included in order to assess the extent to which the subjects' choices, when no specific context is implied, would differ from their previous choices in the CB-sentences and the CL-sentences. The hypothesis favouring the inclusion of the CN-sentences was that the most typical category members (assessed on the basis of such previous work as the one carried out by Rosch 1975d) would, in the absence of an explicit context (which the CN-sentences presumably imply) receive the lowest ranks. Thus, it was assumed that in context-neutral sentences, the rankings assigned would reflect typicality structures which would resemble the ones obtained when no explicit context was implied.

6.2.1.3. Procedure

The instructions appearing at the beginning of the booklet containing the various context-type sentences were read aloud to the subjects and the example given was worked out by the experimenter on the board, as initial practice. (see Appendix J). At this point, it was emphasized that although only four choices of lexical items were given, their rankings could go up to seven. The subjects did not therefore have to rank the lexical items sequentially. They were asked to read the

sentences and the lexical choices carefully before ranks were given. They were informed that there was no set time for the completion of the experiment but were asked to work at a consistent pace and finish as soon as they could.

6.2.1.4. Subjects

Fifty-one psychology students from the University of Brasilia, Brazil, took part in Experiment 2 as unpaid volunteers. These were all native speakers of Brazilian Portuguese. From this group of 51 subjects, eight were seen individually in order to have their responses timed for the purposes of Experiment 2b. The remaining 43 subjects answered the word-choice test during the first 30 minutes of a two-hour class of an introductory course in psychology. Their ages varied from 17 to 37 years. Twelve native speakers of American English participated in Experiment 2 as a control group. These also took part in the experiment as unpaid volunteers. The twelve Americans were students of various departments of the University of Leeds. The great majority, with only two exceptions, had been in England for only four months. Their ages varied from 19 to 24 years.

6.2.1.5. Results and Discussion

The results of the analysis performed on the data emerging from Experiment 2a provide additional support for the hypothesis that the presence of context can alter the representation accessed for a category name at the time a word-choice task is performed. Initially the Friedman two-way analysis of variance (ANOVA) was applied to the mean ranks obtained from the two groups of subjects under the three contexts environments. The results obtained proved to be significant for the both groups at $p < .05$. This overall significant difference for the mean ranks obtained from the Brazilian subjects and the American subjects provided statistical evidence that the three context environments presented in the CB-sentences, the CL-sentences and the CN-sentences were able to influence the subjects' choices of lexical items as appropriate substitutions for the various category names presented in the sentences.

As Table 6.6 shows, most of the semantically dissimilar but context related items of the CB-sentences received very typical ranks, when compared with the ranks obtained for the SSR items and the SSU items. Two of the SDR items, i. e. piano (mean rank = 2.3) and table (mean rank =3.1) were given higher ranks by

the group of Brazilian subjects. However, the overall mean rank obtained (1.6) still reflects the fact that, as a whole, the SDR items of the CB-sentences were viewed by the Brazilian subjects as very typical. When the results are cross-compared with the ones obtained from the group of American subjects, the similar pattern remains (see Table 6.7). Despite a slight increase in the mean ranks for piano (2.8) and ant (25), the overall mean rank obtained for the SDR items (1.7) highlights the fact that such items were also considered very typical by the American subjects. Such a result seems to indicate that semantically dissimilar but strongly context-related items will be selected as fitting representatives of the category on the basis of an instantiation, when individuals are faced with a category verification task involving word-appropriateness. That is to say, such items will be chosen as instant selections of the context's best fitting items rather than on the basis of a process of comparison and weighting of characteristic attributes which might be shared by the selected semantically dissimilar items and the other lexical items given as possible substitutions for the category name.

Table 6.6
Mean Ranks Given by Brazilians for Items in CB-Sentences

SDR	Ranks	SSR	Ranks
piano	2.3	electric guitar	3.8
chicken	1.2	cow	3.0
beer	1.0	coffee	5.4
ball	1.2	doll	1.8
table	3.1	chair	3.1
charcoal	1.3	alcohol	2.3
bow and arrow	1.4	rifle	4.2
ant	1.2	bee	1.3
coconut	1.6	mango	1.6
Totals	14.3		26.5
	Mean = 1.6		Mean = 2.9

SSU1	Ranks	SSU2	Ranks
guitar	3.8	cello	3.8
dog	3.6	cat	3.9
cocoa	6.0	tea	6.1
teddy bear	5.0	muppet	5.6
sofa	3.1	stool	4.3
kerosene	4.6	gasoline	5.6
pistol	5.1	machine gun	6.4
beetle	5.3	fly	5.9
cashew	2.8	oak	5.1
Totals	39.3		46.7
	Mean = 4.4		Mean = 5.2

Table 6.7
Mean Ranks Given by Americans for Items in CB Sentences

SDR	Ranks	SSR	Ranks
piano	2.8	electric guitar	2.8
chicken	1.3	cow	1.8
beer	1.0	coffee	3.8
ball	1.8	doll	3.1
table	1.8	chair	2.3
charcoal	1.0	alcohol	5.6
bow and arrow	1.4	rifle	2.0
ant	2.5	bee	1.0
coconut	1.6	mango	1.5
Totals	15.2		23.9
	Mean = 1.7		Mean = 2.7

SSU1	Ranks	SSU2	Ranks
guitar	2.8	cello	5.8
dog	4.1	cat	4.7
cocoa	4.6	tea	4.2
teddy bear	5.1	muppet	5.1
sofa	3.8	stool	4.6
kerosene	2.7	gasoline	4.3
pistol	3.3	machine gun	6.3
beetle	5.0	fly	4.4
cashew	4.1	oak	5.7
Totals	35.5		45.1
	Mean = 3.9		Mean = 5.0

Further evidence for what has just been discussed is presented in Section 6.2.2.4 where the results of Experiment 2b are reported. The overall mean ranks obtained for the SSR items and the SSU items also provide additional evidence that GOE distributions, will change with context, rather than providing a fixed pattern of category structure, as prototype theory has traditionally implied. In other words, the goodness of fit of a category exemplar will, in the presence of context, be decided on the basis of the item's appropriateness to the context evoked.

Representativeness ratings are thus, in the presence of a binding context, generated as a reflexion of the context evoked and not as a function of the category's prototypical instances and distance from such instances. Taken at face value, the GOE distribution generated by the overall mean ranks in the presence of the constraining context of the CB-sentences does appear to reflect a context-related representativeness ordering rather than a prototype-based typicality ordering. It could be argued, however, that the mean ranks obtained for both groups of subjects could never provide conclusive evidence in favour of the instantiation hypothesis. This is indeed the case because, no matter how strictly controlled or well thought out experiments and experimental procedures may seem to be, no one is actually able to predict what goes in people's heads so as to assert with total confidence that in a category verification task, such as the one devised for Experiment 2, a given categorization process is used and not another. For this reason, I have submitted the mean ranks obtained for both the semantically dissimilar items (SD items) and the semantically similar items (SS items) of the CB-sentences to the Wilcoxon statistical test of significance. It was felt that such a procedure was appropriate because a test like the one mentioned would reveal significant similarities and differences in the assigning of the various mean ranks in the CB-sentences. This, in turn, would more convincingly provide the framework against which more reliable predictions could be made as to what decision process or processes were involved in the task the subjects had to perform. The mean ranks obtained for the SSR items were thus first compared to the SSU items. The results obtained demonstrated that for both groups of subjects, the mean ranks assigned for these items were, in their great majority, significantly different at $p < .05$. This result adds support in favour of selection by instantiation for the SS items presented in context. If context was not able to affect the selection process by causing an instantiation to occur every time an item was chosen, the mean ranks assigned to the SSR items and the SSU items would not have reached a significant difference. In other words, if a process of comparison and weighting of characteristic attributes was at stake, semantically very close items, such as the semantically similar related items and the semantically similar unrelated items of the CB-sentences would have attracted, because of the fact that they have many characteristic attributes in common, mean ranks which would be so similar that they would not reach a statistical difference. The fact that the majority of ranks assigned for the SSR items and SSU items prove to be significantly different supports the assertion that to a great extent, both the Brazilian and the American subjects

were selecting semantically similar items, in the presence of a binding context, to fit the representation accessed for the various categories on the basis of an instantiation. As a next step the SSR items were compared to the SDR items. Once again the intention was to provide statistical evidence which would allow reliable conclusions to be reached as to the decision process or processes used in ranking the SSR and the SDR items in the CB-sentences. The results obtained demonstrated that while, in the group of Brazilians, the majority of the mean ranks assigned for the SDR and the SSR items were significantly different at $p < .05$, the opposite was true in the American group. That is, for the latter group the majority of the mean ranks assigned for the various SDR items and SSR items did not reach a significant difference ($p > .05$). These results appear to demonstrate that in a category verification task, such as the one the two groups of subjects had to perform, more than one categorization process may be involved. Therefore, in deciding on the appropriateness of SDR items and SSR items as possible substitutions for the category name in the CB-sentences, the Brazilians and the Americans seemingly employed different rationales. The Brazilian subjects apparently evaluated an item's compatibility with the category presented in the constraining context on the basis of a comparison and weighting of characteristic attributes. Since the SDR items and the SSR items have very few attributes in common, the majority of the ranks assigned for such items by the Brazilians reach a significant difference. On the other hand, the American subjects appear to have given ranks to both SDR items and SSR items on the basis of the item's fitness to the memory schema evoked by the constraining context. Prompted by the constraining context of the CB sentences, an instantiation of the best fitting items among the lexical choices given seems to have taken place and, for this reason, items which have few characteristic attributes in common were selected as equally fitting choices. This process, in turn, is made evident by the fact that the ranks assigned by the American subjects for the SDR items and the SSR items do not reach a significant difference. What therefore seems evident is that in judging the various SDR items and SSR items as fitting lexical choices in substitution for the category name presented in the constraining context of the CB-sentences, the majority of the Brazilian subjects relied more heavily on degrees of semantic relatedness which might hold among the various SDR items and SSR items given as possible choices. The majority of the American subjects, however, employed a different rationale. They were prompted by the presence of a constraining context to evaluate the SDR items and the SSR items according to their fitness (or appropriateness)

to the mental schema evoked by the context. One can not, however, generalize and state that while one group of subjects followed one pattern of behaviour, the other followed another. All that can be asserted, based on the evidence provided by the results, is that the majority of the Brazilian subjects appear to have followed one pattern of behaviour (i. e. a categorical approach based on degrees of semantic relatedness holding among the various lexical choices given), whereas the majority of the American subjects followed a schema-based behaviour based on the instantiation of context-related items. This is in harmony with what the findings for Experiment 1 have demonstrated.

Evidence from the present study also supports the prediction made concerning the GOE distribution generated in the presence of a less constraining context such as the one implied by the CL-sentences. As Tables 6.8 and 6.9 show, the graded context relatedness association holding between the three semantically related items and the context loose environment was able to generate GOE distributions for both groups of subjects which display a fine gradation of typicality ratings from SSR1 to SSR3. Apart from a few variations which might be due to cultural differences or idiosyncrasies, ranks assigned to the SSR1 items by both the Brazilian and American subjects attracted the lowest ranks. The mean ranks assigned to the SSR2 items were, in their vast majority, higher than the ones assigned to the SSR1 items but lower than the ranks assigned to the SSR3 items. The semantically dissimilar but related items, on the other hand, received an overall rank which approximates the average on the 7-point scale used.

Table 6.8
Mean Ranks Given by Brazilians for Items in CL Sentences

SSR1	Rank	SSR2	Rank	SSR3	Rank
cello	1.6	guitar	2.8	electric guitar	4.1
dog	1.1	cat	1.2	cow	5.2
coffee	1.1	tea	2.0	cocoa	4.1
doll	1.1	teddy bear	1.3	muppet	2.3
chair	1.2	sofa	2.8	stool	2.6
kerosene	3.3	alcohol	2.8	gasoline	4.8
pistol	1.4	rifle	2.1	machine gun	3.7
fly	1.0	bees	2.3	beetle	3.6
mango	1.9	cashew	3.3	oak	3.2
Totals	13.7		20.6		33.6
	Mean = 1.5		Mean = 2.3		Mean = 3.7

SDR	Rank
piano	1.4
chicken	3.9
beer	4.9
ball	2.7
table	4.3
charcoal	2.4
bow and arrow	4.0
ant	2.6
coconut	5.3
Total	31.5
	Mean = 3.5

Table 6.9
Mean Ranks Given by Americans for Items in CL Sentences

SSR1	Rank	SSR2	Rank	SSR3	Rank
cello	1.5	guitar	3.4	electric guitar	5.2
dog	1.5	cat	1.5	cow	5.3
coffee	1.2	tea	1.6	cocoa	2.8
doll	2.0	teddy bear	2.0	muppet	2.3
chair	1.4	sofa	4.1	stool	2.3
kerosene	1.5	alcohol	4.9	gasoline	3.8
pistol	1.3	rifle	1.4	machine gun	4.9
fly	1.5	bees	2.9	beetle	4.7
mango	5.4	cashew	3.7	oak	1.0
Totals	17.3		25.5		32.3
	Mean = 1.9		Mean = 2.8		Mean = 3.6

SDR	Rank
piano	1.8
chicken	4.2
beer	4.7
ball	2.9
table	3.2
charcoal	2.9
bow and arrow	3.4
ant	2.4
coconut	5.2
Total	30.7
	Mean = 3.4

These results seem to demonstrate that the concept of appropriateness in a word-choice selection task where a loose context is implied, will facilitate the generation of a GOE distribution based on a context proximity relation rather than on a semantic proximity relation holding between the various items given as possible lexical substitutions for the category name. Evidence that, in a context-loose environment such as the ones implied by the CL-sentences, context is apparently the driving force dictating the subjects' choices, lies in the fact that in a sentence such as *Jane hates being disturbed by* ***insects,*** semantically

similar items such as flies and bees are ranked quite differently by both groups of subjects. Semantically dissimilar items such as the item ants receive, on the other hand, a mean rank which is nearer to the one assigned to bees. This may be so because the mental schema evoked for the context implied is able to draw semantically dissimilar items together or to pull semantically similar items apart so as to fit the memory structure activated by the context. As further evidence that the above explanation is plausible, we can contrast, for example, the mean ranks obtained for SSR items with the ones obtained for the SDR items in categories such as **Musical Instrument**, **Furniture**, **Toy**, and **Fuel**.

The GOE distributions generated by the Brazilian and American subjects for the context-neutral sentences harmonize with the hypothesis which favoured the inclusion of such sentences in the present experiment. As was assumed, the absence of an explicit context facilitated representativeness orderings which closely resemble those previously obtained by Rosch. Compare, for example, the GOE ratings obtained by Rosch (1975d) for some common typical items **in Furniture**, **Toy** and **Weapon**, with the ones obtained in the CN-sentences in the present study (see Tables 6.10, 6.11 and 6.12). Moreover, when the ranks assigned by the Brazilian subjects and those assigned by the American subjects are cross-compared, we find that there is a great deal of agreement as to which items are more typical or less typical of the categories. The apparent discrepancies such as the mean ranks assigned for alcohol by the Brazilians (1.4) and the Americans (5.8), or for mango (2.0 and 4.2, respectively) can easily be resolved by considering the different cultural and geographical backgrounds of the subjects. Alcohol, for example, in the CN-sentence *Mary remembered she needed some **fuel*** came to be considered by most of the Brazilian subjects a very strong candidate as an appropriate substitution for the category name. This is apparently the case due to the fact that nowadays the great majority of Brazilian vehicles run on methanol alcohol.

Table 6.10
Rosch's Norms for Goodness-of-Example Rating for Some Members of the Categories Furniture, Toy and Weapon

Furniture	Rank	GOE Specific Score
chair	1.5	1.0
sofa	1.5	1.0
table	3.5	1.1
stool	32	3.1
Toy		
doll	1	1.4
teddy bear	11	1.9
ball	14	2.0
Weapon		
pistol	2	1.1
rifle	5	1.2

(Adapted from Rosch 1975d)

Table 6.11
Mean Ranks Given by Brazilians for Items in CN Sentences

TSI1	Rank	TSI2	Rank	TSI3	Rank
guitar	1.3	electric guitar	1.7	cello	2.0
dog	1.5	cat	1.6	cow	2.0
tea	1.7	cocoa	1.9	coffee	2.0
doll	1.3	teddy bear	1.3	muppet	3.8
chair	1.4	sofa	1.7	stool	2.7
alcohol	1.4	gasoline	1.5	kerosene	4.3
pistol	1.4	rifle	1.9	machine gun	3.0
bee	1.5	fly	1.7	beetle	1.8
oak	1.5	mango	2.0	cashew	2.6
Totals	13.0		15.3		24.2
	Mean = 1.4		Mean = 1.7		Mean = 2.7

TDI	Rank
piano	1.6
chicken	2.5
beer	2.9
ball	1.8
table	3.4
charcoal	4.9
bow and arrow	4.4
ant	1.3
coconut	1.8
Total	24.6
	Mean = 2.7

Table 6.12
Mean Ranks Given by Americans for Items in CN Sentences

TSI1	Rank	TSI2	Rank	TSI3	Rank
guitar	1.8	electric guitar	1.9	cello	2.8
dog	1.7	cat	1.5	cow	2.8
tea	2.0	cocoa	1.8	coffee	2.0
doll	1.7	teddy bear	1.8	muppet	3.3
chair	1.4	sofa	2.8	stool	3.2
alcohol	5.8	gasoline	1.0	kerosene	2.5
pistol	1.8	rifle	2.0	machine gun	1.7
bee	2.8	fly	2.2	beetle	2.6
oak	1.3	mango	4.2	cashew	3.6
Totals	20.3		19.2		24.5
	Mean = 2.3		Mean = 2.1		Mean = 2.7

TDI	Rank
piano	1.8
chicken	3.5
beer	3.1
ball	2.0
table	3.8
charcoal	4.4
bow and arrow	4.1
ant	2.0
coconut	3.6
Total	28.3
	Mean = 3.1

Interestingly, the comparison of the mean ranks assigned for the semantically similar items with those assigned for the semantically dissimilar items in some of the categories reveals the same pattern that became evident when the mean ranks obtained for such items in the CB-sentences and the CL-sentences were analysed. Namely, that a semantically similar item and a semantically dissimilar item might equally receive very close ranks (consider, for example, the mean ranks given by the Brazilians and the Americans for electric guitar and piano in the CN sentence environment). On the other hand, semantically closer items,

such as cello (mean ranks 2.0 and 2.8 in both groups, respectively) and guitar (1.3 and 1.8) are ranked quite differently. This seems to indicate that, even in the absence of an explicit context, other processes, rather than only the comparison and weighting of shared characteristic attributes of the category items presented as possible substitutions for the category name, may. at times, be involved. In order to reinforce this conclusion, let us compare some of the mean ranks assigned by the Brazilian subjects to category items such as doll (13), teddy bear (1.3), muppet (3.8) and ball (1.8). As it is made evident by the mean ranks assigned, an item such as muppet, although it shares many more common characteristic attributes with the items doll and teddy bear, attracts a much higher mean rank than the one assigned to ball which both structurally and functionally shares fewer common attributes with doll and teddy bear. (Compare also the ranks given by the Americans for the same items in the CN-sentences.) It is therefore apparent that even in a context-neutral environment, individuals may, when performing a category verification task, adopt behaviours which are parallel to the decision-processes involved in categorizing items in context, such as the ones discussed in relation to the CB-sentences and the CL-sentences environments.

6.2.2. Experiment 2b

6.2.2.1. Purpose

Experiment 2b uses the same context-type sentences of Experiment 2a in order to verify whether reaction time on word-choice tasks is affected by the presence of different types of context. To this end, two sub-groups of eight subjects of the main groups of Brazilian subjects and American subjects had their responses timed.

Category verification time has often been taken to reflect the degree of semantic relatedness of a category name and the representation of an exemplar. Some models of semantic memory, for example, assume that category verification time reflects the level of feature overlap or of similarity between the representations of the instance and the category name (McCloskey and Glucksberg 1979; Medin and Schaffer 1978; Smith et al. 1974). On the other hand, others imply that verification time reflects the accessibility of the links connecting the two representations (Collins and Loftus 1975; Holyoak and Glass 1975; Elkhart, Lindsay and Norman 1972, in Roth 1980). Both set-theoretic and network models have thus assumed that category verification time increases with semantic

distance between items and decreases when items being verified are semantically similar. In order words, the more related two or more category items are, the faster they will be verified as belonging to a given category.

The main purpose of Experiment 2b is to verify how the presence of context affects reaction time in a word-choice task where semantically similar and semantically dissimilar items are included. A second concern of the experiment is to verify whether reaction time is still speeded up for semantically similar items and slowed down for semantically dissimilar items in the presence of context.

If context can affect the representation accessed for a category name in a word-choice task, such as the one my subjects were faced with, evidence should be obtained of the change in representation by examining the time it takes for the subjects to make appropriate word-choices in three specific context environments.

If, with context, the representation accessed for a category name and a semantically dissimilar but strongly context-related exemplar can become more closely related, then word-choice decision time for that exemplar should be speeded up. Because of the constraining nature of the context implied by the CB-sentences, word- choice decision time for the semantically dissimilar but related category items should be faster in sentences with this type of context than in the CL-sentences where context is less binding. Similarly, if context can so change a category representation as to make it less closely related to an exemplar, word-choice reaction time for the CL-sentences should be slower than for the CN-sentences in the case of the semantically dissimilar items.

Moreover if, contrary to what models of semantic memory such as the ones mentioned above have so far implied (1. e, that the closer two or more items are semantically, the faster they will be verified), the presence of context can slow down category verification time for semantically similar items, a partially reversed trend should be observed. If, in the presence of a constraining context such as the one implied by the CB-sentences, the semantically similar items are judged as appropriate substitutions for the category name both on the basis of semantic relatedness and also on the basis of an instantiation, as Anderson et al. (1976) propose. the time involved to evaluate these items according to degrees of appropriateness in relation to the context evoked should be slowed down in this type of sentences. In the presence of a CN sentence where context is absent, the semantically similar items may again be considered appropriate substitutions for the category on the basis of semantic relatedness. However, due to the context neutral environment

of such sentences any of the category items presented as possible options in the word-choice task are acceptable substitutions for the category name. Word-choice reaction time may thus be faster for both SS items as well as SD items as opposed to what may take place in the very constraining context of the CB-sentences which will force SD but strongly related items to be chosen. On the other hand, in the CL-sentence environment, the presence of context, although in a less constraining degree, might again cause reaction time to increase in relation to the context neutral environment of the CN-sentences.

6.2.2.2. Design and Materials

A sub-group of the total number of subjects who took part in Experiment 2a had their responses individually timed. Their responses were timed in order to verify whether reaction time for word-choices was affected by the presence of three specific types of context-sentences (i.e. a context-bound sentence, a context-loose sentence, and a context-neutral sentence). The same set of 36 context sentences of Experiment 2a was used. The order of presentation of the sentences was the same as in Experiment 2a and again the first context-bound sentence for each of the nine categories investigated constituted additional practice and therefore was not considered. A stop-watch was used to time the subjects' word-choices.

6.2.2.3. Procedure

For Experiment 2b as well, instructions were read aloud and the example given was read out, as initial practice, by the experimenter to each individual subject. In addition, the subjects were also instructed to read aloud each of the sentences and all the lexical choices given in each case. Thus. to allow for their responses to be timed by the experimenter, they were to start giving their choices by speaking out loud each of the items chosen in order of appropriateness. That is, the first item to be uttered was the most appropriate one to substitute in the given context sentence, the second was the next most appropriate and so on, until all the items were chosen (see Appendix I)

The overall reaction time was then computed for each of the lexical choices in the three types of context sentences. Mean reaction times (RTs) were thus

obtained for both the SD items and the SS items. The mean RTs for the three SS items were added up and an average obtained for each type of context-sentence.

6.2.2.4. Results and Discussion

The data of primary interest from the results emerging from Experiment 2b are the word-choice reaction times (VICRTs) for the three context-type sentences obtained for the two groups of subjects (see Table 6.13 and Table 6.14).

Table 6.13
Word-Choice Reaction Times Given by Brazilians

	CB-Sentences	CN-Sentences	CL-Sentences
SDI	1.8 secs.	1.8 secs.	2.1 secs
SSI	2.2 secs.	1.9 secs.	2.0.secs

S.D. (SDI in CB) = 0.43; S.D. (SSI in CB) = 0.75; S.D. (SDI in CN) = 0.47;
S.D. (SSI in CN) = 0.56; S.D. (SDI in CL) = 0.82; S.D. (SSI in CL) = 0.59.

Table 6.14
Word-Choice Reaction Times Given by Americans

	CB-Sentences	CN-Sentences	CL-Sentences
SDI	1.9 secs.	2.0 secs.	2.2 secs
SSI	2.1 secs.	2.1 secs.	2.0.secs

S.D. (SDI in CB) = 0.55; S.D. (SSI in CB) = 0.60; S.D. (SDI in CN) = 0.46;
S.D. (SSI in CN) = 0.47; S.D. (SDI in CL) = 0.55; S.D. (SSI in CL) = 0.44.

In order to test whether the three context types evoked by the CB-sentences, the CL-sentences, and the CN-sentences, respectively, influenced reaction time, I submitted the mean reaction times obtained under these three context environments to the Friedman two-way analysis of variance (ANOVA). The results obtained revealed that while there was a sifnificant difference at $p < .05$ for the

mean reaction times given by the group of Brazilians, the same was not true for the group of American subjects ($p > .05$). The results emerging from the analysis of the mean RTs in the three context conditions, thus, partially harmonize with the hypothesis stated in Section 6.2.2.1.

As shown on Table 6.13 and Table 6.14, reaction times seem to be faster for the CB-sentences for the semantically dissimilar but related items (SDI) than for the semantically similar items (SSI). In order to assess whether such apparent ease of reacting to semantically dissimilar but related items in the presence of the highly constraining context of the CB-sentences was indeed significant, I submitted the mean reaction times obtained from both groups of subjects to the Wilcoxon statistical test of significance. The results of the test showed that while the mean RTs for the SD items and the SS items obtained from the group of Brazilian subjects reached a significant difference at $p < .05$, the opposite happened for the group of Americans ($p > .05$). This result appears to harmonize with what has been previously made evident as regards the different categorical behaviours which the two groups of subjects seem to employ in their categorization judgements. While the Brazilians appear to assume a more constraining prototype-based categorization behaviour which rely on feature overlap and the goodness of fit of an item as an appropriate category representative in a given context, the Americans seem to be guided by a more flexible schema-directed behaviour in which items enter or are excluded from the categories depending mainly on whether these are compatible with the individual's world knowledge about the category. The presence of a highly constraining context such as the one provided by the CB-sentences is thus able to cause the semantically dissimilar but related items to be chosen faster by the Brazilian subjects. At this point, it seems that the item's goodness of fit to the context implied by the CB-sentence is the main variable influencing their speed of reaction to the items presented. This provides evidence that, in the case of the Brazilian subjects, the presence of a highly constraining context was able to alter the representation accessed for the various category names presented in the CB-sentences at the time the word-choice task was performed (Roth 1980). In the case of the American subjects, however, the apparent faster RTs for the SD items as opposed to the SS items in the CB-sentences do not reach a significant difference. The Americans appear, therefore, to judge both SD and SS items as equally good candidates to substitute for the category names which appear in the CB-sentences. However, the fact that a highly constraining context, such as the ones evoked by the CB-sentences, served, in the case of the Brazilian subjects, to speed up category verification time for semantically dissimilar items but to slow

down the selection of semantically similar items, partially reinforces Anderson et al.'s (1976) conclusion that, when interpreted in context, category names are accessed on the basis of an instantiation. When faced with a word choice, the subjects may readily choose the item which, though semantically dissimilar to the remaining options, best fits the context evoked. The semantically dissimilar item is therefore promptly selected, not on the basis of semantic proximity to the remaining options, but on the basis of an instantiation generated by the context. The more constraining a context is, the quicker the selection. On the other hand, once the SD item is selected, the subject is left with a choice which involves selecting, from among semantically similar items, the next item which best fits the context. At this point, the instantiation process appears to give way or, at least, run side by side with a feature-comparison process. This is made evident by the fact that, before making his next choice, the subject needs more time. I believe that the subject is, at this point, weighing up the various overlapping attributes of the SS items and at the same time evaluating how appropriately these semantically similar items fit the context. This may be the reason why, specifically for the Brazilian subjects, category verification time was actually slowed down for the SS items in the CB-sentences ($p > .05$). When mean RTs for the SD items in the CN-sentences are compared with the mean RTs for the same items in the CL-sentences among the group of Brazilian subjects, one finds that, again, there is an improvement in RT for the SD items ($p < .05$) but not for the SS items in these two context environments. This is an interesting finding which suggests that verification time may also improve for SD items in context neutral environments and not only in highly binding contexts. Such easiness to choose from among items may be due to the practically total absence of contextual contraints in the CN-sentences as opposed to the still quite binding nature of the contexts evoked by the CL-sentences. In the latter type of sentence environment, category verification time may actually slow down for SD items because, in such sentences, context is neither present in a highly binding fashion so as to strongly suggest the choice of any particular item, nor virtually absent so as to allow for quick category verification responses for both SD and **SS** items. As hypothesized, category verification time was also faster for the SS items ($p < .05$) in the CN-sentence environment as opposed to the CB-sentence environment. Such result seem to confirm what has been stated previously, i.e. that contrary to what happens in a binding context environment where SD items which are strongly implied tend to be chosen faster rather than SS items, the absence of contextual constraints such as in the case of the CN-sentences, is conducive to allowing both SD items and SS

items to be chosen as equally fitting substitutions for the category name. This is revealed in the fact that whereas there is an improvement in reaction time for the SS items in the CN-sentences as opposed to the CB-sentences, no improvement in reaction time occurs between SD items and SS items within the environment of the CN sentences themselves. As discussed previously, the fact that the Americans subjects seem to use a more flexible approach to categorization based on the compatibility of any of the category items to their individual world knowledge about the categories may be the reason why a significant level of difference is not found for any of the RTs in the various contexts conditions.

6.3. General Discussion of Findings for Experiments 2a and 2b

The analysis of the results emerging from the data collected through Experiments 2a and 2b has served to shed light on the structure of context-dependent categories.

The results emerging from Experiment 2 provide additional evidence that context does alter the representation accessed for a category name at the time category membership decision tasks are carried out. The three context environments presented in the CB-sentences, CL-sentences and CN-sentences, respectively, were thus able to influence the subjects' choices of lexical items which were to be appropriately substituted in the three types of context-sentences.

The fact that the semantically dissimilar but context-related items in the CB-sentences received very typical ranks by both groups of subjects is evidence that in context-dependent categories, membership decisions are governed by context related constraints. This effect of context gives rise to representativeness ratings (GOE distributions) which are generated as a reflection of the context evoked and not as a function of context-neutral prototypical instances and distance from such instances. This fact demonstrates that the representativeness distribution observed in the presence of an explicit context can not be derived from the typicality structure observed in the absence of an explicit context. Moreover, when reaction times were calculated in Experiment 2b for the CB-sentences environment, it seemed clear that the presence of a highly constraining context such as the one in question served to speed up category verification times for the semantically dissimilar but related items among the group of Brazilian subjects. This suggests that when interpreted in a highly binding context, category names appear to be accessed on the basis of an instantiation.

The statistical analysis of the mean ranks assigned to the various lexical items given as possible substitutions in the CB-sentence environment revealed that the two groups of subjects displayed categorical behaviours which were sometimes harmonious and sometimes different. For instance, the comparison of the ranks assigned to semantically similar and related items with those assigned to the semantically similar but unrelated items by both groups of subjects by means of the Wilcoxon test of significance revealed a somewhat harmonious behaviour in the way both the Brazilian and the American subjects assigned ranks to such pairs of items in the CB-sentences environment. The majority of the ranks assigned proved to be significantly different. This result added support to the hypothesis that in ranking SSR and SSU items in the CB-sentences, both the Brazilian subjects and the American subjects were allowing context to affect the selection process they employed in deciding on the appropriateness of the semantically similar items to be substituted in the CB-sentences. Had this not been the case, the ranks assigned to the SSR items and the SSU items would not have been significantly different. Both groups of subjects appeared, in this case, to be judging the semantically similar items as substitutions for the category name presented in the CB-sentence on the basis of an instantiation prompted by the context elicited. On the other hand, when the Wilcoxon test was again applied to detect possible similarities and differences between the ranks assigned to the semantically dissimilar but related items and semantically similar and related items, the two groups of subjects appeared to employ different categorical behaviours. While most of the ranks assigned to the SDR items and the SSR items by the Brazilian subjects reached a significant difference, the majority of the ranks assigned to the SDR items and the SSR items by the American subjects did not reach a significant difference. This result seemed to indicate that in ranking semantically dissimilar and semantically similar items in the CB-sentences environment, the two groups of subjects were employing different processes. While the Brazilian subjects apparently evaluated an item's compatibility with the context-related category of the CB-sentences on the basis of a comparison and weighting of characteristic attributes, the American subjects appear to have given ranks to both semantically dissimilar but related items and semantically similar and related items on the basis of the item's fitness to the memory schema evoked by the constraining context. The fact that the Brazilian subjects appear to have relied more heavily on a prototypical approach to category membership decisions based on degrees of semantic similarity holding among the various SDR items and SSR items given as possible choices in the CB-sentences served to expose a greater number of

significant differences among ranks assigned to pairs of SDR and SSR items. On the other hand, the fact that the American subjects relied on a schema-based approach to the category membership decisions they had to make was evidenced by the lower number of significant differences found for pairs of SDR/SSR items in the ranks given by the Americans subjects. It is interesting to note that when the two groups of subjects performed the task of reorganizing categories under the elicitation of three specific contexts in Experiment 1, the same trend was observed in the behaviours of both the Brazilian subjects and the American subjects. This seems to indicate that in both Experiment 1 and Experiment 2, the Brazilian subjects consistently favoured a prototypical approach to the decisions they made in assigning category membership in context, whereas the American subjects were consistent in using a schematic approach based on instantiated representations which fit the context elicited and are fully compatible with the individual's world knowledge of the category.

According to the prediction made for the CL-sentences environment, the presence of a less constraining context precipitated the generation of goodness of example (GOE) distributions by both groups of subjects which displayed a fine gradation of typicality ratings from the semantically similar and most related item to the context (the SSR1) to the semantically similar and least related item (the SSR3). The presence of a less constraining context also caused the semantically dissimilar items to receive an overall mean rank which approximated the average on the 7-point scale used in the experiment. Despite few variations which might be due to cultural differences or idiosyncrasies, the SSR1 items were given the lowest ranks by both Brazilians and Americans. The GOE distributions for the semantically similar items generated appeared to be based on a context proximity relation rather than on a semantic proximity relation holding between the various items given as possible lexical substitutions for the category name in the context-loose environments.

The GOE distributions generated by both groups of subjects for the CN-sentences environment were, apart from a few exceptions which might have been due to constraints imposed by cultural or geographical differences, rather similar to those obtained by Rosch (1975d). When the semantically dissimilar items were compared to the semantically similar items, it was found that the former frequently received very similar ranks from both the Brazilian subjects and the American subjects. Such similarities between the ranks assigned for semantically dissimilar and semantically similar items in the CN-sentences appear to

indicate that even in context-neutral environments such as the ones implied by the CN-sentences, other processes, rather than the comparison and weighting of shared characteristic attributes of the category items presented as possible substitutions for the category name may be at work.

The analysis of the Brazilian subjects' and of the American subjects' behaviours in making appropriate lexical choices in the three types of context environments has served to demonstrate that context is predominantly the variable against which category membership decisions are made. This is an important finding firstly because, contrary to claims traditionally made by proponents of prototype theory, and the assumptions put forward by models of semantic memory, category membership is, in the presence of context which can be either explicitly evoked in the experiment or mentally evoked by the individual taking part in the categorization task, a context-related phenomenon. Typicality ratings generated in context, rather than exposing degrees of semantic relatedness to generic prototypical instances of the category, will reflect degrees of relatedness between the various category items and the context elicited. Secondly, the comparison of the behaviours adopted by both the Brazilian subjects and the American subjects in the task of choosing the various lexical items as appropriate substitutions for the category name presented in three different context environments, has demonstrated that context effects were, on the whole, able to influence the choices of both groups. The results of the study therefore indicate that context-related categorization tasks can influence individuals who belong to different cultures in similar ways.

Chapter seven
Summary and Conclusions

7.1. Aim of the Study

As stated in the introductory chapter, the main objective of the research carried out in this study was to investigate the manner in which graded (or fuzzy) category membership varies across cultures. A secondary concern has been to examine some of the effects that context appears to have on category structure and typicality shifts.

The main motivation for this study lay in the fact that prior cross-cultural research on individuals' judgements as regards category membership involving speakers of two distinct languages has been little (Hampton and Gardine, 1983; Schwanenflugel and Rey, 1986; Segalowitz and Poulin-Dubois, 1990). Both Rosch (1975a) and Markovitz (1977), however, emphasize the need for investigations such as the one which I have carried out, to be conducted. The need to look into how semantic categories are organized in diverse cultural settings and into how concepts come to be either culturally specific or universally shared can be better appreciated if one considers that a cross-cultural analysis such as the one performed in this study enlightens us in at least two ways. First, such a study serves to broaden our still rather limited knowledge of how human categorization systems work and, second, it sheds light on categorical behaviours employed in decision-making tasks which involve the assignment of category membership in the absence and in the presence of context.

In order to analyse the data emerging from the folk definition interviews, the ranking tasks and the word-choice tasks performed by the Brazilian and the American subjects, I have utilized Markovitz's (1977) model of category structure as far as the processes included on **Rung One**, **Rung Two** and **Rung Four** are

concerned. By doing so some attempt has been made to assess the universality of the model.

The analysis of the data included under the variable **Context** on **Rung Four** has specifically shed light on categorical behaviours which appear to be employed in ranking decisions involving context-bound categories. The results of the statistical analysis performed on the data included on **Rung Four** appear to indicate that decisions on category membership tasks in the presence of **Context** are motivated by two main categorical behaviours. Such behaviours will reflect either a prototypical approach to category structure based on heavy reliance on degrees of semantic relatedness holding between the various items included under the context-bound categories, or a schema-directed approach based on the instantiation of items which fit the mental schema evoked by the elicited context.

7.2. The Model Adopted

Since the major concern of the present study was to obtain an insight into how graded category membership varies across cultures by comparing the structure of some semantic categories in Brazilian Portuguese and American English, I felt that a model which favoured a relational approach to semantic structure such as the one which I have adopted from Markovitz (1977) would more satisfactorily allow for such an investigation. This is the case because, by concentrating on semantic relations rather than semantic features, subjects' views of the various categories and their members could more accurately be preserved in their original form and did not have to undergo a great deal of decompositions into semantic features.

The model is composed of four distinct rungs which are hierarchically organized. **Rung One** contains a list of ***lexical items***. This list includes the category name, the category members included under each of the categories and the terms which have been employed to define the category name. **Rung Two** comprises a set of ***semantic relations***. Such relations link the lexical items of **Rung One** to each other. The interconnection of the various relations and the lexical items of **Rung One** form a semantic network. The main relations included under **Rung Two** are **Taxonomy**, **Modification**, **Part-Whole**, **Agent**, **Experiencer**, **Object** and **Locative.**

Rung Three, not utilized in the present research, contains some of the other ***psychological variables*** included in the model. These are **Cue Validity**, **Family**

Resemblance and **Scales**. Such variables can modify, group and assign weights to the semantic relations found on **Rung Two**. Included on **Rung Four** are additional psychological variables, namely, **Context**, **Frequency of Occurrence** and **Dominance**. These variables can exert an influence on the variables found on **Rung Three** by modifying or dictating subjects' behaviour in ranking decisions and thus affect the generation of Goodness of Example (GOE) distributions. **Context** is the only process of **Rung Four** which has been investigated in the present study. The results of the context experiments demonstrated that **Context** can indeed alter the representation accessed for a category name at the time when ranking decisions are made. This will result in radical shifts of typicality ranks which will precipitate GOE distributions which will reflect the **context in** which they were generated.

7.3. The Study

The study was divided into two main parts. The first part comprised the comparison of ranking decisions and statements produced during the folk definition interviews by the Brazilian subjects I used and the American subjects in Markovitz's study (1977). The data emerging from the ranking tasks and the interviews were accommodated on **Rung One** and **Rung Two** of the model. This part of the study also included a RT experiment which involved category membership judgements. For this experiment the same nine semantic categories which were cross-culturally compared through the ranking tasks and the folk definitions interviews were utilized. The aim of this experiment has been to provide an additional measure of prototype effects on subjects' decisions when these have to assign category membership to items presented under correct or incorrect category names. The data for this experiment was collected from twelve American English speakers contacted through the Psychology Department of the University of Leeds.

The second part of the study included the comparison of the behaviours adopted by Brazilian subjects and American subjects when these were faced with category verification tasks in the presence of specific types of context.

The main aim of the ranking task included in the first part of the study was to provide GOE distributions for members of the categories utilized by Markovitz (1977) so that a comparison could be drawn between the ranks I obtained from the Brazilian subjects and the ranks given by the American subjects utilized by

Markovitz. The ranking task for each category followed the interview on that category. Once the ranking task for a category was performed, the subject was asked to decide whether any of the items included under the category name were, in fact, not category members. If there were non-members, the subject was asked to explain why these items were eliminated and in which aspects they differed from the other category members.

The population of Brazilian subjects who took part in the ranking task and folk definition interviews was composed of 30 native speakers of Brazilian Portuguese whose ages varied from 17 to 43 years. These were current or former students of various departments of the University of Brasilia. The selection of individuals from different academic backgrounds and varied life experiences made possible, I believe, the emergence of a richer type of data which reflected the subjects' world knowledge and expertise. This, in turn, contributed to a more encompassing view of the categories investigated.

The context experiments included in the second part of the study were aimed at assessing whether context can indeed alter the representation accessed for a category name at the time ranking decisions or word-choice tasks are performed.

Seventy native speakers of Brazilian Portuguese participated as unpaid volunteers in the two sets of context experiments. Nineteen of these subjects took part in Experiment 1 and fifty-one took part in Experiments 2a and 2b. These nineteen subjects also took part in the ranking task and folk definition interviews. The fifty-one subjects who took part in Experiments 2a and 2b were all psychology students at the University of Brasilia.

The second set of context experiments (Experiments 2a and 2b) involved word-choice decisions in three specific types of context-sentences; namely, context-bound sentences (CB-sentences), context-loose sentences (CL-sentences) and context-neutral sentences (CN-sentences).

7.4. Results of the Study for Rung One and Rung Two

Several statistical procedures were used to analyse the data included on Rung One. Kendall's Coefficient of Concordance was utilized to assess the amount of intergroup agreement on ranking. The Spearman Rank Correlation was employed to assess intra-group agreement. The Chi-square test determined the degree of agreement between groups of subjects. And the Wilcoxon test was used to

verify whether or not the mean ranks assigned for the items included under the various category names were significantly different from each other.

Intra-group agreement for the present study proved to be lower than the levels of intra-group agreement for other studies such as the ones conducted by Rosch and her associates and also the study conducted by Markovitz (1977). The Chi-square procedure was therefore utilized to assess whether or not the low levels of agreement found for the present study could be attributed to differences in sex, age, socioeconomic, educational or geographical backgrounds of the subjects involved. The results of the Chi-square test demonstrated that the low levels of agreement could not be attributed to the various factors listed above. It appeared, rather, to reflect the different backgrounds and varied world knowledge of the individuals who participated in the present study.

Inter-group agreement was calculated to determine the agreement between the group of Brazilian subjects and the group of American subjects. The correlations obtained by the use of the Spearman Rank Correlation Coefficient test were significant for most of the categories. This confirmed the hypothesis underlying the application of the test; namely, that the common experiences of the two groups of subjects, who belong to two different cultures and are members of two westernised nations would act as a cohesive factor in making their behaviour uniform.

Differences and similarities in the assignment of ranks for pairs of items included under the various category names were detected by the use of the Wilcoxon test. The aim in utilizing this procedure was to shed some light on the process or processes which appear to have guided the subjects' behaviours during the ranking task. A second concern for the application of the test was to compare the results obtained with those of Markovitz.

The results of the Wilcoxon test for matched pairs revealed non-significant differences between mean ranks assigned to most pairs of items in the present study. Not only were pairs of items which shared several common attributes given ranks which did not reach a significant difference but also items which apparently were rather semantically distant received mean ranks which proved to be statistically non significant. These results showed that ranking decisions appear to be governed by well-established contrast sets which divide up whole categories into smaller clusters of member items viewed as similar on the basis of some shared attributes. On the other hand, ranking decisions appeared to be

also determined by a more encompassing category structuring principle which coexists with the prototype extension and conforms to the elaboration of a schema (Langacker 1987). In other words, it appears that category membership decisions will either be governed by degrees of resemblance between a category item and the category prototype or be directed by a global view of the category which is compatible with the mental schemas elaborated at the time ranking decisions are performed.

The data collected through the interviews were analysed by means of the inter-lexical relations included on **Rung Two**. The results of the analysis indicated that, to a large extent, the Brazilian Portuguese speakers made use of the inter-lexical relations of **Taxonomy**, **Modification**, **Part-Whole**, **Experiencer** and **Locative** in very similar ways to the American English speakers in Markovitz's study. Such similar behaviour on the part of the two groups of subjects indicated not only that the semantic structure of the nine categories which were cross-compared is very similar in the two languages but also that the model utilized appears to be one of universal validity.

As in the study conducted by Markovitz, **Taxonomy** and **Modification** emerged as the most predominant of the semantic relations and were found in the definitions of all ten categories investigated on **Rungs One** and **Two** of the model. The Brazilian subjects also largely restricted the use of the **Part-Whole**, **Agent** and **Experiencer** relations to animate categories. Such a restriction was not absolute, however, in the case of the **Part-Whole** relation. This was at times used to define inanimate categories. **Seasoning**, **Weapons**, **Furniture** and **Drinks** were, at times, described by the use of the **Part-Whole** relation. **Part-Whole** statements were also frequently used to reject certain category items from the categories. In contrast to Markovitz's (19'77) findings, the Brazilian subjects behaved differently as regards the use of the **For** relation. Markovitz found that use of the **For** relation was largely limited to categories of inanimate nouns. Evidence from the present study showed, however, that the Brazilian subjects viewed animate categories such as **Animal** and **Insects** as instrument-like in nature. For the majority of the Brazilian subjects, such categories had associated **w**ith them the fulfilment of certain functions such as food production. This view of the **Animal** and the **Insect** categories was often signalled by the use of the **For** relation to describe functions associated with these categories. Another contrast between the behaviour of the Brazilian subjects and the American subjects was linked with the tendency displayed by the Brazilian subjects of assigning non-membership to certain category items by the use of

affective expressions translated by **Object** statements. **Locatives** were also used in a somewhat culturally specific fashion in statements employed to describe the **Insect** category. Contrary to the behaviour adopted by the American subjects, the Brazilian subjects often reported that insects were to be found both indoors and outdoors. Markovitz (1977) observed that her subjects limited insects to outdoors environments. The fact that the Brazilian subjects come from a tropical country where insects can be found much more frequently indoors might explain their behaviour in this regard.

The behaviours displayed by the two groups of subjects both in ranking the various category items and in making use of the semantic relations included on **Rung One** and **Rung Two** to define and describe the categories which have been cross-culturally analysed in the study highlight the fact that despite a lot of linguistic correspondence between the behaviours of the two groups, there exist culturally specific peculiarities which will govern the frequency and the uses of certain semantic relations by culturally distinct groups of subjects.

7.5. Results of the Study for the Context Experiments

The results of the two sets of context experiments showed that the elicitation of specific contexts can alter the representation accessed for a category name at the time ranking decisions are made.

Experiment 1 demonstrated that GOE distributions generated in the presence of context will reflect constraints imposed by the various contexts elicited. The production of context-dependent typicality ratings thus proved to be a dynamic process based not only on degrees of semantic similarity between the category's best exemplars and the remaining category items but also on the context in which the category was generated. Such results showed that contrary to the view which appears to have been traditionally held among prototype theorists, context does indeed cause an alteration of the representation accessed for a category name at the time ranking decisions are made. This precipitates a restructuring of the category, with the result that GOE distributions generated will reflect the items' fitness as representatives of the context elicited rather than solely rely on degrees of semantic similarities holding between the various category items and the category's best types.

Experiment 2 has provided additional evidence that the representation accessed for a category name at the time membership decision tasks are performed

will be altered by context. The presence of the three context environments presented in the CB-sentences, CL-sentences and CN-sentences in Experiment 2a, were thus able to influence the subjects' choices of lexical items which were to be appropriately substituted in the three types of context sentences.

The semantically dissimilar but contextually strongly related items of the CB-sentences were ranked as very typical items by both groups of subjects. This constituted evidence that in context-dependent categories, membership decisions are governed by context-related constraints. This effect of context precipitates the generation of representativeness ratings which reflect the context evoked and not degrees of similarity between a context-neutral prototypical entity and the various category members. In the presence of a less constraining context such as the one evoked by the CL-sentences, GOE distributions generated by both groups of subjects displayed a fine gradation of typicality ratings from the semantically similar and most related item to the context (SSR1) to the semantically similar and least related item to the context (SSR3). The semantically dissimilar items, on the other hand, received according to what was expected an overall mean rank which approximated the average on the 7-point scale used in the experiment. These results show that context, even when present in a less constraining form, can still affect the generation of GOE distributions. The results obtained seem to demonstrate that the concept of appropriateness in a word-choice selection task such as the subjects had to perform in the case of the CL-sentences will facilitate GOE distributions that are still more strongly based on a context proximity relation rather than on a semantic proximity relation holding between the various items given as possible lexical substitutions for the category name. For this reason semantically dissimilar items in relation to the other items that are given as possible choices but are at the same time more closely related to the context implied still received ranks which were closer to those assigned to the semantically similar items which were related to the context evoked.

The typicality ratings generated by both groups of subjects for the CN-sentences environment were, in their majority, rather similar to those obtained by Rosch (1975d) in ranking tasks performed for context-neutral categories. These results conform to the hypothesis that the absence of context would facilitate representativeness orderings which would closely resemble those obtained for context-neutral categories such as the ones in Rosch's research. The apparent discrepancies in the assignment of mean ranks by the Brazilian subjects were due to differences in culture and geographical backgrounds. Most of the mean

ranks obtained by both groups of subjects, however, resembled those obtained by Rosch (1975d). Interestingly, a comparison of the mean ranks assigned for the semantically similar items with those assigned for the semantically dissimilar items, in some of the categories, still revealed the same pattern which had become evident when the mean ranks obtained for such items in the CB-sentences and the CL-sentences were analysed. Semantically similar and semantically dissimilar items still attracted very close ranks even in the CN-sentences environment, as made evident by the comparison of the mean ranks assigned to these items. This finding seemed to indicate that in the absence of an explicit context as well, processes other than only the comparison and weighting of shared characteristic attributes of the category items which are presented as possible substitutions for the category name are at times involved. It is therefore apparent that in a context-neutral environment as well, individuals may adopt behaviours when performing a category verification task which are parallel to the categorical behaviours they adopt when performing ranking decisions in context.

Both Experiment I and Experiment 2 have demonstrated that context is able to influence membership verification decisions by altering the representation accessed for a category name at the time category verification tasks are performed. Such a change of representation will be reflected in the production of GOE distributions which reflect the constraints imposed by the context in which they have been generated.

The results of the statistical analysis performed demonstrated that in making decisions about an item's fitness as a category representative in the presence of context. the subjects' behaviours appeared to be motivated by two broad approaches to category structure, i.e., a prototypical approach and a schema-directed approach. The fact that the Brazilian subjects appeared to follow a prototypical approach which relies heavily on degrees of semantic relatedness holding between the various category members and the category's best types under the context elicited was made evident by the fact that the ranks assigned to pairs of semantically dissimilar and semantically similar items showed in the majority a significant difference when compared by the Wilcoxon test of significance. On the other hand, the mean ranks assigned to most pairs of semantically dissimilar items and semantically similar items by the American subjects did not reach a significant difference when compared by the same test. This seemed to indicate that the American subjects as a whole favoured a schema-directed approach to category structure. Rather than relying on degrees of

semantic relatedness holding between the various members they had to rank, and the best types under the context elicited, the American subjects appear to have let instantiations based on the mental schema they formed for each of the context-bound categories govern their decisions.

7.6. Suggestions for Future Research

Further research could be carried out in the three main areas which have been the concern of the present research, namely; the model. semantic categories and diverse populations. These are discussed as follows.

7.6.1. The model

Additional research could be carried out to assess the universality of the model to a greater extent. This could be done by including the remaining rungs of the model, namely, **Rungs Three** and all the variables of **Rung Four** in future cross-cultural researches similar to the one carried out in the present study.

Specifically, the role played solely by Context in the generation of GOE distributions by culturally distinct populations could be analysed yet further. Context could be approached from a culturally specific perspective with a view to assessing how ecological and/or social factors contribute to nuances in the salience of certain category members in different cultural contexts.

7.6.2. The Categories

Culturally specific meanings linked to some members of certain categories could be investigated in depth. This might shed light on how certain attributes used to describe some members of certain categories in specific cultural settings come to be present in one language but not in another. This may, in turn, have an applicability at foreseeing areas of potential difficulties in second or foreign language vocabulary learning.

7.6.3. Populations

A number of different types of populations could be of interest to research with a view to testing further the power and validity of the model. Work with

individuals from culturally distant populations and also work with children may, however, provide more interesting results in shedding light on the model's universality and on concept formation. Research such as the one carried out in the present study, should thus be conducted with still other culturally more distant populations in order to assess how social constraints (i. e. beliefs and culturally accepted behaviours) and/or ecological factors (i. e. the climate, the flora, etc) may play a part in influencing individuals' views of the categories and their behaviours in ranking decision tasks. Moreover, the role concept familiarity seems to play on the formation of cultural prototypes could be researched yet further by analysing the behaviours on ranking decisions and familiarity ratings given by members of culturally more distant cultures than those analysed previously (Schwanenflugel and Rey, 1986; Segalowitz and Poulin-Dubois, 1990). Finally, work with children could test further the generality of the model since researching into the extent to which children make use of the relations and are influenced by the psychological variables included on **Rung Three** and **Rung Four** of the model might reveal interesting aspects of category formation since their linguistic concepts are still in the process of developing.

7.7. Conclusion

The results of the study reported in Chapter Five have demonstrated that graded category membership is a cross-cultural phenomenon which varies according to the cultural settings in which concepts are formed or come to be incorporated by members of a given culture. For this reason, despite a lot of correspondence in the way category members were ranked by both the Brazilian subjects who participated in this study and the American subjects of Markovitz's study, there were still certain differences in the way category items were viewed as more or less typical of the categories. The same trend became evident when the semantic relations contained on **Rung Two** of the model were used by both the Brazilian subjects and the American subjects to define and describe the various items included under the categories investigated. Although both the Brazilian subjects and the American subjects displayed at times a corresponding behaviour in the definitions they produced, cultural constraints appeared to govern the frequency and the use of some of such relations. This was in turn reflected in the way the responses of the two groups of subjects gave rise to a contrasting taxonomic display of the categories in the two languages.

The results of the context experiments reported in Chapter Six have demonstrated that context can indeed alter the representation accessed for a category name at the time ranking decisions are performed. The responses of the Brazilian subjects and those of the American subjects have thus been influenced by the presence of context. Both groups have therefore been able to produce GOE distributions which reflected the constraints imposed by the context in which they had been generated. Ranking decisions performed in context have therefore contradicted what has been the traditional view put forward in prototype theory. The traditional view has it that category verification tasks are mainly based on degrees of semantic proximity holding between context-neutral prototypes and the remaining category members. Evidence from the present research points to the fact that ranking decisions performed in context will be motivated either by a context-constrained prototypical view of category structure or by a schema-directed approach to category structure. Categorization in general, but more specifically categorization in context-bound environments, appears therefore to be a function not only of the prototype but, it seems, to equally reflect a global more encompassing schematical view of category structure based on instantiations prompted by the individual's world knowledge.

Appendix A

Questionnaire

Name: Sex: M / F

Age:

Area of the city where you live:

1. Did you live in a city as a child?

---

2. If you answered yes, which city?

---

3. If you answered no, where did you live?
(on a farm, in a village, in a country house, etc.)

---

4. What is your highest qualification?

---

5. What is your occupation? (or what career do you intend to follow?)

---

6. What is you father's occupation?

---

7. What is your mother's occupation?

Appendix A (cont'd.)
Questionnaire in Portuguese

Nome: Sexo: M / F

Idade:

Areá da cidade onde mora:

1. Morava numa cidade quando criança?

_____

2. Se respondeu sim, qual cidade?

_____

3. Se respondeu não, onde morava?
(numa fazenda, povoado, chácara, etc.)

_____

4. Qual sua mais alta qualificação?

_____

5. Qual sua ocupação? (ou qual a carreira que pretende seguir?)

_____

6. Qual a ocupação de seu pai?

_____

7. Qual a ocupação de sua mãe?

_____

Appendix B

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Sex** (Male/Female)

	M	F		
Animal				
Very typical	20	35	df = 2	
Typical	19	28		
Not typical	15	27	Chi-Square = 0.32	(p > .05)
Disease				
Very typical	20	40	df = 2	
Typical	18	30		
Not typical	17	29	Chi-Square = 0.24	(p > .05)
Drink				
Very typical	20	40	df = 2	
Typical	19	35		
Not typical	22	25	Chi-Square = 2.29	(p > .05)
Fuel				
Very typical	20	40	df = 2	
Typical	19	31		
Not typical	18	24	Chi-Square = 0.96	(p > .05)
Furniture				
Very typical	20	39	df = 2	
Typical	18	27		
Not typical	08	11	Chi-Square = 0.62	(p > .05)
Insect				
Very typical	20	37	df = 2	
Typical	20	28		
Not typical	17	27	Chi-Square = 0.48	(p > .05)
Seasoning				
Very typical	19	40	df = 2	
Typical	18	28		
Not typical	14	26	Chi-Square = 0.55	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Sex** (Male/Female)

Toy

	M	**F**		
Very typical	20	39	df = 2	
Typical	18	45		
Not typical	15	30	Chi-Square = 0.47	(p > .05)

Tree

Very typical	20	40	df = 2	
Typical	18	33		
Not typical	24	36	Chi-Square = 0.61	(p > .05)

Weapon

Very typical	20	40	df = 2	
Typical	20	37		
Not typical	20	30	Chi-Square = 0.55	(p > .05)

Variable: **Educational Background** (Undergraduate-Graduate-Postgraduate)

Animal

	U	**G**	**P**		
Very typical	19	24	12	df = 4	
Typical	17	20	10		
Not typical	14	19	10	Chi-Square = 0.14	(p > .05)

Disease

Very typical	20	28	12	df = 4	
Typical	18	23	10		
Not typical	17	22	11	Chi-Square = 0.16	(p > .05)

Drink

Very typical	20	28	12	df = 4	
Typical	19	23	12		
Not typical	14	22	11	Chi-Square = 0.51	(p > .05)

Fuel

Very typical	10	20	12	df = 4	
Typical	19	28	11		
Not typical	15	17	10	Chi-Square = 4.86	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Educational Background** (Undergraduate-Graduate-Postgraduate)

	U	G	P		
Furniture					
Very typical	20	27	12	df = 4	
Typical	20	16	10		
Not typical	05	11	04	Chi-Square = 2.98	(p > .05)
Insect					
Very typical	20	25	12	df = 4	
Typical	20	18	10		
Not typical	18	18	08	Chi-Square = 0.73	(p > .05)
Seasoning					
Very typical	20	28	12	df = 4	
Typical	19	19	10		
Not typical	15	17	09	Chi-Square = 0.68	(p > .05)
Toy					
Very typical	20	27	12	df = 4	
Typical	18	24	11		
Not typical	10	21	14	Chi-Square = 2.98	(p > .05)
Tree					
Very typical	20	28	12	df = 4	
Typical	19	22	10		
Not typical	21	27	15	Chi-Square = 0.59	(p > .05)
Weapon					
Very typical	20	28	12	df = 4	
Typical	19	27	11		
Not typical	16	24	10	Chi-Square = 0.04	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Geographical Region** (North/Northeast-Central-South/Southeast)

	N	C	S		
Animal					
Very typical	12	22	19	df = 4	
Typical	11	18	16		
Not typical	07	22	18	Chi-Square = 1.51	(p > .05)
Disease					
Very typical	14	26	20	df = 4	
Typical	13	23	15		
Not typical	12	20	19	Chi-Square = 0.75	(p > .05)
Drink					
Very typical	14	26	20	df = 4	
Typical	14	22	18		
Not Typical	13	18	14	Chi-Square = 0.44	(p > .05)
Fuel					
Very typical	14	26	19	df = 4	
Typical	13	21	17		
Not typical	10	18	21	Chi-Square = 1.62	(p > .05)
Furniture					
Very typical	14	25	20	df = 4	
Typical	13	19	15		
Not typical	03	11	06	Chi-Square = 1.75	(p > .05)
Insect					
Very typical	16	23	20	df = 4	
Typical	16	20	14		
Not typical	16	21	10	Chi-Square = 2.15	(p > .05)
Seasoning					
Very typical	14	26	20	df = 4	
Typical	13	22	14		
Not typical	10	15	13	Chi-Square = 0.56	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Geographical Region** (North/Northeast-Central-South/Southeast)

Toy

	N	**C**	**S**		
Very typical	14	25	20	df = 4	
Typical	13	23	17		
Not typical	11	15	15	Chi-Square = 0.53	(p > .05)

Tree

Very typical	14	26	20	df = 4	
Typical	13	22	16		
Not typical	15	22	22	Chi-Square = 0.70	(p > .05)

Weapon

Very typical	14	26	20	df = 4	
Typical	14	24	19		
Not typical	11	23	16	Chi-Square = 0.19	(p > .05)

Variable: **Social Class** (Upper-Middle)

Animal

	U	**M**		
Very typical	12	43	df = 2	
Typical	10	37		
Not typical	08	35	Chi-Square = 0.17	(p > .05)

Disease

Very typical	12	48	df = 2	
Typical	10	40		
Not typical	10	38	Chi-Square = 0.01	(p > .05)

Drink

Very typical	12	48	df = 2	
Typical	12	42		
Not Typical	11	35	Chi-Square = 0.24	(p > .05)

Fuel

Very typical	12	48	df = 2	
Typical	11	39		
Not typical	08	34	Chi-Square = 0.13	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Social Class** (Upper-Middle)

Furniture

	U	**M**		
Very typical	12	47	df = 2	
Typical	11	34		
Not typical	06	14	Chi-Square = 0.82	(p > .05)

Insect

Very typical	12	45	df = 2	
Typical	10	38		
Not typical	10	34	Chi-Square = 0.06	(p > .05)

Seasoning

Very typical	12	48	df = 2	
Typical	09	41		
Not typical	09	30	Chi-Square = 0.35	(p > .05)

Toy

Very typical	12	47	df = 2	
Typical	12	41		
Not typical	14	31	Chi-Square = 1.72	(p > .05)

Tree

Very typical	12	48	df = 2	
Typical	10	41		
Not typical	17	46	Chi-Square = 1.19	(p > .05)

Weapon

Very typical	12	48	df = 2	
Typical	11	46		
Not typical	13	37	Chi-Square = 0.84	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Age** (A = 15yrs to 20yrs; B = 20yrs to 30yrs; C = 30yrs to 45yrs)

Animal

	A	**B**	**C**		
Very typical	10	35	10	df = 4	
Typical	09	28	10		
Not typical	08	26	11	Chi-Square = 0.64	(p > .05)

Disease

Very typical	10	40	10	df = 4	
Typical	07	34	10		
Not typical	05	31	12	Chi-Square = 1.71	(p > .05)

Drink

Very typical	10	40	10	df = 4	
Typical	10	34	10		
Not typical	08	28	09	Chi-Square = 0.31	(p > .05)

Fuel

Very typical	10	40	10	df = 4	
Typical	09	33	08		
Not typical	02	31	09	Chi-Square = 4.17	(p > .05)

Furniture

Very typical	10	39	10	df = 4	
Typical	10	28	07		
Not typical	01	15	04	Chi-Square = 2.83	(p > .05)

Insect

Very typical	10	37	10	df = 4	
Typical	10	30	08		
Not typical	07	28	09	Chi-Square = 0.55	(p > .05)

Seasoning

Very typical	10	40	10	df = 4	
Typical	10	31	09		
Not typical	06	23	10	Chi-Square = 1.60	(p > .05)

Appendix B (cont'd.)

Chi-Square for the Ten Categories Based on Number of Subjects Giving Same Ranks (cont'd.)

R_1-R_2 = Very typical; R_3-R_4 = Typical; R_5-R_8 = Not typical

Variable: **Age** (A = 15yrs to 20yrs; B = 21yrs to 30yrs; C = 31yrs to 45yrs)

Toy

	A	**B**	**C**		
Very typical	10	39	40	df = 4	
Typical	10	35	08		
Not typical	05	31	09	Chi-Square = 1.36	(p > .05)

Tree

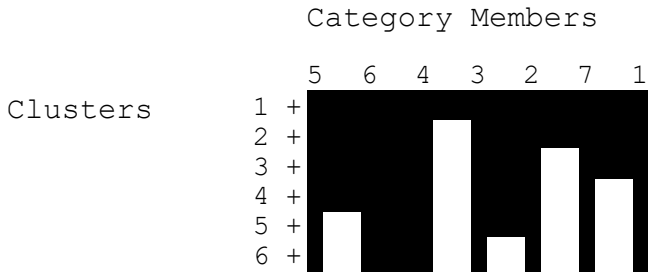
Very typical	10	40	10	df = 4	
Typical	09	34	08		
Not typical	06	38	13	Chi-Square = 2.02	(p > .05)

Weapon

Very typical	10	40	10	df = 4	
Typical	10	37	10		
Not typical	07	35	08	Chi-Square = 0.37	(p > .05)

Appendix C

Hierarchical Cluster Analysis for the Animal Category Based on the Mean Ranks Given by the Brazilian Subjects



(Across) Category members
1 = deer
2 = cow
3 = dog
4 = squirrel
5 = snake
6 = turtle
7 = elephant

Stage	Clusters Cluster 1	Combined Cluster 2	Coefficient	Stage Cluster Cluster 1	1st Appears Cluster 2	Next Stage
1	4	6	.010000	0	0	3
2	2	3	.040000	0	0	5
3	4	5	.205000	1	0	6
4	1	7	.250000	0	0	5
5	1	2	.635000	4	2	6
6	1	4	3.929167	5	3	0

Appendix D

Reasons given for non-membership or borderline status

Category	Non-member	No. of Times	Borderline	No. of Times
Animal				
squirrel	less familiar	1		
	It reminds me of a toy	1		
snake	lay eggs	1		
	not proportional	1		
	no limbs	1		
	not food-producer	1		
	I hate them	1	I don't like them	1
	noxious	2	mystical	1
	has no legs	3	has no legs	1
turtle	aquatic	4	aquatic	2
	lay eggs	1		
	has no legs	2		
deer	not familiar	1		
Disease				
drug addiction	not a disability	1		
	permanent	1		
	self-inflicted	9	self-inflicted	1
	perverted need	1		
deafness	not aggressive	1		
	not acquired	1		
	might result from a disease	1		
	disability	9		
	congenital problem	2	limitation	1
	permanent	4	permanent	1
	consequence of a disability	3	disease	3
cold	not acquired	1	still a disease but too simple	1
	might result from a disease	1		
Drink				
milk	contains no alcohol	1		
	appearance	1		

Appendix D (cont'd.)

Reasons Given for Non-membership or Borderline Status (cont'd.)

Category	Non-member	No. of Times	Borderline	No. of Times
Drink (cont.'d.)				
fruit juice	contains no alcohol	1		
tea	contains no alcohol	1		
soup	contains no alcohol	1		
	savory	1	is eaten	1
	more filling	1	more filling	1
	type of food	2	type of food	1
	requires a spoon	3	more solid	1
	solid meal	4	type of food	2
	viscosity	7	has solid pieces	3
	has solid pieces	8		
cider	not nutritious	1	contains alcohol	1
	I don't like it	2		
tea	not nutritious	1		
	I don't like it	1		
Fuel				
steam	not familiar	1	only carries energy	1
	does not burn	3	does not burn	1
	results from other fuels	6	only helps in combustion	1
			results from other fuels	1
			has various other uses	2
paper	does not make things move	1		
	results from deforestation	1		
	not inflammable	1		
	not typically used as fuel	3	not typically used as fuel	3
wood	not typically fuel	1	has much water	1
	does not burn	1		

Appendix D (cont'd.)
Reasons Given for Non-membership or Borderline Status (cont'd.)

Category	Non-member	No. of Times	Borderline	No. of Times
Fuel (cont.'d.)				
picture	simply for decoration	1	accessory	1
	fails to fulfil useful purpose	1	gives spiritual comfort	1
	not essential	2	artlike	2
	not functional	2	decorative	6
	accessory	3		
	decorative	16		
lamp	electrical	1	complement	1
	not functional	2	modifies environment but also fulfils a purpose	1
	accessory	4		
	decorative	12	electrical appliance	1
			accessory	3
stool	decorative	1	decorative	4
	not essential	1		
Insect				
ant	way they organize themselves	1	not harmful	1
	not harmful	1		
centipede	size	1		
	eat other insects	1	bigger than the other insects	1
	not harmful	1		
	less harmful	1	not harmful	1
	has many legs	1	size	2
	shape reminds you of a reptile	1	shape	3
	shape	2		
spider	eat other insects	1	shape	1
	not harmful	1	size	1
	shape	1		
	size	1		
grasshopper	size	1	organized in large groups	1
			size	2

Appendix D (cont'd.)

Reasons Given for Non-membership or Borderline Status (cont'd.)

Category	Non-member	No. of Times	Borderline	No. of Times
Seasoning				
nuts	I don't like it	1	used as an ingredient	1
	complement	1	decorative	1
	used as an ingredient	1	spice	1
	can be used in cakes	1		
	used on foods	1		
	essential part of dish	1		
	spice	1		
	fruit	5		
	decorative	6		
ketchup	i don't like it	1	sauce	1
	not essential	1	made from other seasoning	1
	made from other seasoning	1	used on food	1
	sauce	3		
	dressing	3		
	used on food	5		
salt	ingredient	1	ingredient	1
	kind of food due to its widespread use	1		
parsley	vegetable	1		
garlic	vegetable	1		
Toy				
paint set	not frequently used by children	1	educational	1
			requires skill	1
	artistic	2		
teddy bear	American acquisition	1	American acquisition	1
soldier	I don't know it	1	violence	1
	man	1	fight	1
	violence	1	weapon	1
	police	1	army	3
	army	2		

Appendix D (cont'd.)
Reasons Given for Non-membership or Borderline Status (cont'd.)

Category	Non-member	No. of Times	Borderline	No. of Times
Toy (cont.'d.)				
block	educational	1		
	more complicated	1		
	i don't like it	1	building	1
	building material	2		
balloon	vehicle	1	vehicle	1
	ornamental	1		
swing	you play on it not with it	1	you play on it not with it	1
	instrument	1	requires ability	1
	utensil	1	instrument	2
	its static	1	requires effort	3
	requires effort	1		
	requires ability	1		
	cant be handled	1		
Tree				
bamboo	big bush	1	hypertrophic stem	1
	width of the trunk	1	shape of leaves	1
	has a hollow trunk	1		
	has many thin trunks	1		
	has no trunk	1		
	has no branches	1		
	has a fragile structure	2		
	has many stems	2		
	does not have a strong trunk	3		
	shape reminds you of a bush	5		
weeping willow	I don't know it	1	shape of branches	1
palm	shape of leaves	1	shape of leaves	1
	shape of branches	1	layout of branches and leaves	1
	shape of leaves	1		

Appendix D (cont'd.)

Reasons Given for Non-membership or Borderline Status (cont'd.)

Category	Non-member	No. of Times	Borderline	No. of Times
Tree (cont.'d.)				
ash	I don't know it	9		
birch	I don't know it	10		
Weapon				
knife	utensil	1	utensil	6
rock	not metal	1	not metal	1
	obsolete	1	not typical	1
	not typically a weapon	2	building material	1
	evokes a context	2	evokes a context	2
bow and arrow	ornament	1		
	obsolete	1	museum piece	1
	requires skill	1	more linked to sport	1
	linked to the idea of sport	1	evokes a context	2
stick	not metal	1	not metal	1
	obsolete	1	requires a specific context	1
	evokes a context	3	not typically a weapon	1

Appendix E

Instructions For The Reaction Time Experiment

This is an experiment about category names. You will be shown a category name (for example, **crockery),** then an item name (for example, cup or bicycle) and you will be asked whether the item is or is not a member of the category. Obviously, in the case of the **crockery** example, the answer would be "yes" for cup and "no" for bicycle. For every category name, you will be shown two item names one after the other. In some cases, both items will belong to the category, sometimes only one of the items and sometimes neither item. You are asked to decide as quickly as possible and the time taken for your decision to be made will be recorded.

The exact procedure is as follows. The experimenter will say "next card now" and you are requested to look into the viewer when you will read the category name. Please continue to stare at this word because it marks the exact position where the item name will appear and will prevent your wasting time by having to shift your eyes to read the new word. Before the item name replaces the category name in the viewer, the experimenter will say "ready" to warn you of the change so that you are ready to respond as quickly as possible. Your response is simply to say "yes" or "no", as explained earlier, to indicate whether the item is a member of the category. Please speak in a firm clear voice as your voice will activate a microphone which works the timer.

After you have responded, please look down until you are told to look in the viewer again with the signal "next card now". This will enable the experimenter to change the cards for the next response without your seeing the names in advance.

Have you any questions before we begin?

Appendix F

For Statements

Category	Statement	Number
1. Animate categories		
Animal	for food production	11
	for protection	10
	for companionship	8
	for milk production	5
	for transportation	4
	gives you affection	4
	for meat production	3
	for antidote production	3
	for carrying loads	2
	for subsistence	2
	for playing with	2
	for hunting	1
	for carrying messages	1
	for races	1
	for shepherding the flock	1
	for entertainment	1
	for breeding	1
	for fabrics manufacture	1
	for ploughing	1
	for pulling carts	1
	for working	1
	keeps the ecological balance	1
	provides necessary things	1
	gives you friendship	1
	gives you leather	1
	Gives man subsidies	1
Insect	serves as food	4
	for honey production	3
	indicates it will rain	1
	balances the environment	1
Tree	gives shade	19
	provides wood	12
	provides food	10

Appendix F (cont'd.)
For Statements (cont'd.)

Category	Statement	Number
Tree (cont'd.)	Gives fruit	10
	gives shelter	9
	for oxygen production	7
	for decoration	6
	for beautifying the environment	3
	keeps the ecological balance	2
	gives refreshment	2
	for relaxation	2
	purifies the air	2
	gives a feeling of quietness	1
	for making furniture	1
	for fuel production	1
	for medicine production	1
	for rubber production	11
	for sustaining life	1
	for photosynthesis process	1
	transforms CO_2 into	1
	cools the environment	1
	improves air humidity	1
	gives a bloom	1
	contributes to physical health	1
	prevents the wind from blowing	1
	hard over coffee plantations	1
2. Edibles		
Drink	for pleasure	19
	for quenching thirst	19
	for relaxation	11
	satisfies an organic need	10
	for nutrition	7
	for socializing	7
	for refreshment	5
	for hydrating the body	4
	helps to forget problems	4
	satisfies an addiction	3
	satisfies a psychological need	2

Appendix F (cont'd.)
For Statements (cont'd.)

Category	Statement	Number
Drink (cont'd.)	serves as medicine	2
	for accompanying meals	2
	for reinvigoration	1
	for easing off tension	1
	for pastime	1
	causes an addiction	1
	satisfies a momentary desire	1
	helps suppress shyness	1
	makes one happy	1
	helps with digestion	1
Seasoning	enhances the taste of food	20
	gives a characteristic taste to food	13
	for seasoning food	4
	adds taste to food	2
	for preparing food	2
	adds a peculiar smell to food	2
	adds flavor to drinks	1
	gives colour to food	1
	neutralizes the natural flavor of food	1
3. Mass noun		
Fuel	generates power	14
	makes things move	9
	generates movement	6
	moves machines	5
	moves vehicles	5
	makes things work	4
	burns	3
	runs engines	3
	feeds machines	2
	produces thermal and mechanic energy	2
	for explosions	1
	generates heat	1
	helps in locomotion	1
	makes transportation possible	1
	harms the environment	1

Appendix F (cont'd.)
For Statements (cont'd.)

Category	Statement	Number
4. Man-made		
Furniture	makes life comfortable	13
	for sitting on	12
	for decoration	11
	for eating meals on	9
	for sleeping on	9
	fulfils useful purposes	9
	for storage	8
	for working on	6
	fulfils a functional role	5
	for relaxing	4
	for making the environment beautiful	3
	fulfils physical needs	2
	modifies the environment	2
	organizes life more efficiently	1
	for studying	1
	for putting things away	1
	for organizing things	1
	makes domestic life easier	1
Toy	entertains	21
	educates	16
	develops skills	8
	for amusement	8
	for leisure	5
	for passing time	5
	develops creativity	4
	for instruction	4
	for relaxation	4
	keeps children busy	4
	for getting children out of the way	2
	for pleasure	2
	for improving one's health	2
	for learning	2
	for decoration	2
	for testing mental capacity	2

Appendix F (cont'd.)
For Statements (cont'd.)

Category	Statement	Number
Toy (cont'd.)	for socializing	2
	develops intelligence	2
	pleases children	2
	for joy	1
	for training	1
	for competition	1
	for showing off	1
	for the child's locomotion	1
	for imitating reality	1
	for exercising	1
	calls children's attention	1
	provokes different reactions	1
	provokes aggressivity	1
	improves communication between child and parent	1
Weapon	for defense	16
	for attacking	10
	for hurting	7
	for destruction	5
	for penetrating a body	4
	for cutting	3
	for aggression	3
	for protection	3
	for killing	3
	eliminates life	2
	for violence	2
	for sports	2
	for reaching a goal	1
	for national defense	1
	for intimidating	1
	for keeping order	1
	for conflicts	1
	for repression	1
	for mutilation	1
	for war	1

Appendix F (cont'd.)
For Statements (cont'd.)

Category	Statement	Number
Weapon (cont'd.)	for displaying one's power	1
	for taking one's life	1
	for obtaining something	1
	helps you reach a goal	1
	gives you a feeling of power	1
	brings death	1
	brings traumas	1
	causes damages	1
5. State/Consequence		
Disease	prevents the body from functioning normally	4
	brings suffering	3
	causes death	3
	causes destruction	3
	brings unease	3
	announces death	2
	brings about immobility	2
	brings insecurity	2
	calls attention to the malfunctioning of the body	1
	brings debilitation	1
	brings fear	1
	brings limitations	1
	brings despair	1
	generates feelings of loss	1
	prevents you from feeling well	1
	brings a change of values	1
	brings weakness	1
	eliminates the body's energy	1
	causes sadness	1
	causes damages	1
	causes stress	1
	harms the body	1
	causes death	1
	prevents people from realizing activities	1

Appendix G

Locative Statements

Category	Locative	Number
1. Animate categories		
Animal	at home	11
	in the jungle	9
	in zoos	9
	on farms	9
	on land	6
	in forests	5
	in water	5
	in fields	3
	in the city	3
	in the sea	3
	in country houses	3
	in the countryside	2
	in parks	2
	in the woods	2
	in the air	2
	on the streets	2
	near man	2
	near water	1
	around the house	1
	in the circus	1
	in cages	1
	in Kenya	1
	in swamps	1
Insect	in dirty places	17
	in the house	10
	both indoors and outdoors	8
	everywhere	8
	in the fields	6
	in tropical regions	6
	in cold regions	6
	in the trash	4
	in trees	3
	in rivers	3

Appendix G (cont'd.)
Locative Statements (cont'd.)

Category	Locative	Number
Insect (cont'd.)	in humid places	2
	in hot regions	2
	in urban areas	2
	in cities	2
	in sewers	2
	in undeveloped regions	2
	in the air	2
	in the jungle	1
	in grass	1
	in canals	1
	in dark places	1
	in cold regions	1
	in warmer places	1
	in nature	1
	in fur	1
	in forests	1
	in sheltered places	1
	in picnic areas	1
	in shantytowns	1
	in ditches	1
	in gardens	1
	in gaps	1
	in mattresses	1
	in mortuaries	1
	on food	1
	on the ground	1
	under stones	1
Tree	in the scrub	7
	in forests	4
	in the Amazon region	2
	in humid regions	2
	in the jungle	1
	in tropical climates	1
	in groves	1

Appendix G (cont'd.)
Locative Statements (cont'd.)

Category	Locative	Number
2. Edible Categories		
Drink	in bottles	13
	in glasses	10
	at home	2
	at parties	2
	in bars	2
	in tins	1
	in clubs	1
	in restaurants	1
	in dischargeable glasses	1
	in wheel barrels	1
Seasoning	in food	4
	on food	3
	on meat	3
	both in and on food	3
	in small containers	2
	in little plastic bags	1
	in cakes	1
3. Naturally occurring categories		
Fuel	underground	2
	in rocks	1
	at gas stations	1
4. Man-made objects		
Furniture	at home	20
	in an office	13
	indoors	7
	both indoors and outdoors	4
	near swimming pools	4
	in rooms	3
	in the bedroom	3
	in clubs	3
	in schools	2
	in the varanda	2
	in the garden	2

Appendix G (cont'd.)
Locative Statements (cont'd.)

Category	Locative	Number
Furniture (cont'd.)	everywhere	1
	in saloons	1
	in libraries	1
	in the sitting room	1
	in the kitchen	1
	in hotels	1
	in a bar	1
	in a laboratory	1
	on the porch	1
Toy	in parks	8
	at home	7
	at school	7
	at fair grounds	7
	both indoors and outdoors	6
	in the street	1
	in a playroom	1
	in the nursery	1
	in parties	1
	in the classroom	1
	in open areas	1
	in enclosed areas	1
	on the beach	1
Weapon	in city streets	11
	in urban areas	7
	in the countryside	6
	at home	5
	in wars	5
	in rural areas	3
	in battlefields	2
	in the jungle	2
	in cars	1
	in pockets	1
	on farms	1

Appendix G (cont'd.)
Locative Statements (cont'd.)

Category	**Locative**	**Number**
4. State/Consequence		
Disease	in rural areas	3
	in urban areas	3
	in the countryside	1
	in cities	1
	in shantytowns	1

Appendix H

Context Sentences

1) When the music teacher sat down to play the ***instrument***, the students gathered around to sing along.

   guitar
   electric guitar
   piano
   cello

2) The jazz band musician played the ***instrument*** very well during the concert.

   guitar
   electric guitar
   piano
   cello

3) The musician played the ***instrument*** very well during the concert.

   cello
   piano
   electric guitar
   guitar

4) He plays the musical ***instrument***.

   electric guitar
   cello guitar piano

5) The ***animals*** gathered around Celia as she started throwing them some food.

   dogs
   cows
   chickens
   cats

Appendix H (cont'd.)
Context Sentences (cont'd.)

6) Diana enjoyed getting up early to feed the ***animals*** on the farm during her vacation.

   dogs
   cows
   chickens
   cats

7) Diana enjoys looking after the ***animals*** while Lucia is on vacation.

   cats
   chickens
   cows
   dogs

8) Mary looked at the ***animal.***

   cow
   cat
   dog
   chicken

9) John enjoys having the ***beverage*** at the bar with friends after dinner.

   tea
   cocoa
   beer
   coffee

10) After the soccer match we all went to the bar and had the ***beverage.***

   tea
   cocoa
   beer
   coffee

Appendix H (cont'd.)
Context Sentences (cont'd.)

11) Helen enjoys having the ***beverage*** after dinner.

coffee
beer
cocoa
tea

12) Deborah liked the ***beverage.***

cocoa
coffee
tea
beer

13) Children like to play with ***toys*** in the house garden.

teddy bears
dolls
balls
muppets

14) Silvia enjoys playing on the beach with her ***toy.***

teddy bear
doll
ball
muppet

15) Children like to play with ***toys*** at home.

muppets
balls
dolls
teddy bears

Appendix H (cont'd.)
Context Sentences (cont'd.)

16) The child grabbed the ***toy.***

doll
muppet
teddy bear
ball

17) Sandra always leaves her books scattered all over the ***piece of furniture*** in her room.

chair
sofa
table
stool

18) Joseph always leaves his clothes scattered all over ***piece of furniture*** in the dining room.

chair
sofa
table
stool

19) Martha always leaves her clothes on the ***piece of furniture*** before putting them in the closet.

stool
table
sofa
chair

20) The clothes were found on the ***piece of furniture.***

sofa
stool
chair
table

Appendix H (cont'd.)
Context Sentences (cont'd.)

21) The boy scouts used some ***fuel*** to make a fire while they were camping.

alcohol
kerosene
charcoal
gasoline

22) We've bought some ***fuel*** for the barbecue.

alcohol
kerosene
charcoal
gasoline

23) The neighbours brought some ***fuel*** to keep the fire going.

gasoline
charcoal
kerosene
alcohol

24) Mary remembered she needed some ***fuel.***

kerosene
gasoline
alcohol
charcoal

25) South American Indians still use this ***weapon*** in hunts nowadays.

machine gun
rifle
bow and arrow
pistol

Appendix H (cont'd.)
Context Sentences (cont'd.)

26) The Indian aimed his ***weapon*** at the target before shooting.

machine gun
rifle
bow and arrow
pistol

27) Daniel aimed the ***weapon*** at the target before shooting.

pistol
bow and arrow
rifle
machine gun

28) Robert thought of the ***weapon.***

rifle
pistol
machine gun
bow and arrow

29) Patricia hated being stung by the ***insects*** as she tried to pick some flowers in the garden.

beetles
bees
ants
flies

30) The boy cried as he was stung by the ***insects*** while he was playing in the garden.

beetles
bees
ants
flies

Appendix H (cont'd.)
Context Sentences (cont'd.)

31) Jane hates being disturbed by ***insects.***

flies
ants
bees
beetles

32) Andrea saw the ***insects.***

bees
flies
beetles
ants

33) Richard, when young, liked climbing up ***trees*** while on vacation on the coast.

mango trees
cashew trees
coconut trees
oak trees

34) It was amazing to see how quick the Indian boy climbed high up the ***tree*** in order to pick a fruit.

Mango tree
cashew tree
coconut tree
oak tree

35) Boys like climbing up ***trees*** in the countryside.

oak trees
coconut trees
cashew trees
mango trees

Appendix H (cont'd.)
Context Sentences in Portuguese

1) Quando a professora de música sentou-se para tocar o ***instrumento*** os alunos a rodearam para cantarem juntos.

   guitarra elétrica
   violão
   violoncelo
   piano

2) O músico do conjunto de jazz tocou o ***instrumento*** muito bem durante o concerto.

   guitarra elétrica
   violão
   violoncelo
   piano

3) O músico tocou o ***instrumento*** muito bem durante o concerto.

   violão
   violoncelo
   piano
   guitarra elétrica

4) Ele toca o ***instrumento*** musical.

   violão
   guitarra eletrica
   piano
   violoncelo

5) Os ***animais*** rodearam Célia quando ela começou a jogar-lhes comida.

   gatos
   cachorros
   galinhas
   vacas

Appendix H (cont'd.)
Context Sentences in Portuguese

6) Diana gostou de levantar-se cedo para dar de comer aos ***animais*** na fazenda durante as férias.

   cachorros
   vacas
   galinhas
   gatos

7) Rute gosta de tomar conta dos ***animais*** quando Letícia está de férias.

   gatos
   galinhas
   vacas
   cachorros

8) Maria olhou para o ***animal.***

   vaca
   gato
   cachorro
   galinha

9) João gosta de tomar a ***bebida*** no bar com amigos após o jantar.

   chá
   chocolate quente
   cerveja
   café

10) Depois do jogo de futebol nós todos fomos ao bar e tomamos a ***bebida.***

    chá
    chocolate quente
    cerveja
    café

Appendix H (cont'd.)
Context Sentences in Portuguese

11) Elena gosta de tomar a ***bebida*** depois do jantar.

café
cerveja
chocolate quente
chá

12) Débora gostou da ***bebida.***

chocolate quente
café
chá
cerveja

13) Criança gosta de brincar ***com brinquedos*** no jardim da casa.

com ursinhos
com bonecas
de bola
com marionetes

14) Sílvia gosta de brincar com seu ***brinquedo*** na praia.

ursinho
boneca
bola
marionete

15) Criança gosta de brincar ***com brinquedos*** em casa

marionetes
de bola
com bonecas
com ursinhos

Appendix H (cont'd.)
Context Sentences in Portuguese

16) A criança agarrou o ***brinquedo.***

boneca
marionete
ursinho
bola

17) Sandra sempre deixa seus livros espalhados sobre a ***peça de mobília*** no quarto.

cadeira
sofá
mesa
banquinho

18) José muitas vezes deixa suas roupas na sala de jantar espalhadas sobre a ***peça de mobília***

cadeira
sofá
mesa
banquinho

19) Marta sempre deixa roupas sobre a ***peça de mobília*** antes de guardá-las no armário.

banquinho
mesa
sofá
cadeira

20) As roupas foram encontradas sobre a ***peça de mobília.***

sofá
banquinho
cadeira
mesa

Appendix H (cont'd.)
Context Sentences in Portuguese

21) Os escoteiros usaram ***combustível*** para fazer um fogo enquanto estavam acampando.

álcool
querosene
carvão
gasolina

22) Nos compramos ***combustível*** para churrasco.

álcool
querosene
carvão
gasolina

23) Os vizinhos trouxeram ***combustível*** para manter o fogo aceso.

gasolina
carvão
querosene
álcool

24) Maria lembrou-se de que precisava de c***ombustível.***

querosene
gasolina
álcool
carvão

25) Índios sul-americanos ainda usam esta ***arma*** para caçar hoje em dia.

metralhadora
rifle
arco e flecha
pistola

Appendix H (cont'd.)
Context Sentences in Portuguese

26) O índio apontou a ***arma*** para o alvo antes de atirar.

metralhadora
rifle
arco e flecha
pistola

27) Daniel apontou a ***arma*** para o alvo antes de atacar.

pistol
bow and arrow
rifle
machine gun

28) Roberto pensou na ***arma***

rifle
pistola
metrahadora
arco e flecha

29) Patricia odiou ser picada pelos ***insetos*** ao tentar colher as flores no jardim.

besouros
abelhas
formigas
moscas

30) O menino chorou ao ser picado pelos ***insetos*** enquanto brincava no jardim.

besouros
abelhas
formigas
moscas

Appendix H (cont'd.)
Context Sentences in Portuguese

31) Jane odeia ser pertubada por ***insetos.***

moscas
formigas
abelhas
besouros

32) Andrea viu os ***insetos.***

abelhas
moscas
besouros
formigas

33) Ricardo, quando jovem, gostava de subir em á***rvores*** quando de férias no litoral.

mangueiras
cajueiros
coqueiros
carvalhos

34) Foi impressionante ver quão rápido o garoto indígena subiu bem alto ***na árvore*** para pegar um fruto.

mangueira
cajueiro
coqueiro
carvalho

35) Meninos gostam de subir em á***rvores*** no campo.

carvalhos
coqueiros
cajueiros
mangueiras

Appendix H (cont'd.)
Context Sentences in Portuguese

36) Elizabete contemplou as ***árvores*** a distância

cajueiros
carvalhos
mangueiras
coqueiros

Appendix I

Instructions for Context Sentences Experiment

Instructions

Choose the most appropriate word to substitute the word or phrase in italics. Rank these words on an ascending scale from 1 to 7. For example, think carefully about the sentence: "The ***bird*** passed the barn entrance." If you were given the following items (duck, chicken, sparrow, crow) to substitute for the word ***bird*** you should give rank 1 to the word which, in your opinion, is best appropriate as a substitute for bird in the sentence given. Your ranking would increase as the degree of appropriateness decreased. Therefore, rank 7 would be reserved for a word which you thought was completely inappropriate. Write your rank beside the word. Remember, your choices should not be dictated on the basis of personal preferences. Rather, they should reflect the degree of appropriateness of the word in relation to the sentence where it is to be substituted.

<u>Additional instructions for the informants whose reaction time will be taken:</u>

In order for your choices to be correctly timed you must do the following.

1. Read each one of the sentences aloud.

2. Read each of the lexical items listed aloud.

3. Read your choices aloud, not necessarily in the sequence they appear in the list but according to degrees of appropriateness. You must, therefore, begin with the most appropriate word, then go to the next one until the least appropriate word is chosen.

Before you start let's do the above example together.

Appendix I (cont'd.)
Instructions for Context Sentences Experiment in Portuguese

Instruções

Escolha a palavra ou frase mais apropriada a ser substituída pela palavra ou frase em itálico. Classifique tais palavras ou frases em escala ascendente variando de 1 a 7. Por exemplo, pense cuidadosamente na oração): "O pássaro passou pela porta do celeiro." Se fossem dados os seguintes itens: pato, galinha, pardal, corvo; para substituir pelo termo pássaro, você deveria dar classificação 1 ao Item que, na sua opinião, seria a mais apropriada substituição para a palavra pássaro na frase acima. Sua classificação deveria aumentar a medida que o grau de propriedade diminuísse. Assim, a classificação 7 seria reservada para aquela palavra que você considerasse inapropriada. Roce pode repetir uma dada classificação para mais de uma palavra. Lembre-se: suas escolhas não deveriam ser ditadas por preferência pessoal. Antes, elas deveriam refletir o grau de propriedade da palavra ou frase em relação a oração onde será substituída em cada uma das situações dadas. Escreva sua classificação ao lado das palavras.

Instruções adicionais para os informantes cujas respostas serão cronometradas:

Para que suas escolhas sejam corretamente cronometradas você precisara fazer o seguinte.

1. Ler cada uma das orações em voz alta.

2. Ler todas as opções em voz alta.

3. Ler suas escolhas de acordo cron o grau de propriedade da palavra a ser substituída na oração e não necessariamente na seqüência em que tais são alistadas.

Antes de começar vamos fazer juntos o exemplo dado acima.

References

Anderson, R. C. (1977). "Schema-directed Processes in Language Comprehension." ***Technical Report*** No. 50. Center for the Study of Reading, University of Illinois.

Anderson, R. C. and Ortony, .A. (1975)."On Putting Apples into Bottles: A Problem of Polysemy." ***Cognitive Psychology*** Vol. 7, 167-180.

Anderson, R. C., Pichert, J. W., Goetz, E. T., Schallert, D. L., Stevens, K. V. and Trollip, S. R. (1976). "Instantiation of General Terms." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 15, 667-679.

Anderson, R. C., Spiro, R. J., and Montague, W. E. (1977). ***Schooling and the Acquisition of Knowledge.*** Hillsdale, New Jersey: Lawrence Erbaum Associates, Publishers.

Anderson, J. R. (1990). ***The Adaptive Character of Thought.*** Lawrence Erlbaum. Hillsdale, New Jersey, Hove and London.

Barsalou, L. W. (1983). "Ad-hoc Categories". ***Memory and Cognition*** Vol. 11, 211-227

Battig, W. F. and Montague, W. E. (1969). "Category Norms for Verbal Items in 56 Categories: A replication and extension of the Connecticut Categories Norms." ***Journal of Experimental Psychology Monograph*** Vol. 80, No. 3 Part 2, 1-46.

Becker, A. H. and Ward, T. B. (1991). "Children's Use of Shape in Extending Novel Labels to Animate Objects: Identity versus Postural Change". ***Cognitive Development*** Vol 6, 3-16.

Berlin and Kay (1969). ***Basic Color Terms: Their Universality and Evolution.*** Berkeley: University of California Press.

Bjorlund, D. F. and Thompson, B. E. (1983). "Category Typicality Effects in Children's Memory Performance: Qualitative and Quantitative Differences in the Processing of Category Information." ***Journal of Experimental Child Psychology*** Vol. 35, 329-344.

Blewitt, P. and Toppino, T. (1991). "The Development of Taxonomic Structure in Lexical Memory". ***Journal of Experimental Child Psychology*** Vol. 51, 296-319

Bobrow, D. G. and Norman, D. A. (1975). "Some Principles of Memory Schemata." ***Representation and Understanding: Studies in Cognitive Science,*** 2-34. Edited by D. G. Bobrow and A. M. Collins, New York: Academic Press.

Bourne, L. E. (1968). ***Human Conceptual Behavior.*** Boston: Allyn and Bacon.

Brooks, L. (1978). "Nonanalytic Concept Formation and Memory for Instances". ***Cognition and Categorization.*** Edited by E. Rosch and B. B. Lloyd. Lawrence Erlbaum Associates, Hillsdale, New Jersey.

Carey, S. (1985). **Conceptual Change in Childhood.** Cambridge, Massachussets: MIT Press.

Chafe, W. L. (1970). ***Meaning and the Structure of Language.*** The University of Chicago Press.

Collins, A. and Quillian, M. R. (1969). "Retrieval Time from Semantic Memory." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 8, 240-247.

Collins, A. and Quillian, M. R. (1970). "Experiments on Semantic Memory and Language Comprehension." ***Cognition in Learning and Memory .*** Edited by L. W. Gregg. New York: Wiley.

Collins, A. and Quillian, M. R. (1972)."How to Make a Language User." ***The Organization of Memory,*** 310-354. Edited by E. Tulving and W. Donaldson. New York: Academic Press.

Collins, A. and Loftus, E. (1975). "A Spreading-Activation Theory of Semantic Processing." ***Psychological Review*** Vol. 82, 240-247.

Crick., M. (1976). ***Exploration in Language and Meaning.*** London: Malaby Press Limited.

Cruse, D. A. (1986). ***Lexical Semantics.*** Cambridge University Press.

Dewey, G. I. and Medin, D. L. (1984). " Evaluation of Exemplar-Based Generalization and the Abstraction of Categorical Information". ***Journal of Experimental Psychology: Learning Memory and Cognition*** Vol. 10, No. 4, 638-648.

Duncan, E. M. and Kellas, G. (1978). "Developmental Changes in the Internal Structure of Semantic Categories." ***Journal of Experimental Child Psychology*** Vol. 26, 328-340.

Elio, R. and Anderson, J. R. (1981). "The Effects of Category Generalizations and Instance Similarity on Schema Abstraction." ***Journal of Experimental Psychology: Human Learning and Memory.*** Vol. 7, No. 6, 397-417.

Estes, W. K. (1986a). "Array Models for Category Learning." ***Cognitive Psychology,*** Vol. 18, 500-549.

Estes, W. K. (1986b). "Memory Storage and Retrieval Processes in Category Learning." ***Journal of Experimental Psychology: General,*** Vol. 115, No. 2, 155-174.

Franks, J. J. and Bransford, J. D. (1971). "Abstraction of Visual Patterns." ***Journal of Experimental Psychology*** Vol. 90, No. 1, 65-74.

Glass, A. L., Holyoak K. J. and O'Dell, C. (1974) "Production Frequency and the Verification of Quantified Statements." ***Journal of Verbal Learning and Verbal Behaviour*** Vol. 13, 237-254.

Glass, A. L. and Holyoak, K. J. (1975). "Alternative Conceptions of Semantic Theory." ***Cognition*** Vol. 3, 313-339.

Glass, A. L. and Holyoak, K. J. ***(1986).Cognition*** (2nd edition). McGraw-Hill Book Company.

Hampton, J. A. and Gardiner, M. (1983). "Measures of Internal Category Structure: A Correlational Analysis of Normative Data." In ***British Journal of Psychology*** Vol. 74, 491-516.

Hayes, B. K. and Taplin, J. E. (1993). "Developmental Differences in the Use of Prototype and Exemplar-Specific Information." ***Journal of Experimental Child Psychology*** Vol. 55, 329-352.

Hayes-Roth, F. (1974). *"Schematic-Classification Problems and Their Solution."* ***Pattern Recognition*** Vol. 6, 105-113.

Hayes-Roth, F. and Hayes-Roth, B. (1973). "A Schematic Model of Abstraction". ***Michigan Mathematical Psychology Program.*** MMPP - 74 Ann Arbor: The University of Michigan

Hayes-Roth, B. and Hayes-Roth, F. (1977). "Concept Learning and the Recognition and Classification of Exemplars." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 16, 321-338.

Heider, E. R. (1971). ""Focal" Color Areas and the Development of Color Names". ***Developmental Psychology*** Vol. 4, 447-455.

Heider, E. R. (1972). "Universals in Color Naming and Memory." ***Journal of Experimental Psychology*** Vol. 93, 10-20.

Heider, E. R. and Olivier, D. C. (1972). "The Structure of the Color Space in

Naming and Memory for Two Languages." ***Cognitive Psychology*** Vol. 3, 337-354.

Henley, N. (1969). "A Psychological Study of the Semantics of Animal Terms." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 8, 176- 184.

Hines, D.; Czerwinski, M.; Sawyer, P. K. and Dwyer, M. (1986). "Automatic

Semantic Priming: Effect of Category Exemplar Level and Word Association Level." ***Journal of Experimental Psychology: Human Perception and Performance*** Vol. 12, No. 3, 370-379.

Hintzman, D. L. and Ludlam, G. (1980). "Differential Forgetting of Prototypes and Old Instances: Simulation by an Exemplar-Based Classification Model." ***Memoryt and Cognition*** Vol. 8, 378-382.

Hollen, J. (1975). "Features and Semantic Memory: Set Theoretic or Network Models?" ***Psychological Review*** Vol. 82, 154-155.

Holyoak, K. J. and Glass A. L. (1975). "The Role of Contradictions and Counterexamples in the Rejection of False Statements." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 14, 215-239.

Homa, D. (1984). "On the Nature of Categories." ***The Psychology of Learning and Motivation*** Vol. 18, 49-94.

Homa, D.; Sterling, S. and Trepel, L. (1981). "Limitations of Exemplar Based Generalization and the Abstraction of Categorical Information." In ***Journal of Experimental Psychology: Human Learning and Memory*** Vol. 7, No. 6, 418-439.

Horton, M. and Markman, E. M. (1980). "Developmental Diferrences in the Acquisition of Basic and Superordinate Categories." In ***Child Development*** Vol. 51, 708-719.

Hupp, S. C. and Mervis, C. B. (1981). "Development of Generalized Concepts by Severely Handicapped Students." In ***Journal of the Association for the Severely Handicapped*** Vol 6, 14-21.

Jacoby, L. L. and Brooks, L. R. (1984). "Nonanalytic Cognition: Memory, Perception and Concept Learning." In ***The Psychology of Learning and Motivation*** Vol. 18, 1-43.

Jolicoeur, P. and Gluck, M. A. , and Kosslyn, S. M. (1984). "Pictures and Names: Making the Connection". ***Cognitive Psychology*** Vol 16, 243-275.

Katz, J. and Fodor, J. (1964)."The Structure of Semantic Theory." ***The Structure of Language,*** 479-518. Edited by J. Fodor and J. Katz. Eglewood Cliffs, New Jersey: Prentice Hall, Inc.

Katz, J. and Postal, P. M. (1964). ***An Integrated Theory of Linguistic Descriptions.*** Cambridge: MIT Press.

Katz, J. and Postal, P. M. (1972). ***Semantic Theory.*** New York: Harper and Row.

Kay, P. and McDaniel, C. K. (1978) "The Linguistic Significance of the Meanings of Basic Color Terms". ***Language*** Vol. 54, 610-646.

Keil, F. C. and Batterman, N. (1984). "A Characteristic - to - Defining Shift in the Development of Word Meaning". ***Journal of Verbal Learning and Verbal Behavior*** Vol. 23, 221-236.

Keil, F. C. (1986). "The Acquisition of Natural Kind and Artifact Terms". ***Language Learning and Concept Acquisition: Foundational Issues.*** Edited by Demopoulos and A. Marras. Norwood, New Jersey: Ablex.

Keil, F. C. (1987). "Conceptual Development and Category Structure". ***Concepts and Conceptual Development. Ecological and Intellectual Factors in Categorization.*** Edited by U. Neisser. New York: Cambridge University Press.

Keil, F. C. (1989). ***Concepts, Kinds, and Cognitive Development.*** Cambridge, Massachussets: MIT Press.

Keil, F. C. Batterman, N. (1984). "A Characteristic-to-Defining Shif in the Development of Word Meaning." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 23, 221-236.

Keller, D. (1982). "Developmental Effects of Typicality and Superordinate Property Dominance in Sentence Verification". ***Journal of Experimental Child Psychology*** Vol. 33, 288-297.

Keller, D. and Kellas, G. (1978). "Typicality as a Dimension of Encoding." ***Journal of Experimental Psychology: Human Learning and Memory*** Vol. 4, 78-85.

Kelly, M. H.; Bock, K. J. and Keil, F. C. (1986). "Prototypicality in a Linguistic Context: Effects on Sentence Structure." ***Journal of Memory and Language*** Vol 25, 59-74.

Krackow, E. and Blewitt, P. (1989). "What Determines Order of Acquisition of Taxonomic Relationships?" Paper presented at the annual meeting of the ***Southeastern Psychological Association,*** Washington, D.C.

Krascrum, R. M. and Andrews, S. (1993). "Feature-Based versus Exemplar-Based Strategies in Preschoolers' Category Learning." ***Journal of Experimental Child Psychology*** Vol. 56, 1-48.

Krumhansal, C. L. (1978). "Concerning the Applicability of Geometric Models to Similarity Data: The Interrelationship Between Similarity and Spatial Density." ***Psychological Review.*** Vol. 85, 445-463.

Kucera, H. and Francis, W. N. (1967). ***Computational Analysis of Present-Day American English.*** Providence, R. I.: Brown University Press.

Labov, W. (1973). "The Boundaries of Words and Their Meanings." ***New Ways of Analyzing Variations in English,*** 183-228. Edited by C. J. Bailey and R. Shuy. Washington, D. C. Georgetown University Press.

Lakoff, G. (1972). "Hedges: A Study in Meaning Criteria and the Logic of Fuzzy Concepts." ***Papers from the Eighth Regional Meeting of the Chicago Linguistic Society,*** 183-228. Edited by.P. Peranteau, J. Levi and G. Phares. Chicago: Chicago University Press.

Lakoff, G. (1980). "Getting the Whole Picture: The Role of Mental Images in Semantics and Pragmatics." ***Proceedings of the Sixth Annual Meeting of the Berkeley Linguistics Society*** Vol. 6, 191-195.

Lakoff, G. and Johnson, M. (1980). ***Methaphors We Live By.*** Chicago and London: The University of Chicago Press.

Landau, B. (1982). "Will the Real Grandmother Please Stand Up? ThePsychological Reality of Dual Meaning Representations"Jourria/ ***of Psycholinguistic Research*** Vol. 11, 47-62.

Langacker, R. W. (1987). ***Foundations of Cognitive Grammar.*** Theoretical Prerequisites, Stamford: Stamford University Press.

Loar, B. (1981). ***Mind and Meaning.*** Cambridge: Cambridge University Press.

Loftus, E. (1973). "Category Dominance, Instance Dominance, and Categorization Time." ***Journal of Experimental Psychology*** Vol. 97, 70-74.

Loftus, E. (1975). "Spreading Activation within Semantic Categories: Comment on Rosch's 'Cognitive Representations of Semantic Categories'." ***Journal of Experimental Psychology*** Vol. 104, 234-240.

Loftus, E. and Scheff, R. (1971). "Categorization Norms for Fifty Representative Instances." ***Journal of Experimental Psychology*** Vol. 91, 355-365.

Lorch, R. F. Jr. (1978)."The Role of Two Types of Semantic Information in the Processing of False Sentences." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 17, 523-537.

Lorch, R. F. Jr. (1981). Effects of Relation Strength and Semantic Overlap on Retrieval and Comparison Processes During Sentence Verification." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 20, 593- 610.

Lucariello, J. and Nelson, K. (1985). "Slot-Filler Categories as Memory Organizers for Young Children". ***Developmental Psychology*** Vol 21 272-282.

Lucariello, J.; Kyratzis A. and Nelson, K. (1992). "Taxonomic Knowledge: What Kind and When?" ***Child Development*** Vol 63, 978-998.

Malt, B. C. (1989). "An On-Line Investigation of Prototype and Exemplar Strategies in Classification." ***Journal of Experimental Psychology: Learning, Memory and Cognition*** Vol 15, No. 4, 539-555.

Malt, B. C. (1990). "Features and Beliefs in the Mental Representation of Categories". ***Journal of Memory and Language*** Vol. 29, 289-315.

Malt, B. C. (1994). "Water is Not H20." ***Cognitive Psychology*** Vol 27, 41-70.

Malt, B. C. and Johnson, E. C. (1992). "Do Artifacts Concepts Have Cores?" ***Journal of Memory and Language*** Vol. 31, 195-217.

Malt, B. C. and Smith, E. E. (1982). "The Role of Familiarity in Determining Typicality." ***Memory and Cognition*** Vol. 10(1), 69-75.

Markowitz, J. A. (1977). ***A Look at Fuzzy Categories.*** Unpublished Ph.D. dissertation. Northwestern University.

Mc Closkey, M. (1980). "The Stimulus Familiarity Problem in Semantic Memory Research". ***Journal of Verbal Learning and Verbal Behavior*** Vol. 19, 485-502.

McCloskey, M. E. and Glucksberg, S. (1978). "Natural Categories: Well Defined or Fuzzy Sets?" ***Memory and Cognition*** Vol. 6 , No. 4, 462-472.

McCloskey, M. and Glucksberg, S. (1979). "Decision Processes in Verifying Category Membership Statements: Implications for Models of Semantic Memory." ***Cognitive Psychology*** Vol. 11, 1-37.

McNeill, D. (1966). "A Study of Word Association." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 5, 548-557.

Medin, D. L. (1986). Comment on "Memory Storage and Retrieval Processes in Category Learning." ***Journal of Experimental Psychology: General*** Vol 115, No. 4, 373-381.

Medin, D. L. and Schaffer, M. M. (1978). "Context Theory of Classification Learning." ***Psychological Review*** Vol. 85, No.3, 207-238.

Medin, D. L.; Dewey, G. I. and Murphy, T. D. (1983). "Relationships Between Item and Category Learning: Evidence that Abstraction is not Automatic." ***Journal of Experimental Psychology: Learning, Memory, and Cognition*** Vol. 9, No. 4, 607-625.

Medin, D. L. and Alton, M. W. (1984). "Given Versus Induced Category Representations: Use of Prototype and Exemplar Information in Classification." ***Journal of Experimental Psychology: Learning, Memory, and Cognition*** Vl. 10, No. 3, 333-352.

Medin, D. L. and Smith, E. E. (1984). "Concepts and Concept Formation." ***Annual Review of Psychology*** Vol. 35, 113-138.

Medin, D. L. and Shoben, E. J. (1988). "Context Structure in Conceptual Combination." ***Cognitive Psychology*** Vol. 20, 158-190.

Medin, D. L. and Ortony, A. (1989). "Psychological Essentialism." ***Similarity and Analogical Reasoning.*** Edited by S. Vosniadou and A. Ortony, 179 - 195. New York: Cambridge University Press.

Medin, D. L. and Florian, J. E. (1992) "Abstraction and Selective Coding in Exemplar-Based Models of Categorization". ***From Learning Processes to Cognitive***

Processes: Essays in honor of William K. Estes Vol. 2, 207-234. Edited by Alice F. Healey, Stephen M. Kosslyn and Richard M. Shiffrin. Lawrence Erlbaum Associates. Hillsdale, New Jersey, Howe and London.

Mervis, C. B. (1980). "Category Structure and the Development of Categorization." ***Theoretical Issues in Reading Comprehension.*** Edited by R. Spiro, B. C. Bruce, and W. F. Brewer. Hillsdale, N. J.: Erlbaum.

Mervis, C.B.; Catlin, J.; and Rosch, E. (1975). "Development of the Structure of Color Names." ***Developmental Psychology*** Vol. 11. 54-60.

Mervis, C. B. and Pani, J. R. (1980). "Acquisition of Basic Object Categories." ***Cognitive Psychology*** Vol 12, 496-522.

Meyer, D. E. (1970). "On the Representation and Retrieval of Stored Semantic Information." ***Cognitive Psychology*** Vol. 1, 242-300.

Morris, W. (ed.). (1976). ***The American Heritage of the English Language.*** Published by Houghton Mifflin Company. Boston, Atlanta, Dallas, Geneva, Illinois, Hopewell, New Jersey, Palo Alto.

Morris, W. (ed.). (1976). ***The American Heritage of the English Language.*** Published by Houghton Mifflin Company. Boston, Atlanta, Dallas, Geneva, Illinois, Hopewell, New Jersey, Palo Alto.

Murphy, G. L. and Medin, D. L. (1985). "The Role of Theories in Conceptual Coherence." ***Psychological Review*** Vol. 92, No. 3, 289-316.

Nelson, K. (1982). "The Syntagmatics and Paradigmatics of Conceptual Development." ***Language Development: Language, Thought and Culture,*** 335-364. Edited by S. Kuczaj. Hillsdale, New Jersey: Erlbaum.

Nelson, K. (1983). "The Derivation of Concepts and Categories from Event Representations." ***New Trends in Conceptual Representation,*** 129149. Edited by E. Scholnick. Hillsdale, New Jersey. Erlbaum.

Nelson, K. (1988). "Where do Taxonomic Categories Come From?" ***Human Development*** Vol. 31, No.1, 3-10.

Nosofsky, R. M. (1984). "Choice, Similarity, and the Context Theory of Classification." ***Journal of Experimental Psychology. Learning, Memory and Cognition*** Vol. 10, No. 1, 104-114.

Nososfsky, R. M. (1986). "Attention, Similarity, and the Identification-Category Relationship." ***Journal of Experimental Psychology: General*** Vol. 115, No. 1, 39-57.

Nosofsky, R. M. (1988). "Exemplar Based Accounts of Relations Between Classification, Recognition, and Typicality." ***Journal of Experimental Psychology. Learning, Memory and Cognition*** Vol. 14, No. 4, 700-708.

Nosofsky, R. M. (1991). "Tests of an Exemplar Model for Relating Perceptual Classification and Recognition Memory." ***Journal of Experimental Psychology: Human Perception and Performance*** Vol 17, No. 1, 3-27.

Nosofsky, R. M. (1992). "Exemplars, Prototypes, and Similarity Rules." ***From Learning Theory to Connectionist Theory: Essays in Honor of William K. Estes*** Vol. 1, 149-167. Edited by Alice F. Healy, Stephen M. Kosslyn and Richard M. Shiffrin. Lawrence Erlbaum Associates. Hillsdale, New Jersey, Howe and London.

Nosofsky, R. M., Palmeri, J. T. and McKinley, S. (1994). "Rule-Plus Exception Model of Classification Learning." ***Psychological Review*** Vol. 101, No. 1, 53-79.

Ortony, A.; Schallert, D. L.; Reynolds, R. E. and Antos, S. I. (1978). "Interpreting Methaphors and Idioms: Some Effects Of Context on Comprehension." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 17, 465-477.

Osherson, D. N. and Smith, E. E. (1981). "On the Adequacy of Prototype Theory as a Theory of Concepts." ***Cognition*** Vol. 1, 35-38.

Posner, M. I. and Keefe, S. W. (1970). "Retention of Abstract Ideas." ***Journal of Experimental Psychology*** Vol. 83, No. 2, 304-308.

Potter, M. C. and Faulconer, B. A. (1979). "Understanding Noun Phrases." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 18, 509-521.

Pulman, S. G. (1983). ***Word Meaning and Belief*** London and Camberra:

Putnam, H. (1975). "The Meaning of 'Meaning'. ***Mind, Language, and Reality: Philosophical Papers*** Vol. 2. Edited by H. Putnam. Cambridge, England: Cambridge University Press.

Quillian, M. R. (1967). "Word Concepts: A Theory of Simulation of Some Basic Semantic Capabilities." ***Behavioral Sciences*** Vol. 12, 410-430.

Quillian, M. R. (1968). "Semantic Memory." ***Semantic Information Processing,*** 216-270. Edited by M. Minsk. Cambridge, Massachusetts: MIT Press.

Redec, L. M. and Anderson, J. R. (1974). "Negative Judgements in and About Semantic Memory." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 13, 664-681

Reed, S. K. (1972). "Pattern Recognition and Categorization." ***Cognitive Psycology*** Vol. 3, 382-407.

Richards, D. D. (1988). "Dynamic Concepts and Functionality: The Influence of Multiple Representations and Environmental Constraints on Categorization." ***Human Development*** Vol. 31, No. 1, 11-19.

Richards, D. D. and Goldfarb, J. (1986). "The Episodic Memory Model of Conceptual Development: An Integrative Viewpoint." ***Cognitive Development*** Vol. 1, 183-219.

Rips, L. J. (1975a). "Quantification and Semantic Memory." ***Cognitive Psychology*** Vol. 7, 307-340.

Rips, L. J. (1975b). "Inductive Judgements About Natural Categories." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 14, 665-668.

Rips, L. J. (1989). "Similarity, Typicality, and Categorization". ***Similarity and Analogical Reasoning,*** 19-59. Edited by S. Vosniadou and A. Ortony

Rips, L. J., Shoben, E., and Smith E. (1973). "Semantic Distance and the Verification of Semantic Relations." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 12, 1-20.

Rips, L. J., Shoben, E. and Smith E. (1975). "Set-Theoretic and Network Models Reconsidered: A Comment on HolIan's 'Features and Semantic Memory'." ***Psychological Review*** Vol. 82, 156-157.

Rosch, E. (1973a). "On the Internal Structure of Perceptual and Semantic Categories." ***Cognitive Development and the Acquisition of Language ,*** 111-144. Edited by T. Moore. New York: Academic Press.

Rosch, E. (1973b). "Natural Categories." ***Cognitive Psychology*** Vol. 4, 328-350.

Rosch, E. (1975a). "Universals and Cultural Specifics in Human Categorization." ***Cross-Cultural Perspectives on Learning.*** Edited by R. Brislin, S. Bochner, and W. Lonner. New York: Halstead Press.

Rosch, E. (1975b). "Cognitive Reference Points." ***Cognitive Psychology*** Vol. 7, 532-547.

Rosch, E. (1975c). "The Nature of Mental Codes for Color Categories." ***Journal of Psychology: Human Perception and Performance*** Vol. 1, No.4, 303-322.

Rosch, E. (1975d). "Cognitive Representations of Semantic Categories." ***Journal of Experimental Psychology*** Vol. 104, 192-233.

Rosch, E. (1975e). "Reply to Loftus." ***Journal of Experimental Psychology*** Vol. 104, 241-243.

Rosch, E. (1977). "Human Categorization." ***Advances in Cross-Cultural Psychology*** Vol. 1. London: Academic Press.

Rosch, E. (1978). "Principles of Categorization." ***Cognition and Categorization.*** Edited by E. Rosch and B. Lloyd. Hillsdale, N. J. Lawrence Erbaum Associates.

Rosch, E. (1983). "Prototype Classification and Logical Classification: The Two Systems." ***New Trends in Conceptual Representation: Challenges to Piaget's Theory.*** Edited by Ellin Kofsky Scholnick. Lawrence Erlbaum Associates. Hillsdale, New Jersey, London.

Rosch, E. and Mervis, C. (1975). "Family Resemblances: Studies in the Internal Structure of Categories." ***Cognitive Psychology*** Vol. 7, 573-605.

Rosch, E., Mervis, C., Gray, W., Johnson, W., and Boyes-Braem, P. (1976a). "Basic Objects in Natural Categories." ***Cognitive Psychology*** Vol. 8, 382-439.

Rosch, E., Mervis, C., and Catlin, J. (1976b) "Relationships Among Goodnessof-Example, Category Norms and Word Frequency." ***Bulletin of the Psychonometric Society*** Vol. 7, 283-284.

Rosch, E., Simpson, C., and Miller, R. S. (1976c). "Structural Basis of Typicality Effects." ***Journal of Experimental Psychology: Human Perception and Performance*** Vol. 2, Number 4, 491-502.

Roth, E. M. (1980). ***Context Effects on the Representation of Meaning.*** Unpublished PhD dissertation. Champaign: University of Illinois at Urbana.

Roth, E. M. and Shoben, E. J. (1983). "The Effect of Context on the Structure of Categories." in ***Cognitive Psychology*** Vol. 15, 346-378.

Rumelhart, D. E. (1980)."Schemata: The Building Blocks of Cognition." ***Theoretical Issues in Reading Comprehension,*** 33-58. Edited by R. Spiro, B. Bruce, and W. Brewer. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Rumelhart, D. E., Lindsay, P. , Norman, D. (1972). "A Process Model for Long-Term Memory." ***The Organization of Memory,*** 198-248. Edited by. E. Tulving and W. Donaldson. New York: Academic Press.

Rumelhart, D. E. and Ortony, A. (1977). "The Representation of Knowledge in Memory." ***Schooling and the Acquisition of Knowledge,*** 99-135. Edited by R. C. Anderson, R. J. Spiro, and W. E. Montague. Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Schaeffer, B. and Wallace, R. (1970). "The Comparison of Word Meanings." ***Journal of Experimental Psychology*** Vol. 86, 144-152.

Schank, R. and Abelson, R. (1977). ***Scripts, Plans, Goals and Understanding: An Inquiry in Human Knowledge Structures.*** New Jersey: Lawrence Erlbaum Associates.

Schvaneveldt, R. W., Durso, F. T., and Mukherji, B. R. (1982). "Semantic Distance Effects in Categorization Tasks." ***Journal of Experimental Psychology: Human Learning and Memory*** Vol. 18, 1-15.

Schwanenflugel, P. and Rey, M. (1986). "The Relationship Between Category Typicality and Concept Familiarity: Evidence from Spanish and English Speaking Monolinguals." ***Memory and Cognition*** Vol. 19, 150-163.

Segalovitz, N. and Poulin-Dubois, D. (1990). "The Structure of Categories: Typicality Gradients, Perceived Linguistic Familiarity and Cross-Linguistic Comparisons." In ***Cahiers of Psychologie Cognitive.European Bulletin of Cognitive Psychology*** Vol. 10, No. 5, 491-512.

Sellars, W. (1969). "Semantic Similarity and the Comparison of Word Meanings." ***Journal of Experimental Psychology*** Vol. 82, 343-346.

Siegel, S. (1956). ***Nonparametric Statistics for the Behavioral Sciences.*** New York; McGraw-Hill Book Co.

Sperber, R. D. ; Davies, D. ; Merrill, E. C. and McCauley, C. (1982). "Cross-Category Differences in the Processing of Subordinate Superordinate Relationships." ***Child Development*** Vol. 53, 1249-1253.

Smith, E. ; Shoben, E., and Rips, L. (1974). "Structure and Process in Semantic Memory: A Featural Mode For Semantic Decisions." ***Psychological Review*** Vol.81, 214-241.

Smith, E and Medin, D. L. (1981). ***Categories and Concepts.*** Cambridge, MA: Harward University Press

Smith, E. E. and Sloman, S. (1994). "Similarities Versus Rule-Based Categories." ***Memory and Cognition.*** Edited by Geoffrey R. Loftus. Vol. 22, N. 4,

Sternberg, S. (1969). "Memory-scanning: Mental Processes Revealed by Reaction-time Experiments." ***American Scientist*** Vol. 57, 421-457.

Taylor, J. R. (1989). ***Linguistic Categorization - Prototypes in Linguistic Theory.*** Oxford: Clarendon Press.

The New Michaelis - Illustrated Dictionary Vols 1 and 2. 40th Edition. Companhia Melhoramentos de Sao Paulo, S.P. Brazil.

Tulving, E. (1972). "Episodic and Semantic Memory." In ***Organization of Memory,*** 381-403. Edited by E. Tulving and W. Donaldson. Academic Press.

Tulving, E. and Thompson, D. S. (1971). "Retrieval Processes in Recognition

Memory: Effects of Associative Context." ***Journal of Experimental Psychology*** Vol. 87, 116-124.

Tulving, E. and Thompson, D. M. (1973). "Encoding Specificity and Retrieval Processes in Episodic Memory." ***Psychological Review*** Vol. 80, 352- 373.

Tversky, A. (1977). "Features of Similarity." ***Psychological Review*** Vol. 84, 327-352.

Ward, T. B. (1994) "Structured Imagination: The Role of Category Structure in Exemplar Generation." ***Cognitive Psychology*** Vol. 27, 1-40.

Ward, T. B., Becker, A. H., Haas, S. D. and Vela, E. (1991). "Attribute Availability and the Shape Bias in Children's Category Generalization." ***Cognitive Development*** Vol 6, 143-167.

Watkins, Ho and Tulving (1976) "Context Effects in Recognition Memory for Faces." ***Journal of Verbal Learning and Verbal Behavior*** Vol. 15, 503-517.

Whitney, P. and Kellas, G. (1984). "Processing Category Terms in Context: Instantiation and the Structure of Semantic Categories." ***Journal of Experimental Psychology: Learning Memory and Cognition*** Vol 10, No. 1, 95-103.

Wittgenstein, L. (1953). ***Philosophical Investigations.*** New York: Macmillan.

Zadeh, L. (1965). "Fuzzy Sets." ***Information and Control*** Vol. 8, 338-353.

Zadeh, L. (1971). "Fuzzy Languages and Their Relation to Human and Machine Intelligence." ***Memorandum.*** No. ERL - M302. Electronics Research Laboratory. University of California, Berkeley.

Zadeh, L. and Lee, T. E. (1969). "Note on Fuzzy Languages." ***Information Sciences*** Vol. 1, 421-434.

Biodata

Ana Cristina Pelosi is graduated in Letters from the University of Brasilia (Brazil). For her post-graduate training, she attended the University of Leeds (UK), where she obtained her MA in both Linguistics and English Teaching as well as PhD in Linguistics and Psychology. She completed her post-doctoral studies at the University of California, Santa Cruz (USA) in Experimental Psycholinguists. She has since worked at Universidade Federal do Ceará, Fortaleza (Brazil) where she is currently a faculty member of the Graduate Program in Linguistics and group Leader at Research Group for Language and Thought-Cognition and Linguistics (GELP/COLIN), CNPq/UFC. She has conducted research on experimental psycholinguistics, with special emphasis on Cognitive and Applied Linguistics. Currently, her research interests are focused on the discourse and figurative language of victims of violence in the Brazilian urban centers. Her studies are based upon the theory of complex adaptive systems, being conducted from a cognitive-discursive perspective. She is engaged in national and international research projects as well as in human resource formation with focus on the following themes: semantic categorization, conceptual metaphor, the emergence of metaphor in discourse and cognition and reading from the perspective of the Theory of complex adaptive systems.

This thesis was defended almost 25 years ago. I did not want to let it go unnoticed, therefore, I decided to publish it as a jubilee celebration. The research first investigates how graded category membership varies across cultures. Secondly, it examines context effects on category structure causing typicality shifts to occur. The first concern is acomplished by comparing responses given by English-Speaking and Portuguese-English speaking subjects during folk definition interviews and ranking tasks. The second goal is achieved by conducting context experiments in which subjects had to reorganize categories presented in context and perform lexical-choice tasks in different context environments. Results highlight that despite some linguistic correspondences between groups' performances in ranking the various category members and in describing functions and atributes associated with category members, culturally specific peculiarities also exist and will govern the frequency and the uses of certain semantic relations. As regards the context experiments, results suggest that context is able to influence membership verification decisions and that in making context-bound category membership decisions, individuals' behaviors appear to be motivated by two broad approaches to category structure: a prototypical approach and a schema-directed approach. It is hoped that the work will provide relevant reading to scholars interested in how categorization behaviors varies across cultures.

ISBN: 978-65-88977-63-7
9 786588 977637

encontrografia

encontrografia.com
www.facebook.com/Encontrografia-Editora
www.instagram.com/encontrografiaeditora
www.twitter.com/encontrografia