A PSYCHOLINGUISTIC STUDY OF SOME ASPECTS

OF GRADABILITY,

WITH SPECIAL REFERENCE TO CHILD LANGUAGE

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Declaration:

I hereby declare that this thesis is my own original composition. The work is my own, and the empirical child language data used in this thesis was collected by me and under my direction in 1975.
Acknowledgements

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ABSTRACT

This thesis is intended to provide an outline of some of the relevant developmental and psycholinguistic factors influencing the evolution of gradability as a structured cognitive system, and to supply a partial theoretical description of adjectives used in the expression and comprehension of a limited number of gradable concepts in English, namely those associated with the relative physical dimensions of perceived entities (size, height, and length), and those involved in judgments of conformity to or implicit deviance from a norm.

The first two chapters treat the subject of gradability very broadly from the philosophical, linguistic, psychological and developmental points of view. Previous work is surveyed and a number of theoretical inconsistencies are found, particularly with respect to earlier semantic and syntactic analyses of gradable adjective structure.

The remaining parts of the thesis describe a pilot study and two clinical studies of a limited area of adjective vocabulary in children aged 8-11 years and 11-13 years, who were compared with a group of 19 adults from mixed academic backgrounds, the majority in higher education. The small-scale pilot study used picture cards in sets of seven as a stimulus for oral judgements which were recorded; the second study used a written—completion method with a six-page questionnaire containing pictures and captions; and the third study focused on the comprehension of one pair of gradable antonyms and their negatives in such a way that "category widths" could be established for each participant over two fields of referents.

The data from these studies generally support a hypothesis that "relative coding" is cognitively earlier in development than "absolute coding", as reflected in children's use of different adjective forms
and types, and the result was found to be well explained by recourse to Bryant's perceptual framework theory. There were seen to be both linguistic and cognitive differences between younger and older children and between boys and girls in the 8-13 age range. Perceptual and linguistic grading were found to differ less with increasing age; boys appeared actively to master extremal polar adjectives (particularly negative) at a faster rate than girls and to develop antonymic structure sooner, while girls possessed a richer vocabulary for norm-related concepts (e.g. medium, average, etc.); though girls developed a stable dyadic logic for antonyms earlier than boys, this was a transitory stage through which boys seemed to move much faster to achieve a triadic logical structure postulated to underlie gradable antonym usage.

This study indicates that the accurate use and comprehension of gradable adjectives is much slower to develop than was previously thought, and passes through a number of stages of stability and flux. Existing theories of language acquisition, particularly Clark's Semantic Feature Hypothesis, are examined and found not to account fully for the stages of development postulated to be discernible in the above data. A theory that takes account of frameworks, and the difference between filled and empty space, is better able to explain the kinds of difficulty children have in distinguishing the meanings of size adjectives. As an outcome of these considerations, an analysis of comparison sentences is provided that will act as a testable basis for future research. The practical implications of the results of the present study for education in the middle years of school life, particularly with regard to science subjects, are briefly considered.
INTRODUCTION

0.1. General Overview

The present thesis takes the form of an Introduction and six chapters, followed by page notes and appendices. The Introduction is intended to set the other contents of the present work off against the wider issues which inspired it in the first place, and to complement the more detailed discussion of these issues in the ensuing chapters. Chapters 1 and 2 are concerned with a discussion of previous work in the relevant fields; a rough division has been made between (mainly linguistic and philosophical) theoretical aspects of gradability in Chapter 1, and (mainly psychological and psycholinguistic) empirical research and experimentally derived theory in Chapter 2. Chapters 3, 4, and 5 report, analyse and discuss various pieces of experimental work conducted by me and covering slightly different aspects of gradability, although the core of the work was connected with adjectives relatable to the physical dimensions of size. The final chapter, Chapter 6, is an attempt at a theoretical synthesis of previous work and my own results.

0.2. Background

The precise nature of the triangular relationship between perception, cognition and language has been a source of controversy for quite some time, and so it is perhaps not surprising that both psychologists and linguists have tended to differ in their assessment of the relative importance of these three aspects of human mental activity.

Piaget, for example, sees language as somewhat peripheral to the growth and development of human intelligence, since for him the sources of intellectual operations are found in the (pre-linguistic) period of sensorimotor development of the child, roughly up to the age of two years, rather than in the pre-operational stage that follows (approximately two to seven years of age), during which language acquisition takes place (Piaget, 1977). He is rather ambiguous on the part which language might play in the structuring of intelligence at more advanced stages of development (see, for example, Piaget, 1962: 359; and 1971: 94).
Other psychologists (e.g. Vygotsky, 1962; and Bruner, 1968) have accorded language a more central function in the structuring of intelligence. For Vygotsky, speech and thought have independent origins, both phylogenetically and ontogenetically. In the child, they merge at about the age of two, so that the quality of both speech and thought are altered, permitting speech to become rational and thought verbal (Vygotsky, 1962:49). It is at this juncture that so-called inner speech develops, as an internalised representation of the socialising speech of the child's mother, and gradually becomes conceptually enriched by increased cultural experience. According to this theory, the interaction of language with thought is crucial for further intellectual development, and thus the presence of language could be said in this respect to determine thought in a precise way, although Vygotsky suggests (op. cit.: 50) that the child may not at first be fully aware of the internal, symbolic structure of words: the child may not have a fully developed set of meanings to attach to particular words, but may nevertheless appear able to use them, treating words as properties of objects rather than as symbols.

Bruner's postulate of three different kinds of mental representation, namely the enactive, the iconic and the symbolic modes, is different in kind from that of Vygotsky, but his view of the structuring function of language, which is involved in the third mode of representation, is essentially the same: language is a cognitive instrument, and once the child has internalised it "it becomes possible for him to represent and systematically transform the regularities of experience with far greater flexibility and power than before" (Bruner, 1968: 385).

Aspects of the developmental theories of Vygotsky and Bruner have their parallels in linguistics in the 'strong' and 'weak' versions of the theory known as linguistic determinism /linguistic relativity. Vygotsky's standpoint is matched by the strong version, generally known as the Sapir-Whorf hypothesis, after its two main proponents, which claims that the way we organise our perception of reality, and hence our thought structure, is determined by language structure; and that, furthermore, speakers of different languages will think and perceive in different ways (cf. Whorf, 1956: 212-214). This strong view of language puts it in the centre of cognitive processes, which is the position occupied by inner speech in Vygotsky's theory (Vygotsky, 1962: 51).

However, a weaker version of the hypothesis (see Brown and Lenneberg,
1954; Carroll and Casagrande, 1958) suggests that language encodes for easy reference those perceptual distinctions, and meanings, which a particular speech community deems it fit to take account of. According to this view, language affects perception and thought without determining it absolutely, and this accords more with Bruner's view of language as a tool of thought.

Linguistic theory has been explicitly linked to psychological theory through Chomsky's claim (Chomsky, 1965; 1971) that the linguistic structures of transformational-generative grammar are themselves cognitive structures, and that in constructing for himself the grammar of the language he is exposed to, the child activates a set of innate, universal and species-specific mental capacities for learning language:

What evidence is now available supports the view that all human languages share deep-seated properties of organisation and structure. These properties - these linguistic universals - can be plausibly assumed to be an innate mental endowment rather than the result of learning. If this is true, then the study of language sheds light on certain long-standing issues in the theory of knowledge. Once again I see little reason to doubt that what is true of language is true of other forms of human knowledge as well.

(Chomsky, 1971: 134)

Chomsky's theories have directly inspired a large body of research in psycholinguistics aimed at accumulating empirical evidence to support or refute his claims. This research has taken a number of forms and directions, perhaps the best-known being studies of child language acquisition; it was felt that through examining the early stages of child language development, research would be able to reveal the nature of the linguistic universals which Chomsky claimed were inborn. Of these recent child language studies, the earlier ones (e.g. Miller and Ervin, 1964; Braine, 1963; Brown and Bellugi, 1964) were mainly devoted to child syntax, but later studies have sought to investigate the child's meaning system, and the structure of the semantic component of the grammatical system developed by him in the early stages of language acquisition (These studies are discussed in sections 2.4.2. ff.).

0.3. The Nature of Universals

There is a tendency to associate the term 'universals' exclusively with a Chomskyan view of language, but in fact there are almost certainly other kinds of universals, which are non-linguistic and are nevertheless crucial to cognitive development.² Indeed, Piagetian developmental
psychology claims precisely this (Piaget and Inhelder, 1969; Sinclair de Zwart, 1969), and recent studies of newborn and very young infants (Fantz, 1967; Salapatek and Kessen, 1966; Meltzoff and Moore, 1977) certainly suggest the existence of what might be termed innate perceptual universals.

The divergence between Chomsky's view of language on the one hand, and developmental psychology on the other, is not necessarily all that great, as McNeill has shown (McNeill, 1970: 70-75), if we differentiate weak from strong linguistic universals. In the case of a weak linguistic universal, there is a reflection in language of a universal cognitive ability which is both a necessary and sufficient cause of the appearance of the linguistic ability. On the other hand, a strong linguistic universal is "a reflection of a specific linguistic ability and may not be a reflection of a cognitive ability at all. The cognitive universal, if it has anything to do with the linguistic one, is a necessary but not a sufficient cause of the strong linguistic universal" (McNeill, 1970: 74). McNeill goes on to discuss whether there might not also be a third type of linguistic universal, a kind of hybrid which he terms erratic, on the basis of its having two sufficient causes and no necessary ones, and he concludes: "...there is no reason to suppose that all linguistic universals are of one kind - weak, strong or erratic. Far more probably, language is a mixture of the three." (McNeill, 1970: 75).

We shall take up this question in more detail later (section 2.2. ff), but it will be seen to underlie the subject of the present investigation, namely the development in meanings and uses of selected items from the subset of English adjectives which will henceforth be termed gradable adjectives, after Sapir (1944).

0.4. Gradable Adjectives and Gradability

For various reasons it is difficult to give a formal theoretical definition of the fundamental term 'gradable adjectives' (for some of the reasons why, see sections 1.3.2. ff.), and accordingly this will be delayed for the moment; instead, we shall here confine ourselves to a partial, implicitly ostensive definition by indicating some forms of gradable adjective which have been found to be present at a very early stage of language development. Big, little, pretty, dirty, poor and hot are all found in the earliest combinatory utterances of young children between 19 and 29 months of age (see, for example, McNeill,
1970: 25-26; Brown, 1970: 92-93), and some adjectives, such as hot, have even been reported at the one-word stage, before combinatoric speech appears. All of the above adjectives, as well as more⁴, are used gradually in adult speech, but we must differentiate form from meaning as far as their appearance in child language is concerned, since it is fairly clear from the evidence that such utterances as Bye-bye hot, More taxi and There high⁵ have no adult equivalents, and it is doubtful whether the full set of adult meanings is associated with a word when it first appears in child speech.

Nevertheless, it is necessary to postulate some kind of structuring system which — whether innate or acquired — will allow the eventual matching of the child's words with the adult's concepts (whatever these might be), since it is only by such a matching that it becomes possible for the many aspects of a culture to be transmitted from one generation to the next.⁶ It is possible that in the case of gradable adjectives this structuring system will feature kinds of universals beyond those postulated by McNeill (1970: 74-75), and for this system the term gradability will be used. Thus gradability is a neutral term with respect to the linguistic, cognitive and perceptual processes which might inhere in the structural organisation of meaning, and it assumes no priority whatsoever of one process over another.

If this theoretical construct is to be of use, there are a number of relatively ill-defined areas which need to be explored. At the present time, for example, there is no coherent description of gradability in adults, in spite of recent empirical research in this area (Cf. H.H.Clarck, 1969a, 1969b, 1970a; Clark and Card, 1969; Flores d'Arcais, 1970; Higgins, 1976; De Soto, London and Handel, 1965; Handel, De Soto and London, 1968), which has in some cases produced inconclusive and even contradictory results. There are two reasons for this: firstly, psycholinguistic experiments have been conducted on the basis of inadequately understood (linguistic) theory, so that experimental findings neither support nor invalidate the theories they purport to test; and secondly, the adult subjects who have participated in experiments have usually been either high-school or university students, many of whom were studying psychology, so that there is some doubt about the generalisability of results.⁷

The lack of a systematic exploration of gradability in adults has inevitably resulted in somewhat piecemeal activity in child language research, and an over-simple account of the adults' systems which leads
to claims such as that made in Bartlett (1976: 214) that "adult meanings of terms which describe overall size" were acquired by children in the study she conducted - although some children were less than three-and-a-half years old! A second effect of the lack of a theoretical model of adult gradability is that longitudinal studies of the child's meaning system are less common, because less attractive, than 'one-off' experiments focussing on small segments of the system; since if there is no general theory of what adult gradability is, then it is somewhat difficult to determine in a longitudinal study of child language at what point the child has acquired the complete system. We should also bear in mind the fact that once children reach school-age they are less accessible to students of language behaviour, and this also partly explains the relative paucity of longitudinal as compared with synchronic data, as well as the strong concentration of this latter type of data in the age-band below six.

It was the purpose of the present study of gradability to approach some of the problems and theoretical issues raised above, both by providing language data from older children and adults, and by means of a comparative analysis of these data in relation to the results of previous studies to evolve a set of principles that would act as the basis for a general theory of gradability.

Perhaps inevitably, the weight of both the theoretical discussion and the experimental work here presented has gravitated towards the subset of gradable adjectives which relate to various concepts associated with the physical dimensions of size. There are four interrelated reasons for this. Firstly, much of the relevant linguistic and philosophical discussion has treated them as paradigm cases. Secondly they are, as has already been said, among the earliest adjective forms to appear in child language, so that they have inevitably drawn the attention of child language investigators. Thirdly, they probably form a substratum upon which more abstract types of language can be built, and perhaps even provide a set of fundamental meaning-structures and/or images that can act as the basis for higher-level abstraction: this perhaps explains the linguist's interest in these adjectives as paradigm cases. Lastly, on a practical level, because they refer to phenomena that are visually perceptible, they tend to be relatively easy to elicit in language experiments using stimuli such as objects or pictures, whereas other kinds of gradable adjective (e.g. generous, mean; nice, nasty; brave, cowardly)
can usually be elicited only by purely verbal means, a fact that has its own attendant problems:

...this method, concentrating on the word, fails to take into account the perception and the mental elaboration of the sensory material that give birth to the concept. The sensory material and the word are both indispensable parts of concept formation. Studying the word separately puts the process on the purely verbal plane, which is uncharacteristic of child thinking. The relation of the concept to reality remains unexplored; the meaning of a given word is approached through another word, and whatever we discover through this operation is not so much a picture of the child's concepts as a record of the relationship in the child's mind between previously formed families of words.

(Vygotsky, 1962: 52-53)

From the point of view of the linguist, it is desirable to investigate such inter-word relationships within language, but from the viewpoint of psycholinguistics this cannot be sufficient, as here the important focus of study is the performance component rather than the competence component of language behaviour, and this inevitably involves pragmatic factors such as the link between language and the everyday world in which language-users live.

These two points of view are of course complementary, and the division of labour should be of mutual benefit. Unfortunately, as will be seen from the discussion in the following two chapters, this has not often been the case. For my own part, in the investigations described in Chapters 3, 4, and 5, I have tried to strike a balance between the two positions, and not go uncomfortably beyond the empirical data provided by these experiments. At the core of these experiments, as has already been stated, were adjectives related to size: those expected to appear were big, small, wide, narrow, tall, short, long, high and low. Picture stimuli were also used to elicit gradable adjectives related to other concepts, such as clean, dirty, normal, abnormal, good, bad, ugly and beautiful.

As will be seen from what follows, gradability has ramifications in virtually every domain of human thought. Its linguistic aspects are integrated with cognitive and perceptual dispositions at so many levels that they pose an especial problem for the child language-learner constructing for himself the semantic system of 'his' language. Somewhat paradoxically, gradable adjectives, particularly that subset called dimensional adjectives, are apparently themselves crucially involved in
the organising of hierarchic structure in both the general conceptual system and the linguistic part of it which is usually called the dictionary in studies of semantics.

While this is probably far from being the only paradox with which language research is faced, it lies at the heart of the ensuing chapters.
1.1. Overview

There are two main sections to this chapter. Section 1.2. below is concerned with a number of issues which are fairly fundamental to an understanding of the area of human behaviour which this thesis attempts to investigate. There is unfortunately not room to probe deeply into the philosophical background, but the most important sources are touched on. It has been found necessary to split discussion of Sapir's (1949) work into two main parts and integrate information from other sources between 1.2.2. and 1.2.2.5.

The longer part of the chapter, following section 1.3., takes off more or less from the linguistic issues raised by Sapir, although it is necessary to backtrack historically in some cases. The bias is understandably towards semantics, but a review of syntactic studies is included because recent syntactic theory has been quite influential in this area of psycholinguistics. My own ideas have been incorporated wherever these seemed appropriate.

1.2. Basic Notions

1.2.1. Gradability

As far as can be ascertained, gradability is a term which has been used only once before, in Quirk and Greenbaum (1973: 131), where it denotes the grammatical process of modification of gradable adjectives by adverbial elements called amplifiers. It thus has a much more limited
sense than that intended in the present case, where gradability is used as an all-purpose superordinate term, as already described above in section 0.4.

The term *gradable* is of wider currency, and has been used to categorise different structural elements in the vocabulary of English. Thus it is applied to "adjectives" in the source just mentioned (Quirk and Greenbaum, *ibid.*), to "opposites" (Lyons, 1977: 271) and, most generally of all, to "words" (Leech and Svartvik, 1975: 100). In none of these three cases is "gradable" used to characterise more than a sub-class of the items referred to: the term clearly makes reference to semantic, rather than syntactic features of structural organisation within language, and as we shall see later (section 1.3.3.) there is no available syntactic characterisation generally applicable to all *gradable* elements of linguistic structure, even if we confine attention to single word-classes.

### 1.2.2. Grading

Language can be used in a number of ways by a person to talk about the phenomena in his/her environment. At the simplest level, language is used to name individual persons, animals and other more or less discrete physical objects which may be termed "first-order entities" (Lyons, 1977: 442), but virtually no language users restrict their use of language in this way, since this would deprive it of its most useful function, which is to represent ideational relations between entities and also between entities and other environmental phenomena. In the fulfilment of this function, two quite fundamental processes are apparent. The first is the organisation of phenomena experienced into categories and groupings by means of class-membership and class-inclusion, and this process embodies what could be called the de-individuating principle, the effect of which is to ignore the particular or accidental in favour of the generally recurrent characteristics of the environment.
Counter and complementary to this process is another, embodying the identity-preserving or individuating principle, the function of which is to re-establish the value of the particular or the unique features of the environment.

Although we can conceive of these two processes separately and discuss them separately, they are in fact inseparable, and the one would have no application without the other. This has not always been appreciated, and has been the source of much controversy in philosophy since ancient times (Cf. Plato: Philebus, 15A. It is also what underlies the whole Platonic theory of Forms, discussed at length in the Parmenides and Timaeus. Aristotle later faced the same difficulties in his Categories.), with various philosophers espousing the one or the other process as a foundation for their theories. There is not room to go into detail here: the reader is referred to the discussion of the philosophical issues in Bahm (1970).

What is fairly clear is that entities have to be the same (or at least similar) in respect of some property before they can be grouped together by the first principle, whereas if they differ in respect of that property they are held to be distinct and separate according to the second.

Both of these principles are involved in grading, a process discussed by Sapir (1949), who seems to have been the first to use this term in a semi-technical sense, in a theoretical study which appears to have had a seminal influence on much of the pertinent linguistic and psycholinguistic research of the last ten years or so. According to Sapir, 'grading' denotes a process of ordinative comparison which precedes both measurement and counting as a psychological process, and its linguistic correlates are found in all the major word-classes of English. Grading can occur when a concept is quantifiable in some
way, so that lexical items which denote such concepts are then said to be "implicitly gradable". Grading involves four degrees of explicitness, and these, beginning with the null case, are as follows:

1. Implicitly gradable but ungraded: e.g. house; houses
2. Implicitly graded by quantification: half of the house; a house 20 ft. wide; ten houses.
3. Quantified by implicit grading: e.g. much of the house; a large house; many houses.
4. Explicitly graded and implicitly quantified: e.g. more of the house (than); a larger house; more houses (than).

(Sapir, 1949: 124)

Sapir states specifically that grading is a psychological rather than a linguistic process, but that the evidence for the process is linguistic. He discusses three aspects of it, namely Logical, Psychological and Linguistic Grading. These will be examined in more detail below, but before we proceed further we should examine the four degrees of explicitness given above, since in some respects this taxonomy is problematic.

Firstly, it should be made plain that Sapir's set of quantifiable concepts contains both entities and properties: these are listed as existent (for which read 'entity'), represented linguistically by nouns and nominals; occurrent, represented linguistically by verbs (Sapir gives run); and quality, either of existent or of occurrent, represented by adjectives (red) and adverbs (gracefully) respectively. All of these would be eligible for entry into the first of the four classes listed above.

However, the other three classes do not seem to involve such a mixture of categories. The second class seems to be based on number, as the only examples given are of rational numbers and cardinals above zero, infinite sets which intersect at unity. It is a characteristic of number that its terms impose discreteness on what may be continua - although Sapir does not say this - so that it would be impossible to find number
used with all of Sapir's original set of "quantifiables" at this level: consider the inadmissibility of expressions like *half of red, *one-third run, *one-quarter gracefully on the one hand or *ten red, *eight run, *five gracefully on the other⁴, to use examples derived from Sapir's own initial list of implicitly gradable concepts. It can be seen that nouns and nominals will be the only word-class central to class (2) of his scheme, although other word-classes may be associated syntactically with them, as is the case in the second example of (2), above, where wide is introduced in conjunction with feet.

In the third class of Sapir's taxonomy we find nominals with "quantifiers" such as many, few, much, little, large, small, etc. - which are more traditionally known as absolute adjectives, although some of them have not always been recognised as exclusively adjectival.⁵ Then the fourth class seems to be composed of nominals with comparative forms of adjective. No place in the system is allocated specifically to superlative forms of adjective, but towards the end of his paper Sapir suggests that they be treated similarly to class (3).

Apart from the terminology used, Sapir's four classes of grading are very traditional, owing more to Plato and Aristotle than he acknowledges. It perhaps would have been more desirable for him to term his type (1) concepts "potentially gradable" rather than "implicitly gradable"⁶, and to have included individuals in it as well as classes, for as it stands it bears a strong resemblance to the Platonic Unities (discussed in Philebus, 15A ff.) or Aristotle's "things . . . said of a subject but . . . not in any subject" (Categories, 1a20). Numbers occupy an intermediate position between the "One" and the "Many" in Platonic theory (Philebus, 16D - 18E): they have as their constituents unity and infinity (or, the One and the Great-and-small). It is striking that Sapir claims of his class (3) concepts that "Such terms as many are
psychologically midway between terms like more than and hundred." Terms like many appear in Platonic theory as part of the Great-and-small, i.e. infinity.

It is at this point that we note a possible departure from Platonic theory in Sapir's formulation, since he has a fourth level which is not treated separately by Plato: both comparatives and absolute gradable adjectives were treated as classes of the infinite (Philebus, 24A - 26A), although later, in The Republic (Part Five, Book Four, 11. 438ff.), Plato distinguishes correlative terms (comparatives) from relative terms (gradable adjectives, among other things)\(^7\), a distinction made - albeit inconsistently - by Aristotle (Categories, \(^5\text{b} \ 11-29, \text{b} \ 28-35\).

Sapir's choice of terminology for his four classes of grading is quite confusing in a number of respects, and not just for the reader.\(^8\) The way terms "grade" and "quantify" are used to characterise his classes (2) and (3) seem to involve an infinite regression, which may or may not be intentional. We have no way of deciding this, since the rest of his paper purports to discuss his class (3) and (4) in greater detail, and he appears to abandon some of the terminology for more traditional terms.

Of classes (3) and (4), Sapir claims, "It is very important to realise that psychologically all comparatives are primary in relation to their corresponding absolutes ("positives")" (op.cit.: 125). It is unclear whether he is speaking with reference to stages of mental development, or whether this is a comment on the behaviour of adult language-users: certainly the two are not mutually exclusive, but in either case it is difficult to see what truth there is in this contention, unless he means that his class (4) can be operationally defined in terms of class (3), i.e. that some can be differentiated from many (in class 4) by saying something like "many is more than some", and so on for other terms. But in any case, class (3) can be established from class (2), and class (2)
from class (1), in a similar fashion, so that there is little value in Sapir's observation, which in any case has little support from recent work in psychology. Piaget claims that it is in fact the absolute adjectives which are used first, and that comparative forms are not used by children until later, during the stage of concrete operations, when the notion of reversibility becomes operational (Cf. Piaget and Inhelder, 1969 : 89 – 90).

What perhaps gives rise to Sapir's claim, although he does not put it in these words, is that the underlying structure of his class (4) grading is dyadic, whereas that of class (3) is triadic: he perhaps feels two is more "fundamental" than three. This can be inferred from his treatment of what he calls Logical Grading, which has two "orders of complication": Type I is where grading is "with reference to a norm" (previously called class 3 grading), and Type II is grading "with reference to terms of comparison" (previously class 4). The basic difference between these is that in the first case the norm does not shift and the grading gives the appearance of being absolute, whereas in the second case the "term of comparison" can be anywhere on a scale with respect to the norm, and grading is much more obviously contingent or relative.

Logically, this is fairly straightforward. What is far less straightforward is the manner in which Sapir exemplifies and discusses his two types of logical grading. His exposition is faulty in a number of respects.

Firstly, an exposition of "Logical Grading" might be expected to take into account such basic distinctions as the difference between (logical) predicate terms and argument terms, and at least to distinguish between one-place and two-place predicates in propositions. No such distinctions are made; some of the illustrations given might serve as linguistic predicates if the verb be were included (e.g. of average
quality), but others are incomplete (e.g. at a normal distance from) so that even at a pre-theoretical level Sapir's treatment is unsatisfactory. It is also unclear what the status of the symbol = is; it could represent either identity or equivalence, as in the following exemplification of Type I:

1) Norm: at a normal distance from; of average quality

2) Lower-graded: at a less than normal distance from = nearer or less far (from) (explicitly graded), near or not far (from) (implicitly graded); of less than average quality = worse or less good (explicitly graded), bad or not good (implicitly graded).

(Sapir, 1949: 125)

The second major criticism concerns the terms themselves. Regardless of the status of =, near and not far should never have been listed together any more than bad and not good, since they are not logically equivalent, the negated terms having a wider range which includes the ordinary terms as a sub-set (i.e. not far implies either at normal distance or near: Cf. sections 1.3.4.1, and 5.1.). Such an oversight should never have occurred, but it has been quite damaging to subsequent research, to judge by the number of scholars who acknowledge indebtedness to this paper without commenting on its shortcomings.

A third negative comment here concerns Sapir's treatment of nearer as logically equivalent to less far, and worse as equivalent to less good. Again, it is difficult to see any justification for this: he appears mesmerised in his choice of Logical categories by traditional Linguistic criteria. In fact, it is far from certain that the two kinds of comparative structure are logically equivalent, as I argue below (see the latter half of section 1.3.3.). This initial oversight means that Sapir is subsequently led into self-contradiction when he considers adjectives which provide only the more/less structure in
the comparative, as do brilliant and stupid, which he tries unsuccessfully to force into the mould cast by the adjectives good and bad and their comparatives. Given this situation, his opening comment that "These are logical terms, not terms of actual usage, which exhibit great confusion" (op. cit. : 126) is both inevitable and appropriate in its ambiguity.

The last negative criticism to be voiced relates to Sapir's choice of items to illustrate his two types of Logical Grading. There are two sets of these, probably selected because one represents a spatial and the other an affective concept: (i) near, nearer, far, farther and at a normal distance from; and (ii) good, better, bad, worse and of average quality. It is unfortunate that Sapir did not think fit to include argument terms (nominals) together with these in his exemplification, since then a number of non-obvious facts would have been clarified. He would, for one thing, have had to take account somehow of the difference between simple predicates and downgraded (or embedded) predicates, grossly representable in linguistic terms as the difference between adjective predication vs. attribution. Quite apart from this, however, Sapir would probably have realised that the two sets chosen by him are logically quite distinct. In order to see why this is so, it would be necessary to digress and consider the logical nature of opposition, polarity, and negativity, and we would lose the thread of the argument by doing so. Although we shall consider these below, it is perhaps here enough to anticipate matters somewhat, and indicate that near-far are instances of directional opposition, whereas good-bad are opposites by definition.

Bierwisch (1967 : 12) has also pointed out that quite often the adjective good represents a norm rather than an extreme on one side of it, so that, for example, a good cigarette would merely mean something like a cigarette of standard quality.

An interesting point suggested by a close reading of Sapir's
exposition of the two types of Logical Grading concerns the fact that both comparative and absolute adjectives are free to occur with either Type I or Type II. To explain how this is possible, it would be necessary for Sapir to attempt somehow to differentiate logically between individuals and sets (or classes), but he does not take this opportunity. What seems to be implicit in his discussion, however, is that when graded terms range over sets it is normally absolute adjectives that appear primarily, and these may be simplified to (dichotomously contrasting) comparatives, as perhaps in the change from This is a good school to This is one of the better schools, where what starts off as a three-state classification with a zone of indifference is reduced to a two-state classification created by directional opposition. Similarly, in the case of individuals, normally we class pairs by means of comparatives, but providing only two individuals are at issue a simplification can be achieved by replacing the comparative, as in My book's bigger than yours changed to My book's the big one. This might represent a "logic of small sets", which would operate in inverse manner to the "logic of large sets", but this observation is speculation on my part, as Sapir does not mention the possibility.

Sapir has more to say on the distinctions between Logical Grading and Psychological and Linguistic Grading, but we shall delay a consideration of these remarks until section 1.2.2.5., below. It is necessary to consider how opposition, polarity and negativity may generally be understood. This will lead us to examine how grading can be represented mentally in terms of various images abstracted from our everyday experience, and following this we shall be in a position to appreciate the important role played by the human body itself in gradability.

1.2.2.1. Opposition and Polarity

One of the problems of distinguishing between these two notions is that they appear to exchange roles according to the occasions when the
terms are used. In ordinary language we normally treat the former term as referring to an act of some kind, and the latter as referring to a state of some kind. However, it is also possible to interpret 'opposition' as a resultative state (i.e. "having opposed"), instead of a dynamic act ("opposing"), and 'polarity' as a directional (and thus implicitly dynamic) value.

As examples of the different points of view, we need only consider the work of Bahm (1970), Ogden (1932) and Tarde (1897).

For Bahm, oppositeness is to be treated as a static element in one of three general categories which together constitute the system of polarity. Opposition is said to presuppose three other categories, namely (i) position, or something positive; (ii) twoness, or duality; and (iii) negation or "notness". What he calls oppositeness then involves two posits, or positives, each of which is (a) opposed to the other and (b) is positive in itself and negative with respect to its opposite\(^{13}\) (Bahm, op, cit.). The remaining categories of polarity are complementarity and tension, the latter supplying the dynamic element of the system.

In his discussion of complementarity, Bahm goes into some detail on how the notion of dimension may be defined. This has two features: appositeness and poles.\(^{14}\) The relationship called into being by two (apposite) opposites may be said to transcend them in the sense that it is more than either individual posit.\(^{15}\) Similarly, both posits share the dimension in respect of which they are opposed, and in this sense are the same.\(^{16}\) Bahm uses pole to refer to each/either end of a dimension, and polarity as a more general term to refer to both of two opposed poles and their common dimension.

Ogden's study of opposition focuses more narrowly on how language deals with, and in many cases conceals the true nature of, opposition.

Basing his discussion on early observations made by the sociologist Tarde
(Tarde, 1897), he shows how polarity is merely one type of opposition which is expressed through language (Ogden, 1932).

Tarde made the important claim that all oppositions are dynamic in origin, even though some may appear static. Between two extremes, which may be states or actions, he posits an intermediate zero-state; the extremes are symmetrical opposites and dynamically opposed. Now this opposition may be conceived of as either simultaneous or successive in time. Simultaneous oppositions are those with which language is primarily concerned, and these oppositions may be either radial (i.e. centripetal or centrifugal), or linear. For Tarde, polarity is the manifestation of this last-mentioned, linear type of opposition.

There are two major kinds of opposition, then: the first is directional and the second positional. Directional opposition, referred to as reversibility by Ogden (op. cit.), is not normally scaled. For Ogden, in contrast to Tarde, a pole is a centre of force, and may have either of two properties (positive, negative) called polarities; when these are mixed in equal proportions, they neutralize one another. Opposed in direction, the polarities may act either convergently or divergently. Thus in Ogden's theory of (dynamic) opposition a polarity is a value of a pole, whereas in Bahm's (1970) theory of (dynamic or stative) polarity a pole is a constitutive element of a dimension, which is in turn a constitutive element of one of the three main theoretical categories.

From this brief presentation, it can be seen that the terms pole, polarity, and opposition, frequently used in discussion of this topic by other scholars as if they were totally unambiguous, are actually a source of great confusion. This is, however, to a certain extent inevitable as long as such a large number of phenomena have to be discussed in such a limited vocabulary. That the phenomena are numerous can be seen from the basic categories of meaning so far implicated in gradability: stative,
dynamic, direction and position are merely the ones which are most frequently mentioned. One aspect of meaning which has not yet been considered in detail is negativity. Let us make good this lapse.

1.2.2.2. Positive and Negative

It is easy to overlook the fact that these terms are used to refer to a number of different types of distinction, especially in the everyday use of language. Two senses of positive and negative must be differentiated, according to Tarde (op. cit.), who points out that quantitative opposition is connected with the notions of plus and minus, augmentation and diminution, and that it implies a continuous increase or decrease throughout the scale of development. It is based on the perception of acquisition and loss, whereas other kinds of opposition, such as mechanical and logical opposition, are derived from the opposition of positive and negative in direction. This is the kind of opposition that implies a zero point, and movement through it together with reversal of direction, referenced to zero, on the other side.

From this isolation of two types of opposition, matching the two mathematical uses of plus and minus, it follows that there are two kinds of series: reversible and irreversible. Ogden points out that we cannot reverse, nor do we find in inverse form, many natural processes (e.g. growth: most living things grow larger, reach an optimum size, and die. They do not normally shrink before death). In other cases - and these would be found mainly in logic and psychology - the same order can appear in two series, the one the inverse of the other (Ogden, 1932). This observation is important when later developments in linguistic theory are considered, particularly the treatment of linguistic polarity and "marking", since augmentation and diminution are both processes involving positive entities. It is only the second kind of negative that could be termed "true" negative, and there is even some doubt about this (since reversals
of direction all take place in a positive world: there is no anti-
matter anti-world entered after such changes of direction. For this reason
the use of the term "zero-point" is possibly misleading).

1.2.2.3. Structural Prototypes

For most people it is impossible to discuss abstractions without
having recourse sooner or later to some kind of mental image or set of
images to represent the essential features of the problems area under
discussion, and quite often the choice of appropriate imagery will
influence one's abstract capabilities for conceptualising what the
extent of a theory should be. We shall adopt the term "structural
prototype" for this kind of mental image in terms of which a theory is
cast, and examine the prototypes involved in gradability. There are
five main structural prototypes observable in previous discussions
of the topic. These are: (i) a journey or locational displacement;
(ii) fitting something into a container; (iii) a scale and a cut;
(iv) a gamut and a crest; and (v) a (vertically positioned) flat plane
surface, such as a screen or a blackboard.

Small (1923) has presented detailed historic evidence to support a
localist analysis of grading for many of the ancestors of modern Indo-
European languages. He quotes extensively from research presented in
Scherer (1878), who analysed comparative particles in Sanskrit,19 and
himself comments:

To express the exact relationship between the two necessary
objects of any comparison the speaker had to seize upon the
auxiliary words that would bring out this gradation and these
at first naturally corresponded to the oldest spatial con-
ception of comparison. That is to say, in whatever quality
or property an object was being brought up for comparison
with one or more others, the speaker always had a spatial
conception of the difference between them.

A rose is more fragrant by far than a violet . . .

(Small, 1923: 24)

This prototype is found, for example, in Plato's discussion of the
difference between the fixedness of quantity and the variability of
the more-and-less: "for hotter and colder are always progressing and
never stationary; but quantity is at rest and does not progress."
(Philebus, 24 D.). He was probably led towards this statement, as was
Aristotle (Categories, 6a 36 ff.) by the fact that the noun representing
the object with which another was compared always appeared in the genitive
case, which would represent the locational idea of "movement away from
a source" in Greek.

The prototype of the journey has been explored in detail by Jessen
(1975). Although one might be led to expect that the representation of
grading in these terms would be simplified, this turns out not to be the
case, since the prototype is parasitic upon our notions of space and
movement, and these are exceedingly complicated, as Jessen has shown
(Cf. also Lyons, 1977 : 690 - 703). This is partly a result of the fact
that discrete physical objects as we see them are inseparable from the
space that they fill (which is their location), and so it often comes about
that we refer to the objects when what we are really intending to mention
is their location, and conversely (although not so often) we refer to
locations as if talking about fairly discrete objects. From the stereo-
type of a journey we thus derive two categories, namely location and
direction, and two relations: a locative relation pairs an object with
a place, and a directional relation spatially orders two objects, two
places, or an object and a place with respect to a third object or place.
"Thus, a directional relation defined on objects involves the implicit
pairing of objects with places and to this extent is a (complex) locative
relation" (Jessen, 1975 : 45). Jessen goes on to distinguish between a
reference object and a location object: a location object is the place
paired with an object by means of a locative relation, i.e. it is the
region functioning as the location of an object (e.g. at the end in
John is at the end of the street) and a reference object is "the one
which for discourse or other reasons has been chosen as belonging to
the reference world or the background universe, a three-dimensional map
to which other objects are referred " (Op. cit. : 46). Which location
object is chosen as reference object is a matter of contingency: it
is chosen "for either thematic reasons (information structure of the
discourse) or because of perceptual/conceptual factors (and these two
may not be independent of each other) . . ." (ibid.). On this basis,
Jessen goes on to make a three-way distinction among locatives: (i)
direct; (ii) semi-direct; and (iii) indirect (op. cit. : 46-49).

Direct locatives are those where the location object is identical
with a reference object (e.g. the bath in John is in the bath). Semi-
direct locatives are those where a part of an object - say an extremity -
can itself define a spatial region which can function as a location
object in a locative relation (e.g. the side in John is at the side of
the house). Indirect locatives are (abstract) ordering relationships,
as for example in Tom's balloon is above Mary's.

If we attempt to develop these distinctions with reference to grading,
we can see that, initially at least, the prototype image is quite apt.
If we say:

1. The grandfather clock is tall.
We might decide that tall is to be treated as a direct locative (i.e.
is to be glossed in sentence 1 as: in tallness). Similarly, if we say

2. The grandfather clock is taller than Mary.
We might interpret Mary as both location object and reference object
in an indirect locative relation. But here we need to determine some
third object or place with respect to which the grandfather clock and
Mary are ordered, since otherwise we introduce an unorientated proximal-
distal distribution. But yet we do have such dichotomous spatial concepts,
such as the inside and the outside of an enclosed area - such as a circle.
We could imagine the location/reference object Mary as the area of the inside, and the location object the grandfather clock as the whole region of the outside, and this could possibly eliminate the necessity of a third object or place. Yet clearly, while this does solve the problem in the individual instance, there is something counter-intuitive about meting out the same treatment to:

3. Anne is shorter than Mary assuming Mary is the same location object as in sentence 2. The reason for this is that there is no way of deriving from the conjunction of the two sentences the fact that location object Mary is always situated between location objects Anne and the grandfather clock. We can solve this problem by making Mary the boundary or perimeter of the circle, Ann the region inside, and the grandfather clock the region outside, so that using the prototype of the journey we have a distinction away from (the inside) versus away from (the outside) (away from itself syncretizing the distinction stative versus dynamic), glossing the previous examples thus:

2a. The grandfather clock is (in tallness) away from the inside of Mary and away from Mary.

3a. Anne is (in tallness) away from the outside of Mary and away from Mary.

There are still a number of problems which remain unsolved in this prototype, but we shall not go into those here. 20

It is perhaps, however, easy to see why Sapir (1949: 122) developed the image of a container to deal with the same phenomenon as we have just regarded as a type of journey:

"If A can be "enveloped by" B, contained by it, so placed in contact with B, either actually or by the imagination, as to seem to be held within its compass instead of extending beyond it, it is judged to be "less than" B, while B is judged to be "more than" A."

(Ibid.)
Sapir, however, does not further maintain this prototype, but abandons it in favour of another, which we shall consider below.

A much more serviceable prototype, which manages to solve the sorts of problems that are difficult to handle exclusively by means of the image of a journey, is developed in detail by Ogden (1932). This is the scale and the cut. Opposites "may be either the two extremes of a scale or the two sides of a cut; the cut marking the point of neutrality, the absence of either of two opposed characters in the field of opposition. By a cut, moreover, we can dichotomize either a linear projection or a field of referents" (Ogden, 1932: 58 - 59).

Both the scale and the cut may be of varying kinds: the cut may be an intermediate term or value, or it may be a fiction, a state of indifference between opposites (i.e. the space imagined between the opposites is either occupied or empty). The scale may be arranged symmetrically or asymmetrically on each side of the cut, and part or all of it may be graded (i.e. it may be represented as a calibrated rule). Use of the scale and cut allows Ogden to distinguish twenty-five different types of opposition represented in language, and he introduces a set of notational conventions for representing these various kinds (op. cit: 99 - 104). We shall not go into this in great detail here, but it is clear that the descriptive term gradable can be applied to a number of different kinds of opposition, such as

(a) Hot 0+ +Cold (Hot, scaled to neutral, is the opposite of Cold, scaled to neutral in the series composed of two scales end-to-end)

(b) Hard 0+ M+ Soft (Hard, scaled to a medium value, is the opposite of Soft, scaled to a medium value).

(c) Learned 0+ + Ignorant (Learned and Ignorant are both scaled and opposed by definition. A controversial borderland may be expected)

(d) Kind 0 + i + s Unkind (Opposition of symmetrical stretches opposed by cut scaled to indifference. There are more extreme parts of the scale with separate names which also form opposites).

(e) Possible 0 + n Impossible (Possible is opposed to Impossible by negation, and Possible is scaled).
Pairs like good-bad are said by Ogden to be like (c) and easy-difficult is classed with (b).

If we synthesise the prototypes of the scale-and-cut with those of the journey, we can see that where A is a cut and B and C are situated on either side of the cut, any or all of A, B and C can be treated as defining either objects or regions; thus in a one-dimensional model (to save space!) we have, for example:

\[
\begin{align*}
&B & A & C \\
\end{align*}
\]

(3 objects)

or

\[
\begin{align*}
&B & A & C \\
&\text{---} & \text{---} & \text{---} \\
\end{align*}
\]

(2 regions, 1 object A)

or

\[
\begin{align*}
&\text{---} & A & \text{---} \\
&B & C \\
\end{align*}
\]

(2 objects, 1 region A)

or

\[
\begin{align*}
&B & A & C \\
&\text{---} & \text{---} & \text{---} \\
\end{align*}
\]

(3 regions)

and these are just the symmetrical examples that come immediately to mind. The specific problem with gradable adjectives is that we are not always sure which concept - objects (perhaps points or "poles") or regions - is appropriate, and focus can shift between the one and the other rapidly. It can easily be appreciated that how we ever come to solve the problem of grading is a minor miracle of cognition.

Sapir’s other prototype image, which was alluded to earlier, deserves mention at this point, since it shares one of the notions of the scale-and-cut. In his (1949) paper he introduces the prototype of a gamut and a crest. The gamut is, as I understand it, similar to Ogden’s scale idea, except that it suggests a musical scale, which is usually presented in visual terms as a series of horizontal lines, one above the other, somewhat similar to a ladder, so that the scale is vertically orientated (Ogden’s scale being horizontal). The idea of a crest (opposed as it is
by that of a trough or hollow or vale) is compatible with this vertical orientation, but is obviously a less precise prototype image than that of a cut, although interestingly enough it again has the two aspects of point and region since when the crest of a hill is seen from below it forms a sharp image - possibly a point or a line - against the background of the sky above it, whereas when we actually arrive "at the crest" it turns out to be a zone or region without sharp boundaries. Unfortunately, Sapir's choice of prototype does not help us to understand his presentation of the subject of grading, since he changes dimension several times. Because he makes no distinction between the notions of logical individual and logical class, he is forced successively into introducing closure (presumably at top and bottom of the gamut) and circularity, so that we end up with unimaginable monsters like "conjunct semicircular closed-gamut grading or conjunct closed gamut grading with open ends" (sic!) (Sapir, 1949 : 128). There is no way of diagramming all five types of so-called Psychological Grading that Sapir describes, since in the case of Type III the gamut is turned partly inside out, an accident which recurs in Type V and is the result of a decision to use letters of the alphabet as algebraic constants, in place of nouns or noun phrases in the grading expressions. The description of Type V is also racked with misprints among the algebraic constants, so that contradiction occurs, and Sapir generally confuses where he should clarify. However, once his examples are stripped of their pseudo-mathematical garb, and separated from the prototype image, they do become more comprehensible, as will be seen from section 1.2.2.5, below.

It should not be thought from the above criticism that all kinds of vertical prototype images are unserviceable. This certainly does not appear to be the case with the last of the five prototypes to be mentioned, namely that of a vertical flat plane surface, where graded objects can be
ordered from left to right or vertically one above the other. That people can and do use this prototype for some kinds of logical problems involving grading has been shown by De Soto, London and Handel (1968) and Handel, de Soto and London (1968), who investigated adults' ability to represent in spatial terms comparative sentences and "linear syllogisms" based on them. In comparisons of better-worse there was a significant preference for the "better" term to be placed above - and secondarily to the left of - the "worse" term, but there was no significant difference when the comparison involved the pair lighter-darker (De Soto et al. 1968). Handel et al (1968) found preferences similar to those for better-worse when they extended their experiment to more-less, but these were more "consistent" than farther-nearer and faster-slower. They conclude that spatial representations underlie the solution of linear syllogisms: "People have the ability to order elements in a cognitive space, of at least two dimensions, which has properties not found in geometric space. It is easier to represent relationships vertically in this cognitive space and to order from the top element to the bottom element." (Handel et al., 1968: 357). While this is an attractive claim, however, it should be pointed out that (i) the subjects in the last-mentioned experiment were not given the opportunity not to use a vertical flat plane surface as a prototype image, and (ii) the so-called vertical dimension was only metaphorically or symbolically vertical, as it was a sheet of paper placed - presumably - flat on the desk. Handel et al. have thus not substantiated their claim.²¹

In their earlier paper, De Soto et al. point out that linear orderings seem to provide a "good figure" in cognition in the same way as certain shapes do in perception, and they offer the hypothesis that the spatial representations used for abstract orderings might have "good figure" properties. They quote Asch's (1958) finding that straight in English, and its equivalent in many other languages, is equated with
goodness and propriety, whereas crooked in its metaphorical use conveys evil and impropriety; and:

We can add that it is good to be 'upright' or 'on the level' and bad to be 'oblique', 'slanted' or 'biased'. . . . it is bad to be cross . . . to be square; a love triangle is bad; a vicious circle is bad; it is bad to have a chequered career; or to weave a web of deceit. The evolutionary tree . . . hardly has the appeal of the seriously misleading scale of nature which dominated western thought for so long . . .

(De Soto et al., 1968: 121 - 122)

Although the most favoured prototype images seem distinct and separate, they do have one thing in common. As Ogden put it:

The symbolic forms which have been developed in ordinary language for the expression of these distinctions have been crystallized not only in terms of two-dimensional projection, but also in a very special relation to the human body.

(Ogden, 1932: 94 - 95)

Let us now examine the truth of this observation in more detail.

1.2.2.4. The Body Universal

According to Ogden, the three-dimensional space we occupy is divided (left-right, up-down and front-back) according to the characteristic primary dispositions of the human body. He was not the first to observe this phenomenon. These divisions correspond exactly to six of the "seven motions" described by Plato in Timaeus (34A and 43B), although he orders them forwards, backwards, right, left, upwards and downwards.22 Even the seventh motion, which is actually the primary one in his theory, that of the rotation of a spherical body about its axis, might be derived from the pivotal movement of the human head or of the body turning to change direction. Similar observations to those of Ogden were made earlier by Mach (1893) and after him by Orton (1937) - both reported in Bryant (1974: 65 - 66). Mach pointed out that since the body's visual system and motor apparatus is symmetrical with respect to the median plane of the head, symmetrical movements of looking will be connected with like or approximately like space sensations, and that this accounted for children's
early confusion of letters b and d, and p and q when reading, a mirror-image confusion which tends to become reduced with age - though in inessential situations it may never disappear altogether - as the body develops asymmetric motor functions (such as "handedness"). Orton makes the same point with regard to the central nervous system and the gradual functional specialisation of the cerebral hemispheres, which brings about a slight internal asymmetry that suffices to allow disambiguation of mirror images.

How crucial the human body is to our mental processing and control over environmental stimuli is illustrated well by Ogden, who speculates what sort of oppositional symbolization we would have elaborated for ourselves if we had been otherwise shaped, for example like starfish:

We, too, have elaborated secondary oppositions for the upper and lower surface, the opposite ends of a diameter, radial opposition, etc.; but since they are not 'our' radius, neither our primary projections and diagrams nor our linguistic metaphors are in these terms.

(Ogden, 1932 : 96)

This perceptive, and important, observation is a strong counter to linguistic determinism, and highly relevant to the present study. It would seem to provide support for claims such as those made by Bierwisch (1967; 1969) that it is the characteristics of the human body which provide the basic set of universal categories postulated in recent linguistic theories to underlie the semantic component of transformational-generative grammar:

There are good reasons to believe that the semantic markers in an adequate description of a natural language do not represent properties of the surrounding world in the broadest sense, but rather certain deep-seated, innate properties of the human organism and the perceptual apparatus, properties which determine the way in which the universe is conceived, adapted and worked on.

(Bierwisch, 1967 : 3)
This is an unmistakeably attractive theory, and it is easy to adopt the belief that this is the foundation-stone on which the brotherhood of man is to be established: it is assumed, for example, that children experience the world - once they have learned to walk and have adopted an upright posture - in much the same way as adults do, and create for themselves a mental representation of three-dimensional space in terms of abstract semantic features which they then "hook-up" to the language they hear around them, and which they are in process of learning, in order to be able to represent this space to themselves linguistically.

As Clark put it:

The child is born into a flat world with gravity, and he himself is endowed with eyes, ears, an upright posture (sic!), and other biological structure. These structures alone lead him to develop a perceptual space, a P-space, with very specific properties. Later on, the child must learn to apply English spatial terms to this perceptual structure, and so the structure of P-space determines in large part what he learns and how quickly he learns it. The notion is that the child cannot apply some term correctly if he does not already have the appropriate concept in his P-space. Since this is so, the concept of space underlying the English spatial terms, to be called L-space, should coincide with P-space: any property found in L-space should be found in P-space.

(H.H. Clark, 1973 : 28)

We shall not go into the details here, but delay a full discussion of some of the inadequacies of Clark's discussion of "P-space" and "L-space" until later (Cf. chapter 2, in particular 2.2. ff. and 2.4.). It will be shown that children are far from being adults in miniature, and that the notion of "body universals" is in need of refinement in a number of respects since adults are at an advantage over children when it comes to using their bodies as a universal yardstick. As will be shown in Chapters 4 and 5, it is not even the case that all the hypothesized universals, even in such a limited semantic field as size relations, can be found in adult language behaviour alone.

1.2.2.5. Psychological and Linguistic Grading

In his study of grading, Sapir (1949) suggests "grading to a norm"
and "grading to terms of comparison" as two distinct logical types which, though in principle separate, are not easily separable where language is concerned, since although "positive terms" (i.e. uninflected adjectives etc.) tend to occur in the first type, and "comparative terms" in the second, "this tendency never hardens into a definite rule" (Op. cit. : 127). It has already been suggested (on pages 16/17) that this conclusion is based on a failure to see a difference between two kinds of adjective sets.

A second kind of confusion in discussing the connection between logical structure and language use arises when Sapir states that only one adjective of a pair is used to name a dimension linguistically, thus creating a logical embarrassment by showing preference for one pole of an opposition:

How embarrassing logically such couplets as good: bad, far: near, much: little really are comes out in asking a question. "How good is it?" "How far was he?" and "How much have you?" really mean "Of what quality is it?" "At what distance was he?" and "What quantity have you?" and may be answered, with a superficial character of paradox, by "very bad", "Quite near", and "Almost nothing" respectively. (Sapir, op. cit.: 127)

Not all linguists agree with this analysis (Cf. Ljung, 1974), but subsequently much has been made of it, especially in the over-extension of the terms marked and unmarked to cover the same phenomenon - a procedure criticised by Lyons (1977 : 306) - and the over-generalisation of Sapir's statement regarding the nature of "How..." questions in this connection (see section 1.3.4.2. for a full examination of these points). It seems to me that Sapir's statement is not derived from any corpus of empirically derived data, but is a product of his own confusion of linguistic and logical criteria: because good-bad etc. are both logically and linguistically opposed he momentarily loses sight of the fact that logical systems are separate from linguistic systems in some cases, as in this. He introduces logical (vector) opposition by the back
door into a linguistic structure relating to scalar quantity - in the process riding roughshod over the distinction he initially made between the second and third of the four types of grading - and claims the resulting "answers" containing the (illegitimate) logical opposites are linguistic, since he presents them as having arisen in the course of conversational interaction.

As a matter of interest, I have asked the same questions, and ones of similar form to those mentioned in the above quotation, since 1975 of thirty-seven British adults in varying walks of life, whenever we have been engaged in casual conversation; and in not one of these "covert elicitations" did I obtain one of the answers postulated so confidently above by Sapir. The reason is that such answers quite simply would break rules of conversational co-operation, which demand a (numerically) quantified answer if possible. If no such answer is possible, then either (i) the same adjectives appear as were used in the question, or terms related to them, and they are adverbially or otherwise modified, with answers like Quite/very good, Quite a way, Quite a lot; or (ii) syntactic negation occurs in the response, but not negativity (i.e. polarity in the adjective term is not reversed. See section 1.3.4.2. for a discussion of this distinction), so that typical answers to the Sapir questions - although not the more frequent type - are: Not much (good), Not very far, and Not much respectively. Because this problem is part of a tight complex, no more will be said about it here, but we shall return to it later, in section 1.3.4.2.

Sapir's five types of Psychological grading are exemplified linguistically as follows. "Open-gamut grading", the first type, is similar to the second type (i.e. the fourth of the initially-introduced types) of Logical grading and is exemplified by A is better than B = B is worse than A, or A is big, B is little. The second type of grading
"conjunct closed gamut") is exemplified by the opposition of green and yellow in the colourspectrum, where judgements of more or less are made with respect to each colour on an either-or basis. If the first two types are combined, and the first re-interpreted in terms of the second, oppositions like A is better than B = B is less good than A, or A is big, B is not really big are the result. The difference, linguistically speaking, is that in type 1 the two elements of the opposition are realised grammatically through similar syntactic structures in which the lexical item is changed, whereas in type 3 the grammatical realisation is through different syntactic frames containing related lexical items. The fourth type of grading ("disjunct closed gamut") is exemplified by blue and yellow on the colour scale; in this case the 'neither-nor' area between the two opposites may or may not be represented linguistically. If "open-gamut" (type 1) grading is interpreted in terms of this fourth type, then the last and fifth type of grading results, giving structures like A is less good than B = B is better than A and J is less bad than K = K is worse than J. 23 It could also be exemplified by A and B are good in varying degree; J and K are bad in varying degree; and the zone of indifference might be spanned lexically by such terms as average, fair, medium, neither good nor bad, etc.

The important feature of psychological, as opposed to logical, grading is that "to the naive, every person is either good or bad; if he cannot be easily placed, he is rather part good and part bad than just humanly normal or neither good nor bad". (Sapir, 1949: 130). Further to this, Sapir says that psychologically there is a difference between better and less bad, or between worse and less good, although logically the pairs are the same. 24 The corollary of this is that a given grade will have a psychologically different value according to the directional source: consider fairly good when derived from very good versus poor (Sapir, op.cit.:131). What he seems to mean by this is that
people have a tendency to confuse the positive/negative of direction
with that of augmentation-diminution, so that a direction becomes an
incremental value, like an amount. There does seem to be some truth
in this.

For specifically Linguistic grading, Sapir maintains the explicit/
implicit distinction already exemplified in the four kinds of grading
listed in section 1.2.2., near the beginning. Explicit linguistic grading
seems to be characterised by presence of a comparative (bound or unbound)
morpheme: more than - less than occurs either alone or with 'absolute'
adjectives, and where it does not appear then the adjective takes -er
suffixation. Implicit linguistic grading is exemplified by much, little,
many and few for "abstract grading", plus all the paired opposites like
good-bad; some single-term sets, like capacious; and three-term and four-
term sets (e.g. bad-average-good, and cold-cool-warm-hot respectively).
Sapir suggests that the reason for the absence of large numbers of three-
term sets is that they tend to maintain themselves badly against the
psychological tendency to dichotomy. We shall not go into detail here,
as Sapir's remarks receive further exposure in the following sections,
below. We shall not consider at all his comments on Affect, but we
shall return to his ideas on polar grading at the end of section 1.3.3.

The last point to be mentioned is Sapir's treatment of the Super-
lative. Here for the first time (op. cit.: 144-145) he remarks on
properties of classes or sets of individuals, and distinguishes -
though not in this terminology - between class and proper class. This
distinction allows him to create two kinds of superlative: (i) the
"conditioned" or "relative" superlative, applied (contingently) to a
member of a class, which is a subset of another class or proper class;
and (ii) the "unconditioned" or "absolute" superlative, applied uniquely
to a member of a proper class (or universal set) - this being the kind
that would appear in *The Guinness Book of Records*, it seems. It is fairly obvious that most uses of language will involve the conditioned superlative applied to limited sets.

Sapir's prior treatment of the comparative leads him to apply the same schema to the analysis of superlative structure, so that, for example, *least good* and *least bad* are treated as if they oppose each other as do *worst* and *best*. In fact, though, according to Sapir's own observation, *least good* is opposed to *best*, the pair of terms representing one half of the full dimension. This confusion can be seen clearly in the following portion of his discussion:

> Paradoxically enough, language so handles *least* and *most* that *least good* (of *good* ones) and *least bad* (of *bad* ones) are often next door to each other, though *least good* and *least bad* may in other contexts be polar extremes, while *best* and *worst* are typically polar extremes.

(Sapir, 1949: 145)

We shall not consider this further. The superlative is discussed in the context of the experimental work described in Chapters 3 and 4 (see sections 3.3. and 3.4.; and 4.4.2.1. and 4.4.2.2.). Let us now go on to consider the linguistic aspects of gradability from other points of view.

1.3. Linguistic Aspects of Gradability

1.3.1. Gradable elements in language

There is at the present time no satisfactory definition of gradability in language, or even in a language. Although gradable concepts are characteristically realized, in English at least, through the adjective, all the other major word classes are capable of lexicalising such concepts also, a point which was made at the beginning of section 1.2.1. However, the similarity between different word-classes in respect of grading was not indicated so explicitly in Sapir (1944) as it has been since (for example by Givon, 1970; Leech, 1974; Ljung, 1974; Lyons, 1977; and Vendler, 1968) in studies of various aspects of semantics.
specifically, the gradable adjective - rather than any other word-
class, that realises predications of this type. To begin with, then,
it is necessary to distinguish between gradable and non-gradable 
adjectives - by no means an easy task, as some recent studies have 
demonstrated. One of the main problems seems to be that there is 
no criterial attribute common to all gradable adjectives: rather, 
there are a number of characteristics which are shared differentially. 
Perhaps the only point they have in common is to be involved in 
predications of comparison. Broadly speaking, there are four main 
distinctions that can be made.

It has been observed that large numbers of gradable adjectives 
are related by "negative pairing" (Givon, 1970: 818), and there is 
a large body of literature devoted to the study of what are variously 
termed "irreversible binomials" (Malkiel, 1959), "polar-opposites" 
(Deese, 1964: 349), "antonym pairs" (Zajonc, 1968, "relative adjectives" 
(Bierwisch, 1970b), "polar antonyms" (Donaldson and Wales, 1970: 
225), "antonymous adjectives" (Ljung, 1974), "dimensional polar terms" 
(Ehri, 1976: 369) and "gradable antonyms" (Kempson, 1977: 84). 
Recently, Lyons has suggested a re-definition of the term "antonym" 
so as to restrict it entirely to "gradable opposites" (Lyons, 1977: 
279), and to exclude all other types of opposite from its domain of 
reference.

Although perhaps the majority of gradable adjectives are paired 
antonymously, there are some which are not, as Ljung (1974) has 
indicated. These are adjectives like stony, hairy, snowy, etc. (see 
section 1.3.4.2. for further detailed discussion.)

Apart from the adjectives indicated by Ljung, there is a third
To anticipate somewhat, and to attempt a synthesis of what has been so far discovered about the effect of grading on and in language, we may note that the widespread presence of gradable elements in the vocabulary of English (if not in all languages) is related to the fact that gradability functions at the most fundamental level of logical structure which may be postulated to underlie language, since it operates as a predicate-variable in what we could term basic propositions, and cyclically thereafter in increasingly complex propositions as either name-variables or predicate-variables. In this sense, gradability is the structuring principle that allows "nesting" of logical structures within logical structures: it is not clear what the upper limits of complexity might be, if indeed there are any; and a logical analysis is in principle incapable of determining the lower bounds, since according to Piaget (1971: 28 ff.) at each level of logical analysis what is content for a level immediately above will be form for the next level immediately below; a view shared by Bierwisch (1969).

This lack of outer bounds for the principle of gradability, though it presents an insoluble theoretical problem, need not concern us too much if we adopt "the metaphysics of everyday usage" (Lyons, 1977: 148) on the grounds that this is what most language-users do in their everyday affairs, and thus the point of view of naive realism may be expected to be what is represented in the language-system.

1.3.2. Gradable Adjectives

1.3.2.1. General Definition

Many kinds of predication made through language involve comparison, and in English it is typically the adjective - more
sizable group, related to the first, which Leech and Svartvik have called limit words:

There are two kinds of gradable words: SCALE words indicate a relative position on a scale (e.g. large, small) and LIMIT words indicate the end-point of a scale (e.g. black, white)

(Leech and Svartvik, 1975: 100)

They also suggest (op. cit.: 101, section 221) that superlative forms of adjective also function as limit words. The above distinction also seems to be essentially that made by Higgins (1977: 204), who talks of "regular" and "extreme" adjectives, "extreme" corresponding to Leech and Svartvik's "limit". Higgins gives as examples tiny-small-large-huge and wicked-bad-good-saintly; in each quadruple, the second and third adjectives are "regular", and the first and fourth "extreme". This particular distinction is not taken into account in the analysis of the child language data presented in the following chapters of this thesis, although it would undoubtedly be important to do so when attempting to characterise the whole gradability system.

It is fairly obvious from other data (e.g. Edwards and Gibbon, 1975; Nelson, 1976) that the two types of adjective enter the child's linguistic repertoire at different stages of development, with "regular" preceding "extreme". (Although both types occurred in the data I analysed, they tended to remain undifferentiated since I was concerned with more general semantic distinctions, such as that of Global versus Specialised adjectives).

A fourth and much smaller group of adjectives are those which I shall term intermediary adjectives: some examples are medium, average and middle-sized. Probably because this last group is not lexically extensive, it has attracted virtually no linguistic study, although
it has stirred some interest among psychologists interested in child logic (Cf. Spiker, Gerjuoy and Shepard, 1956).

Apart from these four groups, there are a few "adjectives" - if that is the correct term - which ought to be explicitly mentioned as being somewhat more fundamental than other elements in the grading system since they structure it more fully than would be the case were they to vanish. Following Donaldson and Wales (1970), we should take special note of same and different, as well as similar, and more and less.

It is obvious from the foregoing remarks that gradable adjectives are a heterogeneous group, and the functional definition implied in the opening paragraph of this section, minimal though it is, is perhaps adequate as a working basis. In any case, much of what follows will be implicitly limited by the scope of previous research, a large proportion of which has been concerned with the first group of gradable adjectives, i.e. antonyms.

Furthermore, many studies of antonyms have focused on those with the highest frequency in English as measured by the word-counts compiled by Thorndike and Lorge (1944) or Kučera and Francis (1967), for instance. These antonyms are of the kind found in semantic differential scales (Cf. Osgood, Suci and Tannenbaum, 1957); Deese has pointed out that they have the following notable characteristics (Deese, 1965 : 123):
(a) they are morphologically almost all un derived (no -ly, -able or -ive endings);
(b) they are all of Anglo-Saxon rather than French or Latin origin;
(c) they are all inflected in the comparative, instead of being syn-
tactically premodified by more.
(d) they elicit each other reciprocally in word association tests.

In this set of thirty-nine pairs of adjectives, the largest sub-group is used to describe dimensions of physical size. There are eight pairs of these: big-little, long-short, tall-short, high-low, deep-shallow, wide-narrow, thick-thin, and large-small. These do not exhaust the set, however. Wales and Campbell (1970) included wee, broad and fat-thin in their experimental set, and there are doubtless others.

1.3.2.2. Types of Comparison

If the defining feature of gradable adjectives is that they realise predications of comparison, a word needs to be said about the different kinds of comparison before going on to consider gradable adjectives in more detail.

In broad terms, we can say that the minimum number of elements needed in a situation before comparison can occur is three: two entities,

There may possibly be more than this number of entities and/or properties; the specification above is of the minimum. If the entities differ with respect to a property (to put it another way: if the property is perceived to be differentially shared by the entities), then the comparison is what Small has called a "comparison of inequality" (Small, 1923). On the other hand, if the two entities are the same with respect to the property - we shall ignore temporarily the fact that same is itself susceptible to various interpretations (Donaldson and Wales, 1970; Karmiloff-Smith, 1977) - then there is a "comparison of equality" (Small, op. cit.).

This seems straightforward until we consider how the two types
of comparison are realised through English, for there are a number of
different ways of expressing both types. Taking the basic situation
given above for comparisons, the most important factor to consider next
is whether both the entities being compared are explicitly mentioned in
the statement of comparison, or whether only one of them is (the second
entity being contextually but not textually present). This factor has
already been mentioned (in 1.2.2.5.) in connection with Sapir’s distinc-
tion between explicit and implicit grading, but it may not be obvious
that the distinction is relevant to comparisons both of equality and of
inequality, and furthermore that gradable adjectives realise all four
types of comparison. 29

1.3.3. Syntax

Although it may well be that a distinction between syntax and
semantics is inconvenient theoretically when considering gradable
adjectives, for the sake of clarity, such a distinction is here made
so that some of the broader problems tangential to this thesis can be
considered. In this section we shall begin by considering the "base"
or "absolute" forms of adjectives, and how these have been classified
on the basis of syntactic and morphological criteria. We then proceed
to an examination of the functional distinctions to be made between
attribution and predication, and then consider how the adjective is
far from being an independent entity, so that statements as to typology
inevitably involve other word-classes, particularly nominals. The last
part of the section will focus on the flaws in the Transformational
Generative Syntax accounts of comparative adjective structures which
have so strongly affected and biased research in psycholinguistics.

Historically, gradable and non-gradable adjectives have tended to be
grouped together and to share a common fate in linguistic analysis. Lyons has described how the status of the adjective has fluctuated over the centuries between treatment as a verbal and as a substantival element (Lyons, 1968: 323-329). The tendency in the last few hundred years has been to treat adjectives, on morphological and syntactic grounds, as "belonging" with nouns, but Lyons has pointed out that in deep-structure, intransitive verbs and adjectival predicates are formally similar (Lyons, 1966).

In traditional linguistic studies, the so-called comparative and superlative adjective inflections (-er and -est in English), because they were morphologically salient, attracted the attention of structuralist analysts who attempted to classify, on formal grounds alone, those adjectives which inflected for comparison as belonging to a different category from those which were modified by more and most. Yet it is clear that the proposed distinction between gradable and non-gradable intersects such classifications: this fact can be seen from examining, for example, the work of Gleason (1961) or Crystal (1967).

Gleason distinguishes between (paradigmatically inflected) adjectives and (uninflected) adjectivals, so that for example fine is a member of the paradigmatic class, whereas beautiful is a member of the syntactic class (of adjectivals). Interestingly, Gleason then goes on to import the class of adjectives into that of adjectivals: the reason for this is that adjectivals can "occur in the type of environments in which adjectives are found" (Gleason, 1961: 95). Presumably he is referring to the fact that some adjectivals are used attributively and predicatively, as are some adjectives, but it is a perilous step to generalise from this observation; in fact attribution and predication are far from being identical processes that allow adjectival entry to all and sundry, as we shall see in a moment when we consider some observations of Bolinger's
(1967) in a slightly different context.

In search of the gradable adjective's syntactic characteristics, we find a number of defining characteristics of adjectives given in Crystal (1967), though they do not define the class exhaustively. Crystal devised five morphological and syntactic tests as criteria for classifying adjectives, and on this basis he then defined seven classes of adjective. The sixth class, which met all but the first criterion, seems to be that of gradable adjectives. The criteria are:

1. Ability to form an adverb by adding "-ly"
2. Ability to inflect for degree (without "-ly" suffix) within a nominal group functioning as subject of a sentence (i.e., to exclude "we seem to be more inside than outside" etc.)
3. Ability to take intensifiers, especially "very", within a nominal group functioning as subject.
4. Ability to occur in the slot 'a/the - Noun' (where Noun stands for any of the central class of nouns, elsewhere defined).
5. Ability to occur in predicative position after the sub-class of verbs including 'be', 'seem', and 'become'.

While it is clear that adjectives such as old, young, fast, big, and long, which are gradable, do not meet the first criterion, other adjectives such as slow, quick, short and new have to be allocated to a seventh class (Crystal gives hard, kindly, and low as examples of the seventh class: Crystal, op. cit.: 51) since they meet all the criteria including the first; yet they too are gradable. To complicate matters still further, these adjectives also meet two of the three criteria which Crystal proposes as tests for adverbs: clearly an unsatisfactory state of affairs. He concludes:

Hence it seems better to take such words as constituting a peripheral area between the two classes, with an as yet undetermined number of subclasses.

(Crystal, 1967: 53)

Crystal's fourth and fifth criteria above closely resemble test
frames proposed a decade earlier by Fries (Fries, 1957: 82-83), and are themselves not uncontroversial, since a number of treatments of adjective-structure in transformational-generative grammar, starting with Smith (1961), have attempted to relate attributive and predicative structures through transformational rules - a procedure fraught with difficulties, and one which has been criticised by Bolinger (1967a) and Campbell and Wales (1969) (Cf. also Weinreich, 1966: 420 ff., for an analysis of the semantic problems).

What Smith proposed in Part I of her paper (Smith, 1961: 345-348) was that sentences containing adjectival modifiers be generated by three ordered transformational rules: (i) a Relative Clause rule; (ii) a Deletion rule; and (iii) an Order Change rule. These rules are ordered as indicated:

According to the embedding rules we have set up, any sentence that contains an adjective is derived from two underlying sentences; sentences with adjectives in relative clauses are prior to others with post- or prenominal adjectives.

(Smith, 1961: 347)

This analysis has had important consequences for subsequent transformational-generative analyses of comparative adjective structures. These will be briefly surveyed below, but it is worth examining for a moment just what the criticisms of the initial adjective-structure proposals are.

The basic problem is that attribution (i.e. pre-nominal adjectival modification) and predication (i.e. post-nominal adjectival modification, usually through BE - complementation) cannot be transformationally related in all cases. Campbell and Wales point out, for example, that sentences like That painting was expensive transform into that expensive painting only if they may be paraphrased by a structure like That painting was an expensive one. However, if its paraphrases are of the form That painting was an expensive item or That painting was an expensive purchase,
no preposing of the adjective is possible (Campbell and Wales, 1969: 225-226).

Essentially the same observation is made by Bolinger (1967a), who also points out that many attributive adjectives cannot possibly be derived from a transformationally prior predicative structure: for example, a fond old man has no counterpart in *The old man is fond; nor can a total stranger be related to *The stranger is total. This lack of a transformational counterpart works in the reverse direction too: we do not have *a sorry girl corresponding to The girl is sorry. In view of this, Bolinger comments:

By itself the fact that many more adjectives are restricted to attributive position than to predicative position is suspicious: if anything the reverse should be true if we want to base attribution on predication.

(Bolinger, 1967a: 3)

The point made by both Bolinger and Campbell and Wales is that it is easy to assume that because some adjectives are used both predicatively and attributively all adjectives are so used. Bolinger (1967a) attributes this tendency towards generalisation to the unwillingness of transformational-generative grammarians to attempt structural description based on any but the simplest examples chosen from among "words like man whose reference systems are close to their grammatical categories" (Bolinger, 1967a: 1), and which are apt to be relatively devoid of semantic content. He points out that there is a clear functional difference between attribution and predication32 which is ignored in T-G analyses - which focus on syntax to the exclusion of all idea of "setting" (Cf. Katz and Fodor, 1963: 177-178: "If a theory of the selective effect of setting were required to deal with such cases, no such theory would be possible, because any sentence may be made to mean anything you like . . . "). Quite apart from this, it should be noted that there are also logical
differences between predication and attribution which are quite complex, the discussion of which will be picked up again in 1.3.4.1., since to digress at this point is inconvenient.

Bolinger (1967a) indicates three important areas of difference between the processes of attribution and predication.

Firstly, a distinction is made between occasion and characteristic adjectives: occasion adjectives describe something temporary and form predicates but not usually attributes (as an example he gives The girl is faint); whereas characteristic adjectives describe something more permanent, forming predicates and also attributes in noun phrases (e.g. The girl is foolish and The foolish girl).

Secondly, on the basis of this adjective distinction two different types of be-predication can be isolated, which Bolinger calls TEMPORARY (or non-customary) and NON-TEMPORARY (or customary). The first type does not yield a grammatical transformation to attributive position in the noun phrase, whereas the second does (compare, for example, The girl is being foolish with The girl is foolish).

Thirdly, Bolinger points out that to consider only the adjective in the predication is insufficient: the type of noun element must be considered as well since adjective modification can be ambiguous, in some cases, between referent- and reference-modification, depending on the semantic information conveyed by the noun: the boy is eager can be acceptably related to an eager boy (where referent-modification is present), whereas the student is eager does not preserve the same sort of meaning across transformations to an eager student because of the occurrence of reference-modification (student being a function-noun, glossed as one who studies).

In retrospect it seems obvious that any description of the syntactic properties of adjectives, of which gradable adjectives are an important
subset - they are involved in all three of the above phenomena discussed by Bolinger - should take the different processes of attribution and predication into account in a principled way.

However, it may well prove difficult even then to account for the peculiarities of the data. Teyssier (1968), for example, who limits his discussion to attributive adjectives, finds gradable adjectives - although he does not use this term for them - an awkward obstacle to smooth analysis. He suggests an initial distinction between identifying and classifying adjectives, whose function is syntactic and semantic respectively. The former makes an "individualising" determination, as it substantiates or expands the definiteness implicitly contained in the 'determinative' element of a noun-phrase, whereas the latter makes a 'categorising' determination, pointing to a specimen of a class of objects; its function is to substantiate or expand the inherent "indefiniteness" (i.e. degree of extension) of the noun it modifies. He claims:

Some adjectives are intrinsically more 'classifying' than others, especially those denoting nationality, age, size, colour, in short, any attribute liable to apply to whole categories of people or objects.

(Teyssier, 1968 : 228)

This suggests clearly that gradable adjectives such as big, small, long and short be regarded as classifying, as they relate to size. However, Teyssier is dissatisfied with this analysis, and goes on to distinguish a third class of adjectives - which he calls characterizing - as a middle group having both syntactic and semantic functions. Judgements are then inevitably of a more-or-less nature as to which adjectives belong to which category, and Teyssier is reduced to stating:

... some adjectives are intrinsically more "characterizing" than others, especially those denoting some accidental or exceptional quality peculiar to one particular object or individual. Thus 'huge' is more descriptive than 'big'; 'slender' and 'lanky' are more evocative than 'thin'; 'hoary' is more graphic than 'old'.

(op. cit. : 230)
The theoretical status of the terms "descriptive", "evocative", and "graphic" is not discussed, but in any case the distinction Teyssier is trying to account for is far better described by Higgins' terms regular and extreme (Higgins, 1977), which emphasize the basic continuity between the two kinds of adjective. As it stands, Teyssier's is clearly a less satisfying analysis than Bolinger's (whose use of the terms characteristic and characterization should not be confused with Teyssier's third class of adjectives).

A specific move away from structuralist preoccupations with segmentation and taxonomies can be seen in Gleason's (1968) discussion of adjective functions within continuous discourse. He points out that adjectives may have any or all of three broad classes of function, which he calls descriptive, identifying and affective, and according to how they function in a particular text will have particular privileges of grammatical occurrence within a sentence. Descriptive adjective function is associated with facts which increase the listener-reader's store of propositional knowledge, in the same way as events in a narrative text would do:

They add to the stock of known characteristics of the Participant, altering in some way the available contrasting features.

(Gleason, 1968: 273)

Identifying adjectives pick out and distinguish, on the basis of the sum total of information accumulating within the text, those nominal elements which are to be identified as what Gleason calls "Participants". And affective adjectives "tell us nothing about the Participant - only about the observer's reaction to a Participant - and they cannot serve to identify" (Ibid.). This last function obviously bears some relation to what Leech means by talking of adjectives of a certain type having "speaker-related norms" as opposed to "object-related norms" (Leech, 1974: 108-10),
and there is also a resemblance between on the one hand, Gleason's distinction between identifying and descriptive functions, and some of the characteristics usually discussed under the heading of "marking" (see section 1.3.4.2. further). What I mean by this last remark is that Gleason notes there is a contextual background against which adjectives function and change function in rather complex ways as a text progresses:

If one Participant is described as little, then big automatically becomes identifying. If one is small, subsequent use of large is identifying. But after little, large preserves at least some of its descriptive function, as does big after small. A significant difference between these pairs of synonyms is that they operate in different sets of formal contrasts, and thus differently in the Participant-Identification system.

(Gleason, 1968: 273)

One cannot pin Gleason down to anything more precise than this, but it is noticeable that the adjectives which seem so able to change function in this way are gradable adjectives. There is some kind of an insight here: the duality of functioning of these gradable adjectives which Gleason describes seems to be not unrelated to the distinction noted by some psychologists between absolute and relative (Bryant, 1974) or comparative (Wales, 1971), judgements realised linguistically by means of such adjectives. However, it never quite becomes clear whether this is what Gleason means. He is in any case surely mistaken when he asserts (op. cit.: 273) that only descriptive adjectives (i.e. adjectives functioning descriptively) "occur in predicate position or as non-restrictive modifiers", since such an assertion overlooks the Bolinger distinction between occasion and characteristic adjectives, only the latter of which occur both predicatively and attributively, but both of which could be identifying in function, according to Gleason's definition. Thus whether his assertion is read as an inclusive or an exclusive disjunction, it cannot be correct if we accept Bolinger's...
observation as valid - which it seems to be. We shall not pursue
discussion of this, since the point must by now be fairly evident that
gradable adjectives are the source of a number of problems in syntactic
theory, perhaps for the precise reason that they are rarely if ever
treated separately as a distinct group.

The second of Bolinger's three distinctions, namely that there are
two different kinds of be-predication, is comparable with a later proposal
by Lyons (1968 : 324-325) concerning the aspectual distinction of stative
versus non-stative in verbs and adjectives. There is some similarity
between these aspectual distinctions and Bolinger's non-temporary and
temporary predications respectively, although the two sets of distinctions
are not quite isomorphic, as the following category diagram shows:

<table>
<thead>
<tr>
<th></th>
<th>TEMPORARY</th>
<th>NON-TEMPORARY</th>
</tr>
</thead>
<tbody>
<tr>
<td>stative:</td>
<td>Mary is faint</td>
<td>Mary is beautiful/tall/foolish</td>
</tr>
<tr>
<td>non-stative:</td>
<td>Mary is being foolish/naughty</td>
<td></td>
</tr>
</tbody>
</table>

As can be seen in the case of foolish, there are gradable adjectives which
can be temporary and non-stative, or non-temporary and stative. It
might be thought that as faint is an ungradable adjective, the kind of
adjective that is temporary and stative is always of this type, but in
fact this assumption would be incorrect, as instanced by the existence
in English of such adjectives as upset, angry, apoplectic, tipsy, high,
euphoric and exultant, all of which assume gradable concepts of different
kinds. Gradable adjectives appear, then, to be ubiquitous, to say the
least. But what kind of gradable adjectives? There is quite clearly a
pre-theoretical distinction between the kinds of adjective that can fit
in the right-hand half of the above diagram and those that will be
accommodated on the left. For example, size adjectives like big-small,
tall-short-long, etc. are not going to be found on the left, at least not
without radically changing their meaning: witness the use of high instead
of intoxicated in the examples mentioned above. In fact it looks as if the adjectives that fit on the right but not on the left are more nearly what most people would perhaps think of as "proper" adjectives, i.e. adjectives par excellence, whereas those occupying the left-hand side are rather "verbish" (or even "adverbish").

Bolinger's third distinction, between referent- and reference-modification, goes some way towards coping with the problem, but other linguists have also examined this "adjectivity-factor" with some success: Vendler, 1968; Givon, 1970; and Ijung, 1974. We shall consider these now.

Vendler (1968), like Crystal, set up a number of criteria as tests for adjective classes, but examined deep-structure differences rather than working with surface-structure morphological and syntactic features. His analysis demonstrates what the various adjective-noun co-occurrence restrictions are and explains the source of certain types of semantic deviance, as well as describing the peculiarities in distribution of adjectives between attributive and complementary (i.e. predicative) functions.

Vendler considers a number of adjective and noun (AN) derivations in deep-structure, on the basis of which nine classes of adjective are set up. His first four Adjective (A-) classes contain all the commonly occurring gradable adjectives, although the last five classes, his discussion of which is rather cursory, also contain gradable adjectives of a more complex type (since they appear to contain embedded predications). The following four paraphrase frames, with examples, illustrate the first four adjective types (Nm is a measure-noun or dimension-noun; V+ is a verbal element with the head noun as its subject; V- is one with the head-noun as its object; e = everbal nominalisation):

- 53 -
### Class: Frame: Examples

<table>
<thead>
<tr>
<th>Class</th>
<th>Frame</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A_1)</td>
<td>(AN - N \text{ wh... is } A)</td>
<td>red rose. rose which is red.</td>
</tr>
<tr>
<td>(A_2)</td>
<td>(AN - N \text{ whose } N_m \text{ is } A)</td>
<td>big stove, stove whose size is big.</td>
</tr>
<tr>
<td>(A_3)</td>
<td>(AN - N \text{ whose } (e(V+)) \text{ is } A)</td>
<td>fast horse. horse whose speed is fast. (i.e. horse whose (it moves at velocity) is fast)</td>
</tr>
<tr>
<td>(A_4)</td>
<td>(AN - N \text{ whose } (e(V-)) \text{ is } A)</td>
<td>easy problem. problem whose solution is easy. (i.e. problem whose (one can solve it) is easy.)</td>
</tr>
</tbody>
</table>

The virtue of Vendler's analysis is that it illuminates the cyclic nature of lexical derivation (i.e. certain nouns are shown to be deep-structure transitive and/or intransitive verbs; and, by inference, certain surface adjectives may therefore be deep adverbs - a notion developed by both Givon (1970) and Ljung (1974), and enables certain co-occurrence restrictions to be theoretically well-motivated and problems of ambiguity to be solved. However, Vendler's adjective frames involve derivation from deep-structure relative clauses rather than conjoined predicates, and in this respect his analysis more closely resembles Smith (1961) than Bolinger (1962), since the latter proposes conjunction as the deep-structure origin of many attributive adjectives.

Certain adjectives are shown to be admissible to more than one of Vendler's classes since admissibility depends on the types of noun which the adjectives modify. This is essentially Bolinger's referent versus reference modification revisited, but Vendler develops the notion in more detail. He shows how nouns can themselves be ambiguous as to derivation, and gives dancer as an example of a noun that may or may not be treated as deverbal according to its adjetival modification. Thus an \(A_1\) class adjective like blonde will give a different reading from an \(A_2\) class adjective like slow when it occurs in an AN combination: compare blonde dancer with slow dancer. Beautiful, on the other hand, to pick up on one of the earlier-mentioned examples, may be either \(A_1\) or \(A_2\), and only
the presence of another adjective co-occurring with it, providing this adjective belongs to only one of the classes, can disambiguate it: compare She is a blond and beautiful dancer (A₁ interpretation), as against *She is a blond and slow dancer, the latter combination being an instance of zeugma, which is not normally acceptable outside the domain of literature.

Vendler goes on to develop the notion in more detail, and illustrates how "function nouns" like king, emperor, father, mother, etc., which are not obviously deverbal in the way that dancer (or Bolinger's example, student) is, are associated with not one but several underlying deep verbs, so that for example an A₃ adjective will map on to the underlying features of a congruent verb, whereas an A₁ or A₂ type creates oddity or ambiguity: compare just king with blond king; good mother with tall mother; stern father and big father. Conversely, if an A₃ adjective occurs with a non-function noun, the combination can only be interpreted by setting up a search among the associated features of the noun to find a (congruent) verbal element: e.g. fast tree might be understood as grows fast/blossoms fast/fruits fast, etc., and good table might be interpreted as it is made well/one can write well on it, etc. It is easy to understand from this analysis why a pair of gradable adjectives such as good-bad should have so many meanings which apparently defy linguistic description. 34

We have so far considered gradable adjectives with regard only to what one might term the syntax of the uncompared form, i.e. that of the type implicit comparison as described earlier, in 1.3.2.2. There is, however, a second, sizable body of syntactic research on explicit comparison, where the main focus of attention has been on comparative structures of the type John is bigger than Mary, and to a lesser extent on other structures of comparison such as: the superlative; too + adjective; adjective + enough; and the equative (e.g. John is as big as Mary). Most of the
linguists concerned with this area of syntax have worked within a transformational-generative framework, as proposed by Chomsky and subsequently developed in Chomsky (1965). Although this aspect of gradable adjectives might appear peripheral to the interests of the present thesis, some knowledge of the theoretical standpoints represented is an essential prerequisite to an understanding of the formation and development of important experimental hypotheses and methodology in psycholinguistics, particularly in the work of H. H. Clark, surveyed in Section 2.5 (Clark 1969b; 1970a; 1970b; 1976; Clark and Card, 1969; Clark and Clark, 1977) later.

Despite extensive disagreement about exactly what should be included in the structures judged to be 'comparative', there is a large concensus of opinion that surface structure comparatives - perhaps the term "comparative expansion" (Pilch, 1965) might be more appropriate for these explicit comparisons - are to be derived from deep-structure conjoined sentences, although proposals vary as to how the transformational rules should be written. The basic view is shared by: Smith (1961); Lees (1961); Chomsky (1965) (although with reservations); Doherty and Schwartz (1967); Harris (1969); Stanley (1969); Bailey (1970); Seuren (1973); and to some extent Nilsen (1972). Alternative proposals are made by Bresnan (1973), still within a transformational-generative framework, and other approaches to the problem are found in Pilch (1965), and Huddleston (1967). Campbell and Wales (1969) point out a number of flaws in the transformational-generative analyses, and offer a radically different solution of their own. Other observations in a similar vein have been made by Ross and Perlmutter (1970), R. Lakoff (1970) and Christie (1972), but these will not be discussed here as they do not bear on the thrust of the present argument.

There are a number of criticisms of T-G analyses involving
conjoining of two base strings. The most important is made by Campbell and Wales (1969: 216-221), who point out the logical inconsistency of an analysis such as that proposed by Chomsky (1965: 177-182) whereby John is more clever than Bill is derived from the base strings John is clever and Bill is clever, neither of which, so they claim, is entailed by the surface structure sentence. They make clearer their objection by means of the illustration sentence Roger is three years older than Robin, which would have as underlying strings Roger is three years old and Robin is old, which are much more obviously unacceptable (Campbell and Wales, 1969: 219). They point out that many T-G analyses of the "comparative expansion" simply fail to take meaning into account and ignore the very important distinction between implicit and explicit comparison of adjectives.

Essentially the same criticism is made earlier in Lyons (1968: 466).

Certainly these are serious criticisms, but it seems to me that Campbell and Wales do not expand sufficiently on other criticisms implicit in their (1969) paper, which concern the methodological approach involved in generative syntactic theories, which (i) work back from surface to deep structure and (ii) oversimplify the comparative in an attempt to secure generality by including as many different structures as possible in the "comparative transformation". The general effect of this procedure is that, firstly, comparisons of equality and inequality are both treated as one "comparative" structure (Cf. Smith, 1961: 349 ff.; Lees, 1961; Chomsky, 1965: 179; and also Huddleston, 1967: 92), and secondly no distinction is made, even among various comparisons of inequality, between comparatives with -er than.... and comparatives with more... than...

since the expansions on than are superficially similar. Now this leads inevitably to an inclusion of less...than... as a comparative, given equal status with more...than..., a status which it is not entitled to have on the basis of any empirical data that I have either seen or been
able to gather in person.

It can be observed that the introduction of less ... than ... as a full comparative confuses matters enormously, since there is now a lack of symmetry in the paradigm cases of -er comparison. In the more-less arrangement, polarity is reversed in the "quantifier", but not in the matrix adjective, whereas the -er than ..... comparatives reverse polarity in the matrix adjective. At least, this is what should happen, ideally: but T-G grammarians don't operate that way. Diagram A presents the ideal; diagram B presents the composite T-G view.

**Diagram A**

1a. John is more intelligent than Bill. 2a. John is bigger than Bill.

1b. John is less intelligent than Bill. 2b. John is smaller than Bill.

**Diagram B**

3a. John is more intelligent than Bill. 4a. John is bigger than Bill.

3b. John is less intelligent than Bill. 4b. John is less big than Bill.

I cannot imagine a situation of utterance for sentence 4b, and I wonder how any T-G grammarian could lean so heavily on his intuitions!

Now it will not have escaped notice (perhaps?) that there is an alternative to the left hand pair of sentences, namely:

5a. John is more intelligent than Bill

5b. John is more stupid (stupider?) than Bill

and what has happened here is parallel to what happened in the pair 2a-b, namely a change of polarity in the matrix adjective rather than the quantifier. This in turn suggests a number of intriguing possibilities, not the least of which is that both Chomsky and Campbell and Wales could possibly be right, since Chomsky's analysis rests on sentences of type 1a-b (or 3a-b), whereas Campbell and Wales quite obviously assume 2a-b as their model, and misunderstand Chomsky's analysis as also pertaining to 2a-b type comparatives. Whatever the rights or wrongs of the matter,
there is no doubt that this aspect of the comparative, namely that there are two types rather than one, has been ignored in the literature: the assumption has always been that their behaviour is syntactically - and semantically - identical. It will later be my argument that they are not identical, and that this fact allows us to explain a number of curious findings in some psycholinguistics experiments (See 2.5).

As to the source of the confusion, it might be Sapir's original (1949) paper, where he discusses what he calls "polar grading" (op. cit. : 147 ff) and treats the two types of comparative as psychologically (and semantically?) equivalent. There is a clear implication in Sapir's diagram (reproduced below), however, that the -er type comparative is dynamic, whereas the less-type is static.

![Diagram](Sapir's_diagram.png)

Note the distribution of terms into intervals and points respectively: the _-er_ adjectives are linked by directional arrows but the _less_ type are not. As far as can be discovered, no later research in linguistics has picked up the implications contained in the latter part of Sapir (1945?) although recent evidence gathered in psycholinguistic experiments by Higgins (1977) has suggested that the _-er_ comparative may well be different in meaning from the more-less comparative, and therefore should presumably be derived differently in the deep structure of a transformational-generative analysis, if meaning is to be taken into account.36 It seems, however, that far from treating the two types of comparative separately, recent theoretical research has been directed towards uniformity. Indeed, the most recent work (Rivara, 1975) reduces all comparatives to an
underlying much and little in deep structure.

In contrast to this general tendency, Campbell and Wales (1969) propose a generative semantics rather than a generative syntax analysis, which will separate equative and comparative structures through the deep structure semantic distinction + directional (notionally similar to Lyons' distinction stative versus non-stative, which was discussed earlier in this section; only the terminology differs). They also propose to treat comparatives as being derived from one base string in deep structure. They consider Lyons' (1966) suggestion that intransitive verbs and adjectival predicates be treated as formally and semantically similar in deep (semantic) structure, but propose as an alternative analysis that "simple adjectival predicates are to be related to short passives and comparative predicates to full passives" (Campbell and Wales, op. cit.: 229).

Furthermore, they attempt to relate a number of different types of comparison by means of semantic operations (similar to the operations postulated in Piagetian psychology - at least superficially) such that, for example, positive comparative structures are linked to negative equative structures, as are positive equative to negative comparative.

Campbell and Wales' (1969) paper indicates an increasing general interest in a potential area of convergence between psychological and linguistic theory, namely semantics. A number of recent (and not so recent) developments in semantic theory are quite fundamental to an understanding of linguistic gradability, and these will now be examined.

1.3.4. **Semantics**

In this section the general treatment will be to work downwards from the sentence to the word; and a little beyond. Three main aspects of semantic theory will be discussed. Firstly, the logical peculiarities of sentences containing gradable adjectives will be detailed, since an understanding of these is important when considering aspects of Piagetian
and post-Piagetian psychological theory as well as some of the psycholinguistic experiments discussed in section 2.5. The second subsection below will discuss the semantic structure relations that constitute the field of gradable adjectives in English: some theoretical issues, such as "marking", will be examined in detail because they have had considerable influence on the formulation of psycholinguistic hypotheses such as those of E. Clark (1973a; 1973b) and H. Clark (1969a; 1969b; 1970a; 1970b). A third aspect of semantics which is also relevant in this connection is the application of componential analysis to the analysis of lexical meaning: this will be considered in the third subsection below.

1.3.4.1. Logic

A number of scholars (Small, 1923 : 9ff; Ziff, 1960; Quine, 1960; Lyons, 1963, 1968 and 1977; Wells, 1954; Weinreich, 1966; G. Lakoff, 1970; Zwicky, 1969; Campbell and Wales, 1969; Donaldson and Wales, 1970 : 249; Borowski, 1973; Leech, 1969 : 37ff; 1974 : 109ff; Kempson, 1977) have pointed out various logical peculiarities of gradable adjectives in sentences used to make statements. Such peculiarities depend on the form the adjectives take (i.e. "absolute", "comparative", "superlative") and also their location, within the sentence, relative to an associated nominal element: i.e. whether they occur as attributive adjectives (surface structure pre-modifier function) or as predicative adjectives (i.e. some sort of surface post-modifier).

When a sentence is uttered to assert a proposition, this sentence may be related logically to other sentences asserting other propositions. The logical relations which are of interest here are: equivalence, entailment and implication; transitivity, reflexivity and symmetry; implicature; and the logical operations which transform one kind of
proposition into another.

In propositional logic a distinction is made, in terms of truth conditions, between a proposition \( p \) and its negation \( \neg p \) such that if \( p \) is true, \( \neg p \) is false and conversely if \( \neg p \) is false then \( p \) is true. On the basis of this distinction it is possible to define a relationship of contradictoriness between two sentences used to express propositions \( p \) and \( \neg p \) respectively (the first sentence being called an assertion of \( p \), the second sentence a denial of \( p \)):

If one sentence, \( S_1 \), explicitly or implicitly denies another sentence, \( S_2 \), then \( S_1 \) and \( S_2 \) are contradictory (\( S_1 \) and \( S_2 \) are explicitly contradictory if \( S_1 \) negates \( S_2 \) syntactically, otherwise they are implicitly contradictory . . .)

(Lyons, 1968: 458)

Now a special case of contradictoriness is incompatibility, which arises when \( S_1 \) and \( S_2 \) are implicitly contradictory sentences of identical deep syntactic structure: "if they differ only in that where one has the lexical item \( x \) the other has \( y \), then \( x \) and \( y \) are incompatible" (Ibid.). Lyons (1968: 460ff) distinguishes between two types of incompatibility: complementarity and antonymy, and this distinction is important to the present study, since antonymous and complementary pairs of lexical items have different logical characteristics when used in sentences to express propositions. (See chapter 5 also).

In the case of complementarity, it is characteristic of pairs of lexical items, such as male-female, that they completely exhaust any field of referents to which they are applied. As Lyons puts it:

The denial of the one implies the assertion of the other and the assertion of the one implies the denial of the other: \( \neg x \rightarrow y \) and \( y \rightarrow \neg x \). Thus John isn't married implies John is single; and John is married implies John is not single.

(Lyons, 1968: 461)
In the case of antonymy, however, only the second of these implications holds; for example, with the pair of antonyms good-bad: John is good implies the denial of John is bad, but John is not good does not imply the assertion of John is bad (ibid.).

Similar observations have been made elsewhere, although the terminology differs: Zimmer has used the terms contradictory for Lyons' complementary, and contrary for Lyons' antonyms (Cf. also Campbell and Wales, 1969 : 229; and Ljung, 1974 : 75).

However, it should be noted that the above distinction, which is what characterises the basic difference between gradable and non-gradable opposites, has been blurred and even ignored by some researchers: Vendler, for example, claims of opposites like long-short and heavy-light that "the denial of one leads to the assertion of the other" (Vendler, 1968 : 95), and a similar view seems implicit in Lamb (1970 : 72-73) and Bierwisch (1967 : 6).

An interesting corollary of the logical difference between complementarity and antonymy is that, as Leech noted (1974 : 108), the conjunction of negated propositions results in a logical contradiction only in the case of the first type of opposition: compare This man is neither alive nor dead with This man is neither rich nor poor, only the first of which is contradictory. This distinction is indeed general, since comparative and superlative forms of gradable antonym yield equivalently non-deviant sentences: consider This man is neither richer nor poorer than John and This man is neither the richest nor the poorest.

Lyons has further observed (1968 : 467; 1977 : 273) that comparative forms of gradable antonyms are distinguishable from both the "base" form (which was referred to as "absolute", above) and the superlative through the logical relation of converseness that holds between pairs of opposites such that "the substitution of one of a pair of gradable antonyms for
the other and the transposition of the relevant nominal expressions within a comparative sentence results in a semantically equivalent sentence" (Lyons, 1977 : 273). Thus Our house is bigger than yours expresses a proposition which implies, and is implied by, the proposition expressed by Your house is smaller than ours. However, the relation of converseness is not as straightforward as it seems, since certain problems arise when an opposition is lexicalised in more than one pair of terms (Lehrer, 1974 : 28; Kempson, 1977 : 85), as it is with adjectives referring to temperature. Considering the ordering cold-cool-(tepid)-warm-hot, are we to say that the converse of Your house is hotter than mine is My house is cooler than yours or My house is colder than yours - or both? Lehrer accepts both, whereas Kempson seems to entertain only the first as a possibility. There seem, then, to be grounds for restricting the notion of converseness to cases where an opposition has no more than two lexical values.

Few linguists have pointed out that in the case of gradable antonyms - and possibly gradable adjectives generally - comparative sentences are logically relatable to equative sentences, and even where this fact has been indicated the relation has not been made fully explicit, since the relation is a complex one. Features of it have appeared in Donaldson and Wales (1970 : 255-256), Borowski (1973), Campbell and Wales (1969 : 240-242) and Ehri (1976 : 378).

Borowski (1973), criticising Seuren's (1973) analysis of the comparative, observes that the negative equative John is not as tall as Fred is not the contradictory of the equative John is as tall as Fred, since the propositions expressed in these sentences may both be false with regard to the comparative John is taller than Fred. This is what Donaldson and Wales (op. cit.) refer to when they remark: "... the comparatives and equatives are essentially asymmetric in their interaction
with negative forms." Matters are more complex than this, however, since Campbell and Wales (1969: 240-242) suggest that a sentence like John is as tall as Fred may itself be ambiguous between the readings (i) exactly equal in height and (ii) at least as tall as. To justify this second possibility, they cite John is as rich as anyone here as an example of an acceptable sentence which must be glossed as the disjunction: (as rich as) or (richer than) anyone here.37

Extrapolating somewhat from this, it would seem that if Campbell and Wales' observation is accurate, then the negation of the equative gives two different readings, since denying the proposition exactly equal in height logically implies different in height, which is the disjunction of taller than and shorter than. On the other hand, denying the proposition at least as tall as (the disjunction of as tall as and taller than) logically implies only shorter than. The application of the negative logical operator to the nucleus of the proposition thus results in the introduction of ambiguity where previously there was none, and its removal where previously it was present. This phenomenon is a direct result of gradable antonyms being (triadic) contraries rather than (dyadic) contradictories.

Campbell and Wales (1969: 245ff) relate comparatives and equatives by means of five basic logico-semantic transformation operations: formal identity (I); negation (A); correlate of comparison (B) - this swops -er than for as as, and vice versa; nominal permutation (C); and polarity reversal (D). Apart from the first of these, any operation can be applied singly to a proposition and will effect a distinct change in meaning. This meaning-change can then be either modified or cancelled by applying one of the other operations to create a sentence equivalent in meaning to the first, thus preserving identity. Thus, for example, the relation of converseness can be shown
to consist in the application of two operations $C$ and $D$, transforming the comparative sentence *John is bigger than Bill* into *Bill is smaller than John*.

However, there is a difficulty here in that the equative allows certain operations where identity is preserved, whereas the comparative does not. We have just seen that applying operations $C$ and $D$ to a comparative sentence does not change meaning, whereas applying operation $C$ alone would effect a change. But consider what happens when operation $C$ alone is applied to the equative sentence: *John is as big as Bill* becomes *Bill is as big as John*. This does not seem to be a different assertion. If, however, we now apply operation $D$, *Bill is as small as John* is the result, and this is - at least as far as my intuitions are capable of judging - not identical with the meaning of the first equative. This observation is relevant to Campbell and Wales' analysis, since some of the sentences they class as synonymous might better be described as weakly equivalent in terms of unilateral implication. Among their sentences, *John is not bigger than Bill* is given as synonymous with *Bill is as big as John*, but not with *John is as big as Bill* or with *John is smaller than Bill*, and yet of these four sentences the second and third seem to be most closely related, and the fourth is consistent with one meaning of the first.

The question then is whether reversal of polarity in an equative sentence preserves logical equivalence or not. Is it ever the case that *John is as tall as Peter* = *John is as short as Peter*? It may well be that these are complex rather than simplex propositions. If we compare these equatives with a sentence such as *John and Peter are the same height*, we can see that something is lost in the paraphrase: in the equative sentences we see predicated not only the relationship of equality, but also what relation the arguments of the proposition *(John and Peter)*
bear to the norm-for-the-class. We shall return to this problem when discussing the difference between negation and negativity in Section 1.3.4.2., below. It is sufficient to note for the moment that lack of awareness of this as a problem has led to some rather peculiar pronounce-
ments in psycholinguistics. Clark and Card (1969 : 546) for example, state: "both the positive sentence, A is better than B, and the negative sentence, B isn't as good as A, mean 'A is greater than B in goodness'" but they proceed from this to claim of sentences like The pie is as good as the cake and The pie isn't as bad as the cake that "they are all at least partially synonymous" (sic).

As will be shown in 1.3.4.2., Clark and Card's initial claim is only apparently accurate, since they have failed to take into account the 'scope' variations of the negative operator. However, the fact that B isn't as good as A would most often be interpreted as implying A is better than B needs explaining, and such explanation can be given if a weaker form of implication is taken into account. Grice has proposed the term conversational implicature for this (Grice, 1975), and rules of implicature would allow the above difficulty to be resolved at the level of pragmatics.

Different linguistic expressions containing basic gradable adjectives like same, different, more and less can be further characterised in terms of the logical relations of symmetricality, reflexivity and transitivity (Donaldson and Wales, 1970 : 249; Lyons, 1977 : 153-154). All comparative and equative sentences may be treated as two-place pre-
dicators which may be regarded as relations. Symmetrical relations are those where the order of the name terms in the proposition may be reversed to yield a logically equivalent proposition.38 Thus X is married to Y is logically equivalent to Y is married to X. Reflexive relations are those where the terms are duplicate. Thus "being the same size as,"
exemplified by \( X \) is the same size as itself, is a reflexive relation (as well as being symmetrical). Transitive relations are those where the terms are ordered in such a way that if the relation holds between the first and second terms, and between the second and third, then it also holds between the first and third. An example is "taller than": if \( X \) is taller than \( Y \) and \( Y \) is taller than \( Z \), then \( X \) is taller than \( Z \).

According to Donaldson and Wales (1970: 249): same is symmetrical, reflexive and transitive; different is also symmetrical, but is irreflexive and intransitive; more and less are each symmetrical (sic), irreflexive and transitive.\(^{39}\) They therefore consider that more and less resemble each other more closely than same and different do. It will not have escaped attention that all comparative adjectives behave like more and less, while all equative adjective structures are like same.

The last aspect of logic to be mentioned here is the way the linguistic functions of gradable adjectives intersect with the rules of the logic of classes: "attribution" and "predication" can be distinguished from each other in the way the latter process seems to disturb entailment conditions which hold for other kinds of adjectives. A number of writers have illustrated the problem in various ways (Small, 1923: 9ff; Wells, 1954; Weinreich 1966; Vendler, 1968; Campbell and Wales 1969; Donaldson and Wales, 1970: 253-255; Bierwisch, 1970a: 43-44; Chafe, 1970: 194ff; Leech, 1974: 109; and Kempson, 1977: 84ff).

When a gradable adjective is used predicatively in a sentence used to express a simple proposition, both the argument and the predicate of the proposition interact in subtle ways. If the property that is attributed to an entity is gradable, the adjective representing the predicate of the proposition will have a variable interpretation. To use Small's (1923) examples, high represents a different extent according to whether we say The mountain is high or The grass is high. Similarly with the superlative adjective form: the size of the largest cat and the largest
elephant is not the same. The meaning of the gradable adjective depends on the class of referents represented by the noun in each case (Cf. Kempson, 1977: 84ff, who makes similar observations in regard to hot and old). Notice that the point of Small's examples is valid irrespective of whether the adjectives are attributive or predicative. Another interesting aspect of the problem, however, has been indicated by Wells (1954: 127) and Weinreich (1966: 422), who point out that gradable antonyms can occur in sentences like A small elephant is big without giving rise to logical contradiction, the reason being that "the terms big and small, although mutually contradictory, are not simply predicated of a single entity, elephant" (Weinreich, 1966: 422-3). What seems to be involved is a predication across the class boundaries of the argument-term of the proposition.

We can see this more clearly in Bierwisch's (1970a: 43) and Leech's (1969: 37; 1974: 109) discussion of the same point. Bierwisch points out that Towers are high is paraphrased as Towers are high for buildings, while These towers are high is paraphrased by These towers are high for towers. Leech (1969: 37) specifies that the problem is one of implication and class-inclusion, putting the problem the other way around: Small animals need protection does not entail Small elephants need protection. Although most of the examples used in the discussions are ones containing size adjectives, it seems that this phenomenon is not limited to them, although it may be limited to adjectives denoting physically perceptible phenomena: one might compare heavy feather and heavy object, loud whisper and loud sound, with intelligent moron and intelligent person in this respect. As far as can be ascertained, no one has explored the full extent of this phenomenon, which can be explained either in logical terms as the difference between universal and existential quantification, or in linguistic terms as the difference...
between generic and non-generic noun phrases and their involvement in relations of lexical hyponymy (which will be touched on in 1.3.4.2.).

Leech says:

The explanation is clearly that if the norm for the sub-species is different from that for the species as a whole, there is no guarantee that the hyponymic relationship is maintained.

(Leech, 1974: 109).

This explains why Xerxes is an adult alsation entails Xerxes is an adult dog while Xerxes is a small alsation does not entail Xerxes is a small dog.

Bierwisch and Chafe attempt an explanation of the phenomenon via the distinction between generic and non-generic noun-phrases. Bierwisch (1970a: 43-44) says the norm for comparison must be provided by "the average elements of a certain class. This class is that of the subject NP if it is not generic; it is the next larger class, i.e. the genus proximum, if the NP is generic" (Ibid.).

Chafe says:

It would be contradictory to say that all members of a class have a certain quality which is defined as exceeding the norm for the members of that same class - that elephants are big with respect to the norm for elephants, for example. Whenever such a situation would otherwise exist, apparently there is an automatic conceptual switch by which the norm is shifted to that established by the higher taxonomic unit.

(Chafe, 1970: 194-195)

Thus it is in some cases a matter of pragmatic interpretation whether a sentence is taken to refer to all or only to some member(s) of a given class: compare Chafe's c and d examples, below:

a. An elephant is big  
   b. Elephants are big  
   c. The elephant is big  
   d. The elephants are big  

   generic | for an animal  
   non-generic | for elephants

An interesting point with both Chafe's and Bierwisch's discussion is that their examples are chosen from areas of vocabulary where there
is a relation of noun to superordinate (or of one class included in
another larger one), so that the posited norm-shift, however this is
calculated, can take place. But what happens when the noun or
noun-phrase has no superordinate? How, for example, does one interpret
Mountains are big or Galaxies are big? One might suggest a very general
and semantically almost empty term such as things as superordinate (not
very different from quasi-hyponymy, suggested by Lyons, 1977: 298. See
subsection 1.3.4.2.), but then there is no reason why things should not
replace animals in Chafe's example 6 above, or buildings in Bierwisch's
element, given earlier. The alternative to this would be to accommodate
the nouns that do not have superordinates by some other means, such as
by suggesting that in the generic types of sentence the use of a gradable
adjective - such as big - refers to an attribute in some absolute sense
that would free it entirely from any class of referents. As will be seen
in Chapter 6, something like this does seem to be reasonable for size
adjectives which are more specialised than big. There are also good
grounds for suggesting that predicative big (and other gradable adjectives)
may imply a norm which is the ego of the utterer of the sentence: i.e.
both Elephants are big and These elephants are big might be glossed as
big in relation to me. Such a suggestion flies in the face of much
current analysis, which assumes an adult's point of view and an adult
logic somehow 'disembedded' from the environment - to use Donaldson's
(1978) expression - and also without an evolutionary history relating it
to the earlier logical systems found in the child.

Yet it is a fact, as Nelson (1976) has demonstrated, that in early
child language adjective attribution and adjective predication are not
contemporary in evolution, as far as gradable adjectives are concerned:
predicative adjectives precede attributive, generally speaking, but
gradable adjectives such as size terms are found to be used almost exclusively
in attributive function, and to reach very high frequency with linguistic development (Nelson's child subjects were aged 24 to 30 months). Nelson makes the important point, however, that attributives can only be used to subdivide a known class of referents, but not to create new classes. Creation of new classes would be by means of predication, yet this is not the function which is performed by predicative adjectives in child language, according to Nelson: she says that when predicative uses are found in her sample, "The focus is on the particular referent without regard to others of its class" (Nelson, 1976: 26), and is more likely to relate to the action-schemas of the child (i.e. to some kind of ego-norm).

For a number of reasons children may fail to appreciate the logical peculiarities of gradable adjectives. The young language-learner may suppose them to have the same characteristics as other, non-gradable adjectives, for example, which are also used attributively. Alone the fact that many of the logical characteristics remain covert, so that the average person rarely has to pay explicit attention to them, may mean that even into adulthood there may be failure to perform competently on tasks involving such processes as syllogistic reasoning. We shall take up these points in more detail in sections 2.4. and 2.5.

1.3.4.2. Sense Relations

As a set of lexemes, gradable adjectives are relatable along a number of parameters that contribute to their overall sense. We shall here consider the three different kinds of norms which might underly gradable adjective predication; this will be followed by an examination of the relations of negation and negativity; polarity; and finally hyponymy, which will lead on to a critical discussion of the theory of neutralisation and so-called "marking" in semantics. All of these aspects of semantic structure have links with experiments in psychology and psycholinguistics,
either positive ones where semantic theory has provided testable hypotheses for empirical research, or negative ones where an inadequate understanding of the theory has led to experimental results which cannot very easily be integrated into the body of scientific knowledge.

In the preceding sub-section, the notion of a norm was introduced to account for certain logical properties of predication and attribution where gradable adjectives were involved. Leech, it should be noted, has suggested that three kinds of norm are in principle distinguishable: object-related; speaker-related; and role-related (Leech, 1974: 109-110).

The "object-related norm" derives from the same sort of observation as was made much earlier by Small (1923: 9ff), and mentioned in the preceding sub-section, namely that the meaning of some adjectives shifts with the object-class of which they are predicated. Leech provides an example in the difference between young man and young archbishop, where the gradable adjective young represents a different age in each case. It seems evident that many, if not all, gradable adjectives relating to various physical properties will be dependent on this kind of norm, which may or may not be lexicalised independently.

"Speaker-related norms" underlie certain evaluative types of gradable adjective such as good: bad, beautiful: ugly and kind: unkind. Leech says that in the case of such adjectives the rules of incompatibility are relaxed: it is not the case that x is beautiful is incompatible with x is ugly when the two sentences are uttered by different speakers, since then they could both be true. But nevertheless it is a contradiction to utter This beautiful city is ugly, since beauty and ugliness are "mutually exclusive to the extent that they cannot be predicated of the same object at the same time by the same person" (Leech, op. cit.).

Perhaps the least obvious of the three types is the "role-related norm" which occurs when the evaluative adjectives, used gradably, modify
a "function-noun". Examples are *good-bad* and *clever-stupid*, modifying nouns like *boss*. Thus the expression *a good boss* may make covert reference to either of the first types of norm or to this third type: it may mean "not only 'a boss who is good as bosses go' and 'a boss who is good according to Mr. X', but also 'a boss who is good at being a boss' " (Leech, *op. cit.* : 110).

It seems very likely that knowledge of the relevant norms to apply in each case will be acquired slowly as the language-learning child matures and attains to wider experience not only of his language but also of his environment, since situation is an important factor in construing norm-related adjectives of this kind. Indeed, one could imagine the norms as being relatively unstable or inconstant over time, as they are never made explicit for the language-learner and thus have to be intuited in fairly haphazard fashion.

Some general remarks have already been made, in section 1.2.2.2., concerning positive and negative, but it is now necessary to consider some more specific aspects of negation and negativity. The term *negation* will be used here to cover the syntactic use of *not* to explicitly transform an assertion into a denial by changing an affirmative sentence into a negative one. The term *negativity* will be used in a much looser way to refer to what might be termed "implicit negation", thus following to some extent the distinction made in Lyons (1968 : 445 ff) between explicit and implicit denial of a proposition.

In spite of the definition just given, negation is by no means a simple aspect of meaning, since the notion of "scope" is important in a consideration of negation as it applies to the use of gradable adjectives. Lyons (1977 : 772-773) has suggested a distinction between *predicative negation* and *nexus negation*, as types of propositional negation, according to whether the proposition is converted into its contradictory or its
contrary. This would provide a possible clarification of why sentences like John is not bigger than Mary are interpreted variously as implying either John is as big as Mary or John is smaller than Mary; the first interpretation would be the result of nexus negation, and the second the result of predicative negation: in the first case it is the subject-predicate link (-er than . . .) which is negated, and in the second it is the predication (big direction relative to Mary). Lyons remarks that the application of propositional negation to a gradable expression "will always tend to produce a contrary, rather than a contradictory, whether the language-system lexicalizes the contrary ( . . .) or not" (Lyons, op. cit. : 773). A related problem is that of the "scope" of the negative operator, where in the spoken language different stress patterns occur in the predicate according to what is being negated. We can see this particularly clearly with gradable adjectives modified by more and less in the comparative: Susan is not more interesting than Mary implies Susan is less interesting than Mary, while Susan is not more interesting than Mary implies some other adjective after more, including Susan is more boring than Mary, although there is possibly no necessity for the adjective to be an antonym.

There are three kinds of phenomena to be included as instances of negativity. The first of these is morphological. Many adjectives add "negative prefixes" such as un- or in- to their base form in order to provide a contrast term. Because of the regularity and apparent uniformity of the process, many linguists have assumed that all adjectives so derived were of uniform type, but this is not the case, since Lyons (1977 : 275) has demonstrated that the distinction of gradable versus ungradable still applies: married : unmarried are complementaries (i.e. ungradable), whereas friendly : unfriendly are antonyms (i.e. gradable). Morphological negativity is quite close to negation in the case of the
first type of adjective, but not in the case of the second: only in the first case does the negation of either adjective imply the assertion of the other. (We have already dealt with this in subsection 1.3.4.1.)

The second kind of negativity is concerned with what is usually termed polarity: Sapir (1949) used the term "polar", as does Leech (1974: 106 ff); Osgood and Richards (1973), Lehrer (1974: 27) and Lyons (1977: 275) indicate a number of features of "polarity"; while Deese (1962, 1964) talks of the associative meanings of gradable antonyms being structured into "bi-polar" continua, and Malkiel (1959: 343-344) describes the phenomenon of "lexical polarization". Although positive and negative polarity corresponds somewhat to the morphological features just described for adjectives, the two phenomena are nevertheless distinct, since there are a number of morphologically unrelated pairs of English adjectives which are related through polarity. One can for instance contrast friendly with unfriendly and hostile in this respect.47

A third aspect of negativity is that of ordering: Malkiel (1959) has pointed out that in ordered pairs of what he terms "irreversible binomials" there is a correlation between privilege of occurrence and polarity, in that positive polarity items generally occur first, because they represent "the stronger of two polarized traits". Malkiel describes the process as follows:

. . . there develops a tendency for one of the two contrasted features to assume the status of a basic or positive trait and for its opposite to signal the lack of that trait, i.e. a reversal of the normal situation.

(Malkiel, 1959: 343-44)

[Lyons has suggested that this can be extended to pairs like man and woman, parent and child (Lyons 1977: 276), on the basis of "a hierarchy of semantic preference". Osgood and Richards (1973) have also illustrated in depth the principle that polarity is not confined to adjectives.]

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It must be evident, from what has just been said, that while polarity might logically be treated as a phenomenon of balance between equals, linguistically there is imbalance in favour of the positive pole of an opposition, an imbalance which is not confined to privileges of ordering. Linguists have been aware of a number of other features of polarity for some time, although these have not always been clearly expounded. Malkiel, in the passage just quoted, speaks of the negative polaritem of a pair as lacking a particular trait, and a number of linguists have tried to characterise negative polarity generally in these terms.

Lehrer, for example, talking of the difference between large and small, comments: "We tend to say that small things 'lack size' rather than that large things 'lack smallness'" (Lehrer, 1974 : 27), and Lyons in similar vein (1977 : 275) remarks: "We tend to say that small things lack size, that what is required is less height, and so on, rather than that large things lack smallness and that what is required is more lowness." H. Clark (1970b : 270), discussing long and short, claims: "long indicates the presence of an attribute, and short its absence." Bresnan (1973 : 334) suggests that adjectives like short are "privative"49, on the grounds that they do not admit modifiers of definite measurement: she rejects five feet short as ungrammatical. Yet this rejection is erroneous, although the assumption of ungrammaticality has been often made (e.g. in Teller, 1969 : 199; in Donaldson and Wales, 1970: 255; and in H.H. Clark, 1976: 83, who comments: "Thus two feet long is acceptable, whereas two feet short is not." The same sort of statement is made, with regard to short used for time, in Clark and Clark, 1977: 427.).

Surely what short means, when used in this way in such cases, is "lacking", so that what is absent is quantified, not what is present in the situation. Thus both the following are grammatical and semantically
well-formed:

This (short) ladder is six feet long.
and
This (long) ladder is six feet short.\textsuperscript{50}

It is clear that both utterances do not have the same privilege of occurrence, but this is surely not the point. What is important is that short is ambiguous in a way that long is not, since when unquantified it refers to physical extent which is present, and when quantified it refers to extent which is absent.\textsuperscript{51} This point will be taken up in the argument of the concluding chapter, where it will be shown that we need to take into account psychological theories of figure-and-ground relationships if an explicit theory of the semantics of size adjectives is to be constructed.

Although some of the above formulations are clearly open to criticism, the underlying observation is accurate, namely that in a number of cases pairs of gradable antonyms exhibit asymmetry in that the so-called positive polarity term appears to have a double function. It can either name a whole dimension or, where it stands in contrast with the negative polarity term, name only the positive part of the dimension beyond the norm. These two functions have been variously characterised as neutral versus contrastive (H. Clark, 1970a) or nominal and contrastive (H. Clark, 1970b), as well as neutral and specific (Flores d'Arcais, 1970); they also underly Lamb's distinction between generic category lexemes and portmanteau representations (Lamb, 1964), and Vendler's (1968: 95-96) discussion of the dominance of the "excess side" of a gradable opposition, in which he concludes: "to say something is short is to indicate length, to say that something is narrow is to indicate width, and so on" (Ibid.).

In an earlier discussion of this asymmetry, Lyons suggested that it be characterised in terms of the neutralization\textsuperscript{52} of the sense-relation of hyponymy that holds between pairs of gradable antonyms such
as long-short, wide-narrow, etc. (Lyons, 1963). At one level there is a directional (i.e. polar) contrast within each pair, but at a higher level this contrast is neutralized so that long contrasts with wide instead of with short. At this level, the level of superordinates, polarity distinctions disappear, and what was previously a positive polarity adjective now names the whole dimension. Thus long and short are co-hyponyms of the neutralized superordinate term long, and so on.

Campbell and Wales (1970) and Wales and Campbell (1970) have attempted to extend the scope of this notion of hyponymy by pointing out that the adjective pair big-small (or big-wee) stand in a peculiar relation to other, more specialised pairs of dimensional antonyms (tall-short, fat-thin, long-short, etc.): "Although the relation between each of tall, fat, long, etc. and big is not strictly one of hyponymy it has similar properties, since the range of application of these terms is smaller than that of big and the range of application of big overlaps with each of their ranges" (Campbell and Wales, 1970: 259).

More recently, Lyons has proposed a sense-relation of quasi-hyponymy which holds between lexical items of different classes; for example, there is no adjective which is superordinate to round, square and oblong, but there is a noun, shape. A number of subclasses of adjective exhibit the same sort of paradigmatic deficiency: amongst them "those denoting differences of shape, texture, taste, sound, age, size, state of mind, etc." (Lyons, 1977: 298). This suggests that adjectives like big and small are quasi-hyponyms of size; long and short quasi-hyponyms of length, etc., so that the superordinate lexeme is different from that in the relation of true hyponymy (viz. size instead of big; length instead of long; etc.). The structural relation of quasi-hyponymy has the advantage of encompassing a greater number of gradable antonyms, and might also help to prevent confusion which has arisen as a
result of an attempt to use the distinction marked-unmarked to characterise the asymmetry in the semantic structure of these sorts of adjective pairs.


The reason why so many scholars following Greenberg have interpreted the marked-unmarked distinction so variously, and, for our purposes, so confusingly, can be found in his original (1966) discussion, in the course of which the definitional criteria for the categories of marked and unmarked are changed twice, and the levels of linguistic analysis to which the categories are applied are not always made clear.

Generally, Greenberg treats of phonology, grammar and semantics, in that order (grammar presumably including syntax and morphology, but not semantics, then), but the distinction between marked and unmarked categories shifts in disturbing ways as the discussion progresses. The
first attested use of the terms was in phonology in the work of Trubetzkoy (1931: 97; and later, 1939), and Jakobson first explicitly extended their use to grammatical categories (Jakobson, 1932), and subsequently to semantics. We shall not go into this in detail. It is sufficient to note that in Prague School phonology, marked features were always positive and denoted the presence of something, while unmarked features denoted the absence of something, namely the component that made the marked feature such: compare nasal versus non-nasal, aspirate versus non-aspirate. But when the definition was reformulated later by Jakobson (1957: 5), there occurred an important shift in emphasis:

The general meaning of a marked category states the presence of a certain property A; the general meaning of the corresponding unmarked category states nothing about the presence of A and is used chiefly but not exclusively to indicate the absence of A. 54

There are thus now two functions possible for the unmarked category, but only one for the marked.

Greenberg indicates that there is a connection between the two definitions of markedness in that Zipf's (1949) principle of least effort would predict that if the unmarked category contained fewer features it should be more frequent in occurrence than the corresponding marked category. Greenberg's implicit proposal in most of his discussion of marking is therefore that the marked category of an opposition should be the one which occurs less frequently. It is difficult to see how this proposal is a helpful one, however, since it leads to a number of seemingly contradictory statements about the characteristics of marked-unmarked oppositions at different levels of linguistic analysis.

Thus on the basis of frequency alone, man is unmarked with respect to woman, author with respect of authoress, and "absolute" (base-form) adjectives with respect to their comparative and superlative forms.
Greenberg's discussion at this point becomes unclear (op. cit.: 72-73), since he introduces the idea of morphological marking in connection with the last two examples: authoress is formed from author by suffixation; base forms of adjectives are said to have "no overt mark" (op. cit.: 73), while comparatives and superlatives are formed by suffixing -er and -est. A further contradiction occurs in Greenberg's later assertion (op. cit.: 74), with regard to inflectional categories (morphology?), that "The marked category may simply lack certain categories present in the unmarked category" (sic). This observation is difficult to reconcile with either of the two definitions he starts with, since it flatly contradicts them both.

Several of Greenberg's statements have a direct bearing on the subject of the present study. For example, he notes (op. cit.: 82) that normal size is unmarked with respect to diminutive or augmentative, which appear in the grammatical categories of some languages as cases or genders: "In European languages normal size, the unmarked member, always has zero expression". However, this appears to conflict with a later statement (Greenberg, 1966: 90) that among adjectival opposites (i.e. gradable antonyms) such as long-short, wide-narrow, deep-shallow, etc., "the first member is unmarked and the second marked." Again, it is only the criterion of frequency which could allow the statements to be non-contradictory, but what follows seems to belie this possibility: "It is noteworthy that in English contextual neutralization occurs with these terms and it is the unmarked member which appears, e.g. What is its width? How wide is it? not What is its narrowness? How narrow is it? Further examples are how good, how many, how long, how deep" (ibid.)

It is perhaps not surprising that subsequent use of the terms marked and unmarked by linguists and psycholinguists has been confused. Greenberg himself virtually admits that the frequency criterion is perhaps inadequate.
as a heuristic device:

If it turns out that in fact frequency is an adequate unifying principle for the domain of the marked and the unmarked in semantics and grammar, a great over-all simplification will have been achieved. But frequency is itself a symptom and the consistent relative frequency relations which appear to hold for lexical items and grammatical categories are themselves in need of explanation. Such explanations will not, in all probability, arise from a single principle. Thus it may be noted that in adjectival opposites where a theoretical scale with an implied zero point is unmarked, e.g. heavy, large, wide, deep, etc., there is obviously a unifying principle but it will not even apply to all adjectival opposites, e.g. good/bad, and is irrelevant in a host of other examples. Again the center of a normal frequency distribution is unmarked in relation to the extremes, e.g. normal size as against diminutive or augmentative.

(Greenberg, 1966:100)

A more careful treatment of marked and unmarked is given in Lyons (1968:79-80), who suggests generality of sense, and distribution rather than frequency, as indicators of the unmarked category of linguistic unit. He describes the marked category as positive, and the unmarked category as neutral rather than negative, although he also includes the earlier (Prague School) definition that "in a given context the presence of a particular unit is in contrast with its absence" (Lyons, op. cit.:79). He indicates three areas of application for the distinction: phonology (op. cit:126) morphology and semantics. The difference between morphological and semantic marking is that in the latter "the marked and unmarked members of a contrasting pair are not necessarily distinguished by the presence and absence of a particular overt unit" (Lyons 1968:79). His examples of semantic marking are dog (unmarked) and bitch (marked), and in the course of his discussion of the distinction between these he introduces the notion of the double function of the unmarked term, of which he says "(it) has a more general sense, neutral with respect to a
certain contrast; its more specific negative sense is derivative and secondary, being a consequence of its contextual opposition with the positive (non-neutral) term" (Ibid.). It is notable that in the particular case of dog : bitch it is the unmarked term only which may be syntagmatically modified by male and female without semantic anomaly thereby arising.

Lyons has since pointed out (Lyons, 1970 : 17) that although morphologically marked forms of lexical items are generally also semantically marked, the two types of marking are in principle independent of one another. He has developed this point further in Lyons (1977 : 305-311), and indicated three types of marking which are relevant for the analysis of lexical structure: formal marking, distributional marking, and semantic marking, all of which are in principle distinguishable. Formal marking arises as a result of morphological processes like affixation; distributional marking is determined by the inability of one of a pair of terms to occur in neutralizing contexts; and semantic marking concerns the sense-relations between lexemes which make one member of a pair more specific than the other.

Thus adjectives which are gradable antonyms are examples of pairs of lexemes which can exhibit marking of various kinds. Bad and low are distributionally marked but formally not marked with respect to good and high, whereas an adjective like unfriendly is both formally and distributionally marked in relation to friendly.

Two further points to note are that almost all semantically marked lexemes are distributionally marked, whereas the reverse is not always the case; and semantic marking is a more-or-less affair, rather than an either-or disjunction. The first point can be illustrated as follows: accepting that big is semantically and distributionally unmarked with respect to small, and dog stands in the same relation to bitch, Lyons says — 34 —
"X has a dog can be uttered to make a true statement whether the animal referred to is male or female. But the proposition expressed by uttering X has bought a big house would be generally regarded as false if the house was in fact small rather than large in relation to the relevant norm" (Lyons, 1977:307). There thus seem to be certain contexts where the 'unmarked' term will always be interpreted in its specific, contrastive sense. The second point made by Lyons is that the semantic marked-unmarked distinction can vary in extent of occurrence, the unmarked term having a relatively wide or restricted field of application according to social priorities which are enshrined and reflected in the original marked-unmarked opposition. Some unmarked terms occur in a large variety of neutral contexts, others only in a few.

The implications of the last observation for the present study can be seen especially in connection with one particular 'test' which has appealed to a number of linguists as an effective way of determining which of a pair of gradable antonyms is unmarked: this has been referred to (in footnote 57) as the "How-question", which asks for quantification in the case of gradable adjectives. The test seems to derive from a remark made in Sapir (1949:127), already quoted in section 1.2.2.5., where he specifically links good to quality, far to distance, and much to quantity. Greenberg, in the passage quoted earlier (page 64) in this chapter, makes the same sort of link (Greenberg, 1966:90). Since then a goodly few repetitions, albeit with varying emphases, have appeared elsewhere: in Lamb (1964:69; 1970:73), Rommetveit (1968:119), Vendler (1968:95-96), H. Clark and Card (1969:545), H. Clark (1969b:206; 1970b:270-271; and 1976:83), Chafe (1970:134), Flores d'Arcais (1970:310-11), Givon (1970:817), Lyons (1968:466; 1977:275), E. Clark (1974:120), Ljung (1974:75), Higgins (1976:204) and Clark and Clark (1977:427).
Lamb's (1964: 69) is typical of the kinds of statement that have been made: "If the speaker of English asks about the size of an object and does not know whether it is big or little he says 'how big is it?' not, 'how little is it?' He does not say 'how little is it?' unless he already knows that it is little. In other words, little is the marked term while big is unmarked. By applying the same test we may determine that small is marked while large is unmarked, low is marked while high is unmarked, near is marked while far is unmarked." Rommetveit (op. cit.) adds long (unmarked) and short (marked) to this list; the pairs thick: thin, heavy: light and wide: narrow can be added from Vendler (op. cit.), and good: bad from Clark and Card (1969: 545), Lyons (1977: 275) and Higgins (1976: 204). Clark and Card (op. cit.) is problematic in the sense that they claim the following pairs as unmarked: marked and imply that the decision is made on the basis of the How-question test: happy: sad, hot: cold, clean: dirty, and pretty: ugly, amongst others. Yet it is difficult to see how these adjectives meet the test at all, and even good: bad seem dubious in this respect, especially in view of Clark and Card's comment (Ibid.) that "the name of the good: bad scale is goodness, not badness." 60 In spite of Clark's frequent repetitions of this statement (e.g. H. Clark, 1976: 83), it is not easy to accept that scalar properties underly such an opposition. Even where scalar properties might be said to underlie an opposition, as say with hot: cold, it is impossible to decide that hot is unmarked, since there seem to be pragmatic problems of presupposition inherent in the nominal with which it occurs. Whereas How hot is the fire? appears superficially to give hot the status of unmarked (Cf. How cold is the fire?, which is definitely odd), it can be seen that the acceptability depends on the nominal, since when this is changed the test is a failure: compare How hot is the ice? with How cold is the ice? 61
Ljung (1974) has attempted to solve this kind of difficulty by suggesting that the unmarked-marked opposition may in fact be cyclical in nature, with the marked adjective itself becoming unmarked in certain contexts where 'contextual scope' (op. cit. : 78) demands it: "Thus, given to understand that some set of objects should be regarded as short rather than long, a speaker of English might ask How short is it? with regard to a particular object. It is clear that, underlying short in this question, we have not unmarked length with a negative quantifier, but the normally marked noun shortness which is, for the occasion, treated as unmarked" (Ljung, 1974 : 86). Ljung arrives at this conclusion apparently as a result of developing an earlier observation by Lyons (1968 : 466-467), who suggests that How-questions themselves are to be differentiated, depending on stress and intonation, into 'marked' and 'unmarked' types. Lyons claims that when the word How is stressed, the question is 'marked', and:

The 'marked' questions How big is it? and How small is it? carry with them the presupposition that the object in question has already been placed towards one end of the scale rather than the other, and seek further specification of the place of the object on the scale relative to the 'size norm'.

(Lyons, 1968 : 467)

There are several problems with this analysis. Note that Lyons' original remarks on How-questions do not specify where stress will be allocated in the 'unmarked' question. But in what sense can the How-question be 'marked'? It seems likely that what Lyons is alluding to is another kind of markedness, namely that of information focus. This has been discussed by Halliday (1967 : 38 ff) in connection with information point and neutral and marked tonicity.62

According to Halliday, unmarked information focus will occur in a
spoken utterance when the tonic falls on the last salient syllable in
the tone group - and this will be a "lexical" or "content" word rather
than a function word, i.e. a noun or a verb or adjective. Thus, to take
Lyons' example from above, How **big** is it? would have unmarked information
focus, whereas How **big** is it (or even How **big is it**) would have marked
information focus. However, Ljung in his discussion of marking combines
the examples from the above Lyons passage with something that precedes
them in Lyons' discussion (Lyons, 1968 : 466), so that the test sentence
is no longer How . . . is it? but How . . . is the house? (Ljung, 1974 : 75), and this introduces a difficulty of which Ljung seems unaware, namely
that the 'unmarked' information focus should have house as tonic, instead
of the salient syllable of the adjective. This leads him into a number
of contradictions regarding the marked-unmarked distinction among gradable
antonyms; for instance:

The unmarked forms typically occur in certain
characteristic syntactic constructions, e.g. how-
questions with weak stress on how. Thus a question
like How **big** is the house? is unmarked, i.e. it pre-
supposes nothing about the size of the house in
question. But a question with a negative adjective,
e.g. How **small** is the house? does presuppose something
about the size of the house, viz. that it falls below
a certain norm attributed by the speaker to houses in
general.

(Ljung, 1974 : 74-75)

Comparing this with Ljung's later comment following the passage previously
quoted: " . . . how-questions with primary stress on the adjective can
contain only unmarked adjectives . . . " (Ljung, 1974 : 86), one cannot
fail to note a certain confusion. It looks as if Ljung has unwittingly
confused marking of information focus - which one might term "pragmatic
marking" - with semantic marking, in consequence of which he is led on
to make such proposals as that beautiful and fleshy be treated as un-
marked with regard to ugly and skinny.
It can already be seen that the notion of marking is far from being a precisely defined and workable scientific concept, and not all aspects of this problem have been considered.

In particular, we have not examined the nature of the How-question itself. No one seems to have thought it important to ask what sort of answer is demanded when this question is used with a gradable antonymic adjective, and yet the pragmatic implications are quite important.

In terms of function, How-questions seem to be confounded with (a) How-exclamations (e.g. How big it is!) where How is a degree emphaser of some sort (Cf. Quirk and Greenbaum, 1973 : 132-133) and where the adjective is prominently stressed in spoken utterances; and (b) How used with full verbs (as in How did you arrive?), where it functions as a manner adverbial. Yet it seems that its function with gradable adjectives is limited to requests for quantification, and so it only occurs with those adjectives which could be said to represent numeric or scalar properties. Quirk and Greenbaum (op. cit.) have touched on this aspect of use, but not explored it in detail. A second area of difficulty is associated with what is referred to as presupposition by Lyons, in the passage quoted earlier (Lyons, 1968 : 467). The nature of both the so-called 'unmarked' and 'marked' adjectives in pairs of gradable antonyms is far from clear. One of the arguments for calling adjectives like big, long, high, wide etc. 'unmarked' is that when they occur in questions with unstressed How they can be answered by utterances containing either the positive or the negative polar term of the gradable opposition, e.g.

Question: How big is it?  Answer: (i) It is very big  (ii) It is very small

(Cf. Sapir, 1949 : 127, quoted in section 12.2.5., earlier)

No one has adduced any empirical evidence in support of this analysis, which seems to be a product of wishful thinking and the confusion of
function just referred to. Anecdotal evidence (end of 1.2.2.5.) suggests that native speakers never consider using *small* in answer to such *how*-questions. This is not to say that answers are always of the same type, for in fact there are two categories of answer, namely, quantified and unquantified. Asking *How big is your house/flat?* for example, produces the following answers:

(i) **Quantified:**
- a. It has six rooms and a bathroom
- b. It's got a floor area of ninety-six square metres.

(ii) **Unquantified:**
- a. It's quite big.
- b. It's not very big.
- c. It's not as big as all that.

In this particular case the quantified answer is far more frequent than the unquantified type, which suggests that *how* in this case is being interpreted as a request for quantification. This would mean that it would be difficult, if not impossible, to generalise the *how*-question test beyond adjectives which denote scalar properties. One can postulate indirect quantification in such cases (e.g. Question: *How beautiful is she?* Answer: She's won four contests, if that's what you mean).

The *big : small* opposition is almost unique in that it can occur in contexts where one, two or three dimensions are referred to. It is therefore questionable whether anything said about such an opposition in terms of marking will necessarily be generalisable. In particular, the fact that one does not say *how small is it?* without presupposing that "it" is smaller-than-the-norm for the object-class to which "it" belongs, may be idiosyncratic to *small* itself rather than a characteristic of 'marked' adjectives as a whole. Certainly for reasons which we have already discussed earlier in this section, one may ask *how short is it?* or even for that matter *how short is it?* - without committing oneself to the belief that the object "it" is shorter-than-the-norm for the
object class as a whole. There is not space to go into this here, but a consideration of such problems can lead to a possibly better analysis: see Chapter 6.

The situation, confusing as it is, becomes even more confusing when some of the applied aspects of semantic theory are considered. Thus Clark (1969b : 206) combines a Chomskyan T-G analysis of the comparative structure with the notion of marking, to arrive at the statement that the inflected comparative forms of gradable adjectives - which it will be remembered are complementaries rather than antonyms - are also to be treated as unmarked/marked; for example, of good : bad, Clark says:

Good, the so-called unmarked member of the pair, can be neutralized in some contexts, as in "How good was the movie?", whereas bad, the marked term, cannot. Good, but not bad, can be neutralized in comparatives: "John is better than Pete" can mean that John and Pete are only being compared evaluatively, although "Pete is worse than John" presumes Pete and John to be bad.

(H. Clark, 1969b : 206)

Clark has repeated this assertion several times elsewhere (e.g. H. Clark 1970b : 272-273, where he proposes the same analysis for longer-shorter and more-less; H. Clark, 1976 : 82 ff., where he discusses the "Principle of Lexical Marking" in the "underlying adjectives" of the Comparative; most recently, the analysis has been reiterated in Clark and Clark, 1977 : 455), but this has not reduced the confusion, and other psycholinguists have followed his lead in referring to adjective forms like better, longer, wider, etc. as 'unmarked', and worse, shorter, and also narrower as 'marked', although this goes well beyond anything in linguistic theory (Cf. Kuczaj and Lederberg, 1977; Townsend, 1976).63

Moreover, the experimental findings which Clark claims support his view of marking can be explained equally well if not better by other facts of linguistic and logical structure (See section 2.4. and following).
It is impossible not to agree with Lyons' (1977:311) description of marking as "a complex and controversial subject" and accept his suggestion that perhaps it would be better to restrict the terms 'marked' and 'unmarked' to formally related lexemes and thus avoid much of the confusion that has arisen recently over the use of these terms (Lyons, 1977:306).

The sense-relation of quasi-hyponymy (Lyons, 1977:298), introduced at the beginning of the discussion on marking, has not escaped the attention of other linguists, although it is characterised quite differently, and Givon (1970) has actually gone so far as to propose that gradable adjectives be treated as derived from, or "based upon"quality nouns in deep structure, his reason for doing so being that relatively few of the stock of adjectives in the vocabulary of English are morphologically original (i.e. overtly underived from nouns or verbs), and that even these few are defined in Webster's new international dictionary by means of what he calls "quality nouns". His claim is that adjectives are not semantic primitives, while nouns and verbs are, and he suggests a relational rule of the following form:

$$\text{be - ADJECTIVE} = \text{have - QUALITY}$$

(Givon, 1970:821)

There are a number of obvious criticisms of this approach. Firstly, the form of rule which he gives is presumably an equivalence or paraphrase, rather than an implication or entailment, since he does not explain what the sign = is meant to represent (Elsewhere in his discussion he uses + and - in a similarly imprecise way). If this is the case, then the rule is statable in both directions, and so the notion of derivation must be rejected. Secondly, in the majority of instances Givon cites, including dimensional adjectives like long, high, wide, etc. the synchronic analysis which he suggests is not motivated morphologically, nor is it supported by the diachronic facts as we know them, since the "quality nouns" which
are supposed to underlie these adjectives are not only morphologically derived from them, but also post-date them historically as regards entry into the language system.

Ljung (1974: 85) has attempted to counter this objection by maintaining that morphologically complex linguistic items may very well represent semantic primes. He sees a parallel between what he terms "antonymous adjectives" (long: short, big: small, old: young, etc.) and adjectives derived (by which he seems to mean morphologically derived) from various "inalienable nouns" (fleshy, chesty, leggy, etc.) and he therefore concludes that "since inalienable nouns refer to entities or properties which are all supposed to be inherently possessed by their owners, the parallelism between the two types of adjectives lends considerable support to the claim that antonymous adjectives must all be derived from nouns regarded as inherent possessions" (Ljung, 1974: 84). He then goes on to state his "principle of antonymy" in terms of antonymous adjectives being derived from noun bases. In support of this decision, and Givon's, to consider nouns as "primitives", Ljung points out that "many nouns connected with antonymous adjectives, e.g. age, size, speed, are not morphologically complex, and (......) the derivational process involved in these cases could just as well be one of adjectivization as of nominalization" (Ljung, 1974: 85).

Both Givon's and Ljung's categories of noun and verb, moreover, are claimed to be "deep" categories, and yet the discussion of the relations between them and adjectives is pursued in "surface" terms, resulting in a confusion of levels which is somewhat perplexing. While it is undeniable that there is a strong relationship between dimensional adjectives and their corresponding "quality nouns", the desire to "derive" the former from the latter, semantically, overlooks the logical-relational character of the adjectives. Lyons has pointed out (Lyons, 1977: 439 ff)
that the most characteristic adjectives denote "first-order properties", whereas the most characteristic nouns denote "first-order entities". In simple propositions, nouns will represent the argument terms, and adjectives the predicate terms. However, "quality nouns" represent second- or third-order entities, and would appear as "embedded predication" functioning as arguments in complex (i.e. higher-level) predications (Leech, 1974: 134 ff.) whereas the adjectives which are supposed to derive from them are only first-order properties, and in terms of a predicate calculus, therefore, simpler (Cf. Lyons, 1977: 429 ff., further).

The proposal to derive gradable adjectives from "quality nouns" - which can be seen as a further development of Vendler's (1968) work - must be rejected, it seems. However, this is not to deny the existence of some kind of unordered structural relationship. Indeed, a number of linguists have drawn attention to the fact that logical names and predicates, which typically are represented in the surface structure of linguistic utterances as nouns and verbs, or nouns and adjectives, cannot be separately analysed without certain information - conveyed by the fact of their association in the utterance - being lost. Weinreich has shown (Weinreich, 1966: 419 ff.) that a statement used to express a proposition is more than the sum of its parts, and postulates "transfer features" which would account for this. Bierwisch, examining the functions of "markers" and "features" in extended-standard theory (i.e. interpretive)
semantics, remarks of gradable dimensional adjectives:

... the extensions introduced so far (...) must occur not only in the adjectives which assign to them a certain value (e.g. greater than a certain average), but also in the reading of nouns which specify the dimensionality of the objects referred to.

(Bierwisch, 1970a : 44)

Similar conclusions have been arrived at independently by other scholars (e.g. Campbell and Wales, 1969 ; 232 ff.; Chomsky, 1965 : 160 ff; Hasan, 1971 : 140 ff).

The specific advantages and disadvantages of a componential approach to lexical meaning will be taken up in the section following.
1.3.4.3. Componential Analysis

A number of linguists have used methods of componential analysis in analysing relations of meaning within and among "lexical sets", and following Katz and Fodor (1963) have worked within a theoretical framework that assumes a transformational-generative model of grammar with a more or less autonomous semantic component (Bierwisch, 1967, 1969, 1970a and 1970b; Teller, 1969; Parisi and Antinucci, 1970; Givon, 1970; Dirven, 1976).

Componential analysis offers a formal linguistic means of explicating the notion of intensional meaning, the relations of sense that are found between lexical items, and as such it is an explicit formalisation of a much older notion in linguistics, namely de Saussure's valeur. In philosophical discussion there is a tradition of distinguishing between the extension and the intension of logical terms (cf. Carnap, 1956), extension normally being connected with reference to objects in the world, and thus with factual or synthetic truth of propositions, and intension being linked with relations within the logical system itself, the interdefinability of its postulates, and thus with logical (or analytic) truth. It is this second notion which componential analysis explores, by representing the meanings of lexical items as bundles of semantic components or "features" - a term seemingly chosen because of the acceptance and status of "distinctive features" in phonological theory (cf. Bolinger, 1965; Greenberg, 1966) - that are combined in the manner of the unions and intersections of set-theory.

There are a number of inherent limitations in componential analytic technique which we shall not consider here because they are only of indirect relevance to our subject and they have been more than adequately articulated elsewhere (cf. Bolinger, 1965; Burling, 1964; Bar-Hillel, 1970 : 186 ff.; Lyons, 1968 : 476 and 479 - 80; Kempson,
Rather, what we shall be concerned with is the aspects of the method which seem to have permeated psycholinguistic theory and influenced recent research into gradability. Firstly, we shall examine the theoretical definition of the terms component, feature and marker; secondly, we shall consider the status of these terms in the general theory of meaning and also language learning; and lastly, we shall consider methods of notation used in componential analysis, and particularly the set of distinctions isolated by Bierwisch (1967, 1970a and 1970b) and Teller (1969) in a componential analysis of gradable adjectives, particularly those relating to dimensions of physical size.

The term component is used with systematic ambiguity in recent discussions in semantics, due to the previous use of the term to describe the major functions of transformational-generative grammar. "The semantic component", in this sense, is on a par with the phonological and syntactic components that together provide a full structural description of the sentences of a language. But within the field of semantics the term more often has a limited character:

The components of the semantic level may be characterised as that sub-set of meaningful abstractions and relations whose meaningfulness can be determined language-internally . . . They are not replications of an extra-linguistic process, object or state, etc. but have to be seen as theoretical constructs, with no concrete existence.

(Hasan, 1971 : 135)

Concatenations of components are realised syncretically in the case of most lexical items, but sentences realise sets of semantic components discretely (Hasan, 1971 : 143). A word, then, can be characterised as realising a bundle of more fundamental sense-elements, and these sense elements are semantic components.71

Katz, however, characterises components in the following way:
semantic theory provides a grammar with two things, a **dictionary**, in which the senses of lexical items are represented, and a set of **projection rules** for combining these into sentences. Amongst other things, the dictionary gives for each lexical item a finite set of **lexical readings** which exhaustively represent the senses of the item. This is where we find components, since a lexical reading consists of a set of semantic markers that represent the conceptual components which make up one sense of the item, then, optionally, a distinguisher that serves to divide senses of lexical items for which there is no systematic conceptual distinction in the language (Katz, 1967: 127). Thus "conceptual components" seem to be identical with **markers**, in the sense that **markers** is the theoretical term used to refer to them; and they are severally implicated in constituting the sense of a lexical item.

It will be noted that Hasan is extremely careful to avoid the trap of "conceptualism" (Lyons, 1977: 112) in her definition of semantic components; but Katz is not. Indeed, he explicitly states that semantic markers are to be thought of as "theoretical constructs introduced into semantic theory to designate language invariant but language linked components of a conceptual system that is part of the cognitive structure of the human mind.", and "A semantic marker is a theoretical term that designates a class of equivalent concepts or ideas" (Katz, 1967: 129). This claim, together with the earlier statements made by Katz and Fodor (1963) -

> The distinction between the dictionary and the rules for its application corresponds, in psychological terms, to a difference between mental processes. The dictionary is something that the speaker learns item by item, more or less by rote, and is constantly learning more of. Knowledge of the rules for applying the dictionary, on the other hand, is gained early and in toto, and comes into play whenever a speaker uses his language.

*(Op. cit.: 183, fn. 14)*

- has understandably provided an attractive theoretical basis for some
recent developments in psycholinguistic research, which will be
examined in section 2.4, and following sections, later.

It is sufficient to note here, though, that the notion of what
semantic components and semantic features are, and what relation they
bear to markers, is far from being a matter of great clarity. Leech
(1969 : 20, and 1974 : 124) uses "components" and "features" as
equivalent terms. Weinreich (1966 : 417 - 418) subordinates features to
components, since each lexical entry in the dictionary of his semantic
theory has three components (phonological, grammatical and semantic),
the last of which is a set of semantic features. Givon (1970) uses
"marker" and "feature" interchangeably, apparently with the same sense,
to refer to a single semantic component rather than a set of them; and
Greenberg (1966 : 92) specifies: "For lexical items . . . the features
correspond to the components of contemporary componential analysis".
The work of Bierwisch is problematic, too, since his use of the terms
mentioned has changed with time. There is an implication in Bierwisch
(1967 : 16) that feature is not being used in quite the same sense as
marker, although he earlier assumes the theoretical position outlined
in Katz and Fodor (1963) as the basis for his discussion. The relation
between "components" and "concepts" and markers also seems to differ
from the Katz (1967) formulation cited above, to judge from Bierwisch's
comment:

The idea of innate basic elements of the semantic
structure [i.e. semantic markers: M.E.] does not
entail a biological determination of concepts or
meanings in a given language, but only of their ultimate
components.

(Bierwisch, 1967 : 4)

This implies clearly that semantic markers, equivalent to ultimate
components, occupy a lower level than "concepts or meanings", whereas
according to Katz each marker "designates a class of equivalent concepts
or ideas". Bierwisch proposed a formal distinction between markers and features in 1969, following Katz's (1967) revision of his theory to allow for "complex markers": "... a semantic metatheory in Katz' sense should not contain any complex marker, but only basic non-complex elements, which I will call semantic features ..." (Bierwisch, 1969: 181).

Further modifications of the theory took place in 1970, when Bierwisch altered the appearance of his semantic features quite radically and adopted a modified predicate calculus notation, introducing relational features (Bierwisch, 1970a: 44) and/or relational components (Bierwisch, 1970b: 173), which we shall consider in more detail below, and in fact by this time there was no longer any theoretical distinction between semantic components, features and markers (see Bierwisch, 1970b: 170, section 3). Most recently, Lyons has suggested a sensible distinction between component and feature, whereby a component is the value taken by a particular (unspecified) semantic feature, so that for example + MALE is a component of the feature + MALE (cf. Lyons, 1977: 323).

It is clear from the above observations that any attempt to adopt the marker/feature/component notion as a working basis for a theory of linguistic performance to be investigated in psycholinguistics will lead to difficulties unless the researcher(s) concerned takes care to specify in which sense the terms are being used. Unfortunately, this rarely happens, and the terminology is taken over wholesale without careful redefinition. Reference is made to the above works as if they constitute a clearly-defined and uniform body of research. See, for example, E. Clark (1974: 74); H.H. Clark (1976: 82 ff.) makes free with markers and features without even explaining the basis for doing so, and Kuczaj and Lederberg (1977: 396-397) are equally vague in their specifications. Recently, Clark and Clark (1977: 414-415) have
suggested that semantic components are propositions, and seem to use "proposition" in the sense it normally has in logic, namely a construction containing an argument and a predicate term. However, according to them, the propositions can be "divided up" - a very unusual procedure in logic!:

The status of the semantic components themselves is rather unclear. Note that the sense of man is given by the proposition Man(x), which divides up into the propositions Male(x) and Adult(x) and Human(x).

(Clark and Clark, 1977: 431)

This is very confusing, as components are usually treated only as predicate terms rather than whole propositions in recent studies of semantics (cf. Bierwisch, 1969; Kempson, 1977: 87 ff.).

Another possible source of confusion for psycholinguists (though not for linguists) is that the term "feature" is also used in psychological research into perception, where "distinctive features" refer to visuo-tactile representations in memory, and the meaning of this term does seem to have coloured the understanding of the sense of the linguistic term in psycholinguistic research, as can be clearly seen in E. Clark (1973a: 66): "I will relate semantic features or components of meaning to other developmental phenomena such as perception in discussing the possible sources for semantic features." By 1975, though, Clark had taken a more pragmatic view of features. According to her, the conventions governing the use of a particular word by language-users could be analysed further, into a "set of conditions of application", and she then remarks: "When I use terms like features or components of meaning, they should be interpreted as conditions of application" (E. Clark, 1975: 79).

As McDonald (1976a: 4) noted, one of the weaknesses of recent psycholinguistic research making use of the notion of semantic features is that "feature" never seems to be adequately defined:

The features suggested by various writers include
factors which are perceptual such as "top point",
... cognitive (for example, proportion), simple
descriptive (four-legged), and linguistic (antonymy).

(Ibid.)

She concludes that "the notion of feature is in desperate need of
clarification" (ibid.). We shall say no more on terminology here, but
return in section 2.4.3, to psycholinguistic research based on the
notion of semantic features. Because psycholinguistics to some extent
interfaces linguistic and psychological theory, it is always in danger
of relating one set of phenomena, described within the particular
conceptual framework of linguistics, to another set described within
the framework of psychology, and then drawing conclusions simply on
the basis of the commonality of the descriptive terms used - a point
made by Wales (1977: 28).

In a certain sense this danger is inevitable, given the inviting -
and misleading - pronouncements, already alluded to above, made by some
linguists employing componential analysis in semantic theory. Katz, for
example, claimed quite specifically (1967: 161) that the difference
between "markers" and "distinguishers" was that semantic markers repre-
ented conceptual elements while distinguishers represented perceptual
ones - a distinction found untenable by Bierwisch (1969: 177), who
argues for the interpretation of most, and possibly all, semantic
elements as being both connected with the perceptual conditions of the
human organism and integrated into the conceptual structure of cognitive
processes. In the original Katz and Fodor (1963) description of semantic
theory, markers were to be drawn from a universal set of language-
independent but species-specific semantic distinctions, and there is a
clear appeal by Katz (1967: 159) for aid from other quarters:

Presumably, a psychological theory of the mechanisms
of (visual, auditory, tactile, etc.) perception will
define the perceptual distinctions which distinguishers
mark at the linguistic level.

(Ibid.)
Linguistic and psychological structure were also explicitly linked in Bierwisch's observation on the nature of simple semantic markers, that "Psychologically they may, of course, be complex. But as elements of linguistic structure they must be primitive, non-complex terms". (Bierwisch, 1969: 180, fn.). We can certainly see a reflex of this in Anglin's remark, quoted in E. Clark (1973: 69) that "... a feature is a complex verbal concept rich in properties just as a word is".

Two other points ought also to be examined at this stage: they are the relation of word (or possibly morpheme) meaning to sentence meaning, and the claim that the components isolated by componential analysis are universal (atomic) concepts. We shall not consider either of these points in great detail, since they will be taken up more fully in sections 2.4.2. and 2.2. respectively.

Here it is enough to point out that Katz and Fodor's original (1963) formulation of a semantic theory and metatheory stated that word meaning - or rather the meaning of a lexical item - is a compositional function of the meaning of its parts (the markers and distinguishers of their theory). The notion of compositional meaning was extended, in Katz (1966), to the relation between sentences and lexical items and, together with the earlier-mentioned conceptualist claims, this has strongly influenced theories of child language acquisition towards a simple incremental view of the development of meanings, whereby the child language learner "acquires" semantic features one at a time. This inference has been criticised by Bolinger (1965: 571), who points out that lexical meanings are in all probability derived by abstraction from concatenations of lexical items. Bar-Hillel (1966) also criticises the same aspect of Katz and Fodor's early theory and later developments of it by Katz (1966):

Katz's hypothesis ... is far too atomistic even to stand a chance of being true ... Nowhere does Katz show any awareness of the importance of semantic fields, a conception that makes it
abundantly clear that, for innumerable terms, no individual, but only a collective, meaning specification is possible.

(Bar-Hillel, 1970 : 185 and 186)

The second point to be taken up is that componential features may represent "universals" (Katz and Fodor, 1963 : 208; Katz, 1967 : 129; Bierwisch, 1967 : 1-3; 1969 : 172, 181; 1970a : 48; and 1970b : 181 - 183). These universals appear to be of two kinds, the first "conceptual" - in the earlier theories, which were devoid of "settings" and therefore "uninterpreted" in the logical sense - and the second what might be termed "interactive" or "procedural", since there is no current term for them. The change from the one kind to the other is particularly clear in the work of Bierwisch, who in 1967 rejected the idea that each semantic marker could be connected with "certain classes of objects, types of relations, or properties of the universe which the speakers of that language inhabit" (op. cit. : 2), but later introduced indexing of variables and semantic features which were to have a constant interpretation in terms of cognitive and perceptual conditions "inherent in human organisms and governing their interaction with the physical and social environment" (my underlining) (Bierwisch, 1970a : 48). Bierwisch, in the last of his papers to be considered here, went on to claim of these features/components:

All these basic elements are not learned in any reasonable sense of the term, but are rather an innate predisposition for language acquisition. They have to be actualized or released by experience during the process of language acquisition, but as a possible structure they are already present in the learning organism.

(Bierwisch, 1970b : 182)

It should be noted that the claim of universals has been questioned by a number of linguists. Langacker (1976) has suggested that semantic representations and conceptual structures are not coextensive, and at
most the former are a subset of the latter, since semantic representations will encode only selected aspects of conceptual structure. Semantic representations are therefore not fully universal, though they may have many universal characteristics. Bar-Hillel (1970:182-201) has very cogently argued the case that what is universal in semantics is logical structure, and not the atomic predicates of Katz and Fodor's semantic marker theory.

The final problem with atomic predicates, or "semantic primes" (Bierwisch, 1967) is their interpretation (using "interpretation" in the logical sense: Carnap, 1956:5). A number of linguists (e.g. Lyons, 1977:329-335; Kempson, 1977:188) have pointed out that there is no interpretation for semantic components isolated by componential analysis which does not involve circularity, and no one has been prepared to discuss the relationship between lexical items like male or adult and semantic components like (+MALE) or (+ADULT). And, as Langacker has indicated, it is paradoxical that a set of components which are concatenated as the sense of a lexical item may actually not fully represent the sense of the item since they lose the original item's compactness, which may be an important feature of its meaning:

... The degree of compactness of an expression often, maybe typically, signals or contributes semantic content along certain dimensions to which compactness of expression bears a natural (iconic) relation.

(Langacker, 1976:340)

Lyons, (1968;479) has made a similar point with regard to the frequency of lexical items and their greater "centrality" in the vocabulary than the components used in characterisations of their senses.

Let us now consider a componential analysis of some gradable adjectives, namely the studies by Bierwisch (1967, 1970a and 1970b)
and Teller (1969), which have concentrated on dimensional adjectives. We shall also make reference to the contributions of Leech (1974) and Weinreich (1966).

In the original proposals, Bierwisch (1967: 6 - 7 ) began by isolating a pair of "antonymous markers which can be paraphrased roughly as 'exceeding a certain norm' and 'meeting a certain norm' respectively." These two markers, (+Pol) and -Pol), characterise the initial part of the lexical entries for the adjectives listed by Bierwisch, although it must be noted that he does not treat contraries and complementsaries differently, and confuses morphological negativity with polarity. The first real theoretical difficulty, however, is that these two features are not atomic components, since they do not isolate the same aspect of sense in the lexical items they decompose.

Firstly, Bierwisch decides that the + and - are to mark an "orientation", on the basis of his observation that Degree expressions like doppelt so, halb so, zehnmal so (twice as, half as, ten times as) only occur with one adjective from each antonymous pair in his list, and that sentences containing the other adjective are semantically deviant. Two of his examples, given here in translation, are:

1. The table is twice as long as the bench.
2.* The table is half as short as the bench.

From these, and similar considerations, long is given the feature (+Pol) and short (-Pol), but there is a gap in Bierwisch's argument for doing this, since even given that the interpretation of acceptability is correct, there is still no valid reason for analysing long as (+Pol) rather than (-Pol). In fact, Bierwisch's examples rely on the same sort of evidence as we considered for the thesis of "markedness" in section 1.3.4.2., namely that only one of a pair of gradable antonyms which predicate scalar properties is used in numerically quantified expressions elicited in response to "How" - questions. And in fact
"markedness" is allowed to slip in through the back door in his
discussion of apparent counter-examples such as his sentence 13,
translated here as

The thread is twice as thin as a hair. (op. cit. : 9)

which depends for its acceptability, according to Bierwisch, on the
presupposition that thinness is involved. He is thus obliged to
introduce pragmatic considerations (i.e. some notion of settings or
context) into his theory, and proposes as a working principle that "A
sentence is the less normal the more conditions outside of it have to be
met for it to be acceptable" (Bierwisch, 1967 : 9). This is very much
a two-edged sword, since if context - and thus usage - is to be taken
into account (as I believe it must be), then others of Bierwisch's
statements can be challenged, such as his claim that in analysing each
pair of gradable antonyms, once the (+Pol)(-Pol) markers have been
allocated, the "Remainder" is the same for each pair.⁷⁸ Now this may
well be convenient theoretically, but in any (pragmatic) interpretation
of the theoretical terms it just cannot be so. We have already seen
(section 1.3.4.2.), for example, that in measure phrases both long and
short can occur (page 78);⁷⁹ but also long can be used uncontroversially
to describe a property of an object and the measured space filled by it
(as in long ladder and ladder is six feet long), whereas short cannot
be used uncontroversially in this way, since it will describe either the
object or a measurable part of the space beyond or outside it (as with
short ladder versus ladder is six feet short).

From a pragmatic viewpoint, therefore, any attempt to index these
expressions referentially and establish an interpretation of the markers
- and it is not clear whether they will in this case be those labelled
(± Pol) or "Remainder" - will not yield the result Bierwisch would like,
since the index for short will be contingent upon the kind of syntactic

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structure into which the lexeme is inserted. It is not clear whether feature-theory can handle this sort of problem at all. Using a different notation from that provided by Bierwisch, it might be possible to adapt Jessen's (1975) notion of location object and reference object (already described in section 1.2.2.3.) to solve some of the difficulties, but we shall not go into this here.

We have examined only one inadequacy of the polarity markers proposed by Bierwisch (1967), and there are others which we shall not go into here. In view of the psycholinguistic hypotheses that have made extensive use of polarity markers, however, it is surprising that a theoretical construct which has been so influential should have so little consistency to it. Let us go on and consider the other markers proposed by Bierwisch in 1967 and later studies, together with those of Teller (1969). Over time a number of modifications were introduced into the notation used for these, perhaps the most important being caused by the move away from simple unstructured listing of markers in lexical entries, towards a more rigorous predicate-calculus type of bracketing convention to represent internal semantic structuring, a proposal originally made by Weinreich (1966).

Bierwisch's early analysis, confined to adjectives of size, did not take into account the notions of filled and empty space, but Teller later made some modifications in this direction. It will help if we can here tabulate the differences between the various versions of the analysis:

**Version 1** (Bierwisch, 1967: 32-33) gives the following analyses:

<table>
<thead>
<tr>
<th>German</th>
<th>English translation</th>
<th>lexical characterisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>lang:</td>
<td>long</td>
<td>(+Pol) [[(lSpace)[*(+Inherent) [(+Max)]]]]</td>
</tr>
<tr>
<td>kurz:</td>
<td>short</td>
<td>(-Pol) [[(l Space)[*(+ Inherent) [(+Max)]]]]</td>
</tr>
<tr>
<td>German</td>
<td>English translation</td>
<td>Lexical characterisation</td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>2. (a) breit:</td>
<td>broad</td>
<td>(+Pol) [(l Space) [*[(+Second)]]]</td>
</tr>
<tr>
<td>(b) schmal:</td>
<td>narrow</td>
<td>(-Pol) [(l Space) [*[(+Second)]]]</td>
</tr>
<tr>
<td>3. (a) hoch:</td>
<td>high</td>
<td>(+Pol) [(l Space) [*[(+Vert)]]]</td>
</tr>
<tr>
<td>(b) niedrig:</td>
<td>low</td>
<td>(-Pol) [(l Space) [*[(+Vert)]]]</td>
</tr>
<tr>
<td>4. (a) weit:</td>
<td>far</td>
<td>(+Pol) [(l Space) [*[(+Vert)]]]</td>
</tr>
<tr>
<td>(b) nahe:</td>
<td>near</td>
<td>(-Pol) [(l Space) [*[(+Vert)]]]</td>
</tr>
<tr>
<td>5. (a) groß:</td>
<td>big/large/(tall)</td>
<td>(+Pol) [(n Space) [*[(+Main)]]]</td>
</tr>
<tr>
<td>(b) klein:</td>
<td>little/small/(Short)</td>
<td>(-Pol) [(n Space) [*[(+Main)]]]</td>
</tr>
<tr>
<td>6. (a) weit:</td>
<td>wide</td>
<td>[(+Pol) [(+Distance)] [(n Space)] [(+Main)]]</td>
</tr>
<tr>
<td>(b) eng:</td>
<td>narrow</td>
<td>[(+Pol) [(+Distance)] [(n Space)] (+Main)]]</td>
</tr>
<tr>
<td>7. (a) tief:</td>
<td>deep</td>
<td>[(+Pol) [(+Observ)] [(l Space)] [(+Inherent)]]</td>
</tr>
<tr>
<td>(b) flach:</td>
<td>shallow</td>
<td>[*[(+Observ)] [(l Space)] [(+Inherent)]]</td>
</tr>
<tr>
<td>8. (a) dick:</td>
<td>thick (solid)</td>
<td>(+Pol) [(n Space) [*[(+Main)]]]</td>
</tr>
<tr>
<td>(b) dünn:</td>
<td>thin (solid)</td>
<td>(-Pol) [(n Space) [*[(+Main)]]]</td>
</tr>
<tr>
<td>9. (a) dick:</td>
<td>thick (liquid)</td>
<td>(+Pol) [(+Consistence) [(+Density)]]]</td>
</tr>
<tr>
<td>(b) dünn:</td>
<td>thin (liquid)</td>
<td>(-Pol) [(+Consistence) [(+Density)]]]</td>
</tr>
</tbody>
</table>

In this version, dependency structure is introduced by means of the square brackets and a place-mark - an asterisk in the examples above. Those markers listed inside the square brackets to the right of the place-mark are interpreted as being dependent on it, whereas those to the left of the place mark dominate it. Features listed first, outside the set of brackets containing the place-mark, are inserted into the brackets at the place marked by the asterisk. Normally the markers to the left of the asterisk are those shared by the lexical entries for nouns in the dictionary, and so syntactic combinations of, say, nouns and adjectives are represented semantically by a one-to-one mapping of those common features in the lexical entries.

Notice that in all cases the (+ Pol) marker, though listed first, is inserted in such a way that it is always dominated by some other marker in the dependency structure. This fact is ignored in many
presentations elsewhere of Bierwisch's analysis (cf. H. Clark, 1970 c : 275: "The feature list for long, for example, would end with /+Polar/ (Bierwisch, 1967)." The same error is found in McDonald, 1976 : 6-7).

The marker (space) represents the number of dimensions referred to in using the relevant adjective, and as (5) big-small may be used for one, two or three dimensional descriptions it is given the value (n Space), as are (6) wide-narrow and (8) thick-thin, which are also used to describe objects with two or more dimensions. The markers (± Main) are introduced to distinguish salient from non-salient dimensions, (± Max) describes the proportion relation between extensions of an object described, and (+Second) picks out one of the two horizontal dimensions. Verticality is marked as (+Vert). The other markers are related to various aspects of orientation: (+Inherent) marks the relevant dimension as unchanging if the position or orientation of an object changes (e.g. long poles stay long even when vertical, and tall men are tall even when horizontal), and (+Observe) represents the depth-of-field aspect of distance away from an observer. The other markers, (± Plain), (+Consistence) and (+Density) are ad hoc suggestions, and will not concern us further. We shall just consider numbers 1, 3 and 5 in what follows.

There were a number of inadequacies in this formulation, which were pointed out by Teller (1969) and subsequently acknowledged by Bierwisch. Teller's proposed lexical readings for numbers 1, 3 and 5 in the above list are given for comparison below:

\[
\begin{align*}
\text{long} & \quad (+\text{pol}) < (1 \text{ space}) \quad (-\text{second})* \quad (+\text{inherent}) \quad (+\text{max}) > \\
\text{high} & \quad (+\text{pol}) \quad (+\text{vert}) < (1 \text{ space}) \quad (+\text{main}) \quad (-\text{vert})* \\
\text{big} & \quad (+\text{pol}) < (n \text{ space}) \quad (+\text{main})* \\
\end{align*}
\]

Teller introduced an extra level of depth into his markers by using a bar convention in selection restrictions, and also tried to take into account the large number of ambiguities involved in using size adjectives;
he pointed to the difference (op. cit.: 203-204) between the notions of an object and the space it fills. He also suggested that in order to accommodate this notion it was necessary to show the difference between a dimension as extent and one as direction (p.207) by introducing two further markers (+ext) and (-ext) to refer to the two extreme ends (poles) of a dimension. We shall not go into this. One important adjustment, however, was a type of predicate calculus notation.

Bierwisch's revisions of his proposals (1970a and 1970b), show quite a radical adjustment. Version II is as follows, for the above adjectives (Bierwisch, 1970a):

long: \[GR\] \[MAX\]' \(X_S\) \[MAX\]' \(X_N\)
short: \[GR\] \[MAX\]' \(X_S\) \[MAX\]' \(X_N\)
high: \[GR\] \[VERT\]' \(X_S\) \[VERT\]' \(X_N\)
low: \[GR\] \[VERT\]' \(X_S\) \[VERT\]' \(X_N\)
big: \[GR\] \[VOL\]' \(X_S\) \[VOL\]' \(X_N\)
small: \[GR\] \[VOL\]' \(X_S\) \[VOL\]' \(X_N\)

He introduced indexing of arguments and a relational predicate \(\sqrt{GR}\) for the greater-than relation - \(\sqrt{GR^{-1}}\) being its converse. The formulae now represent the fact that every use of these types of adjective assumes an underlying comparison which may or may not be realised linguistically. The \(X_N\) argument represents the norm-for-the-comparison, and the \(X_S\) argument is the representation of the subject of the comparison.

A third version of the analysis is offered in Bierwisch (1970b), and this presents the above proposals as properly bound formulae, as follows (op. cit.: 174):

long: \(Y\) GREATER \(N\) and \(< Y\) DIMENSION OF \(X\) and MAXIMAL \(Y\rangle\)
short: \(Y\) SMALLER \(N\) and \(< Y\) DIMENSION OF \(X\) and MAXIMAL \(Y\rangle\)
high: \(Y\) GREATER \(N\) and \(< Y\) DIMENSION OF \(X\) and VERTICAL \(Y\rangle\)
low: \(Y\) SMALLER \(N\) and \(< Y\) DIMENSION OF \(X\) and VERTICAL \(Y\rangle\)

The only problem with this analysis is that it is in some ways weaker.
than the early model. Bierwisch understandably does not present any
formulae for big-small, since in a sense this would involve recursion
(e.g. small: Y SMALLER N and \(< Y \text{ DIMENSION OF } X \text{ and } \text{PHYSICAL } Y\)), as
small and SMALLER are close cousins. There does not seem to be any
possibility of reducing gradable adjectives componentially in this way
as Leech noted (see fn. 81).

However, at a more fundamental level, some sort of characterisation
in logical terms does capture the fact that propositions may function as
arguments in higher level predication, and it is this fact that Bierwisch
is attempting to highlight. Leech (1974) has also tried to represent
a similar set of facts, by combining semantic components and a modified
predicate calculus notation.

The six adjectives we have been considering so far are presented
by Leech as follows:

long: \(\uparrow \text{LENGTH} \quad (\text{length} = \downarrow \text{LENGTH})\) etc.
short: \(\downarrow \text{LENGTH} \quad \text{etc.}
high: \(\uparrow \text{HEIGHT} \quad \text{etc.}
low: \(\downarrow \text{HEIGHT} \quad \text{etc.}
big: \(\uparrow \text{SIZE} \quad \text{etc.}
small: \(\downarrow \text{SIZE} \quad \text{etc.}

Other kinds of gradable adjective are handled in a similar way, although
their components are not always noun-forms. Later in the book, for
example, we find angry presented as \(\uparrow \text{ANGRY}\), and the pair of adjectives
beautiful-ugly represented by \(\uparrow \text{BEAUTIFUL}\) and \(\downarrow \text{BEAUTIFUL}\) respectively,
which leads to some rather strange pronouncements (Leech, 1974 : 275-
276). Leech also introduces components like \(\uparrow \text{AMOUNT}\) to represent
many-much, and a relational component \(\rightarrow \text{EXTENT}\) \(\leftarrow \text{EXTENT}\) as an adverbial,
together with \(\leftarrow \text{GREATER}/\text{GREATER} \rightarrow\) to handle comparison structures, so
that his semantic formula for the sentence Paris is more beautiful than
London is as follows \((A_1 = \text{Paris}; A_2 = \text{London})\):

\[
A_1 : \downarrow \text{BEAUTIFUL} < \text{the} \rightarrow \text{EXTENT} \quad \emptyset < \text{the} \quad \rightarrow \text{GREATER} \quad \text{the}^1
\]
\[
< \text{the} \quad \leftarrow \text{EXTENT} \quad (A_2 : \downarrow \text{BEAUTIFUL}) \triangleright \triangleright
\]

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To formulate for the sentence London is less beautiful than Paris, it would be sufficient to exchange $A_1$ and $A_2$ and reverse the direction of $\rightarrow \text{GREATER}$, to $\leftarrow \text{GREATER}$.

Apart from the introduction of slightly more abstract notation, there is nothing substantive in the difference between Bierwisch's latter proposal and Leech's. Leech's vertical arrows represent polarity in the same way as $(\sim \text{Pol})$ does, and the components look suspiciously like lexical items of the code English language. There is no attempt to analyse dimensional adjectives into anything more fundamental than the words themselves, and it cannot be supposed that any of the above analyses, for all the wealth of their formal apparatus, have succeeded in doing more than relate lexical items to other lexical items. Componential analysis does not appear capable of dealing with gradable items since these not only represent continuous rather than discrete phenomena, but, in the case of gradable adjectives of size, are probably polysemous or homonymous items not susceptible of unique description by means of "atomic concepts".
CHAPTER 2

GRADABILITY: DEVELOPMENTAL AND PSYCHOLOGICAL FACTORS

2.1. Overview

In the last chapter we examined the aspects of gradability which are of interest mainly to linguists; in this chapter an attempt will be made to reduce the importance of the linguistic point of view, and consider instead some of the environmental factors which are important in the development of other human skills, apart from the purely linguistic, which also contribute to gradability. It will not be possible to exclude language altogether, however, as language-skills are bound up with other kinds of skills from a relatively early age for most of us.

There are four main divisions in this chapter. The first part takes up the notion of "universals" in more detail and considers some possible candidates for this title from the genetic and developmental point of view. Then we shall explore the question of the role of language in cognitive development during childhood, as there seem to be a number of cases in which the problem of linguistic grading has been ignored as a confounding factor in some psychological research. We shall particularly focus on Bryant's (1974) theory of frameworks as a way out of some of the difficulties. The second half of the chapter considers psycholinguistic theory, and empirical research directed towards various aspects of gradability, which takes in studies of both adults and young children. Most of the child studies were of age-groups younger than those in the sample investigated in chapters 3, 4 and 5 of the present study, and so they will not be examined in great detail, although they set up certain expectations of what sort of results ought
to be forthcoming from my own research - expectations surprisingly few of which seem to have been fulfilled.

2.2. Universals again

As was seen in the last chapter, a number of linguists have claimed that elements of linguistic structure at the semantic level are eligible to be considered as universals. In semantics, it has been claimed for componential features that they are members of a universal and language-neutral set. Such components are substantive, as opposed to formal universals (cf. Chomsky, 1965; Katz and Fodor, 1963), i.e. vocabulary of the meta-language used to formulate the rules of a grammar of each language, and there are three main ways of treating them within linguistic theory. The 'strong' claim is that each language uses the same set of semantic components, although perhaps these are not always represented at the same place in the structure of each language: in some languages they may be lexicalised, in others grammaticalised, and so on. The 'weak' claim is that there is a universal set of semantic features from which each language draws a sub-set - a similar claim to that made by some linguists for phonology. The third view, which might be termed the 'partial universals' position, is that the semantic components needed to describe a language are partly drawn from the universal set and partly established specially for each language to be described. Most linguists adopt either the second or the third view as far as semantics is concerned, but as Kempson (1977 : 99) has pointed out, adopting the third view means renouncing the goal of creating a single metalanguage to describe the full range of natural languages, and

... while this position may turn out to be correct, it is not one for those working in semantics to adopt lightly, for it has as a consequence that only those aspects of semantic structure which can be claimed to be part of a universal linguistic theory will be of interest to those linguists whose concern is to work towards such a unique characterisation of human languages.

(Kempson, 1977 : 99)
The way out of the impasse, Kempson suggests, is to limit semantic theory to universals and allocate the non-universals to the level of pragmatics, a conclusion which, as we saw in section 1.3.4.3, is already implied in the work of such semanticists as Bierwisch and Katz and Fodor. As for universals, Postal, quoted in Bierwisch (1967: 3-4) has claimed that the relation each semantic "primitive" bears to the universe is determined by the biological structure of the human organism, and "Thus the relation between the semantic primitives and their combinations which are part of the combinatorial structure of language and the world is not learned but innate. What must be learned is only the relations between fixed sets of semantic primitives and sets of phonological and syntactic properties." (Postal, 1966: 179).

Now such an appeal to innateness leads quite naturally to the question of how to define innate universals in a satisfactory manner.

Let us consider gradability as a set of mental procedures. Gradability allows each human being to represent, to himself and others, non-uniform phenomena that are either external or internal to his organism; and such representations need not be recorded (coded) mentally in a way that makes them immediately accessible to language, although in later life many of them are. These representations are assumed to be in the form of either "continua" or "point particles", and gradability imposes its structure on them by allowing mutual transformation of one type into the other.

There are two types of claim that can be made for universals in connection with gradability. The first would be that every human being is born with roughly the same physical apparatus, including a brain, functioning in a certain way from birth. This sort of claim underlies Clark's discussion of P-space (H.H. Clark, 1973), but it is a mistake to extend the claim by inferring that because everyone is born more or
less equal, there is no change in quality or quantity of, let us say, perceptual abilities or cognitive processing of perceptual intake as the human being grows and matures. As we shall see below, there are a number of crucial respects in which the world the infant or the child perceives is different from that of the adult, and there is also quite a large body of evidence that the child does not represent this world to himself in the same way as the adult does.

The second innateness claim, which may or may not include the first as a premise, is that there are certain aspects of human development which are genetically predetermined and are the same for all humans. These could be termed the developmental universals, and they result from the interaction of the human organism with its environment. These universals are also constants, but in a slightly different way: at various times during development, they are available for a certain type of change, provided the input from the environment is appropriate. If the input is not appropriate, the change does not take place and retardation usually results. Lenneberg (1967: 220-221) has suggested the analogy of an automaton to describe what goes on:

The machine unfolds during development, and the internal structure is programmed into the ontogenetic process. Let us call the internal structure innate mechanisms and the modes of operation that are determined by these mechanisms innate behaviour.

(Op. cit.: 220)

The evidence against the extended version of the first claim of innate universals, namely that children are no different from adults, is physiological. The brain of a newborn infant is neurologically very different from that of a fully grown adult: brain cells are smaller and the connections between them are both less numerous and less well insulated than is the case with an adult (Lenneberg, 1967) and there appears to be no specialisation of hemisphere function. In the eye, postnatal development of the fovea and the pericentral area is very rapid during
the first four months: stratification of the cone cells increases from a single layer at birth to three layers at sixteen weeks, but the maximum of four or five layers is in fact not achieved until adolescence. During a good part of childhood the region of the occipital lobes in the brain, which receives a high proportion of nerve fibres from the macula, is less well-developed in all respects than the regions receiving fibres from the periphery of the retina (Piaget and Inhelder, 1969: 30, fn.).

But in favour of the first claim, there is some evidence that infants, despite their apparent helplessness, do have a number of abilities which surprisingly appear to be present from birth. Bower (1977) reports evidence that newborn babies are able to localize sound sources in their vicinity (op. cit.: 26) and turn their heads towards the sound source if it is to left or right. Babies appear to be able to process depth-of-field information in the visual medium, and show defensive responses to approaching objects (op. cit.: 27-29) which appear to be on a "hit path", but not to those on a "miss path". Babies' visual processing abilities also seem able to distinguish between approaching solids and approaching holes, although in terms of contour expansion both approaches are identical: it is only on the parameter of textural occlusion versus revelation that they differ. There are surprising implications here, as Bower says:

Hardness is a property detected by the sense of touch. The fact that the babies can perceive a visible event as signifying potential tangibility and hardness is yet another indication that they live in a unified perceptual world, with some degree of intersensory coordination.

(Bower, 1977: 29-30)

Babies seem able to construct an internal schema for smells (Bower, op. cit.: 25-26); their visual localization, as measured by reaching behaviour, is good, and babies seem to know when something is out of reach. Bower also reports results of experiments (the reference seems
to be to Neltzoff and Moore, 1977) on imitation behaviour in babies that imply they are endowed from birth with an internal representational schema of parts of their own bodies which is elaborate enough to identify those parts with parts of other people's bodies. He comments:

This capacity for imitation has implications well beyond perception. Among other things, it suggests that the newborn baby recognises some identity between himself and the people who take care of him; apparently he feels himself to be a member of the human race right from the start.

(Bower, 1977: 32)

This statement is further elaborated by the report that newborn babies indulge in "interactional synchrony" in time with the phoneme divisions in the speech they hear around them (ibid.). Furthermore, other experimental evidence suggests that newborn babies are, within a few hours of birth, able to start cognitively structuring their environment and to learn simple discriminations. By the age of two weeks they are able to recognise the mother's voice and mother's face, and know that they belong together, as witnessed by distress shown at combinations of mother's face and stranger's voice, and stranger's face with mother's voice (op.cit.: 34-35). Donaldson (1978: 110-112) has reported experiments by Papoušek (1969) which suggest that babies have an innate ability to form hypotheses, and build internal representations or 'models' of the world on the basis of these, which then allow them to predict certain outcomes of their own (physically limited) activities. When the fit between the mental representation and the world is good, babies show satisfaction, but when the expected results of their activities fail to occur, they are reported as showing increased tension and finally signs of displeasure as if they are upset. Bower (op.cit.) suggests that what is characteristic of the baby as opposed to the adult is a generalized ability, which appears to be innate, to make sense of incoming perceptual data in any modality. He cites the
example of a blind baby who was, by means of a device, fed spatial information through his ears, and within a few seconds of putting the device on was able to recognize that change in signal tone signified an approaching object. He comments:

The important point is that no baby had ever before been presented with this kind of specific information. The sighted child in the same situation sees a complex of visual changes which, at an abstract level, are quite like the changes produced by the sonic device. It seems that the perceptual system is ready to use this kind of abstract information, regardless of the specific sensory modality by which it is presented. This readiness does not last long. In the first year or so the perceptual system gets used to a specific kind of input.

(Bower, 1977 : 84)

All of these observations would seem to provide fairly strong evidence in support of the thesis of innate universals - although recent research cannot rule out the possibility that learning takes place during the pre-natal period, as studies have shown that the unborn child is able to see light and dark and to hear human voices and other noises in its vicinity. This puts the question of innate - in the sense of inherited - universals back one stage further, to the pre-natal period, and so a definitive answer is unlikely to be found for some time to come.

However, the view that there are certain fixed abstract perceptual and cognitive categories already available for the child to simply "hook up" into semantic components for the language it first learns is almost certainly an oversimplification.

The reason for this is that even in processing sensory information, babies are handicapped in a number of very important ways compared with the average adult, and these handicaps cannot be overcome except through maturation; thus they last throughout childhood and sometimes persevere into adolescence. The handicaps are related to the effect of the changing size of the child on the quality of sensory data it can receive from its environment via the nervous system.

For instance, the baby has fewer receptors for smell than an adult;
it has a smaller skin surface, which means that it initially has fewer touch receptors, and with growth there may be uncertainty about the exact location of a touch on a child's skin. The baby's limbs are constantly growing, so that accurate proprioception may not be possible during childhood, since proprioceptive receptors are seated in the joints. The fact that the baby's and later the child's head is smaller than an adult's affects both sound and visual location to a certain extent.

Sound sources to the left or right are located by processing time-of-arrival differences between the ears. This information changes for the child as its head grows larger, and so it has to continuously re-learn the processing technique as it matures. The last of the sense-receptors, namely the eye, is also functioning at below optimum efficiency during infancy and childhood, for three reasons. Firstly, the lens of the eye does not change its shape - as it does in adults - to permit precise focusing of objects at different distances. The retinal image projected in the infant's eye is thus lacking somewhat in definition, and at worst the infant may fail to perceive objects perfectly visible to an adult.

Secondly, the infant's eye is shallower than an adult's so that the size of the retinal image produced by an object at a certain distance will be much smaller for an infant than for an adult in the same position, and so will the perceived size of the object. The brain mechanism that translates retinal image size into a representation of object size will thus also be subject to growth changes. The results of this are that

> The baby should be able to say when two objects are the same size, or when one is bigger than the other, However, if required to use absolute size information, he has difficulties.

(Bower, 1977: 16)

If a baby wants to grasp something by reaching out for it, his perception of size is unlikely to be accurate enough to allow him to succeed in this. As the baby tends to match the size of the object to the size
of his own hand in the same visual field, there is a second potential source of error, since the hand itself is continuously growing. This sort of error must be overcome by constant re-learning. Thirdly, the baby's head-size again means that the eyes are relatively closer together than they are in an adult, and the angle of convergence between the eyes and objects looked at, when judging distance for example, changes quite radically during physical development, so that the child would have to learn and re-learn how to process this kind of perceptual information.

On the cognitive side, the biggest limitation on the infant, as against the adult, is the weakness of capacity in processing perceptual information from the environment. Bower (op. cit.) reports a number of experiments which demonstrate these limitations in the visual mode, and says that such limitations, characteristic of the developing child, affect performance for years. In its early days the infant has to learn "what goes with what" so that certain stimuli from the environment need not be attended to with as great attention as previously. Some rules of processing are learned very early, however, such as the "proximate organising rule" and the "good continuation rule", which have both appeared by the end of the first year of life and correspond to the Gestaltist principles of grouping and closure (cf. Köhler, 1970 : 51-60).

Thus what is truly innate seems to be: (i) an integrated perceptual system which is in some respects not as developed as it will become later in life, and (ii) a limited capacity for cognitive processing of incoming perceptual data. But nothing has so far been said about memory, or storage capacity, though it is obviously implied in any statement about learning. Unfortunately nothing definitive is known about how the brain stores information, although the most popular theory seems to be that structural changes in neuronal RNA represent the molecular
"engram" of memory, but Dingman and Sporn (1964) also suggest that since the activity of a single nerve-cell in the central nervous system may well affect that of 4000 other neurones, while a single neurone may have more than fifty dendritic branches, there is clearly a good reason for regarding memory as a property of a neurone or a set of neurones, rather than of molecules within them. Lenneberg (1967) takes a slightly different view:

...permanent memories are not locally defined, structural alterations but probably intercellular activities that are not confined to such specific parts of the brain that they could be surgically eradicated.

(Lenneberg, 1967: 215)

He suggests (ibid.) that any kind of "engram" that becomes established in the brain and corresponds to a memory trace or concept or percept could be described "as an essentially temporal pattern played upon the endogenous activity of cells and cell aggregates". 8

Since language is not present among the new-born baby's repertoire of activities - although "interactional synchrony" inevitably gives pause for thought - the second kind of universals, namely developmental, are of more interest to linguists, since language development might be nicely accommodated within the broader pattern of a general increase and differentiation of cognitive abilities that accompanies physical growth in the child.

Between birth and approximately fourteen years of age, important changes in cell structure are known to take place in the brain of the child (Lenneberg, 1967, 1969). There is a general increase in myelinization and in the density of neuropil as neuronal growth occurs; in Broca's area, i.e. the part of the brain known to be closely implicated in language functions, neurones undergo considerable dendritic growth. This is also the period when the principal linguistic development takes
place for most children: accompanying this there is gradual hemispheric specialization, and differentiation of cell function in the brain which leads to greater integration among cerebral structures. The structural asymmetry created by hemispheric specialization for language has also been thought to lead to solution of mirror-image problems in perception (Bryant, 1974: 64-66).

In harmony with these neurological and physiological changes, cognitive abilities improve throughout the period. Memory capacity gradually increases (McLaughlin, 1963), as does processing capacity (Pascual-Leone, 1970), and from about the age of one year onwards, knowledge of the world begins to become more important than immediate sensory data, (Bower, 1977: 52-53), after the child has created for himself the "schema of the permanent object" (Piaget, 1962: 122) during the sensori-motor stage of intellectual development. However, the increase in reliance placed on cognition is a relatively slow change, and the strength of perceptual data is known to exercise a great influence on the child's reasoning until "conservation" is achieved at age seven or eight (Piaget, 1962: 125-126), after which perception becomes less influential as a means of explaining experience:

We explain our world in terms of unseeable, imperceptible events and forces. And yet our perceptual world, the source of all we know, still conditions and shapes the way we know, even when we are reasoning in terms of the unseen and the imperceptible. . . . The more we grow away from the perceptual world, the more we are compelled to return to primitive certainties of perception.

(Bower, 1977: 65)

Let it not be assumed that perceptual organisation undergoes no changes during childhood, however. There is a gradual integration of perception into other forms of behaviour (Bower, 1977: 50), attention capacity increases (McLaughlin, 1963: 62), and control over self-directed perceptual activity also improves (Piaget and Inhelder, 1969: 124).
35 ff.), particularly in visual exploration: it is as if children have to learn how to scan a visual field to secure maximum information with a minimum number of gaze fixations. Generally, perceptual abilities become increasingly specified.

A number of other changes that take place in visual perception are still not well understood, although they may possibly be universal. Prototype recognition in pattern classification is known to be well established before the age of six (Aiken and Williams, 1973; Drummond, Williams and Aiken, 1973), and image retention (i.e. storage) is efficient even when the image is quite complex in terms of outline contour. This may be considered, together with evidence cited by Bower (1977: 63 - 66) and Bryant (1974: 161 - 170) on cross-modal shape recognition in babies aged six months to one year, as grounds for supposing that some kind of sensory abstraction ("distinctive features") for the dimension of shape exists at the pre-language stage of development, and becomes quite sophisticated by school age. On the other hand, dimensions like size and orientation take much longer to develop.

There is controversy over how children mentally "code" size relations among visual stimuli: this centres on whether they are able to remember only a relation bigger than/smaller than, for example, or whether they can also code absolute size, as well as size ratios. We shall take this question up in much greater detail below (sections 2.3.1. and 2.3.4.) as well as offering evidence in Chapters 3 and 4 in support of one view, that of Bryant (1974), that relative coding precedes absolute. This view is not shared by Piaget, for whom the relative code is theoretically important as being crucial to conservation, while an absolute code is associated with lack of conservation, although he does not speak in terms of "relative" and "absolute" (Piaget and Inhelder, 1969: 89 - 90; Sinclair-de-Zwart, 1969, 1973). Gibson (1969) has also argued for the
evolution of relative from absolute codes.

Orientation seems to be systematised prior to position, for objects in the visual field of children (Coie, Constanzo and Farnill, 1973; Eiser, 1976); this usually occurs from about age eight, although the ease with which children cope with these two aspects of location does depend to some extent on the richness of visual detail offered by the objects-to-be-located.

There is a certain amount of evidence that the salience of particular dimensions to which the child attends undergoes periodic (and somewhat baffling) change during childhood. Melkman, Koriat and Pardo (1976) report a change in preference, from form to colour to form, in children aged from two to five years, but the relative salience of one dimension or the other did not seem to be associated with relative degree of differentiation. Eilers, Oller and Ellington (1974) found a preference for small-sized objects among children aged 2:06 to 3:06. Perceptual salience of a particular dimension has been found, in children aged six to nine years, to aid recall of similar dimensional information but interfere with recall and problem-solving involving simultaneous information from other, non-salient, dimensions (Odom and Corbin, 1973).

The problem of what connection language has to all these developments has been left in abeyance, but it must now be taken up again.

If the above-mentioned developments are universal, how can language be said to be related to, derived from, or dependent on them in any way whatsoever? Clearly, there are broad commonalities: the increase in memory capacity and processing capacity at the cognitive level makes it easier for a child to develop language and understand, as well as make, progressively longer utterances. Just as the perceptual system may undergo cognitive re-organisation, so does language. Language is patterned, organised activity, as are many acts of perception, and it is this patterning, rather than anything more concrete, that is universal:
... in all languages of the world words label a set of relational principles instead of being labels of specific objects. ... the universal is the generality that words stand for relations instead of being unique names for one object.

(Lenneberg, 1969: 640)

It is far easier to see this general characteristic as universal than to try and locate a semantic marker like (-Pol) in the scheme of things.

The emergence of language in the second year of life can comfortably be integrated into the general symbolic function outlined in Piagetian psychological theory, and so be seen as one stage in an invariant, hence universal, developmental sequence (Morehead and Morehead, 1974). But once language has emerged it tends increasingly to monopolize things, as Lovell says:

Language possibly focuses thinking; it certainly acts as an analyzer and synthesizer, plays a role in the storage and retrieval of information, gives a flexible representational system enabling the child to deal with the world in its absence, and having been socially elaborated it has a notation for a whole range of intellectual tools like classification, seriation, which are used in the service of thought.

(Davies, 1977: 31)

If anything we might consider these functions, rather than the formal content or structure of language, as universal. Indeed, as the child grows he grows into a particular social milieu, so that there are grounds for believing that the early stages of language development will be where substantive universals (in the sense of semantic components) are found. Just such evidence has been provided by Moran (1973) in a comparison of the vocabulary structure of American and Japanese children and their parents. Though American English and Japanese are about as dissimilar as two languages could be, in word association tests the answers of the two groups of children were much more similar to each other than to those of their parents. The answers of the two groups of parents did not resemble each other at all. Moran supported the Piagetian
contention that young children order linguistic input to their own cognitive structure, which involves "action upon a referent" as a central organizational principle. The shifts away from these "enactive" categorizations towards "logical" (i.e. paradigmatic) word associations in the American sample, and towards "iconic" (i.e. object + attribute) associations in the Japanese sample as the children became older were, Moran decided, clearly culturally predetermined, and part of becoming an adult in that society, and "since iconic and logical transformations are negatively correlated in both cultures, this trend in opposite directions from the same starting point generates intriguing questions for future investigations" (Moran, 1973: 865).

In the light of these findings, and the studies showing multiple changes in perceptual abilities during childhood, H. Clark's (1973) claims for the link between P-space and L-space begin to look less than convincing, and in some respects rather naive, as a model of part of the semantic structure of language. Let us consider why.

Clark's basic argument is that "the child" (no age is mentioned) "knows much about space and time before he learns the English words for space and time, and his acquisition of these terms is built onto his prior cognitive development" (op. cit. : 28). This ageless child develops for himself a perceptual space (P-space) on the strength of being born into "a flat world with gravity" and being endowed with "eyes, ears, an upright posture, and other biological structure" (ibid.). Clark claims that when the child learns English spatial terms, he will learn quickly and easily those for which he already has a P-space concept. Clark introduces a second notion, that of L-space, which is "the concept of space underlying the English spatial terms" (ibid.). It is not at all clear how this concept of space could be different from the perceptual concept of space, since the "zone of purport" for
the English spatial terms is perceptual space. Perhaps not surprisingly, Clark goes on to claim that P-space is closely correlated with L-space, and that the order of acquisition of spatial terms can be predicted from their relative complexity as determined by the semantic features analysis proposed by Bierwisch (1967) for a subset of German adjectives (given already in section 1.3.4.3.). Somewhat confusingly, however, Clark states that this "complexity hypothesis", as he calls it, refers "only to the correspondence between lexical items . . . and perceptual events. The rules of application in the latter theory are not simply rules concerning structure internal to the language; they are rules about extension, about meaning" (Clark, op. cit.: 29).

When Clark goes on to consider the properties of P-space, which the child is supposed to establish for himself before learning the English spatial terms, some of the properties are unusual, to say the least, and while they might apply to experience within a carpentered environment they could certainly not be considered as universals. They include points, lines and planes, all of which are mathematical abstractions, together with a Cartesian co-ordinate system ("the familiar Cartesian coordinate system with its x-, y-, and z- axis" - op. cit.: 31) and a complicated system of measurement. If we take just this last feature; few children learn to measure before about age eight: this would seem to leave them in a rather peculiar perceptual world.

Clark also imagines that gravity defines our perception of verticality - which he calls a "direction" (op. cit.: 32), and states: "As invariant aspects of man's environment, ground level and gravity can serve as a natural reference plane and reference direction in P-space." Now anything less visible to the naked eye than gravity would be hard to imagine. It apparently did not occur to Clark that verticality can be perceptually deduced while a child moves about in his environment, for vertically extended objects tend to present a constant outline image as
the child moves around them, whereas horizontally extended or inclined objects do not, since from some aspects they appear foreshortened and from others lengthened. This seems a much more natural explanation both of how children perceive verticality and of why it is dimensionally salient.

There are a number of other unsatisfactory points in Clark's proposals. He introduces positive and negative, obviously under the influence of his mathematicalist model, but does not successfully justify this move, and furthermore confuses positive of direction and of augmentation, as well as using positive-negative for presence versus absence.

In discussing the properties of L-space, Clark assumes that measurement (in the sense of a scalar metric reading) is always intended whenever an adjective like long, short, far, near, tall etc. is used (Clark, 1973: 37 - 39), although in fact this is only one out of a whole range of possible meanings. He also introduces the notion of markedness, embedding it in a citation from Bierwisch (1967), although Bierwisch never used this term, confining himself instead to a discussion of orientated polarity. On very dubious grounds, Clark proposes markedness as a criterion of lexical complexity (op. cit.: 37), and he does not consistently distinguish between high and tall. He claims that both adjectives "presuppose three-dimensional objects", having apparently failed to consider the existence of expressions like high wire or high bar. The mathematicalist bias of his original proposals also leads him to imagine a class of one-dimensional objects: "The extent of any one-dimensional object - like a line in geometry - is called its length; and one speaks of distance from one point to another" (op. cit.: 38). But it is a fact that there are no one-dimensional objects in the natural world, although there are one-dimensional parts, like edges and so on. Even the objects that we abstractly call one-dimensional, like pieces of string, needles, cotton thread, etc., are in fact really two-
and three-dimensional, and the world of the child is exclusively two- and three-dimensional, so that Clark's implicit claim that (unidimensional) length and distance are the simplest of the dimensional concepts, while it might well be true for an adult, cannot hold for the child, since the latter could only arrive at a one-dimensional concept by a process of mathematical abstraction.  

One of the inadequacies of Clark's proposal, it may be argued, is his failure to consistently differentiate descriptions of objects from descriptions of the space they occupy. At one point (p. 38) he approaches such a distinction: "The difference between length and distance is that length is extensional - it specifies the extent of an object - whereas distance is positional - it specifies the position of one point with respect to another." But it is not systematically exploited, and it should have been. It will be argued later (chapters 5 and 6) that such a distinction is highly meaningful if we are to characterise the child's early perceptual knowledge, since it is fairly evident that as far as the use of spatial adjectives is concerned, knowledge of objects (i.e. of filled space) precedes knowledge of the space they occupy (i.e. empty space). School experience, together with exposure to the appropriate language, allows the child to develop the "empty space" concepts that are important in mathematical and scientific activity.

Notably, Clark does not consider the alternative that language might influence perception at all (H. Clark, 1973: 61):

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. . . it has been assumed that the child knows all about space before he even begins to learn language. Although this assumption seems plausible, it is in no sense necessary. It could be, for example, that the child comes to know P-space - at least the intricacies of P-space - very slowly, and so the learning of specific spatial terms must wait until the child knows the appropriate properties of P-space so that he can learn the correct rules of application.
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There is no acknowledgement here that language could help to focus perception, and such a theory as Clark's, though superficially attractive,
fails to explain all the data gathered in the present study (see the end of Chapter 5). As Hasan remarks (1971: 139), on the relation between concept formation and language: "... while it is certain that a set of concepts and relations can be formed — indeed must be formed — in the absence of language, it is by no means easy to indicate just where the line between language-independent and language-modified concepts can be drawn."

Perceptual knowledge is undoubtedly an important factor contributing to the development of gradability, but it is only one aspect of cognitive processing; there are others where language and thought interact in subtle ways, as will be seen below.

2.3. Gradable Adjectives and Psychological Development

2.3.1. Piagetian theory

Piaget's theory of intellectual development is well-known, at least in outline: it has been well summarised in Piaget (1962: 120-128). There are four main periods in the development of intelligence, according to Piaget, and these are (i) the sensori-motor period, before the child begins to speak at about age two; (ii) the preoperational period, from about two to seven years of age; (iii) the concrete operations period, from seven to twelve, approximately; and (iv) the formal operations period, going from roughly twelve years of age onwards. The age-levels are not criterial, as each stage is characterised by the set of operational structures that the developing intelligence creates from the structures of preceding stages.12

We have already noted (section 2.2.) that Piaget regards the beginnings of language as part of a much more general act of intelligence which he calls "symbolic functions", so that it is quite clearly dependent on a broader range of intellectual functioning. But Piaget is willing to concede that language is then able to assist the developing intelligence:
At the same time that symbols appear, the child acquires language; that is to say, there is the acquisition of another phase of differentiated significants, verbal signals, or collective signals. This symbolic function then brings greater flexibility into the field of intelligence.

(Piaget, 1968 : 359)

Language allows the child to become more independent of his environment and span spatio-temporal distances much greater than before, while allowing him to represent his thought to himself and others.

It is in the second, third and fourth stages of development that gradable adjectives take on great significance for anyone examining Piaget's theory from a linguistic point of view, since they are crucially bound up both with many of the intellectual operations that the child performs and with the types of questions asked by the investigator in his clinical assessment of the stage of development the child has reached.

One of the key differences between the preoperational period and the stage of concrete operations following it is the "knowledge of conservation" which accompanies the latter, and comes about when the child is no longer deceived by apparent changes in one aspect of a physical phenomenon into believing that the whole has changed. The child at the concrete operations level does not mistakenly believe a volume of water changes when he sees it poured from a low wide glass into a high narrow one (This is perhaps the best-known example of conservation, but all the properties of objects, such as length, area, number, quantity and weight, are amenable to the same kind of configurational illusions).

Gradable language, particularly adjectives, is important in the constitution of the experimental situations. In tests of numerical invariance, children are asked to establish correspondences between, for example, eggs and egg-cups, and then when one set of objects is spatially but not numerically changed the children are asked questions like: Are there the same number of eggs as egg-cups? or Are there more or fewer
eggs than egg-cups? In tests of the invariance of weight, mass and volume, using balls of plasticene (Piaget and Inhelder, 1941), questions of a similar sort are asked: Is there the same amount of plasticene in the sausage as in the ball? Is there more in one than in the other? How do you know that there is always the same amount? How do you know that there is more/less? Will the ball and the sausage weigh the same on the scale?

In the stage of concrete operations, one of the simplest operations is concerned with classifying objects according to their similarity and their difference. This is achieved by including subclasses within more general and more extensive superordinate classes, a process which implies logical inclusion. Piaget says (1968: 361) that such a classification is not acquired until around seven or eight years of age, and logical inclusion is not found at the pre-operational level. As an example: if a pre-operational child is shown a bouquet in which some flowers are daisies and some are not, and then asked whether there are more daisies or more flowers in the bouquet, then "the child cannot tell you whether there are more flowers than daisies; he reasons either on the basis of the whole or the part. He cannot understand that the part is complementary to the rest, and he says there are more daisies than flowers or as many daisies as flowers" (Piaget, 1968: 361). A second set of operations which also appear in the period of concrete operations is serialization, i.e. the ordered arrangement of objects, according to weight or size for example. This appears around the age of seven or eight years of age, together with what Piaget calls "the construction of numbers", which is arrived at by "a synthesis of classification and seriation" (Piaget, 1968: 361). Together these new developments constitute the basis of the logical operations which emerge in the final stage: they form quasi-logical "groupings" in the case of classes and relations, and "groups"
in the case of numbers.

Two further structures found in the concrete operations stage which are also important to the stage of formal operations are what Piaget calls inversion and reciprocity. Inversion is the verbal representation of a schema found at the end of the sensori-motor stage, and is concerned with reversing, annulling or cancelling an action in order to return to a prior situation. In mathematical operations it would be related to adding and subtracting, i.e. augmentation and diminution. If a weight is added to a balance and this tips, then balance can be restored by taking the weight away again. Connected with this is the notion of reciprocity, which allows a situation to be represented in more than one way: "If A equals B, by reciprocity B equals A. If A is smaller than B, by reciprocity B is larger than A" (Piaget, 1968 : 362). Inversion and reciprocity are types of reversibility.

At the stage of formal operations, the reciprocity and the inversion transformations are united into a four-group. The child also begins to understand principles of proportion and co-variance, and to become capable of reasoning propositionally, using language prised free of contextual factors - "disembedded" according to Donaldson (1978). Such language becomes a tool for complicated mental manipulations; a relatively "simple" example of such a manipulation is the "linear syllogism" (De Soto, London and Handel, 1968), alternatively called the "three-term series" (H. Clark, 1969a), such as the following, quoted in Piaget (op. cit. : 362): "Edith is fairer than Susan, Edith is darker than Sally; who is the darkest of the three?" Note that Piaget does not claim that children at the concrete operations stage are unable to use these linguistic forms or unable to reason in this transitive fashion. Rather what he is claiming as typical of that stage is that they cannot use the verbal form of reasoning in the absence of a suitable context. It is

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typical of the formal operations that language can be used in a context-
free way, almost like a logical calculus.

This is a very brief résumé of Piagetian theory, of course, and has
not done it full justice. But what is notable about such a theory of
intellectual development is the almost total neglect of language and the
contribution it might make to the child's developing understanding. Indeed,
Piaget seems to have maintained one view almost until the end of his
life. This has been summarised by Sinclair-de Zwart (1969): intelec-
tual operations are fundamentally actions that have become interiorized
and reversible during the sensori-motor period, which is pre-linguistic,
but these interiorized and reversible actions are also found in linguistic
acts, so that there is a partial isomorphism between language and logic.

According to Piaget, language is not a sufficient condition for the con-
stitution of intellectual operations, but Sinclair wonders whether it
might not be a necessary condition. However, other research evidence
gathered from deaf-mute and blind children (Oleron, 1957; Furth, 1966;
Hatwell, 1960) is taken by Piaget as support for his view (see, for
example, Piaget, 1971: 93f.) that language is not a necessary condition
for the constitution of intelligence. Being able to see is much more
advantageous than being able to hear and speak, since deaf children are
found to evolve the same elementary logical operations as normal children,
but with a slight delay, whereas blind children are delayed by up to
four years in developing some of these operations (Hatwell, 1960).

However, there is an inconsistency in Piaget's interpretation since
in Piaget and Inhelder (1969: 87 - 89) these same experiments are dis-
cussed and it is pointed out that verbal seriation (i.e. logical trans-
itivity of relations: A is smaller than B, B is smaller than C; there-
fore A is smaller than C) develops quite normally in blind children.
This would seem to be quite a high-level ability, belonging to formal
operations, though Piaget and Inhelder point out that verbal co-
ordinations are not enough to compensate for the developmental delay
caused by lack of visual experience. Yet how could such a high-level
operation develop at all, if, as Piaget reckons, language does not
constitute the source of logic but is, on the contrary, structured by
it, with the roots of logic lying in the general co-ordination of actions
that develop from the sensori-motor period onwards? This inconsistency
has been noted also by Halford (1972 : 179), who comments that the complex
issue of whether or not language ought in all instances to be regarded
as a product of cognitive growth rather than a tool which helps it to
materialise, "seems likely to remain open for some time." A possible
compromise has been suggested by Elkind, who says that although thought
determines many aspects of language in the early stages, the relationship
shifts as children develop, so that the data from deaf and blind children
can be interpreted slightly differently:

... it could well be that a certain level of
language proficiency is essential for the attain-
ment of formal operations. The deaf ... are
proficient in concrete operations but show some
deficiencies in formal-operational thought. The
blind, in contrast, show deficiencies in concrete-
operational thought but are proficient in formal-
operational thought.

(Elkind, 1976 : 256)

Clearly, such a compromise solution is awkward if one wants to
base a psychological theory on the continuity of stages. Piaget is also
reported to have used the fact that conservation of volume follows con-
servation of weight, which in turn succeeds conservation of substance,
as a further argument that language (i.e. linguistic structure) develop-
ment cannot be used as an explanation for the emergence of conservation
(McNally, 1977 : 142). The reason is that "If the language argument held,
conservation once attained should apply to all content areas" (McNally, ibid.). However, the implication that all "content areas" are from the
linguistic viewpoint equally difficult may be challenged, since those which are perceptually and/or culturally salient may very well be represented linguistically in structural and lexical forms that are more regular and systematic than the linguistic representations of other "content areas". There certainly seems to be good support for this notion of linguistic differentiation in the results of current psycholinguistic research into both child and adult language (see section 2.5.1., 2.5.2. and 2.5.3. below). Much of this research has been inspired more or less directly by Piagetian psychological theory.

Recently, researchers working with Piaget have turned their attention towards the relationship between language and the stages of intellectual development postulated in his theory, and the results of these studies have been interpreted as supporting Piaget's earlier statements on the language-logic relationship (Sinclair-de Zwart, 1967; 1969), but related studies (Ehri, 1976; Karmiloff-Smith, 1977; Shipley, 1975) specifically set up to investigate the linguistic aspects of the task components of various Piagetian experiments have yielded results less favourable to Piaget's view of the logic-language relation, and have to some extent vindicated views (expressed by Donaldson, Campbell, Balfour, Wales and McGarrigle, among others) that adjectives like long, high, big, together with same and more, and their antonyms, present systematic difficulties that may influence performance and results in conservation tasks:

Because the lexical items occur in the child's spontaneous speech at this stage it is assumed that the "misunderstandings" on the part of the pre-operational child are due to a conceptual deficit - namely a lack of a sufficiently coherent operational system. That the problem might be a consequence of how the child related its concepts to the meanings of its lexical items seems never to have been seriously considered within the Piagetian framework . . .

(Wales, 1977 : 22)
Sinclair-de-Zwart's and Inhelder's experimental investigations into the relationship between language and intellectual operations (Sinclair-de Zwart, 1967) found a number of correlations between linguistic development and the beginnings of concrete operations in children. They also tried to subject children who did not show conservation to a programme of language training that would help them focus on the relevant aspects of the conservation tasks (Sinclair-de Zwart, 1969). Generally, comprehension of instructions containing comparatives (e.g. "give more plasticene to the boy than the girl"; "find a pencil that is shorter but thicker than this one") was good in all three groups of child subjects (non-conservers, conservers and partial conservers), although some of the youngest children failed to comprehend instructions with a double comparative in them. The groups of conservers and non-conservers differed in the following two major ways: (i) conservers used more-less comparatives, whereas the non-conservers used mainly absolutes much-little, and notably the comparative produced a more integrated sentence structure (compare le garçon a plus que la fille with le garçon a beaucoup; la fille a peu.); (ii) Conservers used double pairs of gradable antonyms to describe covariance (grand-petit, gros-mince), whereas non-conservers used mainly "undifferentiated terms", e.g. gros for long and thick, or petit for short and thin. Again there were differences in sentence structure, with more co-ordinate structures found among conservers than non-conservers, who either failed to describe both of the dimensional variations or could only describe them in separate sentences. From these results, Sinclair-de-Zwart concluded that lexical acquisition was less important than syntactic development, since the latter seemed more closely linked to the presence of concrete operativity:

The operator-like words (e.g. more, less, as much as, none) form a class apart whose correct use is also very closely linked to operational progress. The other lexical items (e.g. long, short, thin, thick, high, low) are far less closely linked to operativity.

(Sinclair-de-Zwart, 1969: 325)
In the second part of the study, the children who were unable to conserve liquids or seriate were taught "differentiated terms", a task which Sinclair-de-Zwart says was relatively easy. But it was more difficult to teach plus (more) and moins (less), with only three-quarters of the children learning successfully, and the most difficult learning was the co-ordination in structures like long et (mais) mince, court et (mais) gros (Long and/but thin, short and/but thick). After this linguistic training, one-tenth of the child subjects acquired conservation, while more than a half were able to note and comment on co-varying dimensional features in the conservation task. These results are regarded as a failure to bring about conservation through linguistic training, and Sinclair-de-Zwart concludes: "... language is not the source of logic, but is on the contrary structured by logic" (ibid.).

These results are often quoted in Piaget's later work (Piaget, 1971: 94; 1977: 59 - 71; Piaget and Inhelder, 1969: 89 - 90) in support of his early assertions, but in fact Piaget's view of the logic-language relationship became explicitly modified in the later work, towards allowing linguistic factors more scope and influence. Language looms larger, and is recognized as a potent factor in educative transmission, since it is a "crystallization of syntax and semantics which, in their general forms, include a logic" (Piaget, 1977: 58). There is even an admission (op. cit. : 60) that it is by no means such a well-established fact that operativity leads to changes in language structure, rather than vice-versa - although Piaget still regarded the prospect with some distaste!

In fact, though, a re-examination of Sinclair-de-Zwart's (1967) work in the light of research done by others in the ensuing decade suggests that her results do not offer unequivocal support for Piaget's earlier view, since there were not enough controls for linguistic variables in the original experiments. For example, the questions asked of the
children and declared not to touch upon conservation or seriation problems contain gradable adjectives,¹⁵ which, as we saw in the previous chapter, have a more complex logic than comparatives. Some of the instructions in the comprehension tasks were also rather odd: e.g. donne plus a la poupee-fille, moins au garçon. It is difficult to imagine an appropriate meaning for the expanded form of this sentence, as Donaldson has pointed out. How does one give someone less? Finally, the fact that there were exceptionally few children with conservation who did not evidence comparative forms, syntactic complexity and lexical differentiation, whereas there were quite a few non-conservers who showed these signs of linguistic development, is if anything counter-evidence for the view expressed by Piaget, since there should be far larger numbers of conserving children without these features in their language, for his opinion to carry conviction. And there are the results of the linguistic training experiment to consider as well: if ten per cent of non-conservers were able to become conservers just on the basis of this training, that surely says something for the conceptualising influence of language - despite this being a small proportion.

Thus the problem remains of how far exposure "even to not completely understood language itself helps the child to grasp new concepts" (Greene 1975:74). Ehri has recently carried out a study very similar to Sinclair-de-Zwart's, and has produced results which fail to replicate all those of the earlier study (Ehri, 1976). Again a correlation was found between language structure and the presence or absence of operational thinking in children, but Ehri suggests that differentiation of lexical structure is much more strongly correlated than is syntactic structure with ability to conserve, since children in her study produced comparative forms but could not carry out instructions containing them. Measures of linguistic production were important only for distinguishing
older from younger conservers. Ehri also uncovered a difference in the ability of children to comprehend different comparison forms: whereas performance with affirmative forms was better than with negative forms for comparative structures, the reverse was found for equative structures (Ehri, 1976 : 378). Although Ehri sees her results as generally consistent with Piagetian pronouncements, she does suggest that language is an important aspect of task structure which perhaps exercises great influence on performance: "it may be that a close relationship between language comprehension and seriation was observed because the linguistic systems of Ss were activated just prior to the seriation task. If so, this constitutes a very interesting example of the interfering effects language can exert on one's organization of reality" (op.cit. : 381). Ehri thinks that non-seriators may have been persuaded not to order objects serially because they described the differences between them by using absolute adjectives rather than comparative forms, and wonders whether they could have ordered the objects properly if they had not been reminded of their language just beforehand.

Karmiloff-Smith's study concerns children's comprehension of the expressions the same and another, which play a crucial part in Piagetian investigation of classification. She examines a number of linguistic factors, such as context and communicative structure, etc., which have been generally ignored in the experimental situation, and her critical comments are relevant quite generally to other linguistic items apart from the two she considers:

When we experiment in language, particularly when we place unusual communicative burdens on certain morphemes, are we observing the child's normal language-processing procedures or are we observing ad hoc experiment-generated procedures? ... the procedures children use for isolated sets of sentences are not necessarily the same as those used when analogous stimuli are inserted into connected discourse.

(Karmiloff-Smith, 1977 : 380)

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Karmiloff-Smith shows quite convincingly that there are a number of possible meanings of *same* which might apply for a child in a Piagetian experimental situation, and although she accepts that certain syntactic-semantic structures are inevitable in the investigations, "it may be that the verbal component of experiments has played a somewhat more crucial role than Piaget explicitly suggests" (op. cit.: 389). She concludes that language is not merely "the tool of intelligence" for representing ongoing cognitive development, as Piaget said it was, but is actually in its own right a problem area for the child.

Shipley (1975) examined a third aspect of the relation between Piagetian psychology and language, with respect to the class inclusion question, asked for example in the "bouquet of flowers" situation mentioned earlier (Are there more daisies or more flowers in the bouquet?). Her study goes into detail on different types of comparative structure, and she shows that the Piagetian question violates linguistic rules of semantic well-formedness, and that adults also fail to answer questions of this type in the way predicted by Piaget for those at the operational level of intelligence. Shipley points out that comparative sentences usually contain noun expressions taken from the same level of semantic hierarchy, so that sentences like *A person is taller than a cat* would be unexceptionable, whereas all of the following are semantically odd:

- A person is taller than a woman
- Which is stronger: a rabbit or an animal?
- A gun is more deadly than a pistol.

These constructions represent *distributive comparisons*, since they refer to properties possessed by each member of a class individually (Shipley, 1975: 81), and it is not linguistically admissible to predicate a distributive comparison of members of a class with members of a set (or subclass) within that class - and vice versa.
A second kind of comparison is also found, namely collective comparison where properties are attributed to classes-as-wholes, but special additional wording (for example, use of all or some) is usually necessary to make clear that sentences expressing these are not to be understood as distributive:

**Adults weigh more than children**
will normally be taken as meaning that any adult is heavier than any child, rather than that the total weight of adults in the world exceeds that of the children. With the additional wording, moreover, class may be compared with set:

*The girls alone do a better job than all the children together* clearly refers to the whole set of girls and the whole class of children. Comparisons of the collective sort are always disambiguated in this way, and if a superordinate class and one of its subclasses are compared without such extra wording they will be treated as distributive because of the anomalous form, so that, for example, an utterance like

**Girls do a better job than children**
will force the recipient of it to impose his own quantification somehow, before it makes sense (e.g. treating it as a comparison of big girls with little children, or all girls and other children). Because of this tendency, which is essentially pragmatic, for the addressee to repair any gaps in the information for himself when interpreting these comparisons, it is natural to also treat numerical comparisons uttered in the Piagetian experiments as referring not to a class and sub-class but to co-ordinate classes.

Shipley claims that the Piagetian question-type *Are there more animals or more dogs?* has anomalous wording in that (a) signs that the comparison is collective are omitted and (b) indications of the class
relations are missing. Her argument certainly supports the second claim, but I do not think the first claim is supported well by her evidence, since for numerical comparisons it seems to me to be normal to admit only collective predications. A much more powerful argument in favour of her point would be the pragmatic one that listeners tend to co-operate with speakers in supplying any missing (and essential) information for themselves in order to render anomalous material meaningful - an activity which was amply indulged in by the child subjects in her psycholinguistic study.

A further, linguistic, criticism of the Piagetian question, which Shipley fails to note but which seems to me obvious, is that on any logical reading of the comparative structure there is just no interpretation of the question. What is being compared? We cannot know since the second term of the comparison clause is missing in each case: there are two comparatives joined disjunctively: i.e.

(i) Are there more daisies
(ii) or (are there) more flowers?

and it seems to me that there is an enormous amount of essential content that ought to be supplied here. The complete form should read:

Are there more daisies than flowers, or are there more flowers than daisies? But of course if the question were presented in this way it would be so long as to present a memory test. Piagetian clinical technique thus trades off length against logical anomaly, a rather remarkable fact when one considers that it is supposed to investigate logical development in the child. It is small wonder that the results obtained with this procedure have caused a certain amount of consternation among teachers of young primary school children (Povey, 1976). Shipley's conclusions are well-justified:

The class-inclusion task is not an index of hierarchical classification as Piaget has maintained; instead it reflects inappropriate grammatical restraints. (Shipley, 1975 : 287)
We shall return to more detailed aspects of the links between Piagetian psychological theory and language in the ensuing sections, but one last point needs to be made very generally here, and it concerns Piaget's choice of logical form for the expression of his theory.

Sinclair-de-Zwart (1969 : 320) reports Piaget as being open on the question of whether language might not be a necessary condition for the constitution of logical operations at the level of formal operations; but as noting that these operations go beyond language, "in the sense that neither the lattice of possible combinations nor the group of four transformations\textsuperscript{16} is as such present in language; they cannot even be expressed in ordinary, natural language." This is somewhat misleading: it is perhaps true that they cannot be expressed as economically, but they can certainly be instantiated in ordinary language, as witnessed by the various kinds of sentences containing gradable adjective structures. There is, however, one respect in which the system of logic adopted by Piaget is limited and cannot be used to appropriately characterise all the relations entered into by gradable adjectives. As Inhelder and Matalon (1960) point out, Piaget uses the logic of classes, with the classes serially inclusive, since this is the type of classification that seems to him especially adapted to natural thought. But such a logic entails acceptance of the "law of the excluded middle", and as we saw in the previous chapter, accepting this law automatically means being unable to account for gradable antonyms in a principled way from within psychological theory. It might be more desirable to propose a non-binary logical model if certain linguistic facts are to be accommodated within psychological theory. Indeed, evidence which will be presented in Chapter 5 suggests very strongly that a binary logic is appropriate for linguistic development (as represented by gradable antonyms) up to the concrete operations level but not beyond it.

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It might be very desirable - at least for the aspect of the psychology of language discussed in the present case - if the law of the excluded middle could be suppressed, as is in fact proposed in recent ("intuitionist") theories of logic, as well as in more traditional "non-standard" (i.e. many-valued) logics. One of the consequences of this would be that it would allow the significance of the comparative-structure sentence to be put in perspective. The logical structure of comparatives is binary, and fits well within the Piagetian theory for that reason, but it also seems to have assumed undue significance within the evaluation procedures used to assess intellectual development. On the other hand, the importance of non-comparative structures in which gradable adjectives occur has been very much played down, yet it will be argued later that they must correlate with a later stage of intellectual development than do comparatives, and in the light of this proposal other psycholinguistic data make more sense.

2.3.2. Vygotsky's scientific concepts

In the theory of intellectual development proposed by Vygotsky (1962), school instruction plays a much more important part than it does in Piaget's early theory.

The early thinking of the child, according to Vygotsky, is devoid of concepts, since these are abstractions which can only be made when the child has mastered the metalinguistic function of language. The key to eventual concept formation is word meaning, which goes through three stages of development. At first words are used by the child to form syncretic conglomerations (or congeries) of objects. These are later replaced by complexes of different types (associative complexes, collections, chains, diffuse complexes and pseudo-concepts), which show some isolated features of logical thought but lack logical integration. This type of verbal thought perseveres until the child is about twelve, when
he becomes capable of forming concepts.

The early stage of verbal thought shows a weakness in abstractive power, and the words used by the child take over the function of concepts during the period of thinking in complexes; these words eventually also aid the child to make the transition from complexes to concepts, the final step in the transition being effected by means of pseudo-concepts. Vygotsky hypothesises that word-meaning changes during the child's development in the following way: there is from the beginning a partial isomorphism between the child's words and the adult's as far as extension is concerned (i.e. the child uses words to designate some objects which the adult designates with the same words) and this extensional isomorphism gradually improves until the child forms pseudo-concepts which are perfect extensional matches with adult concepts. However, the pseudo-concepts do not match the intensional aspect of true concepts (Vygotsky, 1962: 66-69), since the child cannot incorporate additional negative information about the intension of a term in order to refine its range of extension, whereas an adult can do this. The child becomes capable of forming concepts when, after learning to read and write, he begins to exercise conscious control over his own intellect as a result of becoming aware of language structure and the metalinguistic function of language. However, even then concepts do not totally replace or annihilate complexes: Vygotsky says that even adults still have recourse to complexes for certain types of verbal thought. This view of logical development is thus somewhat different from that of Piaget, who regards each stage of intellectual development as growing out of an earlier level but then becoming independent and to some extent restructuring it.

One illustrative example of the difference between a pseudo-concept and a concept in the context of the present study is dimensional adjectives like tall and long. These are frequently used in association
with units of measurement by the adult, but not by the pre-school child, who nevertheless uses the adjectives occasionally and may even appear to apply them with some degree of accuracy. When the child goes to school and learns measuring, however, he does not immediately integrate units of measurement and dimensional adjectives, but frequently uses the comparatives bigger and smaller and their related superlative forms, as in these reports by six-year-olds:

There are eight people that are four feet in class one. Ruth is the smallest she is three feet eight inches. Lorraine Ball is the biggest. She is four feet six inches. One twin is taller than the other with an inch. The biggest wun in the class is four feet six inches, the smallest wun in the class is three feet eight inches. So the biggest one is ten inches bigger than the smallest is a girl . . .

(Biggs, 1971 : 47)

The giraffe is very tall and from his horns to his feet it is fifty-two inches and his neck is twenty inches, his legs is thirteen inches and his nose to tail is fifty-six inches and his body is twenty-nine inches and that is the giraffe story.

(Biggs, 1971 45 - 46)

If we speculate what long or tall might mean for the child just entering school, one possibility to consider might be shape, as characterised by the proportion relation between an object's main axis of extent and its secondary axis. This is an inference made from Gardner, Glenn and Renton (1975 : 73 - 74), who point out in connection with the teaching of length, area and volume that our first experience of these properties is in the world of three-dimensional objects, so that length is not the sole dimension of any object of which it is a property. They specifically suggest that premeasurement activity in the school classroom, prior to the introduction of the derived units of measurement for areas and volumes, should clearly be linked to shape (op. cit. : 82).

Returning to Vygotsky: another quite striking difference between
his theory and Piaget's is the developmental ordering of the awareness of sameness and that of difference. Piaget appears to believe that similarity precedes difference, whereas Vygotsky says that awareness of similarities succeeds awareness of differences, since the former depends on an act of generalisation that is typical of a concept, whereas awareness of differences could emerge from thinking in complexes. As regards the use of gradable adjectives, therefore, Vygotsky's theory might be thought to predict that comparisons of inequality would enter children's linguistic competence earlier than comparisons of equality, i.e. comparative structures would be mastered before equative structures. Similarly, we might expect competence in gradable antonyms to be developed before competence in intermediary adjectives (such as normal, average, medium, etc.) since these latter imply a parameter of similarity rather than difference.

Vygotsky rejects Piaget's idea that conflict between the child's early notions about the world and those of the adult is necessary before the child becomes aware of his ideas and modifies them towards the model of logic offered by adults. He suggests that it is school instruction which brings about concept development, building on the habits and skills which the child acquires beforehand. A distinction is made between two kinds of concepts that the child acquires: the natural, spontaneous concepts which are derived by abstraction from a wealth of everyday experience, and the non-spontaneous, scientific concepts, with which the child becomes acquainted through the education system. Spontaneous concepts usually evolve earlier than related scientific concepts, and are at first not tightly integrated in cognitive structure. Each scientific concept, on the other hand, is located in, and presupposes, a larger body of knowledge which is hierarchically and systematically structured. It is imparted to the child primarily by linguistic means.
during the course of school instruction, while the spontaneous concepts may well develop as a result of other types of experience. Vygotsky sees the two kinds of concepts as complementing each other, in that under the influence of scientific concepts the child becomes more conscious of his spontaneous concepts so that they gradually acquire systematic structure and become more controllable, while these in turn invigorate related scientific concepts with a wealth of experiential content that they would not otherwise have. Thus as the child goes through school the two kinds of concepts grow towards each other and intermesh.

To return to the previous example, a way of illustrating the development of a spontaneous concept under the stimulus of scientific concepts is to consider a gradable concept like LENGTH. We have already noted that its pre-conceptual meaning is possibly associated with shape. When the child learns to use numeric measure, LENGTH is no longer an inherent or global property, but rather an abstracted conceptual feature: an object can be taken away and the space it occupied can be measured in one particular orientation to discover the object's length. Related to this concept, however, is a group of other concepts which are scientific in nature: DISTANCE, AREA, VOLUME, MASS, DENSITY, ACCELERATION, FORCE, TIME, SPEED, VELOCITY, WEIGHT, PRESSURE, WORK, ENERGY and POWER are all concepts in mechanics (Preece, 1976: 175) which are tightly associated, DISTANCE being one of the most fundamental, because one of the most ostensive. As it happens, DISTANCE is derivable from the abstract concept LENGTH, in the sense that it is measured in uniform unit lengths (inches, kilometres, miles, etc.); and more than any other concept it combines in products of concepts to yield the derived concepts of the above set: thus AREA, VOLUME, SPEED, VELOCITY, WORK and ENERGY can all be defined with DISTANCE as one of their defining concepts. This is one of the main reasons why gradable adjectives of size are of central
Finally, it is also worth noting here that Vygotsky's theory is incompatible with a theory of language acquisition such as the Semantic Feature Hypothesis (E. Clark, 1973a), if we are seriously to consider each semantic component or feature as a concept, as has been proposed. The reason for this is that according to Vygotsky the child does not form full concepts before the age of about twelve. As it is impossible to ignore the fact that most children are by then quite fluent in their own language, we must conclude that Vygotsky and Clark cannot both be right (although they could both be wrong!).

2.3.3. Bruner's theory of representation

According to Bruner (1968), when we store knowledge derived from our interaction with the environment, we process and code relevant information for retrieval in usable form at a later date, and we do this primarily by means of one of three kinds of representation: enactive representation is the means of storing skilled and patterned motor acts; iconic representation is the conventionalised means of storing perceptual images; and symbolic representation is the means of storing information in linguistic form. Of the three, this last type of representation is the least dependent on the spatio-temporal location of experience, since the language symbols used in storage are conventionalised, and the link between linguistic symbol and referent is remote and arbitrary, which is not the case for instance with the iconic mode of representation. Although the three modes of representation develop one after the other in the intellectual evolution of the child, they co-exist in the adult, and there is a close link between the symbolic and iconic modes, with the latter continuing to be important at higher levels of logical and scientific functioning, for example in mathematics (Bruner and Kenney, 1965), where iconic representation is a source of manipulable images that
provide content for symbols used in abstract calculations.

However, in general the symbolic mode of representation becomes increasingly important as the child grows older, since language provides a means for not only representing experience but also transforming it, and maturation brings about increasing integration, both intramodally and transmodally:

As language becomes more internalized, more guiding as a set of rules for organizing events, there is a shift from the associative principles that operate in classical perceptual organization to the increasingly abstract rules for grouping events by the principles of inclusion, exclusion and overlap, the most basic characteristics of any hierarchic system.

(Bruner, 1968: 401)

It is hierarchic structure which characterizes the symbolic representation and differentiates it from the enactive and iconic. This hierarchic structure is found in both the syntax and semantics of language, and offers a powerful tool for re-working experience.

Language also offers other means of transformation, too: for example, by changing the order of symbols or by negating them. Bruner refers in this connection to the development of gradable adjectives and their various structural properties:

... the ordering device whereby the comparative mode makes it possible to connect what is heavy and what is light into the ordinal array of heavy and less heavy is ... striking. Or, ... there is the discrimination that is made possible by the growth of attribute language such that the global dimension big and little can now be decomposed into tall and short on the one hand and fat and skinny on the other.

(Bruner, 1968: 385)\(^1\)

As to how this sort of change comes about, Bruner suggests (op. cit.: 408) that it arises from the need to share categories of experience with other members of the same culture: "cognitive coin that can be exchanged with those on whom we depend."

Because of his interest in language as a technique for organising
experience, Bruner treats it as an important experimental variable, and describes a number of investigative experiments where children's language was analysed and compared with their performance on concrete operational tasks, some of which resembled those used by Piaget. Several of these are of interest in connection with gradable adjectives.

The first of the experiments (Bruner and Kenney, 1966), concerned children's performance on reproducing a 3 x 3 "double classification matrix" of plastic glasses laid out in a uniform grid. The glasses varied in three degrees of diameter from left to right, and in three degrees of height from front row to back row, so that each glass was different from every other. Children between five and seven years of age were asked to describe the way in which the glasses in the rows and columns differed, and eventually given two tasks. The first consisted of replacing the glasses in the matrix after these had been removed and scrambled, and the second consisted of creating a transposed version of the matrix after the glasses had been scrambled and the experimenter replaced one of the corner glasses but moved it to the next corner of the matrix.

There was a difference in speed but not in efficiency of the children on the reproduction task, but on the transposition task most of the youngest children failed, whereas most of the seven-year-olds succeeded. The type of language used to describe the matrix, moreover, was correlated with success and failure on the transposition task. Bruner (1968: 387 - 388) suggests that there were three "distinctive linguistic modes": dimensional, global and confounded (alternatively compounded) descriptions. The examples given of each are as follows:

i. dimensional: That one is higher, and that one is shorter.
ii. global: That one is bigger, and that one is little.
iii. confounded: That one is tall, and that one is little.

Taking all ages together, children who used confounded descriptions were
twice as likely to fail on the transposition task as those who used either dimensional or global terms, although there was no correlation between language used and performance on the reproduction task.

These results are surprising, for a number of reasons. Note firstly that the three types of description have degree of concept specificity as the defining criterion, and not the distinction of comparative versus "base" form of the adjective. Bruner seems to ignore this latter altogether, although it can be seen to distinguish the above examples also (except that on this criterion the second example would be an instance of confounded usage), and it was found later in Sinclair-de-Zwart's (1967) study that comparative structures were correlated with good performance on conservation tasks. Secondly, since confounded descriptions could be expected to occur at a stage of language-development midway between use of global adjectives and use of dimensional adjectives, there is an unmistakable implication that linguistic development not only fails to facilitate certain types of operations but actually causes regression in performance. However, the results of the Bruner and Kenney (1966) study show a large discrepancy between the number of children using global description for heights and those using it for diameters of the glasses, and this suggests that there were two different groups of children using global description (see the display below).

![Figure 3 Percentage of children (aged five to seven) using different language patterns who reproduced transposed matrix without error (Bruner and Kenney, 1966).](image)

- c-compounded
- g-global
- d-dimensional
About 28% use global description for both dimensions, but a further 18%, approximately, use it only for height. This implies that they may be dimensional describers in disguise. Maratsos (1973) has carried out a study that shows that between the stage of global description (big) and the emergence of specialised dimensional vocabulary, the global adjective undergoes restriction of sense in the way suggested, becoming confined to the vertical dimension judgements of children around five years of age, which matches the age of the youngest subjects in Bruner and Kenney's study.

Thus although Bruner and Kenney attended to linguistic variation, their analysis was possibly not refined enough to reveal all the linguistic factors which might be involved.

Other experiments reported in Bruner (1968) show the importance language can have in inducing conservation judgements in children as young as five years of age, who would not normally be expected to show conservation (of liquid, in this case). When liquid is poured from one beaker to another of a different shape behind a screen, and children are asked to talk about what has happened without actually seeing both beakers, they state that the water is unchanged, and after the age of five they tend to maintain this statement even when the screen is removed and the visual display is in apparent conflict with their predictions. Children of age four are likely to change their minds, as they are overwhelmed by what they see. Bruner implies that these younger children have not yet learned to use the techniques of symbolic representation properly (Bruner, 1968: 393 - 394). To succeed on the conservation tasks, the child "must have some internalized verbal formula that shields him from the overpowering appearance of the visual displays . . ."

Another study by Bruner and Kenney (1966), however, shows that conceptual development can lead to apparent decrease in ability to perform on certain tasks. They considered children's judgements of full
and empty for pairs of glasses varying in height and width which were partly or wholly filled. Full itself presented no problems, but comparisons of fuller and emptier did cause difficulties for the children (age range, 5 - 7 years). But whereas the younger children always used the quantity of liquid for both fuller and emptier judgements, the older children used the apparent amount of filled space in a glass for judgements of fuller, and the amount of empty space in a glass when judging for emptier, showing that they were using a more developed (binary or complementary) type of logic for their judgements, although they still made as many errors as the younger subjects. The older children were attending simultaneously to more aspects of the situation than the younger ones, but could nevertheless not move beyond the ostensive features perceived in it and available for iconic representation. This increased attention to more than one feature, however, is a necessary prerequisite for functioning at the symbolic level:

The older child, it would seem, is ordering his perceptual world in such a way that, shortly, he will be able to apply concepts of relationship that are not dependent upon simple ostensive definition. As he moves towards this more powerful 'technology of reckoning', he is led into errors that seem to be contradictory.

(Bruner, 1968 : 396)

The last piece of evidence of interest to the present thesis concerns the results of research into equivalence groupings among pictures made on the basis of thinking in what Vygotsky called complexes. Bruner reports a study by Rigney (Bruner, 1968 : 400) in which children were asked to group water-colours on the basis of any criterion they wished. It was observed that the largest number of groupings based on perceptual criteria (colour, size, pattern, etc.) and on complexes formed pairs: "61 per cent of all the groups made by six-year-olds were such pairs, 36 per cent of those made by eight-year-olds, and only 25 per cent of the groupings of eleven-year-olds."
This suggests that dyadic groups are a fundamental feature of child thinking up until about the age of seven, after which larger groups begin to be formed - Bruner says, under the influence of the hierarchic classification properties of language. I shall argue later that the fact of dyadic grouping is yet another indicator that comparative structures containing gradable adjectives must enter children’s competence before the gradable adjectives themselves, since these latter depend for their full sense on multiple groupings larger than the triad. Let us now consider some of the strongest psychological evidence that the sense of comparative forms of gradable adjectives must generally precede the sense of the "base" adjectives in gradability competence.

2.3.4. Bryant’s theory of frameworks and perceptual coding

Recently Bryant has re-examined the whole problem of the inter-relation of logic and perception in young children and adduced a large body of experimental evidence in favour of a novel theory of how children and adults differ in the way they code and process perceptual information (Bryant, 1974). He argues very convincingly that background features, or frameworks, are an important factor for young children involved in perceptual processing of their environment, and that while reliance on background features decreases with age, even adults still depend on them to some extent.

Bryant’s theory is diametrically opposed to Piaget’s on the question of the role of deductive inference in perceptual processing by young children. Whereas Piaget reasons on the basis of his experiments that because children up to about age eight are unsuccessful at using a common reference object to make transitivity judgements they are therefore also unable to make logical deductive inferences (of the type: A is the same height as B, and B is the same height as C, so A is the same height as C), Bryant puts the opposite point of view: young children can be shown
to be using deductive inferences all the time, but with framework features rather than other objects as the common reference. Thus logical inference, far from being at the apogee of psychological development, is removed to somewhere nearer its base. Bryant's theory has very strong implications for the present study of gradability, since although limited it covers a number of central aspects of perception: "the way children deal with recognizable perceptual continua, such as size, orientation, and position, and on the effects which their perception of these continua has on their understanding of such central notions as size, space and number" (Bryant, 1974: 1 - 2).

Bryant reviews a large body of evidence that shows that young children - the main age-range is three to eight - generally notice and remember relative values along perceptual continua quite well, but have difficulty remembering absolute values. For example, two objects A and B can be compared for size and remembered as A is bigger than B, but the actual size of A and of B, let us say in inches, will not be remembered. This distinction is referred to as that of relative versus absolute coding. Young children have virtually no absolute codes, whereas adults do possess some, although they, too, have to rely sometimes on relative codes. Even where adults do operate with absolute codes, these are found to be limited as regards the number of values that can be retained over time (Miller, 1956), although practice over a long period can increase this number in special circumstances. It is obviously useful in dealing with certain recurrent features of the environment if one has some kind of internalised yardstick with which to judge them. Such an absolute code, however, is slow to develop, is never complete, and its degree of evolution varies with different kinds of continua.

Young children develop a number of strategies for coping with their dependence on relative codes. One of these is framework dependency, which allows children "to connect separately-presented objects through their
common relations with the same framework" (Bryant, 1974 : 15). This use of a relatively permanent or stable background feature - a characteristic or an object - partly compensates for the absence of an absolute code. It is very rare for there to be no background or framework that can function as a common reference for perceptions of orientation and size, for example. A child may note that a book on a table is lying with its edges parallel to those of the table-top. Similarly, he can compare its size with the table-top and with the pattern on the table-cloth, noting that it is smaller than one and larger than the other. If this book is removed and another is placed on the table, the child will be capable of recognizing whether the second book is in the same orientation by means of a simple match-mismatch judgement with the framework feature, and then a deductive inference. However, this kind of strategy will only work for size if there is some framework feature the same size as the book in both instances, since the two books could otherwise both be smaller than the table-top as well as larger than a pattern in the table-cloth, while still not being the same size as each other.

Bryant (op.cit.: 40 - 56) reports a number of replications of the Piagetian size transitivity experiments using sticks of different lengths, where the results showed children as young as four years of age to be quite capable of making logical deductive inferences based on size differences. The Piagetian experiment was modified to control for language used in the transitivity relations, and also to control for memory capacity. Once these controls were introduced, the age at which children showed inference was reduced to about four or five years below the age of nine suggested in the original Piaget experiments. Riley and Trabasso (1974) have since looked at the verbal element of the transitivity task in more detail, and their findings support Bryant's proposals. Children of four and five in their experiments made transitive
inferences on the basis of verbal descriptions of size relations between pairs of sticks that could not be visually compared, but could only do this provided that comparatives were stated both ways (A is longer than B; B is shorter than A). The use of only one comparative term was found not to facilitate transitivity, as children tended not to infer that the experimenter's use of the single comparative was to be taken as representing an ordinal relationship. Visual feedback did not essentially alter this result (Riley and Trabasso, 1974) in another experimental group, although there was an interesting asymmetry in comparative forms used in the two conditions: in the verbal training alone, the few subjects reaching criterion with only one comparative adjective nearly all trained using longer, whereas in the visual feedback condition subjects who reached criterion were equally divided between training with longer and training with shorter. 20

Bryant (op. cit.) describes further investigations of children's perceptual coding that show that in judgements of size a relative code is capable of processing not only a size relation together with the direction of difference, but also a size ratio when needs must (Bryant, 1974: 95 - 100). However, when the outline contour of objects to be compared differs, it is less easy for size ratios to be coded and remembered, and this again shows the relatively early establishment of shape as a salient dimension which can influence perception of size. Indeed, in a discussion of cross-modal perceptual integration, Bryant points out that there is a discrepancy between shape and size:

As soon as children can recognize shapes by touch they are also able to translate this tactual information into its visual equivalent and vice versa. With length, however, it may be that children's cross-modal performance initially lags behind their within-modal performance and that this lag itself grows smaller as children grow older.

(Bryant, 1974: 169)
He makes the further point that shape only demands a relative code for cross-modal matching, whereas length demands an absolute code (op. cit. : 170) which the child does not possess.

On the relations these developments have to language, Bryant is sceptical about the claims made for the link between comparative adjectives like smaller and larger and successful performance by child subjects in size transposition experiments (Kuenne, 1946) - and thus in Piagetian conservation studies too, one supposes. The reason for this is that even if it were possible to associate developmental change specifically with language, it would still not be established that language was the causal agent, since it could equally well be that a developing ability to code relations perceptually enabled the child to learn and use the correct relative terms, in the form of gradable adjectives. The same argument generally applies, Bryant states, to some of the more recent "verbal mediation" theories of development, some of which will be considered below.

2.4. Psycholinguistic theory

From the remarks made above, it is clear that any theory of human cognitive development that omits mention of language skills is in great danger of misrepresentation, regardless of whether linguistic development is seen as the key to cognitive development or not. Piagetian developmental theory, perhaps the most comprehensive and ambitious statement, to date, of what changes take place in the intellectual life of the child from birth to adolescence, could certainly be strengthened in the above respect. In spite of recent attempts by researchers to fill out the theory in this direction, for example by examining the effect of verbal training on children's performance in Piagetian experimental tasks such as conservation and transitivity (Sinclair-de-Zwart, 1967; Riley and Trabasso, 1974), a number of criticisms still
Piaget's theory is not yet sufficiently explicit to predict precisely occurring aspects of language and language developments while ruling out non-occurring aspects. A second problem is that when one moves from grammatical relations to other linguistic universals . . . it becomes impossible to use Piagetian theory even metaphorically. On balance, then, it seems reasonable to conclude that while it would be possible in principle to predict linguistic universals from a cognitive theory, such a theory is not yet available.

(Cairns and Cairns, 1976 : 226)

Although, as Donaldson points out, Piaget is sensitive that the language of the child is different from that of the adult, at least in the early stages, he completely loses sight of the importance of this fact when he himself uses language as part of his clinical studies of children's thinking (Donaldson, 1978 : 61). We have already examined some of the consequences of this oversight with respect to class inclusion (Shipley, 1975; Fovey, 1976; Karmiloff-Smith, 1977), and as psycholinguistic research proceeds it is becoming increasingly clear, not only that the meanings of individual words, such as more and less, same and different, as well as many gradable adjectives crucial to Piagetian tasks, are not understood or mean something radically different to children at various ages, but also that there are more general variables related to language as a system that have gone unheeded in Piagetian experiments. These include the notion of communicative competence (Campbell and Wales, 1970 : 249), with all that it implies about the strategies used by children, in situations which they do not fully comprehend and in the presence of a linguistic system they do not fully understand, in order to interpret what is going on.

The child learns his language while learning other things about his environment too, and we can expect permanent interaction between the two kinds of knowledge being developed. At least the following four activities proceed simultaneously: (i) the development of conceptual
structure - both linguistic and non-linguistic; (ii) the development of strategies for understanding and producing utterances before knowing the full grammar of the language; (iii) the development of strategies for working out the grammar of the language bit by bit; and (iv) the development of internalised linguistic rules. Results achieved from indulging in one activity have beneficial effects on the others, rules are revised, new rules added, new strategies devised, and the overall process becomes a mutually dependent developing system until children acquire an adult version of competence (Cairns and Cairns, 1976: 222 - 223).

2.4.1. Language and cognitive functions

Bryant's (1974) revelations that young children are capable of making deductive logical inferences from perceptual data are important in this connection, since they challenge the invariant pattern of logical development voiced in Piagetian theory, by removing logical inferences from late in the concrete operational stage of thinking to early in the pre-operational stage of intellectual development. This period in turn is much closer to the time in life when language behaviour gets under way, thus raising again the question of the role of language in cognition. Although Bryant rejects the hypothesis of verbal mediation in the assembly of what he calls the "cross-modal dictionary" - a set of linkages between visual and tactile experience stored in memory - he is sympathetic to the view, originally expounded by Helmholtz in 1866, that the processes found in perceptual inference are the same ones as underlie verbal logic (Bryant, 1974: 2 - 5). This would not prevent linguistic structure from participating in the processes underlying perception, so that linguistic facts and perceptual facts might share storage space in the brain.

A very similar theory to this has been propounded by Macnamara (1971), who sees the task of semantics as providing an explanation of
how thought and language are accessible to each other, but sees no
difference between memory and semantic memory, since "language is part
of psychology, sharing in the general information store and information
processing" (Macnamara, 1971; 371). Thus whatever information is
stored in association with a word is the same as is stored in connection
with the percept which the word labels, so that the associations among
features of the information may be extensive and highly abstract, but
not necessarily ordered in a fixed sequence: "no features are particularly
favored in performance; depending on the context, any feature or set of
features may be salient, while others, including the defining ones, may
play no part" (Macnamara, 1971: 372). Our decision powers for what is
relevant in particular situations are derived from the fact that we
create a structural network of cognitions for ourselves as we amass
experience of our environment, where verbal communication and perceptual
processing interweave:

Communication never takes place in a cognitive
vacuum; it depends upon our whole array of logical
powers, as well as upon established expectations
about what people are likely to say.

All of this is not very different from what
happens all the time in visual perception, where
we unconsciously use complicated arrays of cues
to yield the percepts which we achieve. Moreover,
much of our perceptual observation is related to higher-
order cognitive functioning. We search our environ-
ment for causes, explanations, relationships,
opportunities, and so on.

(Macnamara, 1971: 372)

The implication of this is that cognitive structure mediates
linguistic and perceptual processes in such a way that they both feed
into and build up cognitive structure, and in turn are shaped by it in
a continuous dynamic equilibration. In the developmental history of
the child, perceptual processing lays the foundation of cognitive
structure, but is itself imperfect in many respects throughout childhood,
as was seen in section 2.2. When language is activated - and this may be before the child itself begins to speak - there is an extra channel of input into cognitive structure, a channel that increases processing capacity considerably, since it augments the dimensionality of cognitive functioning and extends the span of immediate memory thereby. It seems feasible that when language is in the early phase of development it will absorb structure from cognition, and this structure will be perceptually derived: the naming function might well be an example of such an absorption. Later, however, language will increasingly feed its structure into cognition, and this new, linguistically derived structure (examples like temporal sequencing and hierarchic organisation spring to mind) could well re-organise perceptual experience and processing activity (imposing method on scanning activity by the retina, for example: cf. Piaget and Inhelder, 1969: 39 - 43). This view, which is my own, avoids the question of linguistic universals in favour of interactionism and potentialities, in a way similar to that proposed by Schlesinger (1974: 145):

In contrast to "cognitive determinism" which postulates a one-way influence from cognitive to linguistic development, I propose therefore an interactionist approach. Language builds on the developing cognitive repertoire and in turn shapes it. In regard to the development of words and concepts such a view of a two-way effect has long since been well known: by learning the meanings of words the child learns how to categorise the entities these words stand for.

The benefit of adopting an interactionist framework is that it avoids the pitfalls of inferring immaturity in the child's cognitive development from immature aspects of his language performance, and vice versa; while it also focuses attention on the way the child gradually creates linguistic and cognitive structure in tandem for himself, and helps us avoid the temptation of viewing linguistic development from the perspective of adult grammar, in the way H. Clark (1973) does when talking about P-space and L-space, for example.
An interactionist approach also makes it easier to find a place for perceptual processes in the evolving cognitive network influencing linguistic performance. The utterances children produce are partially determined by the kinds of things they know and can think about. Early cognitive categories formed from perceptual interaction with the environment may be seen as a foundation for linguistic development, but as well as this they will very often determine a child's "reading" of a communication situation in important ways, since what is taken as a relevant feature of the situation because it is perceptually salient may be totally irrelevant as far as the person talking to the child is concerned—especially if this person is an adult.

Thus there are two kinds of ambiguity inherent in communication between the child and other people around him: they are cognitive and linguistic. There is considerable evidence that children develop very early (as performance skills) ways of overcoming their limitations by means of communication strategies that allow them to understand some things said to them even if they do not have a full command of the underlying language structure (Ehri, 1976; Karmiloff-Smith, 1977; Donaldson and McGarrigle, 1974; McGarrigle and Donaldson, 1974; E. Clark, 1975; Townsend and Erb, 1975; Wales, Garman and Griffiths, 1976). Children, on this interpretation, are seen to be building themselves theoretical models in cognition from a very early age, models which help them to anticipate and be ready to deal with features of their environment:

The expectations thus generated are known to be powerful things. . . . When a child hears words that refer to a situation which he is at the same time perceiving, his interpretation of the words is influenced by the expectations which he brings to the situation. If he is disposed to construe the situation in a certain way, giving salience to some features of it rather than others, then this predisposition will influence what he takes the words to mean.

(Donaldson, 1978: 68 - 69)
In this respect - to close a wide circle - gradable adjectives, even fairly "ostensive" ones like size adjectives, present the child language learner with a basic problem of where to start. Adjectives do not usually name discrete entities: that is the job of nouns, and so there is little in the way of very obvious perceptual data to fall back on as a source of interpretive strategies for gradable adjectives heard in conversation. Secondly, these adjectives - with the exception of number - mostly name continuative rather than segmented properties, which further decreases their perceptual salience. Looked at from the language side, there is an amazing variety of structures associated with the gradable adjectives that occur in ordinary speech: they may occur before nouns (as attributive adjectives) or after them (as predicative adjectives), in comparative, equative, or superlative structures and their negatives, with deictic adjectives (e.g. this big), with what Donaldson and Wales (1970) have called "functional comparatives" (too big, big enough), and so on. Thus the child is unlikely to be able to benefit, as he can in other cases, from uniformity of linguistic structure. How does he establish gradability structures at the cognitive level, then? There seem to be two general views on the linguistic aspect of the problem, and a number of separate hypotheses subsumed under these two broad headings, as described in the following two sections.

2.4.2. Construction versus Acquisition

The notion of language acquisition (as opposed to language development) stems from Chomsky's (1957, 1965) discussion of the way a child might learn language, and his characterisation of what he calls a "language acquisition device". Such a device, according to Chomsky, is activated by "certain kinds of (primary linguistic: M.E.) data and experience" (Chomsky, 1965 : 33), although once the stimulus has been given they may not affect the nature of its functioning in the least.
There is no formative role for situation in such functioning:

Thus it has been found that semantic reference may greatly facilitate performance in a syntax-learning experiment, even though it does not, apparently, affect the manner in which acquisition of syntax proceeds; that is, it plays no role in determining which hypotheses are selected by the learner . . . Similarly, it would not be at all surprising to find that normal language learning requires use of language in real-life situations, in some way. But this, if true, would not be sufficient to show that information regarding situational context . . . plays any role in determining how language is acquired, once the mechanism is put to work and the task of language learning is undertaken by the child.

(Chomsky, 1965 : 33)

It is to be noted that Chomsky has here conflated two statements, one about adults learning syntax in a very tightly controlled laboratory situation (the reference he quotes is Miller and Norman, 1964), and the other about language learning in the child. This is his prerogative, but Miller himself has commented on the laboratory sessions quite negatively in this respect:

... there was, I must confess, some thought in my mind that these experiments would cast light on the way infants acquire the rules of their native languages. It did not take long to disabuse me of this idea.

... there is almost nothing in common between the task we set our subjects and an infant's problems of learning to talk.

(Miller, 1970 : 173)

The reasons for his conclusion are, amongst other things: that his subjects were young adults who already knew one or more languages; that a second language is never learned in the same way as the first; that the artificial language used in the experiment accentuated a different (visual) kind of patterning; that the experiments did not involve meaning, and that there was no use to which the artificially constructed language could be put (ibid.).

The acquisition thesis has been taken up in psycholinguistics by McNeill (1970) and others in the United States, and it has had a strong
appeal to those working in the area of child semantics, via the claims made by Katz and Fodor (1963) about the nature of the dictionary (or lexicon) and the way it was learned; the dictionary was learned "item by item", more or less by rote, and this learning was said to be a continuous process, whereas the learning of rules for its application was said to be achieved "early and in toto" (op. cit. : 183). Thus there develops a view of language meaning which favours the atomistic over the wholistic. But how compatible with this picture is the way a child actually goes about the language-learning task?

It seems much more natural to assume few abilities for decontextualisation in the early stages of language learning: the Katz and Fodor theory, however, gives rise to a mental picture which "is that of a transaction in which one comes wholly into possession of a piece of property all at once, like buying a parcel of real estate, rather than the gradual emergence of meaning, for the speaker, through a long process of decontextualization in which a word is only dimly grasped at first, and slowly, as it gains in contexts, cancels its overextensions one by one" (Bolinger, 1965 : 571). Bolinger's theory of how language is learned by the child is such that morphemes (and single words) are not the operational units, but rather phrases and clauses, possibly even sentences. The goals of a semantic theory adjusted to natural language must somehow reconcile humans' abilities to operate with whole "chunks" and simultaneously with isolated units of linguistic structure that they have managed to decontextualise from wholes. Yet the Katz and Fodor theory, according to Bolinger, provides such a rigid framework that "there is room neither for the acquisition of meaning as it actually takes place, nor for extensions of meaning as they really happen" (op. cit. : 572).

Bolinger's proposals represent what might be called the "constructivist" position in theories of how children learn language. It is
inherent in the importance Brown attached to both "codability" and structural frequency, as well as the hierarchic spread in levels of abstraction, when trying to describe the activities of the language-learning child (Brown, 1958; and 1970; 204 - 206). An echo of Bolinger's critical stance towards the Katz and Fodor (1963) view of language learning is found in Donaldson's (1978: 73) remarks:

It is a common but naive assumption that the understanding of a word is an all-or-none affair: you either understand it or you don't. But this is not so. Knowledge of word-meaning grows, it undergoes development and change. Also, the process of understanding an utterance does not just depend on the serial addition of one word-meaning to another. It is an active process of structuring and making sense of the whole.

(Ibid.)

This distinction between the "constructivist" and the "acquisitionist" standpoints also provides a characterisation of one of the differences between those theories of language development deriving their impetus from Piaget's theory of intellectual development, and those which favour Bruner's system of cognitive stages. As Halford (1972: 179), citing arguments by Furth (1969), points out: knowledge, in the Piagetian view, is derived from relationships between a person's activities and sensory data, and thus knowing is an 'act', which simultaneously transforms both the sense data and the organism. According to Furth, the Bruner theory of cognition is a 'representational' one that has no operational component, since knowledge is there seen as attained by simply internalising experience.

As will be seen below, the adoption of a "constructivist" or an "acquisitionist" position determines to a considerable extent exactly what is conceived as important to theories of language-learning that focus on semantics. The "constructivists" tend to pay more attention to overall interactional features of communication, and include consideration of pragmatic variables to a certain degree, whereas the "acquisitionists"
tend to focus their attention more on isolated aspects of semantic structure and to neglect pragmatic variables which might be important to the child in learning the meanings of his language. At its worst this "acquisitionist" orientation leads to the "common but naive assumption" described by Donaldson above: word meanings are "acquired" in simple incremental fashion. The results of my own study, presented in the next three chapters, show the inadequacy of the "acquisitionist" orientation and the necessity for a "constructivist" view of semantic development.

2.4.3. Psycholinguistic hypotheses on semantic aspects of gradability

In order to secure a reasonable perspective on psycholinguistic research relating to gradability, we shall here consider theoretical issues separately from the research which engendered them - as far as this can be done - and delay examining aspects of experimental work until section 2.5. and subsections.

Accordingly, we shall begin by examining the "acquisitionist" branch of the dichotomy mentioned above, and looking at what Wales, Garman and Griffiths recently referred to as "a specifically linguistic model" of language development (Wales et al. 1976: 47), namely that which is known variously as "the principle of lexical marking" (H. Clark, 1969b, 1970b), "The Semantic Feature Hypothesis" (SFH) (E. Clark, 1973a), "The Full Semantics Hypothesis" and "The Partial Semantics Hypothesis" (E. Clark, 1973b); together with the offspring of all these capital letters: the "Correlation Hypothesis" and the "Complexity Hypothesis" (H. Clark, 1973), as well as the "retention hypothesis" and "semantic acquisition hypothesis" of Bartlett (1976).

Both the lexical marking principle and the SFH rely to some extent on Bierwisch's (1967) original proposals concerning the semantic analysis of (German) gradable antonyms, mainly those concerned with size. The
principle of lexical marking was articulated first not in the context of child language learning, but rather as a way of explaining the pattern of error made by adults in processing what Clark called "three-term series problems" involving comparative adjective structures and transitive inference (H. Clark, 1969b).

H. Clark's proposals have already been described and analysed in the discussion of "marking" in section 1.3.4.2. above, and criticism was made of two procedures adopted by him. The first was the over-extension of the category of adjectives that could suitably be described as "marked" (e.g. good-bad) on the basis of the How-question, which was shown in 1.3.4.2. to be only suitable for scalar metric attributes that could be quantified; and the second was the claim that the comparative forms of gradable adjectives were also distinguishable on the marked-unmarked dichotomy. The second procedure seems to have been adopted as a result of accepting a transformational-generative syntactic analysis of the comparative structure, whereby a comparative sentence is derived from two base strings containing uninflected adjectives: this is certainly to be inferred from the bibliographical references in Clark (1969b). There is an imperceptible slide from one aspect of linguistic theory to another, and then a statement which implies that the linguistic credentials of the "principle of lexical marking" are impeccable, whereas I believe Clark goes badly astray. Researchers who have tried to make use of the principle in research into child language have not been successful (Kuczaj and Lederberg, 1977; Townsend, 1976), and it is interesting to note that Townsend has made some of the same criticisms of Clark's somewhat loose treatment of the notion of markedness in this early paper (Townsend, op. cit.). As was stated in section 1.3.3. above, Campbell and Wales (1969) have argued very convincingly against the two-sentence base for comparative structures, and Wales (1971) presented supporting evidence that comparative structures should be treated as two-place
predicates, by showing that even the uncompared forms of gradable adjectives are not understood first in absolute but in comparative terms by young children. Such a fact, if it were to be accommodated within the two-base-strings T-G analysis, would obviously involve an infinite recursion, as each adjective entering into a base string would have to be analysed as itself being composed of an embedded comparative sentence containing two base strings, etc.

Eve Clark's (1973) proposals to use Bierwisch's (1967) analysis of gradable adjectives as the basis for a testable hypothesis in studies of child language acquisition are much more carefully thought out than H. Clark's lexical marking principle. She confines her attention to the uninflected adjective forms, for example, although she seems to accept Greenberg's (1966) criteria for markedness in the same way as H. Clark does - and as was demonstrated in section 1.3.4.2., Greenberg's criteria are so self-contradictory as to be unable to stand careful examination. Thus E. Clark accepts that more is unmarked with respect to less (op. cit. : 73), thus following H. Clark's (1970b) analysis of results presented in Donaldson and Wales (1970).

The Semantic Feature Hypothesis (SFH) was articulated as a result of considering three other views of language acquisition, namely the "Grammatical Relations Hypothesis" (McNeill, 1970), the "Generalization Hypothesis" of Anglin, and the "Universal Primitives Hypothesis" (Postal, 1966; Bierwisch, 1967). McNeill (1970) had devoted some attention to how a child acquired the lexical items of his language, and also appealed to the notion of semantic features in the organisation of the dictionary. He made the interesting point that in the early stages of lexical organisation, children possibly internalised a sentence dictionary rather than a word dictionary, and only after combinatorial speech advanced did they reorganise this into sets of word entries with an elaborated system of semantic features and rules of

- 174 -
combination. (It is interesting to note that McNeill suggests small as a semantic feature in the list for the dictionary entry of flower, whereas Bierwisch analyses small into three components in his 1967 proposals). Two possible modes of dictionary organisation were discussed by McNeill, namely the "Horizontal Development" and the "Vertical Development". In the first mode, although a word might be acquired, not all the semantic features would be associated with its entry, so that a young child's meaning system would be different from that of an older person, but would increasingly approximate it as the child added more features during maturation. In the second mode, Vertical Development, which I must admit is not very clear to me, most or all of the semantic features enter the dictionary when the word does, "but at first dictionary entries are separated from each other so that semantic features appear at several unrelated places in the dictionary... Semantic development would consist of vertically collecting these separate occurrences into unified semantic features" (McNeill, 1970: 116).

While Eve Clark (1973 : 66) finds the notion of Horizontal Development an "inherently reasonable proposal", she is not satisfied with McNeill's treatment of semantic features:

> Where do they come from? Do they suddenly appear just when the child is about to reorganize his lexicon to accommodate word entries? McNeill appears simply to assume that the features are the same somehow as the adult's features.

(ibid.)

Clark interprets McNeill's notion of Vertical Development as meaning that "the same semantic features are not necessarily recognised as being the same in different entries within the lexicon" (ibid.), and criticises his apparent assumption that words have the same semantic properties for young children as for adults, as well as accusing him rather unjustly of neglecting the possibility that children from the age of
thirty months must already know the semantics of their language in order to both communicate with adults and other children, and use many of the syntactic rules of their language correctly. The weight of Clark's argument derives from her observation that children have some "knowledge about reference" from an early age, and that both McNeill's and Anglin's theories are defective because they fail to take this fact into account, considering only data from older children.

The "Generalization Hypothesis" does not deal specifically with semantic features, but rather with words as the unit of analysis. Anglin, to judge from Clark's account, seems to have considered the development of meaning to proceed from concrete towards abstract concepts. Words appear to become increasingly free of context as children grow older, and they begin to structure their vocabulary hierarchically. It is interesting that children are seen as becoming increasingly reliant on language as a source of new concepts, according to this theory, and many of their later concepts are linguistic, such as form-class. On this analysis, children would actually be developing a Katz-and-Fodor type of dictionary by starting at the distinguisher level and building upwards - if Anglin had couched his hypothesis in those terms. It seems reasonable to regard increasing abstraction and decontextualisation of verbal concepts as a hallmark of semantic development, but Clark's criticism misses this point, and she says of Anglin's theory that "it is quite unable to account for the fact that children can use words appropriately in sentential contexts at an age when they are unable to say anything about form class" (E. Clark, 1973a: 69).

The "Universal Primitives Hypothesis" is concerned with the claim that semantic features are relatable to human cognitive and perceptual structure. This has already been discussed in section 2.2.

From her consideration of these three approaches to semantic
structure, Clark develops the "Semantic Feature Hypothesis," whose general principles are that (a) perceptual knowledge determines the young child's initial word meaning, and that (b) the learning of words will be easier if the meaning given in the language by the speech community coincides with the child's perceptual knowledge; (c) semantic features best describe children's word meanings, and (d) more general features will be acquired before less general features.

There are a number of problems with this hypothesis. The main problem is that Clark's theoretical discussion is weighted strongly in favour of nouns, and she seems to assume (cf. Clark, 1973a: 72-73) that nouns are "acquired" before other words, such as gradable adjectives. Moreover, she also appears to believe that the process of acquisition of the two types of word-meaning is similar, and that this proceeds more or less one feature at a time; this attributes quite powerful abstract inferential powers to the child. It is quite reasonable to point out that children's knowledge is very restricted compared with adults', in language no less than in other areas of behaviour, and that the child does not use words with the same meaning as an adult would give to them; but it is jumping a very wide gulf indeed to proceed from these observations to an explication of them in terms of semantic features that are incompletely listed for word entries in a "lexicon":

Thus the child will begin by identifying the meaning of a word with only one or two features rather than with the whole combination of meaning components or features (qua Postal) that are used criterially by the adult. The acquisition of semantic knowledge, then, will consist of adding more features of meaning to the lexical entry of the word until the child's combination of features in the entry for that word corresponds to the adult's.

(E. Clark, 1973a: 72)

Clark believes that children overextend and overgeneralise word meaning in the early stages of language development because they lack a full set of semantic features for the word entries in their mental lexicons: she
illustrates this with the well-known archetypal example of a child calling all four-legged animals dog, arguing that this shows the presence of only one feature, four-legged, in the child's lexicon. This is an inadequate specification of the meaning of dog, if the child's category is to coincide with the adult's, and she hypothesises that "with the addition of other features, the child will gradually narrow down this initially very general meaning of dog until it means what the adult means" (ibid.). Clark does not appear to believe that the learning of new words does this, since she gives prior status to feature acquisition. It seems to me just as likely, however, that words are what is at stake, and that the child's overextensions of words to other referent classes could as well result from lack of vocabulary as lack of (abstract perceptual) features in the lexicon. It is surely reasonable that anyone who lacks vocabulary - one has only to consider a person trying to communicate in a foreign language to appreciate this - but needs to name something in his environment for which no term is known, simply uses a process of analogy to extend the communicative power of his vocabulary, and uses a name which he knows to be inappropriate but which is nevertheless close enough to the intended term for the listener to be able to arrive at some understanding of what is meant. In many such situations the listener may even achieve perfect understanding, if he can match utterance with spatio-temporal context and retrieve the intended meaning from his "reading" of the situation. This kind of situation is paralleled in that of the child speaking. The child can overextend words as long as there is supportive context: it is only when the language design-feature of "remoteness" is relevant that this type of behaviour fails, as the listener has no means of checking on the appropriacy of the child's references.

A second reason for the child's overextensions are syntactic
rather than semantic: the child's syntax is not developed enough to allow him to say things like "Look at that thing over there that I don't know the name of but which is in some respects similar to a dog", and he just says dog there or bow-wow instead. As the child's syntax develops, he becomes capable of longer utterances, and this brings us to the fact that the child soon acquires the capacity to ask for the names of things, an act which implies a developing metalinguistic function, although the child may not be fully conscious of it, since asking for the names of things links words with objects, whereas later the metalinguistic function develops power to link words with words. This last fact seems to be implicit in Anglin's interpretation of semantic growth as proceeding from specific to abstract. Clearly vocabulary does become more integrated as children mature, and this is mainly thanks to verbally defined concepts.

One of the most severe drawbacks with the SPH is that Clark fails to distinguish intension from extension in her discussion. She consistently uses data on the extension of a child's vocabulary of reference as a means of inferring the semantic features that the child is said to be using, i.e. its intension of terms, and yet such a procedure is futile, as Carnap has pointed out (Carnap, 1956: 236; also see footnote 17, this chapter). A theory of intension can only be arrived at by a process of logical elicitation by interview, and young children would not be suitable for this. Two people could perfectly well agree in their characterisation of the extension of predicates in the language of a third, but they could still differ diametrically on what that person's set of intensions are. Put in terms of the procedures of the SPH, it is quite acceptable to analyse the over-generalisations of a child's vocabulary by experimental means, but one cannot possibly infer from such observations what the child has in the way of semantic features.
Any theory based on such a procedure has the added disadvantage that it is unempirical because its assumptions are not amenable to disproof. (The notion of extension will be developed in Section 5.1.)

Having indicated a theoretical semantic consideration which seems to totally undermine the SFH, I would nevertheless like to return to the central topic of this disquisition, and examine what Clark has to say about gradable adjectives. She assumes that the first semantic features that the child uses are liable to be derived from the encoding of his percepts, and that later as the child learns more about its language it will learn which of these perceptual features are linguistically relevant and which are "relatively redundant within a set or combination of features" (E. Clark, 1973a: 74). More and less are considered first and then gradable antonyms from the size dimensions, as well as same and different.

Basing her arguments on data and results given by Donaldson and Balfour (1968), Donaldson and Wales (1970) and Wales and Campbell (1970), together with H. Clark's (1970b) analysis of the second of these papers, Clark (1973a) proposes that initial word meaning for pairs of gradable antonyms in the child's vocabulary can be characterised as going through three stages. The first is where the meaning of one of the adjectives in a pair is overextended to cover both, and both adjectives merely name the relevant dimension, being used noncomparatively. In the next stage, the "unmarked" adjective's secondary meaning, of naming the positive extremity of the polar extension, is the meaning for both antonyms, and finally the "marked" adjective's meaning emerges and it is distinguished from its antonym. Thus, in feature terms, more and less acquire features as follows: stage one = +Amount; stage two adds the feature +Polar to both; stage three adds the feature -Polar to less (E. Clark, op. cit. : 91). There is an obvious contradiction here, namely that by stage
three less has both + Polar and - Polar in its reading: Clark ignores this fact. She proposed a similar sort of analysis for same and different, as a result of Donaldson and Wales' (1970) findings that children in their studies appeared to understand different as if it meant same. It is notable that Clark offers no semantic feature analysis of these two words, however. (It is also noteworthy that Kavanaugh, 1976, has pointed out serious methodological flaws in the design of the Donaldson and Balfour study which appear to be responsible for their 1968 results: when these are removed, less no longer appears to be used as a synonym for more. Similarly, Glucksberg, Hay and Danks conducted a study of same and different in 1976, and found that adults also responded to questions containing these words in such a way that same and different appeared to be understood as synonyms, just as happened with young children in the 1970 Donaldson and Wales study. Wales, Garman and Griffiths, 1977, also found task variables affecting performance on the above adjectives.).

Clark's suggestion regarding the development of meaning for size adjectives is also that dimensional features are acquired first, followed by positive polarity (unmarked) and negative polarity (marked) features respectively. She further proposes that big-small are at first over-extended to cover the meaning domains of all the other more specialised adjectives such as tall-short, high-low, wide-narrow and long-short.

There are a number of awkward points in Clark's conception of the semantic structure of size antonyms. The first is that she accepts H. Clark's (1970b) argument that since in many cases the positive polar adjective is used in measure phrases, to name a dimension (e.g. He is six feet tall) in addition to its contrastive, antonymous sense, this must necessarily result in the "nominal" meaning being first acquired in preference to the "contrastive" in the young child's lexicon. The objection to this is that Clark talks of children of six years old or
less, and at this age they have not begun measuring things. In pragmatic terms, therefore, there is absolutely no justification for assuming that the so-called "nominal" use of an adjective would be of any interest to children. In discussing the possible perceptual basis for the posited early semantic features in the child's lexicon, Clark (op. cit. : 103) examines results obtained by Ricciuti which showed that outline contour of objects was a preferred dimension of judgement among children between three and eight years of age engaged in classifying items for similarity. Contour was always given priority over details, although the latter were perceived, and it seems to me that this fact is quite significant for a consideration of possible meanings of some size adjectives. The reason is, it provides a much more solid basis, in perceptual terms, from which to start establishing meaning than does H. Clark's (1970b) notion of "nominal" usage, which relies on a highly abstract (adult) view of the world.

Secondly, E. Clark (p. 105) does not appreciate the full complexity of gradable size adjectives. It is simplifying matters enormously to assume that tall-short refer to extension and high-low only to position, although this might help a semantic features analysis along. High-low can of course also be used for extended objects, as in Bierwisch's example These towers are high, and in This coffee table is low. According to this consideration, however, high-low having more uses should mean that the pair enter the lexicon earlier than tall-short, which does not appear to be the case, and so they are theoretically awkward for the SPH account of meaning acquisition. Clark also appears to treat short and low as "measuring" adjectives, which is an inaccurate representation - at least of low:

Measurement in the positive direction along the dimension is named by the unmarked term which also serves as the name of the dimension, e.g. long-length, high-height, etc. The marked terms, such as short or low, though, measure in a negative direction along the dimension. Each dimension is measured from a zero point (or primary reference
point) so the positive direction goes away from the zero point . . .

(E. Clark, 1973a : 105)

The mathematicalist bias of H. Clark (1973), published in the same collection of papers, is clearly discernible in these notions (the idea of a zero point, for example; many size adjectives describe attributes of "positive" physical objects that are never opposed by "anti-objects", and this renders the notion of zero-point somewhat otiose). And many of H. Clark's other proposals, which have already been discussed (section 2.2.) and found wanting, are accepted too.

We shall not consider the details of E. Clark's SFH further, although there are many other shortcomings. Despite support for the Hypothesis that was adduced from results in E. Clark (1972), as well as the Donaldson, Wales and Campbell work mentioned above, it has not had a very good press since then. Bartlett (1976) partly supported the dimensional features order of acquisition, but not the polarity order. Other researchers have made use of the semantic component approach to word meaning (e.g. Mansfield, 1977) and Baron has even proposed it in a developed form as an alternative to Piagetian developmental stage theory (Baron, 1973), but generally comments on the SFH have been critical, and there is little experimental support for it in the domain of research on gradable adjectives. Morehead and Morehead (1974 : 179) have criticised Clark's thesis that perceptual attributes provide a basis for early word meaning on the grounds that the young children considered by her just do not have sufficient powers of abstraction:

There is considerable evidence that the grouping of members into a class (extension) according to the defining attributes of that class (intension) does not occur until the emergence of class inclusion at seven years when the child finally frees himself from perceptual constraints and surface representations . . .

(Ibid.)
Wales, Garman and Griffiths (1977: 32-33) make a similar point when they suggest that semantic features of gradable, antonymous adjectives are unlikely to exist, for the child, independently of the set of objects of which such relations could be predicated. The notion of overextensions of word meaning, on which Clark's SFH is based, can also be seen in quite another light, as Karmiloff-Smith and Inhelder (1974: 209) indicate: "Overgeneralization, a sometimes derogatory term, can be looked upon as the creative simplification of a problem by ignoring some of the complicating factors . . . overgeneralization is not only a means to simplify but also to unify . . . "

The experimental work relating to the SFH has produced negative results both on the general predictions of feature acquisition and on the order postulated for appearance of the polarity features. Friedman and Seely's (1976) results run quite counter to H. Clark's (1973) "correlation hypothesis" as well as E. Clark's (1973a) SFH predictions, regarding both order of development and of polarity acquisition for spatial and temporal terms. Eilers, Oller and Ellington (1974) found the two polarity features to emerge identically. Ehri's (1976) results partly support the SFH predictions on polarity, for adjectives but not for more-less. Similar discouraging results were obtained by Townsend in an investigation of comparatives and superlatives (1976), and by Kuczaj and Lederberg (1977) in a study of older-younger. Incidental partial support for the principle of lexical marking is provided by Riley and Trabasso (1974: 198) in the results of a transitive inference training task with child subjects. This is a depressing picture.

Klatsky, Clark and Macken (1973) also obtained inconsistent results on polarity, using nonsense words in a learning task with young children. Regarding the SFH's predictions on order of emergence of different features, with the more general coming first, and then polarity, Wales
(1977: 23) has pointed out that even Clark's original word association data (Clark, 1972) on which the SFH was raised, do not support this order, since children clearly displayed knowledge of the polarity features before other aspects of gradable antonymic meaning. And there seem to be grounds for believing that, as Wales, Garman and Griffiths indicate (1977: 33), task variables can inordinately affect the type of results achieved in word-meaning studies of children. To take just one example, various researchers have reported that children show a nonlinguistic response bias towards objects of a certain size in experiments on the comprehension of size adjectives. However, whereas Bartlett (1976) and Eilers et al. (1974) found the bias was towards small objects, Townsend and Erb (1975) report it as towards the larger of two objects, and the evidence from Bever, Mehler and Epstein (1968) is also baffling: for the dimensions of number versus length in a Piagetian type of conservation task, children of 4–5 years old tend to incorrectly pick the longer of two rows of objects as having more in it, while younger children (2–3 years old) were more likely to correctly pick the shorter row as having more. One very important feature of these experiments with size adjectives alone is the type of instructions. Depending on whether children are asked "Give me . . ." or "Show me . . .", the response bias appears to change from small to large objects. Such a phenomenon is again awkward for the SFH, which predicts that natural preference for objects of great extent facilitates learning of positive polar adjectives first (see, for example, Klatsky et al., 1973).

A modified, "split" version of the SFH was subsequently produced by Clark (E. Clark, 1973b) in which she presented a "Full Semantics" and a "Partial Semantics" hypothesis. In the first version, it was proposed that for more and less children first learned the features +Amount and +Polar; in the second version, they only acquired +Amount,
and used "non-linguistic strategies", such as picking the larger object or quantity when given instructions containing either more or less, and thus apparently comprehended more correctly, but not less. It can be seen that whereas the "Full Semantics Hypothesis" is the old SFH in disguise, the "Partial Semantics Hypothesis" (PSH?) represents a retreat from a purely abstract view of how words develop meaning, and attempts to take pragmatic factors into account, thus following the view of Stemmer (1971), who criticised the use of componential features in studies of child language, saying that they had no psychological implications for language acquisition: "... the features of the circumstances which determine the generalization classes \[\ldots\] for children are different from the features which logicians, and perhaps adults, consider as basic in their analysis of these terms" (Stemmer, 1971 : 168). The role of non-linguistic strategies has been given more scope in Clark's later work (1974; 1975; 1977a; 1977b), and even the SFH predictions about a fixed order of development of vocabulary items based on semantic feature generality have been allowed to wither quietly ("... there do seem to be various ways of getting from the child's first strategies to the final stage in the acquisition of meanings" : Clark, 1975 : 92). However, H. Clark has been intransigent on the issue of semantic feature acquisition, especially for gradable size adjectives, and in Clark and Clark (1977 : 499), for example, we read, after a very simplified account of the SFH:

Children acquire these terms roughly in the expected order, both in production and comprehension. The first dimensional adjectives, big and small (or little), appear in their speech between the ages of two and three, and the rest follow later, as shown in 5:

5. a. big-small
   b. tall-short, long-short
   c. high-low
   d. thick-thin
   e. wide-narrow, deep-shallow

This order of acquisition reflects the relative semantic complexity of dimensional terms fairly closely.

(Ibid)
A different school of thought from the "acquisitionists", and which I have suggested might be graced with the umbrella-title "constructivist", is found in the approach of Donaldson, Balfour, Wales, Campbell and others to the same problem as that considered by the acquisitionists, namely development of word meaning. In the development of gradable antonyms in the adjective vocabulary of children, context and situation are seen to play a very important part, and the view of developing word meaning is not a simple incremental one, since in harmony with observations made in Piagetian psychology certain kinds of internal equilibration are seen as sometimes resulting in apparent regression as a child's vocabulary becomes reorganised in the light of experience and learning. Communicative functions and the importance of interaction are emphasised (Campbell and Wales, 1970; Wales 1971: 68 - 70).

Wales and Campbell (1970) suggest that gradable size adjectives are relatable in a semantic field whose structure can be characterised as hierarchic, with big and wee (possibly small or little might also enter) in the position of quasi-superordinates, at "nodes of degree seven", to use Fillenbaum and Rapoport's (1971) description of this sort of structure, in the following diagram:

```
positive   long   tall   high   deep   broad   thick   fat
Antonymous A      A      A      A      A      A      A
negative  short  short  low    shallow narrow thin thin
wee
```

Learning these antonyms, Wales and Campbell suggest, is a systematic process which will tend to connect with ontogenetic development, and it will proceed by differentiation from big and wee which provide the fundamental dimension of antonymy. They also suggest that superlatives and absolute forms of adjective are prior, in spontaneous speech, to
comparatives; their studies are the first serious attempt to treat
the various adjective forms separately as having different functional
values. Support for the Wales-Campbell differentiation hypothesis,
which predicts polarity as the first semantic feature, is found in
Eilers et al. (1974) and Bartlett's "Acquisition Hypothesis" (1976).
The notion of fundamental structure depending on polarity is also supported
in other areas of research by Harasym, Boersma and Maguire (1971), and
Deese's (1964:352) results with adults in word association studies.

Donaldson and Wales (1970:264) suggest that gradable antonym
structures present a learning hierarchy and that absolute adjectives are
used before superlative adjective forms; that these are followed by
comparatives; then too + adjective structures and adjective + enough
structures, which are functional comparatives. These suggestions,
together with those of Wales and Campbell (1970) provide a coherent
theoretical account of the pattern of development in meaning for many
gradable adjectives. The idea of differentiation seems to be supported
in a general way by the child vocabulary counts of Edwards and Gibbon
(1973), and the theory that context and function will determine the
differentiation sequence is also supported elsewhere (Griffiths, Shantz

Kuczaj and Lederberg (1977) have also proposed a theory of
"constructivist" activity in child word learning, which they refer to
as the "interpretation" theory. This tries to account for the contribu-
tions made by both language and communication context in establishing
word meaning:

. . . the more or less identical context which is
available to . . . two interpreters is EXTERNAL
CONTEXT, and each interpreter must use the infor-
mation he obtains from the external context to
construct an INTERNAL CONTEXT (a mental construct),
the internal context being important for the inter-
pretation of the entity on which one's attention is
focussed ... Differentiating between external and internal context is necessary not only because it explains why interpretations of the same event are idiosyncratic from person to person, but also because it is able to account for the same person differently interpreting the same or similar events in the same or similar contexts at different times.

(Kuczaj and Lederberg, 1977: 411)

Children are said to use an interpretation of context in assigning initial meaning structure to words, and, further, when they learn something additional about the meaning of a word they will not always allow this to adjust previously learned aspects of its meaning, but may operate simultaneously with two meanings that are nevertheless separated contextually so as to avoid obvious conflict. The theory can thus account for both variant and invariant developmental sequences in word meaning, but can only do this after the fact. Four factors are assessed as being differentially weighted in meaning-development: inter-word relations; minimal cognitive skill to acquire word meanings; (figure-ground) relationships of perceptual focus and perceptual context; and the child's own interpretation of the context. The disadvantage of the theory is that it is not predictive, since the weight of the above four factors cannot be the same for each set of word-meanings. Kuczaj and Lederberg (op. cit.: 414) acknowledge that it is a "messy" theory, but find it preferable to a concise predictive theory (the SFH) which fails to find empirical support.

A final theory about the developmental order of meaning for dimensional adjectives is the "Semantic Acquisition Hypothesis" of Bartlett (1976), which is an "acquisitionist" theory but is closely related to the Campbell and Wales (1970) structural hierarchic model described above. Bartlett suggests a four-stage process of acquisition, whereby polar semantic features are acquired first, then dimensional features which gradually differentiate from big and small, the
specialised adjectives not forming associated antonyms until a final stage. Her discussion is not perfectly clear, but the model proposed seems to be like this:

Stage 1  Stage 2  Stage 3  Stage 4?

+Pol  →  big  →  tall  →  tall
  -Pol  →  small  →  short  →  thick

long  →  thick etc.

thin  →  narrow etc.

The criticism that can be made of this model is that it is not consistent, since if at stage one the polarity feature is given, and this is transferred through big and small, then it must also be a characteristic of the adjectives at stage three. This would then make stage four redundant. Nothing more will be said about this here.

2.5. Empirical Research on Grading

Attention will be focused in this last part on some of the abilities and types of behaviour found to be associated with verbal grading using adjectives, and some recent experimental work will be discussed.

2.5.1. Adults

There are a number of psychological and psycholinguistic studies of adult language which suggest that, while gradable adjectives are better organised from the point of view of logical structure than they are in child language, and are even well-integrated on the parameter of polarity (Deese, 1964; 1962; Osgood and Richards, 1973; Osgood, Suci and Tannenbaum, 1957) as well as to some extent being - in the case of comparatives - spatially representable (de Soto et al., 1965;
Handel et al., 1968), they cause difficulty when they are used in various verbal tasks (H. Clark, 1969a, 1969b; Clark and Card, 1969; Flores d'Arcais, 1970). However, recently it has been suggested that one of the reasons for the difficulties subjects in verbal experiments have experienced is that the analysis of logical structure assumed to underlie the semantic organisation of these adjectives is incorrect (Huttenlocher and Higgins, 1971; Higgins, 1977; Townsend, 1976).

In a study of the relative frequencies of paradigmatic and syntagmatic word associations to four different word classes (nouns, verbs, adjectives and adverbs), Deese (1962) found that there was a correlation between the high frequency of adjectives, as measured on the Thorndike-Lorge word-count, and the tendency for their paradigmatic associates to be polar opposites or antonyms. Low frequency adjectives tended to associate with higher frequency synonyms, where they produced any paradigmatic responses at all. Deese interpreted this as indicating that the associative meaning of high frequency adjectives was therefore relatively context-free, in a way similar to that of nouns. He followed this study up in 1964 by examining these polar contrasts in more detail. The free associations to 278 high frequency adjectives - many of which were gradable antonyms - were obtained from 100 university undergraduates. As Deese observes (Deese, 1964 : 349), one of the main characteristics of members of a pair of gradable antonyms (as of contradictories) is that they should elicit each other mutually as the most frequent associate in a test of word association. Forty pairs of adjectives were found to fulfil this condition.

In view of the subsequent use made of the data and results presented by Deese (1964), for example by H. Clark (1970c), it is worth examining these in more detail. Clark has frequently argued the validity of the "marking" theory as an explanation of the relative frequency of pairs of antonyms within the language: generally, the fact that the
"unmarked" member of a pair of antonyms is remembered more easily than
the "marked" is said to be due to its greater frequency of usage
because it has both "nominal" and "contrastive" meaning (H. Clark 1970a;
1969). Adjectives which are "marked", on the other hand, are implied to
be derived from unmarked adjectives, in semantic terms, by the "addition"
of an extra feature:

... an unmarked adjective has one less semantic
feature than its marked counterpart; i.e. bad
consists of all the features of good plus the
added feature /Polar/.

(Clark and Card, 1969 : 545)

Clark suggests (Clark, 1970c : 277), as a result of considering previous
work on "marking" by Greenberg (1966) and Marshall (1969), that there is
an association between pairs of gradable antonyms such that the "marked"
adjective calls forth the "unmarked" in word associations more often
than the reverse. He claims support for this statement in Deese's
(1964) results:

An examination of 16 pairs of adjective stimuli
that have only one antonym (data from Deese, 1964)
generally supports /Marshall's/ extension /of the
marked-unmarked distinction to antonyms: M.E./,
with 14 of the 16 pairs consistent with this rule.

(H. Clark, ibid.)

This represents a considerable selectivity on Clark's part, since
Deese's list contains forty pairs of opposites - not all of which,
admittedly, are gradable antonyms (cf. Deese, 1964 : 350). In the
partial list below there are eighteen pairs of gradable antonyms,
including all the size adjectives and some others which Clark has
referred to in some of his work. The left-hand column displays the
frequency with which the first word elicited the second in each pair,
and the middle column indicates the reverse elicitation frequencies.
They are percentages, since there were a hundred experimental subjects
in Deese's investigative study. It will be noted that not all these
adjectives are marked-unmarked pairs according to any theoretical linguistic criteria, but seven that are often referred to by Clark as being such pairs (large, long, tall, thick, hot, heavy, old), do not have elicitation frequencies that support his assertion. The right-hand column gives a rough idea of the magnitude of difference in the pairs of frequencies (ratios to 1).

<table>
<thead>
<tr>
<th>Pair</th>
<th>f%</th>
<th>f%</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>bad-good</td>
<td>43</td>
<td>29</td>
<td>1.5</td>
</tr>
<tr>
<td>dirty-clean</td>
<td>21</td>
<td>15</td>
<td>1.45</td>
</tr>
<tr>
<td>little-big</td>
<td>15</td>
<td>14</td>
<td>1.1</td>
</tr>
<tr>
<td>shallow-deep</td>
<td>19</td>
<td>10</td>
<td>1.9</td>
</tr>
<tr>
<td>low-high</td>
<td>31</td>
<td>17</td>
<td>1.85</td>
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<tr>
<td>large-small</td>
<td>23</td>
<td>13</td>
<td>1.85</td>
</tr>
<tr>
<td>long-short*</td>
<td>21</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>near-far</td>
<td>35</td>
<td>17</td>
<td>2.05</td>
</tr>
<tr>
<td>narrow-wide</td>
<td>15</td>
<td>12</td>
<td>1.25</td>
</tr>
<tr>
<td>tall-short</td>
<td>15</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
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<td>21</td>
<td>13</td>
<td>1.6</td>
</tr>
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<td>20</td>
<td>2</td>
</tr>
<tr>
<td>slow-fast</td>
<td>27</td>
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<tr>
<td>few-many</td>
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<td>sad-happy</td>
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<td>13</td>
<td>2</td>
</tr>
<tr>
<td>young-old*</td>
<td>25</td>
<td>7</td>
<td>3.57</td>
</tr>
</tbody>
</table>

(* asterisks mark adjectives which did not elicit their paired antonym as first - i.e. most frequent - choice)

These data leave Clark's theory of lexical marking with very little in the way of empirical support, at least as far as gradable adjectives are concerned, and we have already seen elsewhere that it has theoretical deficiencies too (section 1.3.4.2.).

It could be argued, however, that the experimental evidence provided by Clark (1969a, 1969b) and cited (1970a) by him, as well as results
from Clark and Card (1969), support his thesis. Yet this is not so, as a number of shortcomings can be found in these studies.

To take a very brief look at some of these: Clark (1969b) elucidates three principles which are claimed to affect the way people store and retrieve verbal information when they are performing tasks of verbal reasoning. The first two principles are those of the primacy of functional relations and the lexical marking principle (see footnote 23, this chapter). Briefly, when people process comparative or equative sentences, they remember the "underlying sentences" of the comparison more easily than the relations -er than or as ... as, etc.; and "the neutral senses of unmarked adjectives, like good, are coded in memory in a simpler form than the senses of marked adjectives, like bad". The main result of this, Clark claims (op. cit. : 206), is that "storage and retrieval should be quicker for comparatives containing unmarked adjectives." These two principles are syntactico-semantic, and the third principle is a pragmatic factor relating to performance: the "principle of congruence", which specifies that information given in reply to test questions can only be recovered from memory if it is stored in such a way as to facilitate recall, i.e. by being compatible or congruent. This congruence, Clark states - on the basis of no evidence - is not among "superficial information like words or phrases", but among "underlying functional relations". He seems to have in mind the distinction between surface and deep linguistic structure, but some of his interpretations of the nature of the comparison structures he uses are non-standard, such as that John isn't as bad as Pete implies that both are bad. Match between a probe question (Who is best?) and the information stored in the comparison sentence is, according to Clark, effected by reformulating the question (to Who is least bad?) rather than by reformulating the stored sentence(s) in a "three-term series" task.
The reformulated probe question is also unusual (i.e. least bad instead of the more normal not so bad (as the others) ) and does not match the alternative probe question used by the experimenter. In the three-term series problems, the experimenter asked either Who is best? or Who is worst?, whereas according to Clark's congruence hypothesis the experimental subject was formulating either Who is least bad? or Who is least good? one half of the time. Given a pair of sentences like B is worse than A and B is better than C, and asked Who is best? the subject would behave as follows:

With the question "Who is best?" the search for a solution will produce B (of the second proposition), which, on testing, is clearly wrong. Only after "Who is best?" is implicitly reformulated as "Who is least bad?" is the correct solution (A) directly forthcoming.

(Clark, 1969b : 207)

Two things can be said about these assumptions. The first concerns the relation between information and task content. The subject is presented with two comparisons and has to find one extreme member of the triad A-B-C. To do this he has to process the comparison sentences into a linear order, best-to-worst or the reverse. Because of his initial hypothesis that what the subject will retain will be two sentences, Clark makes the crucial assumption that "Comprehension time per se is presumably equal for all the comparative sentences used in the present study, and equal for all the negative equative sentences, since the same linguistic constructions are involved in all these comparatives" (op. cit. : 206). This is a tenable hypothesis so long as the subject is not required to operate on the information encoded in the sentences: yet Clark's task, that of answering the probe question, requires such operation, and there is evidence that ordering of the terms in the series, as well as polarity, can inordinately facilitate or impede this sort of processing. In fact De Soto, London and Handel (1965) found that these
two variables in combination explained all the differences in performance that were found for subjects doing linear syllogisms (= three-term series) in their experimental study.

The second oversight in Clark's experiment stems from the first. If subjects have to process two sentences, they will do this in one direction only if this is favoured by the same comparative form or equative form in both sentences (e.g. two instances of better or of not as good as). On the other hand, if they have two different words (better and worse) they have to decide which of two orderings should have priority, and change the form of the other sentence by reversing the order of terms and switching polarity in the comparison. All of this inevitably takes processing time, and if negative equative sentences are processed the negation has to be cancelled as well before an internalised order can be established for the series and matched with the probe question.

All of this inevitably means that some pairs of comparison sentences took much longer to process than others before the subjects considered the probe question. As the tasks had a time limit of ten seconds per sentence pair, some of the more difficult pairs would hardly have been interpretable, and subjects would have been reduced to guessing, from one or other of the sentences, what the answer to the probe question was. Under this sort of pressure they would obviously resort to the congruence principle in a simplified version: they would match the question to whichever sentence had a similar-looking form, and just process the two terms in that while ignoring the extra term in the other sentence. When these considerations are borne in mind, Clark's results (from 100 psychology undergraduates) are a self-fulfilling prophecy, while his own analysis, claiming support for his three principles, cannot account for all his data, especially on the question of congruence,
which appears to conflict with the marking principle. Careful analysis of his results shows that when best was favoured by congruence, far fewer errors were made by subjects than when worst was favoured. But where best was "disfavoured", more errors were made than for worst, a fact which is incompatible with Clark's hypothesis.

Some of the faults in the linguistic analysis used as a basis for Clark and Card's (1969) study of memory and recall of positive-negative versions of comparative and equative sentences have already been alluded to in section 1.3.4.1. This concerns their supposition that the pairs of sentences they used in their study were generally synonymous. It was shown in section 1.3.4.1. that the negative equative sentence can in fact be ambiguous: John is not better than Peter may be taken as either the negation of the relation or of the predicate, and thus be compatible with John is as good as Peter or John is worse than Peter respectively. Similarly, in special circumstances it is possible in spoken English by differential stress allocation, to produce an understanding either that John is taller than Pete or that John is as short as Pete, as well as John is shorter than Pete, from the negation of the equative John is not as tall as Pete (high stress tonic on the first 'as'; marked tonic on 'tall'; neutral tonic on 'Pete', respectively). Clark and Card are aware of the first kind of ambiguity, but not of the second. The task for subjects in their (1969) experiment was to study written sets of comparison sentences and try to recall them on cue. There were 64 subjects, all undergraduates, and they were given 7.5 seconds to memorise each comparison sentence in sets of eight before being asked to recall them. The adjectives chosen for these sentences were all gradable antonyms, claimed to be all marked-unmarked pairs, although of the eight pairs used four pairs were definitely not; another two pairs are doubtful cases. Only fast-slow and wide-narrow meet the normal linguistic tests for
marking (now-question, plus provision of the name for a dimension of measurement). The others are as follows: happy-sad, hot-cold, clean-dirty, old-new, pretty-ugly, good-bad. Sets of eight comparisons were constructed for each pair. An example of a set is given in their paper, and reproduced below with the original numbering: I have reorganised the sequence to illustrate the amount of semantic "noise" that occurred in spite of the claim that "one important property of these eight sentences is that they are at least partially synonymous" (Clark and Card, 1969: 546-7).

1. The pie is better than the cake.
5. The cake is worse than the pie.
4. The cake isn't as good as the pie.
8. The pie isn't as bad as the cake.
3. The cake isn't better than the pie.
7. The pie isn't worse than the cake.
2. The pie is as good as the cake.
6. The cake is as bad as the pie.

The pairs have been arranged like this to reveal something partly concealed in the original random order. If we consider these pairs in the light of the linguistic analysis offered earlier, it is clear that 1 and 5 assert inequality, whereas 2 and 6 assert equality. Can it be said that one pair is synonymous with the other, as Clark and Card claim? They state that 2 and 6 are each ambiguous between an equative and positive comparative meaning, but this is doubtful, on the face of it. However, the middle four sentences are interesting, as they have multiple meaning: 4 and 8 share one meaning with 1 and 5 respectively, and with 3 and 7. On the other hand, 3 and 7 share three meanings, one with each respective member of the other three pairs. Going down the above list of sentences, we thus see increasing "confusibility" with each succeeding pair except the last, and also increasing semantic distance from the (unambiguous) meaning of the first pair. My estimate
is that the bottom pair is totally non-synonymous with the first. In recall tasks, therefore, 2 and 6 should be minimally confusible with 1 and 5, and should be easily remembered, whereas maximal confusibility will be found for 3 and 7, and then an intermediate confusion for 4 and 8: so 3 and 7 will cause more error in recall than 4 and 8, especially if, as seems natural, negative information is difficult to process.

Clark and Card noted this last fact, but instead of supposing that it would lead subjects to try to somehow convert negative information into positive at the coding stage in the memory-recall task, they hypothesised as follows: "a denial would be stored in memory as an affirmation plus a feature indicating the sentence was a denial. Since the denial feature should often be lost to memory, negative sentences should be reconstructed as positive more often than the reverse" (op. cit. : 546); by this they seem to mean that a negative comparative will be remembered just as a comparative, and a negative equative as an equative. (For a detailed examination of the fallacy of this analysis, which stems from Mehler, see Cairns and Cairns, 1976 : 152 - 153). They also hypothesised that since sentence types 2 and 3 both meant more than or equal to, they had an "additional feature" which would be "easily lost" so that these types of sentences would be remembered more often as simple comparatives than the reverse (it was not clear whether they meant by "the reverse" that simple comparatives would not be remembered as types 2 and 3, or that 2 and 3 would be remembered as equal to instead of more than.).

The error rate predicted on the basis of the linguistic analysis of potential confusibility made above is perfectly reflected in Clark and Card's results, with verbatim recall scores both ordered in the way predicted and much closer within pairs than across pairs. The data produced below are based on that given in Clark and Card's Table 1, and it can be seen that there is a consistent decrease in verbatim recall as confusibility increases. Sentence types 1, 5, 2 and 6, which are the
least confusable because the least ambiguous, are closely bunched both on error total and error percentage (error as % of verbatim recall), sentence types 4 and 8 are intermediate in difficulty, and 3 and 7 are seen to be very difficult indeed.

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>Verbatim recall total</th>
<th>Error Total</th>
<th>Error %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>275</td>
<td>109</td>
<td>39.64</td>
</tr>
<tr>
<td>5</td>
<td>242</td>
<td>123</td>
<td>50.83</td>
</tr>
<tr>
<td>2</td>
<td>224</td>
<td>134</td>
<td>59.82</td>
</tr>
<tr>
<td>6</td>
<td>212</td>
<td>156</td>
<td>73.58</td>
</tr>
<tr>
<td>8</td>
<td>159</td>
<td>208</td>
<td>130.82</td>
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<tr>
<td>4</td>
<td>166</td>
<td>217</td>
<td>130.72</td>
</tr>
<tr>
<td>7</td>
<td>132</td>
<td>232</td>
<td>175.76</td>
</tr>
<tr>
<td>3</td>
<td>140</td>
<td>253</td>
<td>180.71</td>
</tr>
</tbody>
</table>

A further point is that Clark and Card assume the amount of error in the results is a product of loss of information during storage and recall, but in fact it could be a product of confusibility and initial coding failure, since subjects in their experiment had only 7.5 seconds to try to remember the visual presentation of each sentence. Inevitably, if a sentence is three ways ambiguous, it is going to take much longer to process before storage in memory - if the processing is at all feasible: one could even imagine that sentences with two or three readings might be impossible to code, or take up two or three times the storage capacity of other sentences, and the above error scores certainly are compatible with this idea. Clark and Card introduced no control of input confusibility, and this completely vitiates their results as they fail to prove that the factors affecting these were the ones they claim.

At the end of their (1969) paper, Clark and Card introduce a further factor for consideration when people try to remember comparative sentences. This is something called "syntactic presuppositions". These are the "base strings" said to underlie the comparative sentence:

Underlying John is sadder than Mary are the presuppositions that John is sad and Mary is sad. Not
all nouns that enter into comparative sentences, however, are neutral vis-a-vis syntactic presuppositions. For example, the sentence: This genius is stupider than that genius, sounds highly incongruous, clearly because its presuppositions sound incongruous; This genius is stupid and That genius is stupid. The word genius has its own lexical presuppositions - that geniuses are inherently intelligent.

(Clark and Card, 1969: 551)

They do not consider why it is that This genius is more intelligent than that genius is equally odd. The fact is that genius is itself a gradable predicate, and would certainly not be used in a deictic structure; it is also an "extremal" gradable, and so cannot be relativised for comparison either for intelligence or stupidity. There are other equally odd examples that can be constructed on this principle: for example, This colossus is taller than that one, or This fiasco is more disastrous than that one, and so on.

The reason for alluding to this is that certain kinds of adjective are clearly incompatible with certain kinds of noun. But Clark and Card's (1969) introduction of the terms "marked" and "unmarked" to describe gradable antonyms that were no more than polar opposites, together with the comments just quoted, may lie at the heart of a certain amount of confusion subsequently engendered in the work of Flores d'Arcais (1970). He appears to have understood that positive polarity antonyms were always unmarked, and thus gave their names to dimensions of difference. He reports studies involving more and less comparative adjective structures, of the sort exemplified below:

1. A sheep is less ferocious than a lion.
2. A lion is more ferocious than a sheep.

His thesis is that there is a different "focus of comparison" in the two kinds of sentences, which will affect sentence processing and recall-difficulty. Sentence type 1 is the less comparative (CL), whose comparison focuses on the second noun; sentence type 2, the more comparative
(CM) focuses comparison on the first noun. Flores d'Arcais apparently thought that ferocious was an unmarked adjective (he used the terms neutral and specific instead of marked and unmarked, but his discussion of the topic uses the same adjectives, stupid and intelligent, as Clark and Card mentioned, so one may infer that he was familiar with their paper), constituting a dimension of "ferociousness" along which it was appropriate to grade sheep and lions (op. cit.: 309)

According to Flores d'Arcais, where the grammatical subject and the focus of comparison in a sentence are not the same, processing is more difficult than where they are the same, so that CL sentences are harder. He reports two experiments which he says support this hypothesis, the first containing a free recall task, and the second a set of judgements of relatedness of the content words with CL and CM sentences. In the first study, subjects (48 males and females aged 19-23) were given twelve sentences for recall, six of each type, and the recall patterns were examined. The sentences' contents were represented in an A-B-C sequence, A and C being the noun phrases and B being the comparative adjective structure. F. D'Arcais predicted that for more comparatives, the probability of the AB link being retained was greater than that for the BC link. Similarly, for less comparatives the probabilities were reversed, BC being predicted as more likely to be retained. The possible recall patterns were ABC, AB, BC or AC. He states that his hypothesis was confirmed in both cases, significance being below .01 for more and below .05 for less comparative recall. We are not told how significance was established, and it is notable that the ABC sequence was included in calculating results. It would have been better perhaps for d'Arcais' hypothesis to have been tested in the purer form by examining only the AB, BC recall patterns, since adding the ABC sequence to each of these appears to artificially inflate the N (number of results used in the
statistics) and bring about accidental reliability and significance. In a subsequent experiment with 60 males and females aged 19-26, in four groups, involving judgements of relatedness, subjects were asked to judge which words belonged more together in each of 48 comparative sentences. The hypothesis was that judgements of relatedness would reflect the retention patterns of the first experiment. Again some of the statistical information is missing, and a confirmation of the prediction, significant to below $p = .01$, is reported.

In view of the adjectives chosen for the sentences, such results are not remarkable, as Higgins (1977) has pointed out that they do not represent "neutral" meaning at all, but are rather heavily biased towards one or the other noun phrase, since they are "extremal" and the noun-phrases themselves are "extremal" too: ferocity might reasonably be predicated of lions, but no one has ever been savaged to death by a sheep!

This does not alter the validity of the idea that "focus of comparison" might be important in ease of comprehension and processing of comparative sentences, however, so this notion should be examined more carefully to see how secure it is.

We must note firstly that Flores d'Arcais generally attends to one particular type of comparative, namely the uninflected type, and he favours this even with adjectives that normally inflect: heavy is linked with less heavy as well as lighter in his discussion. (Interestingly, he does not consider the negative equative not so heavy as, which is certainly far more common in the speech one hears every day). Secondly, the notion "focus of comparison", once the misleading adjective examples are stripped away, can be seen to be relatable to something more general, namely the unknown and the limit. Assuming a listener does not know Mary, but knows Jane, and a speaker utters Mary is more intelligent than
Jane, he has communicated to him quite a different type of knowledge from that contained in Mary is less intelligent than Jane, since in the second case he learns what the upper limit of Mary's intelligence is, while in the first case the extent of Mary's mental powers is quite unknown. If Jane's IQ is 140, then from the second sentence the listener can infer a precise type of knowledge: i.e. Mary's IQ is between 0 and 139; he is given the range. On the other hand, from the first sentence he can only infer a lower bound: while he might deduce from consulting McWhirter and McWhirter (1975 : 18) that Mary is unlikely to have an IQ of more than 210 on the Terman Index, he cannot be sure, and so in a sense the listener does not have secure knowledge which is "closed in at both ends", so to speak. On the other hand, if he knows Mary but not Jane, the roles of the two sentences in securing his store of knowledge will be reversed. The question that is now raised is, what would be the normal order of presentation and type of "givens"? Does a comparative sentence have the known/given information first in syntactic subject position, or is it more usually in predicate position? The answer seems to be that sometimes it is and sometimes it isn't. Halliday (1970 ; 162f.) says that in information structure of a text, given is usually associated with theme, and new with theme, "unless there is good reason for choosing some other alignment" (ibid.) It could thus be supposed that in many comparison sentences the "given" information would come first, and this squares to some extent with Flores d'Arcais' assertion that CM and CL sentences are identical in general linguistic form.

But there is a second question to consider, and that is the status of the semantic "givens". In many situations of comparison both of the objects represented in subject and complement noun-phrases are known or familiar: they may even be visible for direct scanning. In such situations the new knowledge communicated by a comparison sentence may
just be that the two objects are related on a particular parameter of difference. In other words, knowing what sheep and lions are like, we might learn something about the nature of *ferocious* from

A sheep is less ferocious than a lion.

The problem is, of course, that in many investigations of verbal skill, the sentences are contextless, and so in a sense all the information in them has to be treated as 'new'. Does the notion of "focus of comparison" hold in such cases? To answer this, the difference between *less heavy* than and *lighter than* has to be considered. The first thing to notice is that the second type of structure is obviously a "directional" relation, while the first is not purely "directional", as it is a composite consisting of a "directional" element, *less*, and a "locational" element, *heavy*: it is thus complex rather than simple. But in his discussion Flores d'Arcais does not carry his analysis this far (*op. cit.*: 311), and due to this omission he is led to conclude that there is a difference in attribute functions, which he calls "focus of comparison" of the predicate in comparison sentences. The following examples are based on those numbered 7, 8, 9, and 10 in the original:

1. A is heavier than B. (The attribute is predicated of A)
2. A is less light than B. (The attribute is predicated of B)
3. B is lighter than A. (The attribute is predicated of B)
4. B is less heavy than A. (The attribute is predicated of A)

At a finer level of analysis, however, it becomes clear that *more* and *less* are comparatives in the same way as *heavier* and *lighter*, and they should be analysed as having the same structural features, namely "focus" on the subject noun-phrase. This still leaves the gradable adjective, and this probably does focus on the complement NP, but the new analysis captures the fact that there is an embedded predicate in one statement-type but not in the other. The same would be said if *more* were used with an adjective like *heavy* (Flores d'Arcais conveniently omits *more*)
from consideration: had he included it he might not have come to the same conclusions). The point will not be laboured here (see Chapter 6). It is perhaps enough to say that Flores d'Arcais' theory of a "focus of comparison" in sentences such as those we have considered rests upon an incomplete analysis of the structure involved.

H. Clark's later work on gradable adjectives, especially with comparative structures (H. Clark, 1970a; 1970b; 1976), is open to the same sorts of criticism as his early papers. In Clark (1970a), for instance, he again assumes that comprehension of comparatives is a memory storage problem, although as I suggested above, it could equally well be input related, since sentences used in timed tasks should all be of the same length, while Clark's are not. It takes longer both to read and hear John isn't as good as Pete (6-7 syllables) than it does for John is worse than Pete (5 syllables). Again, the fact that negative comparatives and negative equatives are ambiguous implies that an experimental subject has twice or three times as much coding work to do before being able to remember such sentences, but this is overlooked. There is also a certain amount of "experimenterese" in the task content, described in Clark (1970a): the first feature of this to criticise is perhaps a quibble, but the second is more serious for someone claiming to be engaged in studies of semantic coding.

Firstly, subjects were asked probe question like who is worst? after being given only a comparative sentence (Clark, 1969a), e.g.

If John isn't as good as Pete, who is worst?

Secondly, subjects are reported to have been given "three-term series" like the following: If John isn't as good as Peter and Dick isn't as bad as Peter, then who is best? The two premises were linked by the conjunction and, but as Osgood and Richards (1973) have demonstrated, and is only used to connect two pieces of information which are consonant.
text
type of comparison structure will be selected in discourse, with the "variable" in theme position: "This choice generally places the variable first and the origin second . . ." (ibid.). However, he does not elucidate this notion very carefully: he is inconsistent, for instance, in his designation of the "origin" of the comparison, at one point saying that it is Peter and at another the goodness of Peter. Discussing experimental evidence such as the results of tasks where subjects had to place a red dot on a page following a sentence like The red dot isn't as good as the black dot (one may question how 'normal' a use of language this is), Clark claims that themes were easier to process than rhemes! He also discusses the difference between "marked" and "unmarked" adjectives (called "contrastive" and "neutral" meanings this time), and says that because an adjective like good has more uses than bad, it is therefore simpler. This is a very strange assertion to make, since the reverse is normally considered a more natural conclusion in discussing linguistic items. Clark's discussion of "presupposition" suffers from a similar shortcoming, since he treats it in syntactic terms although it is usually a semantic category (Cf. Clark, 1970a: 306).

There are too many inconsistencies in Clark's paper for a pursuit of these to be valuable except in a negative way. It is notable, however, that his results, which lead him to conclude that themes of sentences are always remembered more readily than rhemes, are inconsistent with those found to support Flores d'Arcais' thesis of "focus of comparison".

Recently, quite a new light has been thrown on the work of Clark and Flores d'Arcais by Huttenlocher and Higgins (1971) and Higgins (1977), who have tried to clarify the inconsistencies of the former researchers regarding the notions "marked-unmarked" and "presupposition" in
comparative and equative sentences. Huttenlocher and Higgins (1971) refined the idea of adjectives used in comparisons by showing that there were two kinds of adjectives referring to single continua (tall-short, good-bad), one of which they called ratio adjectives, because these involved a metric and a true zero point and described a ratio scale; the other kind they called ordinal adjectives, because these lacked both a metric and a zero point, but could be used to express order relations. They made a further distinction between adjectives that were regular or extreme, which were relatable on the same dimension. Thus attractive could represent the regular, and gorgeous the extreme aspect of the same dimension, as could skinny and thin. There was a slight difficulty in their argument that both ratio and ordinal adjective sets had regular and extreme types, since they chose tiny-small-large-huge as an exemplification of a ratio set, and these adjectives do not easily associate with a metric scale, although others do. One would also question on this basis whether the notion zero is appropriate, since tiny, if it is to represent the extreme end of a size dimension, should according to Huttenlocher's and Higgins' premise refer to no extension, whereas it clearly does not do so. Again it appears that measurement of empty spaces is confused with description of objects. Nevertheless, their paper was the first sharp snip at the wool growing over other researchers' eyes, since it also led to a questioning of the accumulated dogma of the prevalence of 'marking' in antonymous adjective sets. They pointed out that it was only some adjectives, those of the regular-ratio and regular-ordinal type, that could be described as 'marked-unmarked' pairs (My view is that they could have gone further and excluded regular-ordinal adjectives, too: see the discussion of markedness in section 1.3.4.2.). Instead of rejecting the usefulness of the "marking" notion, however, they developed it further by claiming that all extreme adjectives are
marked since they do not permit neutralisation. This seems to make it possible for gradable adjectives which are extreme, but have no antonym, to be qualified as "marked" (e.g. the set introduced by Ljung, 1974: stony, busty, etc.).

Huttenlocher and Higgins (1971) questioned the validity of Clark's linking of "markedness" and "presupposition" within comparative sentences. They suggested that only comparatives containing extreme adjectives, and to a lesser extent regular-ordinal adjectives, could be said to involve presuppositions about both entities being compared in the sentence. They correctly pointed to the fact that sentences like A jet plane is slower than a rocket ship and A hippopotamus is smaller than an elephant do not commit the speaker to the belief either that planes and rockets are slow, or that hippopotami and elephants are small, and they concluded from this that regular-ratio adjectives in comparatives involved no presupposition as to absolute position on a scale, although they did suggest that negative equatives of the sort John is not as tall as Harry might be taken as implying such positional information.

These observations lead to quite a different set of predictions of adult performance on verbal tasks. Higgins (1977) followed up the earlier paper by actually obtaining empirical data on whether or not adults did distinguish adjectives in the ways described above. This was a valuable step forward as it was the first attempt to subject previous researchers' assumptions about linguistic structure to more rigorous test by appeal to informants' own intuitions. He describes three successive studies which supported his and Huttenlocher's analysis.

The first study, of synonymy of pairs of comparison sentences containing two comparative or two negative equative structures, where the argument-terms were the same but the adjective predicates were of opposed polarity (Mary is more huge than Nancy// Nancy is more tiny than
Mary, Bob is not as good as Fred // Fred is not as bad as Bob), asked subjects (32 undergraduates) to judge the following comparatives and their respective negative equatives for equivalence or synonymy:
larger-smaller, heavier-lighter (Regular ratio); more agile-more clumsy, better-worse (regular ordinal); more obese-more skinny, more huge-more tiny (extreme ratio); more gorgeous-more hideous, saintlier-wickeder (extreme ordinal). The examples have been included to show that there is still one uncontrolled variable in the task devised by Higgins, and that is the form of comparative used. Although his study is quite outstanding in other respects, he did mix the comparatives between -er than and more-than, and I believe this coloured the quality of his results. He was inclined to choose more clumsy rather than clumsier, and more skinny instead of skinnier, for example, and some of the other forms are unusual, although not in the same way always (compare more tiny and wickeder).

The second study, with twenty-three undergraduates, asked for judgements of acceptability for sentences where the nouns were oddly assorted with respect to half of the comparisons, using the same adjectives as before (e.g. A feather is heavier than a snowflake; A murderer is not as good as a robber). This was to check on the variable of presupposition in relation to comparisons (one is reminded of the "ferocious sheep" of Flores d'Arcais' study!). In the third study, with thirty-two undergraduates, the noun-phrases were systematically varied so as to produce either total agreement with the absolute adjective used to create the comparison sentences - this time only comparative structures - or partial agreement (subject NP with adjective) or total disagreement (Examples: A whale is more huge than an elephant; A whale is more huge than an ant; A mosquito is more huge than an ant.).
The findings of these studies were, firstly, that greater presupposition was involved in negative equative than in positive comparative sentences, a fact found for all except extreme adjectives (studies 1 and 2). In the comparative sentences, as well as negative equative, extreme adjectives carried greater presupposition than regular, regardless of the ratio/ordinal distinction (studies 1-3). Thirdly, there was found to be greater strength of presupposition in ordinal than ratio comparisons of both kinds among regular adjectives over the three studies. Among regular adjectives, in both types of comparison sentences studied, negative polarity carried greater presupposition than positive polarity (studies 2 and 3) especially among regular-ordinal adjectives (studies 2 and 3); this result for regular-ratio adjectives was only significant in the second study. Lastly, in the positive comparative, both the subject NP and the object NP were found to be affected by presupposition.

In his discussion of the results, Higgins (1977 : 218f.) calls into question the whole notion of applying the linguistic distinction of 'marked' and 'unmarked' to comparative sentences, since "it is evident from the results of Studies 1 and 2 that no clear-cut distinction could be made between marked and unmarked adjectives" (op. cit. : 219).

What Higgins points to, however, is the interesting accumulation of presuppositional load in comparison sentences as a product of four factors: ordinal adjective (versus ratio); negative polarity (versus positive); negative equative (versus positive comparative) structure; and extreme (versus regular) type of adjective. His results show that only the extreme type of adjective had a sufficiently strong effect to be able to outweigh all other factors in a sentence. When the adjective was of extreme type, other factors had an additional effect in only 30% of cases, but if the sole effect present in a sentence was due to either ordinal adjective, negative polarity or negative equative
structure, then "the additional presence of one of the other factors had a significant effect in 100% of the cases" (Higgins, 1977: 219), by which is apparently meant the intercombination of the factors just mentioned rather than of the alternatives to them. When two factors were already present, the only significant additional effect was contributed by the "extreme" factor. Higgins says that there was found to be no informant intuition that positive or negative polarity in regular ratio comparatives carried presuppositional load in Study 3, but there was in Study 2. Fifty-nine per cent of subjects in Study 2 and 71% of subjects in Study 3 rated regular-ratio comparatives with either type of adjective as completely acceptable, and 80% of subject judgements in Study 1 were that regular-ratio comparatives containing negative polarity were "completely synonymous" with positive polarity comparatives where the NPs were reversed.

Other data described by Perfetti (1972) and reported by Higgins, is totally consistent with Higgins' results, namely that there was not felt to be any difference in presuppositional load carried by regular-ratio comparatives of differing adjective polarity. Questioning 20 subjects on what was implied about the second NP in comparative structures containing the adjectives below, Perfetti found that about a quarter of his informants thought regular ratio adjectives conveyed some information on absolute properties, while about two-thirds thought extreme adjectives (ratio and ordinal) did so. The types and percentages are:

<table>
<thead>
<tr>
<th>Regular ratio</th>
<th></th>
<th></th>
<th>Extreme</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>+ pole</td>
<td>- pole</td>
<td>+ pole</td>
<td>- pole</td>
<td></td>
</tr>
<tr>
<td>wide</td>
<td>20%</td>
<td>30%</td>
<td>hot</td>
<td>70%</td>
<td>50%</td>
</tr>
<tr>
<td>tall</td>
<td>20%</td>
<td>25%</td>
<td>beautiful</td>
<td>70%</td>
<td>65%</td>
</tr>
<tr>
<td>large</td>
<td>10%</td>
<td>20%</td>
<td>lovable</td>
<td>60%</td>
<td>75%</td>
</tr>
<tr>
<td>fast</td>
<td>20%</td>
<td>20%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>far</td>
<td>45%</td>
<td>25%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Although, as can be seen, there is a difference between the presuppositional load judged to be carried by members of antonym pairs, the difference is not consistently in favour of positive or negative polarity, and the means are roughly equal for each adjective type.

Thus the three main points to emerge from Higgins (1977) are that although there was a slight difference between positive and negative polarity in comparative sentences of regular-ratio type, this is not enough to support Clark's claim of presuppositional power for "marked" adjectives; secondly, Clark's claim that comparative and negative equative sentences did not differ in presuppositional power was rejected; thirdly, Flores d'Arcais' theory of "focus of comparison" was also rejected, partly as the result of a misunderstanding, it seems, since Higgins understood Flores d'Arcais as claiming that "the presuppositions of positive comparative statements . . . apply only to the subject term". Flores d'Arcais (1970) did not present his thesis in quite that way, as was shown earlier.

Studies of adults' abilities to represent comparative sentences spatially have been conducted (De Soto, London and Handel, 1965; Handel, De Soto and London, 1968), and these have already been detailed in section 1.2.2.3.

Because of its use in syllogistic types of reasoning tasks the comparison sentence has perhaps attracted more attention than was beneficial. Even so, it is still not clearly understood, and as far as can be ascertained no one has yet studied the full set of possible permutations of: polarity in the adjective, more-less versus -er than comparative, positive versus negative syntactic form, and comparative versus equative structure, as well as the adjective types so ably pinpointed by Huttenlocher and Higgins.

One rather neglected area of research is that of ordinary gradable
antonyms. Outside the field of word association studies, very little empirical research seems to have been done on what happens to words when they are learned, and how adults might structure their vocabulary internally. However, two recent studies of gradable adjectives have been conducted outside the confines of Semantic Differential techniques.

Zajonc (1968) noted that positively evaluated adjectives are relatively more common within the language than are negative—as measured using the Thorndike-Lorge word count—and wondered whether positive evaluation of these adjectives might not be a result of their greater frequency. To investigate this hypothesis, he gave a list of 154 pairs of antonyms to 100 college students and asked them to rate each pair for desirability. Only 28 pairs were rated in such a way that there was a negative relationship between adjective frequency and desirability. For 77 pairs which more than 95% of subjects agreed on, only six showed negative correlations. As agreement among subject ratings decreased towards 50%, the adjective frequencies of a pair of antonyms (judged by L-count) were more nearly the same. There was an interesting result for good-bad, in that 99% of subject judgements were in favour of good; however, the same number of judgements favoured best over worst, while better over worse was preferred by 100%. Yet according to the L-count the pairs should have been ordered good-bad (most frequent), better-worse and best-worst (least frequent). In discussing the L-count frequencies, Zajonc (op. cit.: 6) comments that these may well be psychologically sound, "since GOOD is a positive assertion, whereas BETTER implies comparison with some standard which might, in many cases, be itself unfavorable".

Examining some of the scales of Osgood, Suci and Tannenbaum's (1957) Semantic Differential, Zajonc found that among nineteen evaluative scales the positive polar adjective was always of higher frequency than the negative. He conducted experiments which demonstrated, as a test
of the hypothesis that frequency of exposure, and thus familiarity, was enough to improve people's evaluation of words: that when people had to learn nonsense words, or just become familiar with Chinese-like ciphers, they rated these more favourably after the familiarisation than before.

In discussing his findings, Zajonc makes the important observation that if word frequency is weighed against number of different words available to express positive or negative evaluation, it is found that there seem to be more words available in English to express negative evaluation. There are a large number of negative affixes available to enlarge the stock of negative-polarity words (anti-, de-, im-, in-, ir-, un-, and -less), and these are rarely used to reverse the polarity of root negatives. If, as he argues, there are more negative words than positive words, then it would hardly be surprising that per word frequency for them would be attenuated, since their distribution would be more diffuse. According to Zajonc's calculations there are about 2.3 times as many negative words as positive in the lists he considered, and he speculates: "If repeated usage enhances the affective meaning of words, a relatively large supply of negative words would in fact be needed" (op. cit. : 17).

This remark is of course conjectural, but it is related to later work by Fillenbaum and Rapoport (1971), who investigated the structure of the semantic field of a set of evaluative (partially gradable) antonyms. They also found that the organisation of positive polarity elements differed qualitatively from that of negative. Their results could not reflect the frequency-diffusion principle offered by Zajonc, since they chose an equal number of positive and negative adjectives (twenty pairs), which were rated by 55 male and female university students, using various techniques. Fourteen subjects were asked to
construct labelled tree-graphs linking either twenty positive or twenty negative adjectives (they repeated the task after two weeks, with adjectives of the opposite polarity). The remaining 41 subjects were asked to sort the two sets of adjectives separately into clusters. The clusterings of the adjectives are represented in the diagram below, where the twenty pairs are represented. Eleven pairs were judged by at least 13 out of 14 subjects on the labelling task as belonging properly together, and these are joined by lines.

![Diagram of tree-graphs linking adjectives](image)

![Fig. 11-10. Superimposed two-dimensional Euclidean representations for Group GDG (heads of arrows) and Group BDG (tails of arrows).](image)

(Fillenbaum and Rapoport, 1971; 229)

The distance between terms reflects their relative lack of integration within the semantic field: pair members at the heads of arrows are positive polarity, while those at the tails are negative. Two of the pairs together form a quartet: **Ugly/Repulsive - Beautiful/Attractive.** This represents the fact that all 14 judges linked either one or other positive polarity term to one or other negative. It will be noted that five of the eleven pairs linked by arrows are morphologically marked-unmarked pairs.

Fillenbaum and Rapoport asked their subjects to judge positive
sets separately from negative sets of adjectives, and so the display illustration is a composite of two separate sets of clusterings, one for adjectives related to good (GDG) and the other for those related to bad (BDG). Although they found that adjectives in the separate judgements of semantic fields were loosely related in three clusterings, the lack of compactness sometimes meant that adjectives in the outer area of a cluster were closer to some adjectives in other clusters than to some members of their own. In their discussion of results (op. cit. : 230 ff.), they conclude that a spatial or dimensional representation is inappropriate for antonyms of evaluative type. Although the cluster analysis produced greater compactness of field for negative polar than for positive polar items, this was not sufficient to favour any other type of organised structural analysis:

... there would still appear to be little warrant for considering the terms to be truly hierarchically structured or related in general. It may be more realistic to consider the clusters, at most, as relatively separate, discrete nominal classes.

(Fillenbaum and Rapoport, 1971 : 230)

Both the tree-diagram and the clustering data for the adjectives illustrated above produced three general groupings, which were, however much more distinct and consistent for negative polarity than for positive polarity. These were a moral evaluation grouping, with a social evaluation subgrouping (kind, generous); an aesthetic evaluation grouping (beautiful, attractive); and a practical/instrumental evaluation grouping (useful).

Fillenbaum and Rapoport indicate one or two differences in usage and function for positive adjectives which explain the relative lack of sharp distinctions between the three main clusterings, and also why subjects did not agree on antonymous pairings for more than nine of the twenty pairs of adjectives pre-selected for the study. Firstly, many
positive adjectives have a wider range of usage so that they may appear in more than one of the three semantic domains: they cite beautiful, which as well as an aesthetic evaluation now also has a sense something like good or very good when judging performance of some activity, thus moving into the practical/instrumental domain, while its antonym, ugly, does not perform the same semantic shift. There thus seem to be grounds for stating that positive evaluative adjectives may be diffusely related because their functions overlap, while negative polarity adjectives are kept compact and groupings are separated from each other by a higher degree of specialisation. The general lack of overall structure, however, puzzles Fillenbaum and Rapoport, in view of the importance of evaluation in so many domains of human activity, and they conclude:

In principle, there may not exist any coherent, definable domain of evaluative terms, and . . . in principle, the only property shared by all evaluative terms is their positive or negative marking with regard to evaluation.

(Fillenbaum and Rapoport, 1971: 232)

They argue that the attributes expressed by evaluative adjectives cannot be thought of independently of the concepts expressed by the nouns they modify, and that as these are so heterogeneous there is bound to be a low degree of structuration in the semantic field of the adjectives alone.

This observation returns us to the question of contextual dependency. It seems that evaluative adjectives are far less susceptible to the process of decontextualisation than, for instance, size or colour adjectives, which have structural properties that are, for adults at least, relatively more independent of the nominals they modify. The question is, however, whether the same thing can be said of the semantic organisation of these different types of gradable adjective in children's language.

2.5.2. Children

There have been a large number of studies, especially in recent
years, of the development of meaning in children's language. These are
too numerous to go into in great detail here, but the broad trends of
investigation of gradable adjectives will be summarised, and factors
which appear to have been overlooked in some of these investigations will
be alluded to where relevant.

The investigative studies so far conducted have taken a number of
forms. Some have focused on children's productive use of language, while
others have concentrated on children's comprehension of instructions
containing gradable adjectives in various forms. In some investigations,
language use has been studied in conjunction with logical tasks related
to those used in Piagetian clinical psychological observation, and in
others language has been studied free of supportive contexts. A dis¬
tinction can also be drawn between those pieces of research which have
used a manipulative, experimental technique and those which have con¬
centrated on free-form speech activities, recording everything produced
by the child. Obviously, some of these factors can be combined, and
when it is noted that the age-ranges of children in the various studies
have differed quite enormously, comparison between these becomes quite
difficult, as it is virtually impossible to decide that a particular
variable is responsible for differences (or similarities!) in the
results obtained. In order to help the discussion, therefore, a brief
tabulation is given for each aspect of vocabulary which seems to bear
on the subject matter of the present thesis. Studies have been grouped
into three stages, roughly according to Piaget's suggested ages for
development of pre-operational, concrete operational, and formal
operational thinking in the child. The summary will proceed stage by
stage, discussing each aspect of vocabulary in turn.
Stage One:

<table>
<thead>
<tr>
<th>Study</th>
<th>Approximate age of children</th>
<th>Lexical items</th>
<th>Conceptual area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bever et al., 1968</td>
<td>2-5 years</td>
<td>more</td>
<td>number, length</td>
</tr>
<tr>
<td>Griffiths, et al., 1967</td>
<td>4-5</td>
<td>more-less, same</td>
<td>number, length, weight</td>
</tr>
<tr>
<td>Donaldson &amp; Balfour 1968</td>
<td>3 1/2 -4</td>
<td>more-less</td>
<td>number</td>
</tr>
<tr>
<td>Donaldson &amp; Wales, 1970</td>
<td>3-4</td>
<td>same-different</td>
<td>shape, colour</td>
</tr>
<tr>
<td>Harasym et al., 1971</td>
<td>6-8</td>
<td>more-less</td>
<td>quantity (size), evaluation</td>
</tr>
<tr>
<td>Palermo, 1973</td>
<td>3-7</td>
<td>more-less, same</td>
<td>number, liquid</td>
</tr>
<tr>
<td>Donaldson &amp; McGarrigle, 1974</td>
<td>3-5</td>
<td>more, all</td>
<td>number</td>
</tr>
<tr>
<td>Weiner, 1974</td>
<td>2-3</td>
<td>more-less</td>
<td>number</td>
</tr>
<tr>
<td>Shipley, 1975</td>
<td>5</td>
<td>more</td>
<td>number: class inclusion</td>
</tr>
<tr>
<td>Wales et al., 1976</td>
<td>3-4</td>
<td>more-less, same-different</td>
<td>number, quantity</td>
</tr>
<tr>
<td>Lavanough, 1976</td>
<td>3-4</td>
<td>more-less</td>
<td>number</td>
</tr>
<tr>
<td>Gluckberg et al., 1976</td>
<td>2-3</td>
<td>same-different</td>
<td>form-class, size, colour</td>
</tr>
<tr>
<td>Karmiloff-Smith, 1977</td>
<td>2-8</td>
<td>same-other</td>
<td>identity</td>
</tr>
</tbody>
</table>

Bever, Mehler, and Epstein (1968) investigated understanding of numerosity involved in using *more*. Their subjects were presented with two rows of objects in which the shorter row contained more objects than the longer. Children of around four and five predominantly picked the longer row as having more objects, but the children at the bottom end of the age range were more likely to choose the shorter row as having more. This paradox was explained by Bever et al. as resulting from the children's initial numerosity concept being restricted to arrays of small number, while as a result of increasing age and experience they learn that there is a general correlation between longer lines and greater numerosity and so make errors of judgement. It seems to me that the youngest children were attending to the objects *per se*, while the older ones were attending to the objects plus their linearity, but had not yet learned to compute a third dimensional variable of empty space in the linear display. It is this failure to consider the two aspects of a line.
made up of discrete elements that is later corrected in school, when children are taught to manipulate objects and number, and to "decentre" in the Piagetian sense.

Griffiths, Shantz and Sigel (1968) investigated more, less and same, as a result of the hypothesis that children's failure on conservation tasks might result from failure in verbal knowledge rather than cognitive failure. There were 33 girls and 21 boys in their study; the availability of the above three words was investigated in elicited and spontaneous responses when the children were given three-dimensional objects in sets of four to judge them for number, length and weight. For number they were given sets of 4, 3 and 2 yellow lollipops; for length, sets of pencils 8 inches, 6 inches and 4 inches long; and for weight, sets of 2 white wooden blocks plus a white brick and a styrofoam block all of the same size. A sequence of four questions was designed to elicit spontaneous use of the key words, or failing that to test increasingly specifically for comprehension. The second of the questions involved the word different, although Griffiths et al. did not tabulate this in their study, and seem not to have noticed it. They found length to be the best-judged content-area, and same caused difficulty. The mean percentage of correct responses overall was as follows (N= 54):

more, 88%; less, 85%; same, 70%. For the content-areas, number = 75%, length = 92%, weight = 77%. For length, children most often responded spontaneously, whereas for number and weight the response was most often an elicited one. Significant differences were found for correct use of more and less versus same for length and weight comparisons; more was significantly easier for length and weight than for number; same was used correctly significantly more often for length than weight; and less was used correctly significantly more frequently for length than for either weight or number. In discussing their results, Griffiths et al.
suggest that the difficulty with *same* might stem from ambiguous usage, in that it refers to phenomena which are either *identical* or *equivalent*; children may thus interpret *same* to mean "look alike" rather than "really alike". There may be also variations in "category width" among children, so that the sets of four items may not have been large enough; and children might tend to notice differences more than similarities.

Donaldson and Balfour (1968) showed children (9 boys, 6 girls) two toy apple trees, on each of which could be hooked up to six apples. The trees were shown either with the same number of apples or with different numbers, and children were asked various questions about the number comparison. Donaldson and Balfour used *less* instead of *fewer* to question the children, and this seems non-standard to Southern British eyes, but may well be acceptable for Scottish children, who were the subjects in this study. They were asked to judge situations of static inequality and equality, and to add apples to a tree to leave the initial relation changed, as well as unchanged, and also to take apples from a tree. Questions asked were of the type: *Does one tree have more/less apples on it than the other? Which tree has more/less apples?* The children were also given instructions of the type: *Make it so that there are more/less apples on this tree than on this one.* (This is again a slightly odd sort of sentence to use). Children answered the first questions apparently without difficulty, but when asked to pick out the tree with more or less on it, or to change the number of apples, they were correct only for *more*, and appeared to understand *less* as if it meant *more* to them.

Donaldson and Wales (1970) reported on a related study where the same group of children were presented with sets of objects (toothbrushes, eggcups and geometric shapes) that differed in various ways with respect to colour and form. After talking about the objects, the children were
presented with a standard object and asked to give the experimenter either an object that was "the same in some way" as, or "different in some way" from, the standard. The children's responses suggested that they did not understand different, and treated it as if it meant same.

Harasym, Boersma and Maguire (1971) sorted 65 children (42 boys, 43 girls) into three groups on the basis of their performance in six conservation tasks (two-dimensional space, number, substance, continuous quantity, weight and discontinuous quantity). There were twenty children allocated to each of the groups: non-conservers (NCs), intuitive conservers (ICs) and logical conservers (LCs). These groups were then asked to judge six concepts on twelve scales of a modified Semantic Differential. Four of the concepts were more, less, same and different, and the twelve scales were low-high, long-short, wide-narrow, big-small, thin-fat, up-down (the "concrete" scales judged appropriate for differentiating quantity) and bad-good, dirty-clean, strong-weak, happy-sad, slow-fast and noisy-quiet ("abstract" scales, reflecting the evaluation, potency and activity dimensions of Osgood et al.'s Semantic Differential). Children with conservation status were found to have a greater understanding of the four concepts relevant to conservation, as assessed by the degree of differentiation of the concepts on the Differential scales: LCs tended to see more and less as opposites, while NCs confused the two terms. However, NCs appeared to respond to more as if it meant less, in contrast to the results of Donaldson and Balfour (1968); the meaning of more appeared to increasingly differentiate from that of less with advancing logical development in the child.

In a replication of Donaldson and Balfour's experiment with apple trees, and also using water, Palermo (1973) studied sixteen children and found that there seemed to be a developmental sequence such that more
was acquired earlier than same, which was understood more easily than less. He found that up to 19% of children at seven years of age still could not differentiate more and less. He also reported semantic differential ratings of more and less which showed a considerable change in ratings for less when this was known, but no change for more.

Donaldson and McGarrigle (1974), using two shelves with six toy garages on one and four on the other, containing five cars and four cars respectively, investigated children's understanding of more and all (17 girls, 23 boys). When asked the question Are there more cars on this shelf or more cars on this shelf? five children consistently chose the less numerous subset, and, depending on whether the garages were removed or introduced, a further fourteen children were inconsistent: thirteen of these chose the larger number of cars when no garages were on the shelves, but chose the smaller subset when the garages were present, apparently because each garage was occupied. Donaldson and McGarrigle discuss their results with reference to Piagetian conservation tasks, and draw attention to the importance of a child's semantic development in this connection: they assert that the attainment of conservation entails the prior attainment of normal adult rules for assigning truth values to statements. Children appear to use rules of three kinds in understanding the language they hear: lexical rules, syntactic, and local rules. They suggest that the lexical rules for a child's understanding of more might be limited to the notion that a difference is being referred to, and that this difference is one of magnitude. The child does not know what other aspects of the situation (length, density, height, width, etc.) are relevant. The lexical rules and syntactic rules impose few constraints on a child's interpretation of a situation, but the local rules don't. These are hierarchically ordered rules of a cognitive rather than a purely linguistic nature,
and they specify what features take precedence over what in an other-
wise irresoluble situation. These local rules become less important
to the child as it grows older and the linguistic rules for inter-
preting utterances become stronger.

Weiner (1974) used a display of two rows of objects that were either
equal or unequal in order to investigate children's understanding of
more and less. In two experiments she tested comprehension of the
underlying concepts when initially equal or unequal rows of counters
were added to, subtracted from, or left static. Addition and sub-
traction had little effect on children's comprehension of either term.
Two-year-olds were found to understand more when differences in the two
rows of the array were relatively large, and this suggested that many
might be an intermediate meaning for more. Three-year-old children
were found to understand less first of all as "smaller in amount", not
as more, as others had found. Weiner proposed that some possible reasons
why less was apparently learned later than more were: that it was
relatively restricted in meaning and use; and that its converse percep-
tual and logical relation to more might cause difficulty. An interesting
observation made by Weiner is the ambiguity of more in children's
language, where it refers to both recurrence of an object or event
after an intervening disappearance or cessation, and another instance of
the class to which an object belongs. The second of these meanings is
unusual in adult usage except to refer to plural entities - and is
normally accompanied by some or any.

Shipley's (1975) study concerned understanding of more in Piagetian
class-inclusion tasks. Her criticisms of the grammaticality - or rather
the semantic appropriacy - of the question usually asked in these tasks,
have already been considered (section 2.3.1.). She found that with a
revised wording of the class inclusion question (Which is more: all the

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animals or only the lions? instead of Are there more animals or more lions?), one-third of those children who could not answer the traditional form were able to answer appropriately. Shipley does not give any further details of her study, but points out that the results suggest greater attention should be paid to the neglected linguistic variable in Piagetian tasks.

Kavanaugh (1976) conducted a replication of both Donaldson and Balfour (1968) and Weiner (1974); as well as replicating these studies, however, Kavanaugh introduced a "construction condition" into the apple-trees experiment. He presented children (12 boys and 12 girls) with a situation in which both apple-trees were left blank and the child was given four toy apples to hang on them. The child was instructed to "Make this tree have more/less apples than this tree". The point about this procedure was that it introduced a third choice into the experimental framework. Apart from responding correctly by putting more/less apples on to the tree indicated, the subject could give one of two incorrect responses: either put the larger/smaller number of apples on the other tree, or put the same number on both trees. In the results of the first part of the experiment, testing comprehension of more and less as Donaldson and Balfour did, Kavanaugh produced the same effect in his child subjects: they appeared to misunderstand less as more. However, when the results of the "construction condition" were analysed, it was found that the responses of those children who had appeared to misunderstand less were equally distributed between the two error conditions. Thus Donaldson and Balfour's earlier (1968) result was shown to be an artefact of their experimental method. Kavanaugh also points out that many of the preceding studies of more or less used a binary-choice condition. Kavanaugh's results clearly suggest that the reported synonymity of more and less, as well as of other pairs of
gradable antonyms and their comparative forms, may not be a function of the semantic system of the child, but rather, may be determined by the nature of the choice array with which the child is presented.

Kavanaugh's results are further supported by those obtained in Wales, Garman and Griffiths (1976), who investigated comprehension of more, less, same and different. This study is interesting in that it provides data from three different linguistic backgrounds: Tamil, English and Lun Bawang. Wales et al. found again that when an adult linguistic model was not imposed on the design of the investigation, children were seen to have some understanding of all of these terms. In each language group there were ten three-year-olds and ten four-year-olds. The first part of the study presented children with two saucers each containing five coloured beads or marbles, with a further five beads or marbles near them on the table. Children's comprehension was assessed by having them follow instructions and answer questions. The instructions, which were of the sort Make it so that there are more beads/marbles here, used the antonyms more and less, as did the questions Are there more beads? and Which has more beads? The number of beads and the type of display was varied, so that there was, for example, an initial inequality in the number of beads on the two saucers, or only one saucer would have beads on it, or both saucers but not the table would have beads on them. The number of times children added or subtracted beads in response to instructions was tabulated together with their judgements in answer to the experimenter's question. However, Wales et al. do not specify what constituted an addition: it could have been from one saucer to the other, or from the table to the saucer, but different interpretations of more and less must surely have been involved if both kinds of action were allowed. There are also omissions in the tabulation of their results. One may further note that the form of
both the instructions and the questions is linguistically incomplete, since the object of the comparison is never given in a than-expansion; this is a serious shortcoming if the type of comparison is ambiguous otherwise (as it is here: the child can compare either saucer with saucer, or saucer with table-top for the number of beads used as a basis for more/less judgements). The situation for comprehension of same-different is similar: there were beads on just the two saucers, and children were asked Is there the same number of beads? or Is there a different number of beads? without being told whether they were comparing the total number with what had been there before, or the number on one saucer with that on the other.

In the more-less instructions, as with same-different, therefore, it is difficult to determine on what basis children behaved correctly or incorrectly, as different interpretations of the experimental situation did not show up in different types of result. Wales et al. seem to be unaware of this problem. In a further part of the study with different sets of objects, where children were tested for comprehension of same, different and not the same, it was found that in contrast to earlier results obtained by Donaldson and Wales (1970), children did not appear to interpret different as if it meant same, i.e. they were able to handle the conceptual distinction of sameness and difference lexically, though not using linguistic items in the same way as an adult would.

In all of these studies, the tasks themselves seemed to produce their own variables, since the children found to perform in a particular way on one task seemed to perform differently on another although the linguistic variables were unchanged. On the tasks involving same and different, children were observed to shift their perceptual focus from form to colour, depending on which of these was functionally salient for them in the particular situation.
Further evidence that young children do not confuse the meaning of same and different has been provided by Glucksberg, Hay and Danks (1976), in a replication of Donaldson and Wales' (1970) experimental method. Six pre-school children were presented with an array of six objects, one of which was identical in all respects to a target object presented by the experimenter. The other objects were either totally different (two of these), or differed from the target object in size or colour or both. The question asked was slightly different from the Donaldson and Wales original; it was: Can you give me one that's the same as (different from) this one? In a second task, children were presented with sets of different coloured beads, and asked by the experimenter: Give me one that's the same colour as this bead or . . . a different colour than this bead. Children indicated their choices either by pointing or by handing their bead to the experimenter. The results of the first experiment virtually duplicated those of Donaldson and Wales earlier. However, the results of the second study showed that the children in fact could differentiate same from different when this was used with colour. Glucksberg et al. concluded from this that the results achieved in the first study were a consequence of the children misreading the situation rather than of a lack of linguistic knowledge. To test this hypothesis they subsequently conducted a similar sort of experiment with a group of twenty college students. For ten of these, a naturalistic situation was devised as a context where the Donaldson and Wales question could be asked, almost accidentally, and in the second situation a rigid experimental framework was adopted. Surprisingly - or not so surprisingly, when one thinks about it - six of the adults in each group responded as if the question with different was taken to mean same. Glucksberg et al. point out that in reply to an utterance like Give me a different one, adults regularly behave as if this is a request for another object of the
same class or function as the target object: "The word one as it appears in this form of request is interpreted as 'one of these' and both children and adults respond accordingly" (op. cit. : 740). If anything, then, the way children responded to requests containing same and different in the original Donaldson and Wales (1970) experiment showed considerable linguistic sophistication!

Karmiloff-Smith (1977) studied the comprehension of même (same) by 47 children between the ages of two years ten months and seven years eleven months. Although the children she studied were French speakers, the results are relevant in that they point to another use of same, namely to indicate repeated reference to a single object. In her study, Karmiloff-Smith found that the youngest children understood the same as meaning the same kind. A transition stage in comprehension was found among children 4 - 5 years old, who were found to understand same as either identical one or same kind of one, depending on context. She hypothesised that this development pattern may be related to children's initial syntactic notions of the difference between attributive and predicative positions in sentence structure: she points out that same shares, in the noun phrase, the position of attributive with adjectives like big, little, and pretty, so that the child's initial interpretation of same as same kind would be favoured, since it matches the adjectival classificatory system.

<table>
<thead>
<tr>
<th>Study</th>
<th>(Approximate) Age of children</th>
<th>Lexical items</th>
<th>Conceptual Area</th>
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</thead>
<tbody>
<tr>
<td>Spiker et al. 1956</td>
<td>3 - 5 years</td>
<td>middle-size</td>
<td>size discrimination learning</td>
</tr>
<tr>
<td>Ervin and Foster 1960</td>
<td>5 and 11</td>
<td>good, strong, heavy, happy, big, small, dirty, pretty</td>
<td>size, weight, strength, evaluation</td>
</tr>
<tr>
<td>Lumsden and Poteat, 1968</td>
<td>5½ - 6½</td>
<td>bigger</td>
<td>size</td>
</tr>
<tr>
<td>Stern and Bryson, 1970</td>
<td>4 - 5</td>
<td>fatter, bigger</td>
<td>size</td>
</tr>
<tr>
<td>Study</td>
<td>(Approximate) Age of children</td>
<td>Lexical items</td>
<td>Conceptual Area</td>
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<tr>
<td>Mackay et al., 1970</td>
<td>5 - 7</td>
<td>colour, shape, height, diameter</td>
<td></td>
</tr>
<tr>
<td>Donaldson and Wales, 1970</td>
<td>$3\frac{1}{2}$ - 5</td>
<td>comparative and superlatives of: size</td>
<td></td>
</tr>
<tr>
<td>Wales and Campbell, 1970</td>
<td>3 - 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wales, 1971</td>
<td>3 - 6</td>
<td>(big-wee, long- short, thick- thin, high-low tall-short, fat-thin) size</td>
<td></td>
</tr>
<tr>
<td>E. Clark, 1972</td>
<td>4 - 5</td>
<td>absolute forms as above, size</td>
<td></td>
</tr>
<tr>
<td>Klatzky et al., 1973</td>
<td>$3\frac{1}{2}$ - 5</td>
<td>nonsense syllables size (height, length, thickness)</td>
<td></td>
</tr>
<tr>
<td>Maratsos, 1973</td>
<td>3 - 5</td>
<td>big, heavy size</td>
<td></td>
</tr>
<tr>
<td>Eilers et al., 1974</td>
<td>$2\frac{1}{2}$ - 3$\frac{1}{2}$</td>
<td>big, long, wide + antonyms size longer-shorter size transitivity</td>
<td></td>
</tr>
<tr>
<td>Riley and Trabasso, 1974</td>
<td>4 - 5</td>
<td>taller-shorter proportion and fatter-thinner size covariance</td>
<td></td>
</tr>
<tr>
<td>Townsend and Erb, 1975</td>
<td>3 - 6</td>
<td>shorter-taller, higher, thicker, fewer, darker, fatter. colour, size</td>
<td></td>
</tr>
<tr>
<td>Townsend, 1976</td>
<td>$2\frac{1}{2}$ - 4</td>
<td>tall-short, wide-narrow long. size</td>
<td></td>
</tr>
<tr>
<td>Bartlett, 1976</td>
<td>2 - 5</td>
<td>skinny, short, hard, light, more, fat, tall, few, heavy, size, length, large, less, soft weight, long, many. consistency</td>
<td></td>
</tr>
<tr>
<td>Ehri, 1976</td>
<td>4 - 8</td>
<td>big, long, high, wide, deep, far, thick, fat, tall and antonyms size and distance</td>
<td></td>
</tr>
<tr>
<td>McDonald, 1976</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kuczaj and Lederberg, 1977</td>
<td>3 - 7</td>
<td>younger- age (?) and older size.</td>
<td></td>
</tr>
</tbody>
</table>

There have been many studies involving children's early vocabulary of size adjectives, as can be seen from the above tabulation, but these are not always strictly comparable as the role of language is not
always clearly defined, and some researchers have claimed that they are investigating absolute adjectives when in fact they use comparative or superlative forms in their study. But as was seen in chapter 1, the different forms are not equivalent semantically, so that it is not advisable to extend results found for one form-type to all the others. Some of the above-listed studies have been included because they involve the same conceptual area as the psycholinguistic experiments although their aims are slightly different.

Spiker, Gerjuroy and Shepard (1956) studied 84 children, from whom they selected two groups of 30 on the basis of whether or not they could respond to middle-sized of three stimuli by uttering middle-sized, medium-sized or medium one. In a subsequent experiment on discrimination learning, each group was divided, the first half of each being given an "absolute" task and the other a "relative" task. The absolute task consisted of learning to pick out the middle-sized of three objects when the middle-sized object never varied in absolute size. In the relative task the size of the middle object varied from trial to trial. Children who had the verbal concept middle-sized did significantly better on both types of task, although children without the concept were found to be able to learn the discrimination in the "absolute" condition. The fact that some children in the "no-concept" group were able to learn the size discrimination is explained in a rather peculiar way by Spiker et al. (1956: 417, fn. 2): "Presumably, such (subjects) have had sufficient experience with relational concepts 'larger than' and 'smaller than' that they are able to learn rather quickly to respond to the one that is not the larger and not the smaller of the three stimuli." Spiker et al. thus seem to believe that comparative forms are learned before intermediary adjectives are used for gradability. It is interesting to note that the question they used to pre-select
their subjects never contained such comparatives at all: they used "absolute" adjectives big and little.

Ervin and Foster (1960) studied semantic differentiation in twenty-six American first-grade children (14 boys and 12 girls) and thirty-three sixth-graders (17 boys and 16 girls). They presented children with pairs of objects and asked them questions of the following type: Is one of these heavier and one lighter, or are they both the same weight? Which is heavier? Is one bigger and one smaller, or are they both the same size? etc. Size, weight, and strength were independently varied in the object pairs. Pictures of faces were also used with questions containing good, pretty and happy and their antonyms. First graders stated that the comparison objects differed on other dimensions than the attribute actually contrasted. Big and clean were least often confused with other attributes; good, pretty and happy were treated as interchangeable synonyms. There were statistically significant reductions in confusion of the following pairs of adjectives, between first and sixth grade: clean + happy, clean + good, happy + good and pretty + good. In the younger group, relatively many more girls than boys confused strong + big and heavy + strong, as well as clean + good, but more boys than girls confused pretty + clean, clean + pretty and pretty + good. In the older group girls were similar to boys on dimensions of physical quality, but relatively better at differentiation of pretty + happy, clean + happy, happy + good and pretty + good. (In all of these references, the first adjective is the stimulus difference, and the second the response given to the stimulus). These results are consistent with a picture of lack of differentiation for both physical and evaluative concepts at first, with boys making better rates of progress than girls on some physical concepts. Girls seem to be about equal to boys in the older group as regards physical concepts, and to be further ahead in differentiating evaluative dimensions.
Lumsden and Poteat (1968) used pairs of drawings on sheets of poster-board and asked forty kindergarten children in their investigation to tell them which one of a pair was bigger. For twelve different displays of drawings, the children varied between 72.5% and 97.5% choice of the figure that had the greater vertical extent in the pair, although ten of the twelve displays had pairs of drawings that did not differ in overall area. Lumsden and Poteat found that with a control group of 35 high school students this pattern of choice was not found, generally, and concluded that children's concept of bigger evolves "from a relatively simple one weighting the vertical dimension to a multidimensional one approximating the adults concept of areal expanse or inferred volume" (op. cit.: 407).

Stern and Bryson (1970) were interested in the conceptual-linguistic link in acts of comparison. They found that their twelve subjects produced comparative adjective forms very rarely in proportion to the number of times they correctly responded to instructions containing a comparative. In a pre-test session, children used the form 10% of the time, but 85% of the time responded to instructions correctly. In a training session the children were taught either by rule or by rote repetition to produce the inflected comparative form in their speech, and after the training a significant increase was found in their "spontaneous" use of the form: there was 85% production, post-test. Stern and Bryson claim to show up the difference between competence and performance, since it was possible for children to comprehend the concept of comparison "without possessing the labels which convey this concept in the preferred terminology of a particular language community" (op. cit.: 1200).

Donaldson and Wales (1970) studied comprehension of superlative and comparative forms of size adjectives when judging arrays of four
objects. Each child was presented with various arrays of four objects and asked to point to the exemplar of positive or negative polarity superlative (e.g. Point to the biggest one), whatever dimensional adjective was used. The child was then asked "Now give me one that's (bigger) than this one," and was presented with a standard object from the array. In general, children tended to respond more accurately to positive polarity adjectives than to negative polarity ones, although the preference was more noticeable in responses to superlatives than to comparatives. The preference for positive pole adjectives was also reflected in a subsequent study of the children's production. An interesting feature of the results was that just over a third of the children's judgements of negative polarity superlative consisted in not indicating an extreme item in an array. As there were four objects in each, this suggests that they processed only three of them, possibly, or that they understood the superlative as a comparative. It appears that children were always asked to point to the exemplar of a positive-polarity superlative first, and this may have adversely coloured results. Donaldson and Wales consider that their results suggest "absolute" adjectives precede other comparative constructions in child language, and that superlatives enter the acquisition process before comparatives. Bellugi-Klima (1972) also believes that comparatives develop later than absolute adjectives.

What appears to be the same experimental study is reported in more detail in Wales and Campbell (1970), although the wording of the questions asked is reported differently. Blocks varying in two dimensions made up two arrays, one with size covariation of the two dimensions direct, and one with them inverse, for judgements using big-wee (comparatives and superlatives); sticks varying along one axis made up an array for long-short, and upended they served for
high-low (this is a very strange use for low: one would expect short here); blocks varying in only the tertiary dimension were used for thick-thin; for tall-short and fat-thin, pictures of men varying in girth and stature were used, covariation in size being inverse for the two dimensions. Fifteen children were studied and compared with eight in an outside control group. The children were pre-tested, given verbal training and then post-tested. They were trained in two groups: eight were encouraged to justify their responses to the experimenter's questions on dimensions, and seven were asked only the questions. It was hypothesised that after training, the first experimental group would have improved more than the second, and both groups would be better than the control group. This was not significantly so, although the differences were in the predicted direction. Some children were found to greatly restrict their use of big-wee during the training period, and the number of children who were able to give appropriately-worded answers justifying their choices on size judgements also increased.

Wales (1971) reports on a further study in the same range, using absolute adjectives only, with thirty-six children who worked with an array of six cylindrical blocks varying in height or width or both. They were presented with four of these and asked by the experimenter \textit{Give me the big(Wee/thick/thin/tall/short)one}. Whatever adjective was used, two blocks from the opposite end of the array to that described by the adjective would be taken away, and two new ones would be added at the other end. The question was then repeated. Children could then respond in one of two ways: either choose the same block as before, or choose one of the new ones. The first kind of response was called \textit{absolute}, and the second \textit{comparative}. It was found that only a small minority of children responded absolutely for \textit{big} and \textit{wee}, and that generally where answers were not random a comparative judgement was
favoured. Wales interprets this as showing that when children first learn the meanings of gradable adjectives they are immediately aware of their comparative use, and treats this as evidence against the Transformational-Generative treatment of comparative sentences as being derived from absolute adjectives.

E. Clark (1972) tested children's knowledge of antonyms in a word-association type of study where the children were asked to say the opposite of each word spoken to them by the experimenter. She analysed dimensional adjectives into features, using Bierwisch's (1967) proposals for German adjectives as a basis for her choice of semantic components. On the grounds of its having one dimensional feature, +space, Clark predicted that big would be acquired before other size adjectives (tall, wide, short, etc.), which would also be ordered for acquisition according to complexity as measured by number of semantic features, provided by Bierwisch's analysis. Generally, Clark found support for her predictions, interpreting the fact that children replied to specialised size adjectives with the more simple big-small pair of antonyms as supporting her analysis.

In a subsequent study predicated on the Semantic Features Hypothesis, Klatzky, Clark and Macken (1973) taught 24 children nonsense syllables for different size concepts. The children had to point to exemplars of the concept-word in a display of five objects. They appeared to learn positive pole terms faster than negative terms, and Klatzky et al. explained this result as the effect of a non-linguistic size preference for the larger of two objects, a type of behaviour related to H. Clark's (1973) statement that the best exemplar of a dimensional concept is the most extensive one.

Karatsos (1973) studied three year-groups of ten children each, aged three years old to five. Using cutout cardboard rectangles and toy animals, he presented children with pairs and asked Which one is the big
one? He comments that he did not use the comparative bigger in his question because children did not have a clear idea of what was meant. Maratsos found that the youngest group was more accurate than the oldest group at picking the big objects, since these were quite often not the tallest. The older children appeared to understand big as tall, although when asked to pick a heavy object (which was also the biggest overall) they did not mistake heavy as tall. It seemed then that big had become overspecialised in meaning, and restricted to the vertical. This is an interesting observation since besides supporting Lumsden and Poteat (1968), Maratsos' study connects well with observations concerning children's orientation preferences (Eldred, 1973), and the known salience of vertic-ality (Piaget and Inhelder, 1969: 40).

Eilers, Oller and Ellington (1974) studied between fourteen and twenty-two young children for comprehension of instructions containing size adjectives. They found a range of errors in response to Give me ... instructions, consistent with a semantic differentiation hypothesis: more general adjectives big-little caused fewer errors than long-short and wide-narrow respectively. However, children responded better to negative pole than to positive-pole adjectives, and this was not in line with the predictions of the Semantic Feature Hypothesis.

All the subsequent experimental work failed to support the Semantic Feature Hypothesis. Townsend and Erb (1975) asked children questions about rectangles, of the following sort: Which box is taller than it is fat? They found a linguistic strategy at work which led their subjects to ignore the second part of the sentence in each case, and a non-linguistic size preference that led to the choosing of larger objects. Townsend (1976) used three-dimensional objects and questions containing comparatives and superlatives (e.g. which box is thicker/fatter? Which peg is the tallest?) to test comprehension. He found responses to superlative forms
were correct more often than those to comparatives. Investigating the Semantic Feature Hypothesis predictions for "markedness", Townsend found no effect of markedness on number of errors for shorter-taller, and a reversal of the predicted effect for lower-higher at different ages. He concluded that there was no evidence for a polarity feature in comparative adjectives, nor was there any ground for trying to characterise comparatives in marked-unmarked terms.

Ehri's (1976) study also failed to provide support for E. Clark's SFH. In a very detailed investigation, Ehri found that no negative polarity gradable adjectives were misunderstood as their positive counterparts, and that the negative-to-positive assimilation pattern proposed in H. Clark (1970) was not a general phenomenon. She supported a differentialist hypothesis such as that proposed by Wales (1971). Bartlett (1976) and McDonald (1975) provide similar results from the area of size adjectives. Kuczaj and Lederberg (1977) studied children's confusion of the concepts older and taller (plus antonyms), and also failed to find any evidence for assimilation of the "unmarked" to the "marked" member of the adjective pair.

In support of Wales' differentiation theory of adjective development in the conceptual area of size, vocabulary counts of children's language production (Edwards and Gibbon, 1973) give a similar picture, with big and little the most frequent size-adjectives from quite early on.²⁵

Stage Two

Much of the knowledge of children's semantic structure for gradable adjectives after about age seven comes from studies of performance on verbal reasoning tasks (Donaldson, and Duthie, 1963) involving transitive inference in "three term series" problems. Di Vesta (1965) has in addition provided word-association profiles for children aged seven to eleven years²⁶ which give a general picture of vocabulary development that
includes gradable adjectives. Studies by Baldwin (1965) and Pascual-Leone (1970) also provide some insight into aspects of the linguistic-cognitive relation at this age.

Duthie (1963) reports on studies of twelve children aged 8 - 11½, and of 360 children aged seven, eight, nine and ten years. He studied the nature of their tendency to commit "overlap error" in three-term series problems (children could not accept that the middle term in a series was identical in two comparative sentences that acted as the "premises" for the construction of the series). He distinguished between two types of error, structural and executive (following Donaldson, 1963), that tended to prevent children from finding the correct solution in quantified and partly quantified transitivity problems. Duthie found a number of specifically linguistic factors caused difficulty: ordering of information during presentation of the pair of comparative sentences proved to be a confounding factor, causing executive error when children were unable to return to the "link" term (the one mentioned in each sentence) in order to compute a quantity based on the values of the ordinal series. Some children could construct an ordered series of three terms but could not use additional information on measurement in order to arrive at a fully quantified solution to a problem, thus showing structural error: they quite often treated sentences like X is two years older than Y as the same as X is older than Y. This reflects the same sort of problem as was introduced in section 2.4.2. (page 149): children of this age can handle ordinal but not numeric + ordinal information. General confusion of mathematics and ordinal comparative information was found which showed a lack of integration between the number system and the pairs of comparatives used in the tasks (older-younger, taller-smaller): younger than was, in many cases of structural error, treated as a signal to subtract, while older than acted as a signal to add, but children
could not always pay attention to the order of presentation for the three terms in series.

Baldwin (1965) introduced 65 sixth grade American children, and 107 adults, to situations - described pictorially and orally - in which they were asked to make evaluations of the conduct of another person. He found that children tended to have quite a different idea from adults of what various evaluative terms meant. For instance, he reports that they judged as kind a boy who gave away something he did not need at the time; but someone who gave away something that he did need was judged as not kind. This finding suggests that children may have a very vague notion of parts of the evaluative lexicon until relatively late in their development.

Pascual-Leone's (1970) examination of the feasibility of an information-processing model to explicate the transition through the stages of development postulated by Piaget, is interesting from the present point of view in that it spans Stage One and Stage Two with experimental evidence on the sequence of development for six perceptual dimensions, three of which are directly and the other three indirectly related to the present topic of gradability (four groups of children were studied, aged 5, 7, 9 and 11). Although Pascual-Leone has a different purpose in view, his data, involving cognitive processing of the following dimensional information, are quite informative: figure-ground relations, outline, closure, colour, shape and size. In the information-processing task described in his paper, there is noted to be a very stable performance from age five upwards as regards the first three variables listed above. This shows them to be abilities which are acquired early in development (performance was generally above 80% accuracy on these). Closure and colour seem to converge and improve in accuracy with age, colour increasing from 60% to 80% in processing accuracy, Size was the hardest of five concepts
processed by 5-year-olds, and this was closely followed by shape. However, as children became older, the relative difficulty of size was reduced in comparison with shape, although both became easier (over the age-span studied, size processing increased from 30% to 65% accuracy, and shape from 30% to 60%). Pascual-Leone's data suggest an evolutionary sequence as measured by relative ease of processing for these concepts: the sequence is that of the above listed order, with shape and size last and about equal in difficulty.

Stage Three

In the face of psychological research results gathered in more primitive cultures, Piaget began to doubt whether the stage of formal operations is a *sine qua non* of intellectual development (Piaget, 1977), and as the amount of research increases with older child subjects, this stage becomes increasingly attenuated, even for our own European cultural environment.

Donaldson (1963) reports on studies with children between the ages of 11;9 - 12;3 (N = 20) and 14;0 - 14;6 (N = 19) that show great difficulty is found both in dealing with transitivity relations and in processing negative information. Again some of the errors on transitivity tasks like the three-term series, with quantified information, imply measure is difficult for children.

Shayer, Küchemann and Wylam (1976), after examining 10,000 children in the age-range 9 - 14 in different types of school, found that early formal thinking seemed to be confined to only the top 20% of the top year-group, although type of school seemed to be correlated as a variable. Kempa and Hodgson (1976) also noted a sharp levelling-off at the *operational definition* stage of concept learning among 560 subjects aged 14 to 16 years of age in secondary schools. This was the third of four levels of increasing abstraction measured by them. With regard to language
functions in cognition, Donaldson (1978: 81-82) has suggested that even adults have a selective competence for formal logical thought.