

THE CHILD'S ACQUISITION OF UNFAMILIAR WORDS:
AN EXPERIMENTAL STUDY

by

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This thesis is dedicated to the memory of James Dockrell.

He might have given me a pound for it, at any rate I did think about it.

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ABSTRACT

The present thesis investigates how preschool children acquire the meanings of unfamiliar words. In an attempt to clarify the notion of word meaning a three-fold distinction between sense, reference and denotation is introduced. It is suggested that knowing the full meaning of a word entails knowing both its sense and its denotation.

Two main experimental approaches are implemented - the cross-sectional and the mini-longitudinal. In the first set of experiments (Chapters 2 and 3) children's ability to infer denotation (Chapter 2, $n=88$) and to identify the referent (Chapter 3, $n=60$) of a novel term are examined. In both sets of studies children have minimal exposure to the new terms and comprehension is assessed immediately. The results of Chapter 2 suggest that children have greater difficulties discovering the meanings of unknown verbs than they do unknown nouns and that there are considerable difficulties for the young child to coordinate information given about denotation in a 3-series sentence task. On the whole children find the task difficult and there is a suggestion that performance fails to reflect competence. The experimental evidence from Chapter 3 is, in contrast, unambiguous. Firstly, children find it harder to identify the referent of an unknown verb ($p < .00001$). However, children's responses are not random in this condition - they choose the stimulus containing the objects initially associated with the unknown action ($p < .001$). This is not the case with failures to identify the referent of an unknown noun. Secondly, children have greater difficulties identifying the referent of an unknown noun if it replaces a known lexical item than if it replaces an unknown lexical item ($p = .0033$). It is argued that establishing reference is pre-empted by the existence of an appropriate name in the child's vocabulary.

Since acquiring the meaning of a new word is rarely a one-trial affair, the second section of this thesis attempts to trace the acquisition of three novel words, an animal term (Chapter 5, $n=16$), a novel mode of

locomotion (Chapter 6, n=12) and a novel shape or colour term (Chapter 7, n=14), in the lexicons of three and four-year old children over a period of several months. The method is based on that of Carey (1978 a & b). Tasks assessing production and comprehension as well as sense and denotation are introduced. In the case of the novel animal term, introduced by linguistic and perceptual contrast, children learn the term quickly and treat it in a similar manner to other known animal terms. Children have greater difficulty learning the new term for a novel mode of locomotion, supporting the earlier evidence suggesting that verbs are harder to learn than nouns.

Chapter 7 attempts to assess the importance of solely linguistic contrast on the formation of the child's denotation of a novel term (shape vs. colour term). It is concluded that providing that the novel term is not pre-empted, lexical contrast is an effective manner of restricting denotation. Children's individual hypotheses concerning the meaning of the novel term are discussed in detail.

The repercussions of these studies for future work in developmental semantics is discussed and a need to formulate objective criteria for full meaning, such as sense reference and denotation, is recognised

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Typographical Conventions

The following typographical conventions are used to assist the reader:

Single quotations are used to indicate that a word's meaning is being considered (cf. Section 1.4);

Underlining is used to refer to the word qua lexical item and for emphasis;

Upper case letters are used to indicate denotations (cf. Section 1.4);

Double quotation marks are used for quotations from other authors, statements from the subjects and for dialogue between the experimenter (E) and the subject (S);

Square brackets are used to indicate semantic components (cf. Section 1.5.2) and for inserts within the quotations of other authors.

CHAPTER 1

INTRODUCTION

1.1 Aims

This thesis considers the process of semantic development in the pre-school child. In particular the emphasis is on how young children acquire the meanings of unfamiliar words and how the representation of these words changes over time.

By the age of six the child has a productive vocabulary of between 8,000 and 14,000 words (Carey, 1978a). This means that the child is acquiring between five to eight words a day for a period of four and a half years. We have a puzzle. The puzzle becomes more complex when we realize that words are not generally acquired in one trial, but at this stage in semantic development the child will be mapping the meanings of many new words at one time (Campbell, in press). How does the child proceed with this task which to the casual observer appears effortless - a task which would involve considerable concentration from an adult learning a new language or simply attempting to increase his vocabulary? The adult is arguably better equipped than the child for he has access to knowledge of particular grammars, word formation rules and linguistically relevant distinctions of his own native language.

As others have shown, and as I hope to show more fully, part of the solution to this problem is that, for the child, acquiring the meaning of a new word can be a lengthy process. The child may well progress through various "wrong theories" of a word's meaning but, as we shall see, he is flexible and has various linguistic and non-linguistic strategies to help him on his way. It is with these strategies that I am primarily concerned.

What sources of non-linguistic and linguistic information can the child use to work out the rules governing the application of a new word? Can this process be traced from the child's initial encounter with a term for a set period of time with different terms representing different word classes in the English lexicon?

1.2 The need for eclecticism in research on meaning

Three distinct approaches to the problem of meaning can be discerned - the logical, the linguistic and the pragmatic. Each perspective deals with a different and distinct aspect of meaning and, not surprisingly, each orientation is viewed by its proponents as dealing with the central issue(s) concerning "meaning". So for example, logical semantics is concerned with

"the description of possible languages or grammars as abstract semantic systems whereby symbols are associated with aspects of the world"

and not with "the description of the psychological and sociological facts whereby a particular one of these abstract systems is used by a person or population"

Lewis, 1972:170

I believe, however, that the tendency to presuppose the primacy of one particular view of meaning above the others is not a satisfactory way to approach the problem of semantic development.

In that this thesis is concerned with the development of the meanings of individual lexical items we are explicitly involved with the conditions which govern the child's appropriate use of a term. For example in the case of the word ball we are interested in the conditions under which the sentence "That is a ball" would be true. As such we are drawing a parallel between truth-conditional semantics and the acquisition of word meanings. Truth-conditional semantics assumes that meaning is inherent in the symbol that expresses it. The traditional manner of dealing with the truth conditions of any sentence(s) in which a word (X) occurs is to list the entailments of S. It is self-evident that while the primary goal for certain logicians is determining the truth conditions of each sentence in a language, natural or formal, this is not the primary goal of the child.

The linguistic approach to meaning, in contrast to the logical, focuses on the fundamental characteristics of the word. Roughly, these investigators view words as composed of elementary semantic components (cf. Section 1.5.2). The ultimate goal of this type of analysis is to derive

a set of components which cannot be decomposed any further - semantic primitives. Semantic components have been used (a) to prove that sentences are analytic, self-contradictory or anomalous and (b) to account for the meaning relations among words in the vocabulary, eg. synonymy. If such an approach were the sole perspective taken we would be restricting our analysis to the relationships between words to the exclusion of the word-world relationships. Furthermore such an orientation makes the implicit assumption that there is simply a quantitative difference between the semantic representations of children and adults - an assumption which requires justification.

So while logicians are concerned with the truth relationships between a word and a particular world, linguists are concerned with the fundamental structure of the word. Neither of these approaches considers why the child uses language. The failure to acknowledge that the main goal for the child, at least at this stage in development, is communicative competence is I believe misleading. What is communicated is a function of the context in which the utterance occurs as well as the individual items (words making up the utterance). As Campbell and Wales (1970) state:

"Much of what we say and write is constrained in important ways, by the particular circumstances in which we are speaking or writing"

1970:248

So while verifiability theories of meaning hold rigorously for formal languages they fail to recognize an important distinction present in natural languages, that of utterance meaning and speaker's meaning (Grice, 1968).

Focussing on the speaker's meaning rather than the utterance meaning places us in the domain of intentional semantics - pragmatic approaches to meaning (Austin, 1962; Searle, 1969; Grice, 1968). Intentional semantics assumes that meaning is given by the speaker's intentions on any given occasion, frequently referred to as a theory of language use. Psychology provides us with empirical evidence that both children (Donaldson and McGarrigle, 1974; Light, 1979) and adults (Bransford and McCarrell, 1974)

are influenced by their expectations of the speakers intentions and their knowledge of the state of world affairs - be they present or absent. From a philosophical orientation Grice (1968) has isolated a number of general maxims which specify the conventions which participants in a conversation should normally obey, conventions which we might term appropriacy conditions.

Though it is clear that in conversations words do not appear in isolation and that the intended meaning of a particular word may vary between contexts due to various pragmatic factors, it seems equally evident that the meanings of individual words do constrain speakers' meanings and that one can discuss the meaning of a word outwith the context of utterance. It is a condition of being able to use a word appropriately that we know its meaning.

The differences which exist between these three approaches to meaning should not be one of absolutes in psychology but one of emphasis. In investigating a child's communicative system the word and the context will interact and possibly carry different weights in different situations (cf. Campbell and Bowe, 1978; Hoogenraad, Grieve, Baldwin and Campbell, 1978). In fact the relationship between the two may well differ between children and adults. Emphasis on one to the total exclusion of the other is likely to be a stultifying exercise for psychologists.

Miller (1978) has suggested that the significance of an utterance is inferred on the basis of five main components:

1. its meaning
2. its linguistic context
3. its social and physical circumstances including knowledge of the speaker
4. a knowlegde of conventions governing discourse
5. general knowledge.

All of these factors will also affect the child's interpretation of a novel word and his potential for increasing his vocabulary given an initial encounter with a previously unknown word. So while I am advocating

an overall eclectic view of the child as a word learner, this thesis is primarily concerned with one aspect of that process, how the child comes to know the meaning of particular previously unknown lexical items. The problem for the child is two-fold - to map words onto the appropriate set of objects, actions or events and to form some representation of the semantic relationships which exist between different lexical items. These ideas are discussed more fully in Section 1.4.

1.3 Ostensive definition and naming

If one were to approach a parent or an educated layman and enquire as to how a child learnt the meanings of words one is likely to be told that objects are pointed at (or indicated in some way) and named. Despite the present tendency to discount the process of ostensive definition and naming or to claim that it is ineffective, substantially identical approaches may be found in the philosophical and early psychological literature. Ostensive definition is a process of providing the meaning of a word be it by pointing to or using some other means to focus the child's attention on a particular denotatum or referent (cf. 1.4). The term naming, as it is used in this section, is what would be called reference or in some cases reference and denotation (cf. 1.4).

For example Augustine (1952) reflecting upon his own semantic development provides the following explanation:

"When they named anything, as they spoke turned towards it, I saw and remembered that they called what they would point out by the name they uttered ... and thus by constantly hearing words, as they occurred in various sentences, I collected gradually for what they stood"

(1952:8)

The noted linguist Bloomfield (1933) advocated a similar position:

"If someone did not know the meaning of the word apple, we could instruct him by handing him an apple or pointing at an apple, and continuing as long as he made mistakes, to handle apples and to point at them until he used the words in the conventional way. This is essentially the process by which children learn the use of speech forms"*

(1933:140)

More recently Carroll (1971) focuses on the naming aspect:

"There comes a stage when the acquisition of vocabulary is extremely rapid; this seems to occur when in his cognitive development the child has reached the point of perceiving that things, events and properties have names"

(1971:32)

There are a number of difficulties with such approaches. In the first instance ostensive definition, of itself, is never sufficient, since first of all the person interpreting the definition must know in advance the

* Author's emphasis

significance of the pointing gesture and, secondly, be able to identify the object or attribute correctly.* Wittgenstein (1953) emphasises the latter point in his discussions in Philosophical Investigations (1.3.5 numbered paragraphs) when he argues that it would be impossible to grasp the force of an ostensive definition if one did not know the logical category of the word being defined - whether it was a colour word or a shape word for example. How is the child to know which category or 'level of specificity' (see Discussion in Chapter 3) the speaker is intending ?

So problems certainly exist in identifying the ostendent when we are dealing with perceptually specified objects. Additional problems arise when we try to account for the acquisition of abstract or relational terms. Can 'in' be pointed at and named ? Do we point at a set of objects which are in relationship with each other such that an adult would say X is in Y, and say "in" ? We must surely take into account some of the other components enumerated by Miller (1978) in the previous section. On the other hand, how do we account for the fact that "square round" has meaning but no referent ? It seems to me that we must go considerably beyond the process of ostensive definition in our search for an explanation of semantic development.

The notion of 'naming' also merits some discussion. Lyons (1977) has distinguished between two forms of naming, the vocative and the referential. It is with the latter that we are primarily concerned. The idea that the relationship between words and things is primarily one of naming originates with the Greek philosophers. However, words do not name or stand for individual objects, unless they are proper names, but for sets of objects, and the word learner be he adult or child must therefore be able to abstract certain general criteria for use of that particular word. As Harrison (1977, p118) states, the criteria for saying of someone that he knows the meaning of a general name can be specified in terms of the following two conditions.

1. he must be able to identify with certainty an array of objects to

* Collingwood (1938, p.227-228) has made the same point clearly and concisely and discusses the repercussions of such an analysis.

which the name definitely applies together with an array of objects to which the name definitely does not apply plus a group of ambiguous objects.

2. this assignment corresponds to that of another competent speaker of the language.

It is worth keeping Harrison's criteria in mind when we wish to assess the child's semantic competence.

However, Harrison's criteria deal only with the relationship between word and object; and as he remarks himself labelling alone "is a narrow and circumscribed ritual".

Is meaning solely concerned with the relationship between word and object? Surely not, but this is what a theory of acquisition based on naming would imply. Semantics is also concerned with the relationships between words, eg. synonymy, hypernymy, antonymy and converseness. In fact accounting for such relations has been the primary goal of many semanticists (cf. Katz, 1972). These issues are not to be dismissed when considering semantic acquisition.

"Learning the meaning of an expression ... is learning to operate correctly with an expression and with any other expression which is equivalent to it"

(Ryle, 1957:257)

I began this section by discussing the assumption that meanings of words are acquired through the process of ostensive definition and naming:- ostensive definition can be either explicit, that is point to an object and giving its name, eg. "That is a cup", or implicit, that is the fact that an object is called X is embedded in the linguistic or non-linguistic context, eg. "Pass me the cup". As we have seen, this point of view is not without support. It is certainly worth considering what influences these procedures might have on semantic acquisition though they may not be able to account for the development of the full meaning of terms. In fact Schlesinger (1977) has recently suggested

"That the Augustinian view is basically correct as far as first words are concerned. These words are learnt by being limited to specific referents. Later on, as the child attains increasing command of the language the child may learn words through quite a different process ..."

(1977:1)

Schlesinger's position does not concern us here, but it is worth remarking that even with his modifications to restrict the intended referent by means of such notions as textures, there are difficulties; not the least has to do with his notion of referent pairing and the child's establishment of "global perceptual configurations" (p10).

Ostension is an inherently ambiguous method of providing a listener with information about an object's name. For example, the statement "That is a cup" can be interpreted in at least four different ways: the listener can assume that that particular object may be called a cup; or that anything similar to that particular object may be called a cup; or that that particular object is a cup (not a brush as you might have supposed); or alternatively that anything like this object is a 'cup' (to someone who knows the sense of the word but not its denotation, cf. Section 1.4). Therefore, the real problem with ostension is that the definition can be interpreted in a number of different ways; what information is extracted from such a definition depends on how it is interpreted.

The main reasons for discussing ostensive definition and naming were because of the prevalence of these ideas within the lay population and to elucidate a number of problems concerning the acquisition of word meaning. The latter may be summarized as follows:

1. If establishing a relationship between a word and its referent is not knowing the meaning of a word, what is?
2. How do children figure out the denotation of a term in a potentially ambiguous situation, e.g. ostensive definition?
3. To what extent does the linguistic context surrounding a word determine the possible meanings of that word?

Quine & Ullian (1970, p.13-15) distinguish between cause and evidence with respect to believing a statement to be true. "It remains quite important to keep in mind that cause is commonly quite different from evidence". A statement which causes us to believe that x is a cup need not constitute evidence that x is a cup. Hence, we must constantly be aware of new evidence which might lead us to change our beliefs.

1.4 Sense, reference and denotation

The previous discussion emphasizes the need for some elaboration of the notion of 'meaning'. Until this point I have been using the term intuitively. There are a number of ways that one might tackle this problem. It is possible, as Ogden and Richards (1923) have done, to present a list of definitions of meaning, 22 in their case. Leech (1974) takes a similar approach though he reduces the list from 22 to 7, giving primary importance to "logical meaning".

I shall adopt a more restricted notion of 'meaning', since I am concerned primarily with word meaning. I hope to show that the three-way distinction of sense, reference and denotation, applied to words is sufficiently rich to do justice to the child's task, while at the same time narrow and precise enough to permit the framing of empirically testable hypotheses. These three aspects of meaning will now be discussed. For we can only assess what is being acquired if we know what is to be acquired, that is, what counts as knowing the meaning of a word.

Ryle (1957) outlines the historical development of the theory of meaning and discusses a number of, initially, neglected issues which eventually led to a rejection of a solely referential theory of meaning. He emphasizes the point that it is not always the case that a word means nothing if it does not refer to somebody or something. It was precisely this problem which led Frege (1892) to draw a distinction between 'sense' and 'reference'.

"It is natural, now, to think of there being connected with a sign (name, combination of words, letter), besides the reference of the sign, also what I should like to call the sense of the sign, wherein the mode of presentation is contained"

(1892:57)

Frege's chief example has become common place in modern day writings on this topic. Although the evening star and the morning star both refer to the same object, the terms have different senses. From Frege's writing it is possible to extract three main points which clarify one's under-

standing of meaning.

1. To a given referent (object) there does not belong only a single sign, that is an object can be referred to in a number of ways.
2. In grasping a sense of a word one is not certainly assured of a referent. The underlying assumption here is that there are no pre-suppositions about the existence of objects and properties outside the language system itself. So the fact that unicorns do not exist does not prevent us from discussing unicorns and does not force us to postulate the existence of abstract and fictional entities that do not exist in the ordinary way that tables and chairs do. More commonplace is the following example, I know what a virus is, say. It is a subcellular micro-organism. Yet staring down an electron microscope at a virus in full view, I have no idea that it is a virus. Again the sense of the word is known but not its denotation.
3. If words are used in the ordinary way what one intends to speak about is their referents (and denotata, see subsequent discussion).

Psychologists until recently have failed to observe this distinction and even now it is a source of some confusion. What I hope to show is that this is a profitable way of examining certain aspects of the acquisition of word meanings. The use of the terms sense and reference is by no means systematic in the writings of various authors and frequently different terms are used to draw a similar distinction, eg. meaning and reference, intension and extension, connotation and denotation.

I choose to make a three-fold distinction between sense, reference and denotation following Lyons (1977). It may not be evident how original this suggestion of Lyons is. In fact even Lyons (1968) discusses only the difference between 'sense' and 'reference' and although he distinguishes 'denotation' from 'reference' (p426) he does not distinguish it from 'sense' (p428). It is interesting that this distinction is not generally drawn (but see Allwood, Andersson and Dahl, 1977) and is certainly not drawn in the psychological literature. It seems, to the present author at least,

an indispensable distinction. I draw the distinction as follows:-

Reference: describes the relationship between an object and a particular expression on a particular occasion of utterance. It is in fact an arbitrary relationship. An object can be referred to in any number of ways and it is "the person who refers who invests the expression with reference by the act of referring" (Lyons, 1977:177). It follows from this analysis that reference is not a property of words per se but of word containing expressions in concrete utterances.

Denotation: is however not constrained in this manner. Denotation, here, describes the relationship that exists between a linguistic term and a set of objects, a relationship which Lyons argues is external to the language system. An object which is referred to or denoted must exist. Therefore the term tree denotes a particular set of objects (ie. trees) and the individual trees are its denotata. A second example taken from Lyons might help to clarify this point. The denotation of the term red is a particular property and its denotata are all red objects (1977:207). It is possible to rephrase the following quotation by Frege to make this point:

"Singular definite article always indicates an object
whereas the indefinite article accompanies a concept word" (p.45)

Reinterpreted in the light of the preceding distinction we might like to say that a singular definite article indicates a referential expression whereas an indefinite article implies a denotatum.

It is worth considering some of the repercussions of this distinction briefly. For example, "if words have denotation, their denotation will determine their reference when they are employed in a referring expression" (Lyons, 1977:208). If a child knows, in some sense of the word, the denotata of dog he will know what sort of thing to look for when told "There is a dog". An explanation of how a child gets from an initial referential act which is how he is likely to first encounter a term to full meaning is as yet unclear. That the distinction between denotation and reference may

have an empirical motivation is shown by the following (possible) example. A child may know how to make successful reference using the word daddy (in utterances where he refers to his father) without knowing anything about the denotation of the term (except that it includes his father). Quine (1960, Chapter 3) advocates just this point of view with respect to early word use.

Sense: Lyons' use of the term sense is more restricted than that of other philosophers and linguists. I have mentioned that both denotation and reference involve entities outwith the language system, sense on the other has to do with relations entirely within the language system ie. between words. Hence Frege's comment

"That in grasping the sense of a word one is not certainly assured of a reference"

The sense relationship is said to hold between the words or expressions of a language independently of the relationship, if any, which holds between those words or expressions and their referents or denotata (Lyons, 1977:206).

For example, Unicorn has meaning, not because of its denotation, but because of its relationship with other elements in a particular semantic field, ie. animals. It is precisely in this way that the semantic relationship between words (sense) may be pertinent in the restriction of denotation, for the manner in which a child limits the denotation of a new term is a critical issue. Although Lyons regards neither sense nor denotation to be logically and psychologically basic (p210-211), it seems clear that although sense may not determine denotation it surely limits it. Knowing the meaning of X and the sense relationship between X and Y limits the denotation of Y. If we know that 1) X and Y denote vessels and 2) X is incompatible with Y - whatever X is, is not Y and vice versa and 3) X denotes cups then 4) Y denotes drinking vessels which are not cups. Hence, knowing the semantic domain of a term helps set up the boundary conditions for application of that term. Knowing the denotation of a term does not necessarily help us to discover its sense unless we have some a priori

knowledge of the object denoted, that for example a cup is a drinking vessel. We might know the denotation of cup without knowing the semantic domain to which it belongs. Equally we might know the sense of 'champagne glass' without knowing its precise denotation.

The three-fold distinction between sense, reference and denotation has been introduced to elaborate the meaning of 'meaning' and therefore to dissect some of the strands involved in the acquisition of word meanings. It can be argued that this three-way distinction provides us with a) a working definition of what is entailed by knowing the meaning of a word and b) an instrument with which we may hope to examine some of the issues and approaches in semantic development.

As far as a) is concerned I have argued that reference is in fact an arbitrary relationship which is situation bound and therefore being able to decipher the referent of a referring expression on one particular occasion can be due to anything from a clever guess to knowledge of the expressions' meaning.

Establishing successful reference is not a sufficient condition for knowing its denotation. If a child does not realize what is being referred to by a particular term he is in no position to work out the denotation of that particular term. I do not think that one would wish to argue either that knowledge of denotation is a sufficient condition for knowing the meaning of a lexical item. A child may know what the word cup denotes, but not necessarily that it is a drinking vessel. Knowledge of denotation may however be a necessary condition even if a word denotes an empty set. eg. unicorn. Moreover, if a child knows the sense of a term, as I argued previously, he need not know the denotation, therefore sense is really not a sufficient condition either. What I would like to suggest is that to say that a child or adult had the full meaning of a term we would require evidence for knowledge of both sense and denotation. The individual would (using Harrison's criterion for denotation) know which items were definitely denotata, which were definitely not denotata, and a subgroup of questionables,

but he would also know the relation of the term to other linguistic elements i.e. the sense of the term. This interpretation provides us with rough guidelines for an operational definition of what is entailed in knowing the meaning of a word. This is, of course, a more rigid but I believe more appropriate formulation than simply stabbing at some vague entity which one calls "full adult meaning". Assuming the presence of both sense and denotation in a child's "working vocabulary" for a particular term he would be credited with full meaning, though this would not necessarily be full adult meaning. This would allow the possibility of a similar analysis for both children's and adult's lexical entries.

I suggested that the approach to meaning advocated here would also permit clarification of some of the issues concerning and approaches to semantic development. For example, McNeill (1970) and Nelson (1973b) draw a distinction between what they term horizontal and vertical semantic development. Horizontal development occurs when the child has worked out some of the features of a particular word (Clark, 1973b, 1975) but not sufficient features for appropriate use (and the term may be, for example, overextended in use). So in horizontal development not all the features associated with a word are part of the initial representation when the word itself enters the child's vocabulary. In contrast vertical development occurs when a word enters the child's vocabulary accompanied by most or all of its semantic features. However, when vertical development occurs the child does not realize the relationship between words sharing semantic features - a semantic framework must be developed. So for vertical development the child's representation of the individual term is nearly complete - it is the relationship between words which is lacking - sense of the term. Now these two perspectives of semantic development are not mutually exclusive, although they are frequently treated as if they are. However there is a tendency to regard them as two distinct semantic processes. I should like to suggest that they are two parts of the same process - acquiring the full meaning of the word. If we look at word meaning from

the perspective of sense, reference and denotation this suggestion appears not only tenable but imminently sensible. In the terms I am using here vertical development would be seen as the establishment of denotation but not sense, whereas horizontal development would be viewed as a case where denotation was not clearly delimited but sense relations might well be present. The child's representation of the new term would tell us what new information was required before he could be credited with full meaning, eg. in the case of vertical development the sense relationship and in the case of horizontal development the boundary conditions for denotation. The two types of development are part of the same process. This approach would also allow a degree of latitude in assessing semantic development for it is possible from this perspective for different words to be learnt in different ways by the same child, depending on his previous experience with a particular lexical item.

1.5 Representation of meaning

Describing meaning as consisting of three interrelated aspects - sense, reference and denotation provides us with a framework for approaching the meanings of words but leaves us with two principal questions:

1. How is the sense of a term to be represented ?
2. How does the child arrive at the denotation of a particular term ?

These questions are very similar to what Kempson (1977) describes as the two most important demands on a theory of meaning: that is should account for semantic relations between lexical items and different linguistic expressions eg. synonymity and paraphrase; and that it should account for the relations between linguistic expressions and the world, eg. denotation and truth value.

There is no simple answer to these questions. What I shall do is describe the approaches which have had the greatest impact on developmental semantics. The first three modes of representation discussed are primarily concerned with question 1 but have implications for question 2. It is the answer to question 2 which has occupied developmental semanticists to the greatest extent, that is the criteria for application of a particular term (Bowerman, 1974, 1976; Clark, 1973, 1974, 1975; Nelson, 1974; see also section 1.6.2).

1.5.1 Hierarchical structures

One approach to the problem of representation is to regard the lexicon as hierarchically structured. The crux of this approach rests on the relationship between superset and subset or category member relations. The hierarchical ordering of lexical items is best represented schematically, see Figure 1.1

The broken lines in the figure indicate further branches on the tree. As can be seen from this figure each item is related by means of class inclusion to the one above it on the tree. The relationships represented on the tree are transitive, so that while 'dog' is a superordinate of

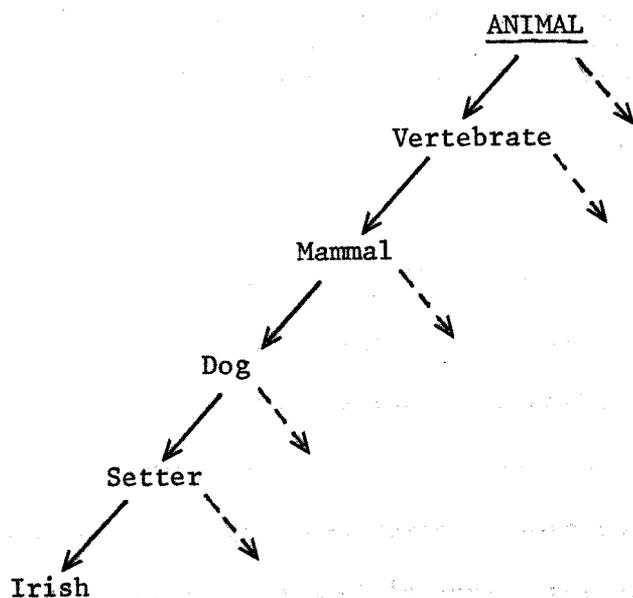


Figure 1.1 Hierarchical structuring of lexicon for nominal semantic field, ANIMAL

'setter', 'dog' is a subordinate of 'mammal'. Hyponymy is the term coined by semanticists to describe the relationship of class inclusion (cf. Lyons, 1968:453).

"A hyponym is a subname: since the referents of the word "table" are included among the referents of the word "furniture", "table" is a hyponym of "furniture""

(Miller and Johnson-Laird 1976:241)

To deal with lexical items in this fashion is to deal with the sense relationships holding between the items, that is between word and word, and to envisage the word as a unitary structure. Knowing that 'dog' is a hyponym of 'animal' implies knowing something about their sense in a global fashion. I would like to expand briefly on my use of the term global. It is reasonable to argue that there is more to knowing the sense of 'dog' than that it is a hyponym of 'animal', for example what are the basic semantic components of the term dog ? Surely being animal is only one of them. 'Woman' is not only a hyponym of 'human' but is also incompatible with being 'man'. Lexical items do not just stand in one relationship to each other, although it can be argued that there is just one relationship per pair.

Lyons (1977:295-301) raises a number of difficulties for such a hierarchical approach. By far the most important here is the fact that although some semantic fields, particularly nominal ones, can be represented in this way, others lack a clear hierarchical arrangement.

"There is no paradigmatic superordinate of which 'round', 'square', 'oblong' etc are hyponyms: what we find instead is what might be called a quasi-paradigmatic relation between these more specific adjectives and the more general abstract noun 'shape'"

(Lyons, 1977:299)

Although there is some experimental support for the hierarchically structured lexicon in the adult (eg. Collins and Quillan, 1969) the major influence that this work has had on developmental semantics is not on the overall organisation of the child's lexical fields (some authors arguing that there is no such organization until school age), but rather as a means

of predicting the order of acquisition of particular words within the hierarchy. It is suggested for example that children first learn terms which are most useful for them talking about their world (cf. Brown, 1958). This issue is discussed in greater detail in Chapter 3.

There are therefore two major problems with a solely hierarchical representation to meaning - lack of applicability across semantic fields and lack of specificity of the internal components of the words' meaning. Finally it is unclear how an individual would get to a restricted denotation of a term from solely hierarchical sense relationships. Undoubtedly, there is some degree of hierarchical organization in the lexicon and this may be a useful concept for predicting the order of acquisition for certain types of words. The arguments made so far would suggest there is more to the representation of meaning.

1.5.2 Semantic components

In contrast to the preceding approach componential analysis does not treat a word as a unitary structure but rather as a complex number of components or features. This is a much more detailed way of characterizing the relation between words and originates from the work of anthropologists such as Goodenough (1965) and linguists eg. Katz and Fodor (1963), Postal (1966) and Bierwisch (1970). Semantic components are seen as basic units of meaning which combine in different ways to make up individual lexical items. These components are thought not to be decomposable any further.

Ultimately there should be fewer components than words and we should be able to combine these components to form the meaning of any word in the lexicon. According to linguists these features are not to be defined in terms of physical properties or relations outside the language system, but are abstract entities. For example in Katz's sense sameness of meaning cannot be identified with sameness of usage nor with sameness of reference but with the same cognitive content; that is with sameness of components. An example of componential analysis follows:

"In this vein, spinster might be analysed as a semantic complex made up of the features (equivalently called components or markers) [female], [never married], [adult],[human] "

(Kempson, 1977:18)

We should be aware, though, that in describing semantic structure in terms of semantic components, we have merely transferred the need to explain meaning from the individual lexical items to the basic components. As Lewis (1972) points out:

"Semantic markers are symbols: items in the vocabulary of an artificial language we may call Semantic Markerese. Semantic interpretation by means of them amounts merely to a translation algorithm from the object language to the auxiliary language"

(Lewis, 1972:169)

What this approach cannot adequately provide an answer for is the relation between a lexical item and its denotata. It does, however, seem to be a satisfactory way of representing meaning relations among words within the vocabulary, eg. synonymy, antonymy, converseness and hyponymy.

There are a number of other limitations which are worth enumerating because of their repercussions for applying this mode of representation to child language. In the first instance not all semantic fields can be broken down into discrete semantic components and certainly not all semantic fields are characterizable by means of binary features like [male]/[female]. What are the semantic components of tulip ? ... [flower] ? If so, how do we distinguish tulip from any other sort of flower ? This problem, which occurs for certain semantic fields - particularly taxonomies, has led linguists like Leech (1974) to suggest that such terms should be left as unanalysed wholes. That is, when we are dealing with multiple taxonomies rather than binary contrasts, eg. instead of

Boy x = [Male x] & [Non-adult x] & [Human x]

we have the following, ie. Gold (x) ≡ (α)Metal . Leech's suggestion of an index (α β ...) allows incompatibility relations to be derived.

It can be argued (cf. Kempson, 1977; Lewis, 1972) that componential analysis fails to provide satisfactory answers to other important semantic questions such as a) what are the necessary features for correct representation ? b) Can all terms be analysed in the form of necessary and sufficient components ? c) When is a property a criterial component of the words' meaning and when simply a part of encyclopaedic knowledge ? To illustrate, how do we decide which of these features are necessary and which are contingent:

$$\text{Dog } x = [\text{animal } x] \ \& \ [\text{barks } x] \ \& \ [4 \text{ legs } x] \ \& \ [\text{has fleas } x] \ \& \ [\text{my dog Cara } x] ?$$

Wittgenstein's (1953) discussion of the term game is a case in point. He argues that there are no defining properties for 'game', rather all games bear a family resemblance to each other. Each game has properties in common with some other game but there is no list of common properties.

The componential approach has been directly applied to the field of semantic acquisition by Eve Clark (1973a, 1975) who proposed a Semantic Feature Hypothesis:

"The semantic feature hypothesis states that when the child first begins to use identifiable words, he does not know their full (adult) meaning; he only has partial entries for them in his lexicon, such that these partial entries correspond in some way to some of the features or components of meaning that would be present in the entries for the same words in the adult's lexicon. Thus, the child will begin by identifying the meaning of a word with only one or two 'features' rather than the whole combination of meaning components or features (qua Postal) that are used criterially by the adult"

(Clark, 1973:72)

The empirical evidence concerning this hypothesis will be discussed in Section 1.6.2. An Andersen (1975:81) points out, this implies that children must learn both the specific subset of semantic primes which are relevant in his language and the combination rules which are derived from the actual lexical items.

Clark's Semantic Feature Hypothesis will suffer from many of the limitations of the componential approach but there is a subtle change from

the linguists' representation to Clark's theory which should be made explicit. While the componential view deals with the relationships between words Clark's theory is dominated by the relationship between word and object.

"In the Semantic Feature Hypothesis features should be taken as a shorthand way of representing a speaker's knowledge about conventions for the use of a word rather than as something inherent in the word itself - that is a method of formalizing the conditions that an object, event etc must meet before it can be referred to appropriately by the word in question"

(Clark, 1975:83)

Effectively, what Clark has done is to use a system that was designed for representing sense as a basis for the representation of denotation. She must still explain how features originate not simply how they are used. Similarly, decisions for defining necessary versus contingent criteria must be made as must some explanation of words which can only be defined in terms of family resemblances.

1.5.3 Prototypical representations

As I have just indicated, one of the difficulties for a componential view of meaning is that we are required to assign determinate components to words though their meanings are not always determinate. In contrast, prototype semantics attempts to represent the meaning of a linguistic form through the presentation of a prototype or paradigm case. Particular instances may therefore be analysed in terms of their approximation to the prototype of the relevant category. It is only within the last decade that linguists (eg.Labov, 1973) and psychologists (eg. Rosch and Mervis, 1975; Rosch, 1976, 1977) have raised questions about definiteness of word meanings, though the problem had been raised in philosophy by Wittgenstein (1953) and in psychology, with respect to categorization processes, by Vygotsky (1962).

The fact is that the boundary of word meanings are fuzzy (cf. Labov, 1973; Lehrer, 1970; Lemmeberg, 1975). The question is whether this fact applies to the sense of the term, the denotation of the term or both aspects

of meaning? For example, Harrison (1977) allows for the establishment of vague boundaries in his criteria for denotation in that he allows for a set which is indeterminate as to whether they are denotata or not. Before considering denotation in any greater depth let us deal with the implications this view has for our representation of sense. In essence we must now consider the sense of a term as consisting of a number of components, some of which will be optional. It is possible to further specify the semantic description by adding more distinctions. Lehrer (1970) suggests a quantification of the components of meaning. Such an analysis would involve marking each component with a numerical indicator, say 0-9 with 9 indicating the most obligatory component (cf. Andersen, 1975). It is suggested that the presence or absence of an optional component is determined by the context in which the word occurs, as the following statement from Lehrer indicates:

"In dictionary entries, a component marked optional may in some contexts be definitely present in other contexts definitely absent though in still other contexts it may be impossible to decide"

(Lehrer, 1970:90)

Lehrer's discussion of indeterminacy deals with the semantic components of words but the strongest evidence for considering words to have vague boundaries comes from data on how we actually classify elements in the world; Linguistic classification means, of course, that we are dealing with the denotation of a term. Concept formation is equated with knowing the relevant attributes of the stimuli which are included in that concept. Psychological experiments on concept formation initially viewed concepts as consisting of a number of conjunctive elements, such that knowing the concept 'dog' entailed knowing the criteria for dogginess. It was Vygotsky (1962) who initially pointed out that referents of a word may resemble each other by one or more different features rather than having a set of defining features in common. More recently Eleanor Rosch (1973) has developed this idea and pointed out that not only do categories have

boundaries but that some category members are better examples of the category than others. From Rosch's perspective, a prototype is viewed as the hypothetical member of a category that represents the most typical conceivable member of that category. Instances may differ to a greater or lesser extent in their relatedness to the prototype (or in language to the core meaning). For example an apple may be a more typical example of the category fruit than a lychee.

"Many examples have shown that categories are coded in the mind neither by means of lists of each individual member of the category nor by means of formal criteria necessary and sufficient for category membership, but rather in terms of a prototype of typical category member"

(Rosch, 1977:213-214)

Acquiring the meaning of most words involves a categorization process:

"With the exception of proper names, the words of a language are not labels for specific objects but rather tags for concepts or categories encompassing a set of often infinitely large similar, yet different items"

(Lenneberg, 1967:322)

The implication is that there is at least a similarity in the manner in which we categorize objects and the manner in which we group the denotata of particular words.

There are examples in the lexicon where a simple component is sufficient to distinguish the sense of one lexical item from another but it is not clear that this simple component distinguishes their denotations. It may be that their denotations overlap. So the action - travelling from Australia to Scotland - might be regarded by me as 'coming' (because I live in Scotland) but would be regarded by you as 'going' (because you live in Australia) - different senses but the same action. Perhaps a better case is the colour lexicon where, for example, red hair made into a rug might be called brown. Thus the same object belongs to the denotation of red and the denotation of brown. It seems that how we draw denotational boundaries depends very much on the context given (cf. Fillmore, 1977 for

an excellent discussion of this issue in terms of scenes and schemas).

The crucial question is whether we may deal with vague denotational boundaries whilst a) retaining a sharp concept of sense and b) supposing that sense determines denotation. I am not proposing to attempt to solve this issue but simply to suggest that it is a possibility. The sense of 'come' and 'go' can be distinguished by a single, simple component. Certainly there is no need to implement the notion of a core meaning. However, it is the application of the sense of the word to the world which determines its denotation and it is the world which governs the vagueness of denotation and denotational boundaries. Such an analysis does not eradicate the problems of fuzzy boundaries and vague denotations, but simply shifts the problems to our notion of world, context, schema or what ever.

The fact that context and use can be shown to affect the appropriateness of the term used is only the beginning of how we get from sense to denotation. One of the strengths of this approach is that the system actually originates from what is happening in the real world, ie. how we actually do classify. From a developmental perspective we must ask such questions as; where does the requisite knowledge for identifying clear exemplars as clear ones and boundary ones as boundary ones come from? Since the ability to recognize attributes of the prototype when they are separated from each other entails the ability to break down the word into some form of componential representation we must still explain the development of these features as well as how some features come to be regarded as more central than others. So while viewing lexical representations from a prototypical perspective appears to have greater external validity than a solely componential view, we must still explain the nature of the relationship between sense and denotation and deal with the issues involved in "fuzzy denotation".

1.5.4 Procedural semantics

Procedural semantics is a theory of meaning in which the sense of a word is represented as a procedure, a set of operations for deciding where the word can and cannot apply. The aim is not to enumerate the entities to which a word applies but rather the specification of a procedure that could produce such an enumeration (cf. Johnson-Laird, 1977).

Table 1.1 presents a simple procedure. As the table shows the steps are represented sequentially and removing or altering one step will affect the next step or subroutine. Since each subroutine is related the effect of altering one subroutine on the overall procedure is a problem in a way that adding or deleting a component is not for a featural approach to meaning.

Table 1.1: Semantic procedure for man or Man (x)

Step 1	Is x human ? If so continue to 2 If not, go to 5
Step 2	Is x adult ? If so continue to 3 If not, go to 5
Step 3	Is x male ? If so continue to 4 If not, go to 5
Step 4	The procedure succeeds: x is a man
Step 5	The procedure fails: x is not a man

(taken from Clark & Clark, 1977:440)

It is possible to show the relations between lexical items in a lexical field by means of a decision table (cf. Miller and Johnson-Laird, 1976). Although in essence a decision table is merely a different mode of representing a procedure it does not constrain the sequential order in which the process is carried out. It also allows us to present lexical items where a flexible taxonomy is required, such as verbal semantic fields. Table 1.2 presents a

decision table for the lexical item seat. Each schema (indicated by the numbers running horizontally at the top of the table) specifies a set of conditions that must be satisfied for an appropriate use of a term. For example, for appropriate use of the term chair, conditions 1, 2 and 4 must be met. Note that also kitchen chair specifies these conditions and it is argued that context and communicative intent can be incorporated into the model to determine the appropriate item at the appropriate time. The conditions may be used either to test the relationship between words or between word and object. For an object to be labelled chair it must satisfy conditions 1, 2 and 4. The relationship between 'chair' and 'sofa' is established by examining the conditions which each lexical item satisfies.

In contrast to the other modes of representation discussed the emphasis of this approach is in examining the relations between the word and the world. Table 1.2 may be taken as an example. To determine whether x is a chair test which conditions are verified or falsified. The analogy between the truth or falsity of propositions is evident. The Y's (yeses) and N's (noes) in the previous table can be regarded as direct test of the truth of a particular condition in a possible world and as such minimally different from a model-theoretic approach to semantics. However, it is argued that while model-theoretic semantic theories are based solely on truth conditions, relating to the assertion of propositions, procedural theories allow a wider range of functional possibilities eg:

"Utterances can be made with a view not only to verifying the truth of a proposition, but also in order to answer questions, comply with requests ..."

(Miller and Johnson-Laird, 1976:268)

As is implicit in the earlier discussion the proponents of this approach are well aware that individuals work with both senses and denotations and have not omitted the sense relation from their formulation. In the case of 'sense' the procedures themselves are treated as the data for investigation, "if the procedure for 'converge' is discovered to be more or

Table 1.2 A Decision Table for Seat (x)

	1	2	3	4	5	6	7	8	9	10	11	12
<u>Conditions</u>												
c1. Forone(s)	N	N	N	N	N	Y	Y	Y	Y	Y	Y	Y
c2. PPRT (x, backrest)	Y	Y	Y	N	N	Y	Y	Y	N	N	N	N
c3. Upholstered(x)	Y	N	N			Y	N	N	Y	Y	N	N
c4. PPRT(x, leg)		Y	N	Y	N		Y	N	Y	N	Y	N
<u>Actions</u>												
a1. Sofa(x)	x											
a2. Parkbench(x)		x										
a3. PLW(x)			x									
a4. Bench(x)				x	x							
a5. Pianobench(x)				x								
a6. Chair(x)						x	x					
a7. Kitchenchair(x)							x					
a8. Stool(x)									x		x	
a9. Footstool(x)									x	x		
a10. Ottoman(z)										x		
a11. Exit												x

(Taken from Miller and Johnson-Laird, 1976:288)

less identical to the one for 'move mutually towards one another'"

(Johnson-Laird, 1977:103) the expressions are deemed to have the same sense.

I am well aware that there are difficulties in determining whether two expressions are synonymous but I am not convinced that talking in terms of "more or less identical" is any significant advance in our understanding of the issue. At any rate, is a logical consequence of such a statement that if two words have the same procedure they are necessarily synonymous? Are the procedures for "the morning star" and "the evening star" the same? If so this is identical to the Fregean definition of sense.

How do procedures go beyond components? In the first instance words which cannot be defined in terms of necessary components may be incorporated in such a model:

"Some words require disjunctive rules, others some combination of conjunctive and disjunctive rules. The judicious choice and ordering of steps can enable a procedure to handle these more complex instances"

(Clark and Clark, 1977:440)

In a similar vein we can include the idea of a prototype in a procedural framework. The prototype of the lexical concept with which we are concerned might constitute the basic conditions for our decision table. This might indeed be suitable for concepts like 'fruit' and 'animal' where it might be possible to enumerate the important features of the prototype but where there are no core concept difficulties to be encountered. What conditions would one want to set for 'game' or 'love' or 'poor'? In the final case the question might well be 'poor' in relation to what? Semantic components may not be able to handle these terms any more adequately but this is not the issue. The important point is that both modes of representation run into difficulties with these terms and both are constrained by similar and as we shall see also different limitations.

In essence the question one must ask is whether procedural semantics does in fact provide a viable direct link between words and the world or whether it is more profitably viewed as a change in orientation as regards

representational frameworks:

"Although investigators such as Bierwisch (1970) have argued that semantic components correspond to basic perceptual and cognitive operations, the analysis itself doesn't require this or make it explicit. Procedural semantics does"

(Clark and Clark, 1977:441-42)

It would seem that one of the main protagonists of this approach (Johnson-Laird) has some sympathy with the latter interpretation:

"The chief advantage of a procedural approach is that the 'compile and execute' strategy forces the theorist to consider processes as well as structures"

(Johnson-Laird, 1977:193)

Specifying knowledge by how it is used may well be a more psychological way of tackling the issue ... dealing with processes rather than structures, but brings with it its own problems. As Winograd (1975) points out, frequently there is more than a single use for an item and specifying each use in advance is unsatisfactory. Since declarative representations are sets of facts or assertions about a particular lexical item, it is not necessary to specify their intended use.

It may well be, however, that formulating certain questions in terms of procedures forces us to ask the right kinds of questions about the child as a word learner, especially in relation to the word/world relationship. Miller and Johnson-Laird (1976) conclude that procedures are based on functional/perceptual schemas. This is a hypothesis which is testable and would seem to be supported to a certain extent by the developmental literature (Bowerman, 1978; Clark, 1973a, 1974; Nelson, 1974; but see Anglin 1978 with regard to the importance of function). It is interesting that these results have been reached without the intervention of procedural semantics.

Procedures ultimately break down to some sort of componential analysis - calling them "conditions" evades the issue. As such, "conditions" are subject to the same criticisms as components eg. criteria for choice. The difference between Man [human (x)] [adult (x)] [male (x)] as opposed to the

procedure illustrated in Table 1.1 is minimal if not non-existent. The process of deciding what is entailed by human (x) is the key and may well in the end be reduced to perceptual/functional criteria. It seems to be the questions raised by procedural semantics rather than the answers provided which are important. Miller and Johnson-Laird argue that previously "theorists' intuitions have generally stood in place of reasoned argument" vis a vis the choice of components. Their argument that the choice of primitives should ultimately be broken down to psychological criteria of appropriateness seems sensible.

Recently there has been a swing from a dichotomy between procedural and declarative modes of representation to a synthesis of these approaches (cf. Winograd, 1975; Sinha, 1978). The argument is directed mainly at representation of knowledge, but there are repercussions for semantic representation:

"...conceptual system, requires both procedural and declarative/propositional modes of representing knowledge. It requires procedural representations of fundamental, concrete conceptual processes, and propositional networks representing abstract universal structures of knowledge ..."

(Sinha, 1978:38)

However, it is not clear to me that for semantic representation we have really done any more than describe the psychological issues involved, in the distinction between sense and denotation. This is certainly no easy task and one which may prove helpful for developmental semantics.

The danger is how we use the approach. Although procedural semantics is in its infancy, Clark and Clark advocate it as the most satisfactory means of representation for dealing with child language. Their objections have to do with details - for example, that so few words have been mapped. In contrast, I would advocate it as a valuable approach because of the change in emphasis and the consequent (hopefully) result of leading us to ask new and insightful questions. This should not lead us to dismiss the other modes of representation, as some procedural semanticists have already accepted.

1.5.5 Is it necessary to advocate a specific form of representation?

The simple answer is, for our present purposes, no. In that the present thesis is concerned with what is developing for the child as a "word meaning" the hierarchical, semantic component and prototypical views all provide us with guidelines as to what we should be looking for. All of these modes of representation have their limitations, and, as will be subsequently shown, different experimental paradigms and forms of analysis provide us with different types of answers. Also different word classes may be more appropriately represented in different ways.

The procedural approach which implicitly focuses on knowing how to use a word warns us of the dangers of an over-static what approach to word meaning (McCall, 1976). It can be argued that the what and the how will interact. What a word meaning involves for a child will influence how it develops. Similarly, how the child treats the word learning task on different occasions will influence what is ultimately represented.

It is because of the limitations of the preceding models and the complexity of the issues at hand that no particular model is advocated. The particular manner of tackling the problem does not require it. The information that we obtain from children will in the end help us to present a realistic model for the child. This may be different from that of the adult. There is no guarantee that it is simply a quantitative difference between child and adult, as Clark's Semantic Feature Hypothesis implies.

1.6 Experimental evidence

I have spent a considerable amount of time discussing theoretical issues in the hope that in so doing I would clarify some of the issues pertinent to the task at hand. We must have some criterion or set of criteria for deciding on what constitutes meaning or partial meaning before we can credit the child with specific knowledge and/or capacities. A dog responds correctly when we tell it sternly to stop doing something; however we would not wish to credit it with the capacity to understand the meanings of the particular lexical items constituting the utterance. This thesis is an empirical one. My goal is not to present a possible representation of meaning or a possible progression in the acquisition of meaning (cf. Quine, 1960), but rather to focus on how the child actually proceeds when he encounters a previously unheard lexical item. The results may well lead us to reformulate our present representations of meaning. The key question is: how does the child actually construct the meaning of a term from an initial encounter to the final phase of knowing its denotation and sense ?

There are three sources of information available to the young child who meets a novel lexical item: linguistic context, situational context and the linguistic and conceptual knowledge already present within the child.

Attempts to tap the child's representation of a word and his use of the sources of information available to him have until recently depended upon two contrasting, but potentially complementary, methods with variations on the main theme within each approach. These are the cross-sectional method with an emphasis placed on carefully designed experiments and observational methods which tend to be longitudinal in nature.

1.6.1 Observational studies

Observational studies investigate a child's spontaneous utterances in a natural situation. Enquiry into the origins of children's early word meanings has only recently gained the attention of experimentalists. The observational method and the keeping of diaries of children's earliest utterances is on the other hand a long-established practice (Guillaume,

1926; Leopold, 1939; Preyer, 1882; Shinn, 1893; Sully, 1895). The continuation of these methods within psychology, in a more systematic fashion, has concentrated on the first words of children and their possible 'pre-historical' origins (Bloom, 1973, 1974; Bowerman, 1978; Greenfield and Smith, 1976; Nelson, 1973).

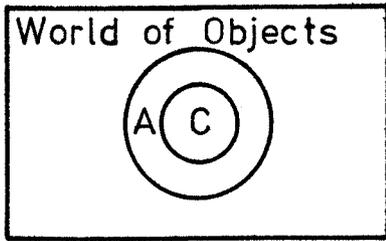
Painstaking recordings of all the speech behaviour of a child is not only problematic vis a vis interpretation (cf. Frances (1979) on Halliday, 1975), but once the child reaches the age of approximately 2:6 the difficulties increase. The continual contact between parent (who is usually the observer) and child diminishes and the corpus of utterances becomes so large that some form of selection is required. The parent is no longer able to record every utterance and every experience with a word and its context. What the studies of early word meanings have shown us is that our understanding of the child's meanings comes from the errors which they make eg. over-extension. Children's word meanings, at this stage, are frequently not like those of adults. They are from one point of view, viz the semantic feature hypothesis, incomplete. Figure 1.2 shows the ways in which a child's denotation can differ from that of an adult.

Bowerman (1974, 1977, 1978) has continued to record selected utterances from her two daughters, Christy and Eva, and presents us with some intriguing data concerning the later development of word meaning. Bowerman discusses a phenomena that she describes as late emerging 'errors' in word use. These are situations where a child has correctly, by adult observational standards, been using a word for weeks, months or years and then begins to make occasional semantic errors, eg. Eva 3:9 to mother who is making dinner:

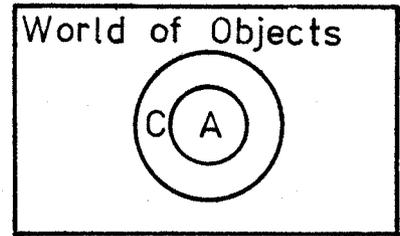
"Can I have any reading behind the dinner ?"

Up until this point Eva had used the term behind correctly.

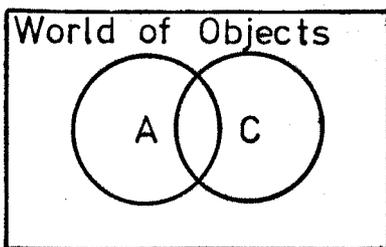
Initially one might like to argue that the child has made a simple mistake ... one without linguistic repercussions. However, rather than this being a simple error, Bowerman argues that the child has made an important linguistic insight. Eva has realized that 'behind' and 'after'



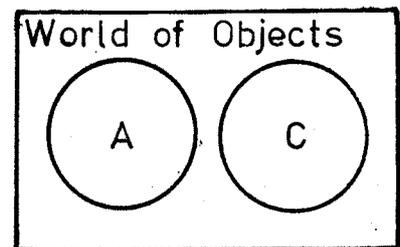
1. Underextension
by the child



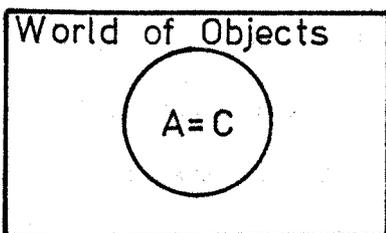
2. Overextension
by the child



3. Partial overlap of
denotations



4. Incompatible
denotations



5. Agreement of
denotations

A = Adult
C = Child

Fig. 1.2 Possible Differences between a Child's Denotation of a term and that of an Adult.

are semantically related. Eya's error violates the distinction between position in space (behind) and position in time (after).

Bowerman argues that these 'errors' are not isolated instances but ones that are systematic and which demonstrate the

"child's continuing analyses of structural regularities far beyond what is needed for fluent communication"

(1978:981)

The existence of these errors at a later stage in development suggests to Bowerman that the child was not initially aware of the semantic regularities holding between the words. So that while the child had previously a general idea of the kinds of contexts in which the word is appropriate (denotation), she was now in the process of isolating aspects which were of linguistic significance for a particular lexical domain (sense).

There are a number of questions which should be asked about these data, some of which pertain to the word-classes which produce these errors (cf. Chapter 6) and others which have to do with the generalizability of Bowerman's findings. Bowerman is emphatic that these errors should not be taken as "isolated deviations that are best eliminated quickly" but rather as "the possibility that they reflect important strides forward". I think the cautious reader would agree that we must be wary of situations in which we choose to record isolated incidents - to what extent is this a general phenomenon across children? What is the frequency within a particular child's productive vocabulary of such errors? Is it possible to demonstrate a lack of lexical organization before error production experimentally and a subsequent presence of "lexical organizers"? Is the difference one of tacit organization versus explicit? Many questions remain to be answered in relation to Bowerman's thesis. The most important insight is that seemingly correct production of a word by a child need not correlate with "full adult meaning" and that the acquisition of "full meaning" is an extended process.

In contrast to the observations made of children's utterances, Rogers (1975, 1978, 1979) examines the opposite side of the coin - the mother's

utterances. Rogers suggests that the child derives much of his knowledge about the meanings of words from the ways in which his parents use those words. His aim is to describe and classify aspects of the mother's language which are potentially instructive about word meanings. The studies initially reported make no attempt to deal with the efficacy of these methods.

From his analysis of protocols dealing with size adjectives (1975), animals (1978, 1979) and household utensils (1979), Rogers has been able to identify two main aspects of maternal speech which are potentially helpful to children in learning the meanings of words: elaborative linkages and semantic extensions. Elaborative linkages are cases where the mother supplies a comment which would add to the child's knowledge about a word or about a world in which the word can be used. Rogers distinguishes four main classes of elaborative linkages: substitutions which are either instances of synonymy, hypernymy or hyponymy; contrastive linkages which indicate that the two words belong to the same semantic field but that they are not synonyms, eg. its short - not very long; statements of equivalence which are similar to substitutions but are more definitional in nature - eg. a dog is an animal; and inclusion eg. an x is a kind of y. (It is not clear in Rogers' writing how one distinguishes between inclusion and hyponymy). Semantic extensions on the other hand are cases when the mother supplies the child with further relevant information without employing another nominal from the same domain. The criterion for 'relevancy' is problematic as Rogers acknowledges. He has, moreover, been able to identify just two categories of semantic extensions; functional and 'other'. Bridges (1979) reports a similar set of behaviours where the mother referred to the target object in terms of the children's background knowledge of the objects' functions or associations.

I think it is plausible to argue that elaborative linkages are clearly semantic in intent and also have to do with the sense of the term. However, one can envisage them affecting denotation - eg. "No that's a lion and this

one's a tiger". Semantic extensions on the other hand, are better thought of as relating to general knowledge. An example of functional extensions (Rogers, 1979) will serve to illustrate this point:

Object: icing syringe

Mother: "It's an icing machine, to ice cakes with. An icing machine for Christmas and birthday cakes. You fill it up with icing and press that down and it squirts icing out." (p19)

The majority of the information presented in this excerpt is merely contingent and not necessary to meaning of icing syringe. The issues in determining essential properties versus contingent ones are controversial and I do not wish to enter the debate at this point. I do feel that Rogers' analysis should make some attempt to disentangle the two. Surely, Mother, "What's that?", Child, "pussy", Mother, "Yes, pussy like Nana's" is not germane to the meaning of pussy. Semantic extensions is possibly a misnomer.

The implications of Rogers' work are intriguing. He has provided us with unequivocal evidence that mothers provide their children with linguistic information which could be used in working out the meanings of words, especially in the case of elaborative linkages. The question remains to be answered as to whether children can and do use this information. Rogers (1979) reports a pilot study directed specifically to the question of whether children make use of contrastive information. His results on the whole suggest that they do, but the experiment is fraught with difficulties: the sample in each group is small, i.e. 3; the materials are complex; and there are problems with statistical analysis. There is considerable room for clarification and modification before we can determine to what extent children can or do use the information present in elaborative linkages.

Rogers deals with the information that is presented to the child. Bowerman deals with the information which comes from the child; these studies are fruitful sources of information and point us in (possibly) the right direction. What they lack is the ability to control the variables that we wish to investigate systematically. They also deal with small

numbers of children and are primarily concerned with production.

Production is not a sufficient means of testing the representation of word meaning (cf. Anglin, 1977; Thompson and Chapman, 1977).

1.6.2 Experimental Studies 1

The missing feature theory (semantic feature hypothesis) (Clark, 1973a, 1975) has provided us with a framework to ask many specific questions about children's partial understanding of lexical items within many specific lexical domains. The first set of experimental studies that I will discuss attempt to deal with this issue. In fact these represent the majority of experiments investigating the acquisition of word meaning. The experiments mainly assess comprehension, though some work has been done on elicitation of opposites (Clark, 1972). The ultimate goal of these paradigms is to discover ways in which children's pattern of interpretation differs from that of the mature speaker, with the hope that the errors that the children make will be suggestive as to the way in which semantic development is proceeding.

The initial impetus for these studies came from an experiment by Donaldson and Balfour (1968) which suggested that young children treat less as more or some.

"What seems to be occurring is that 'less' is understood to refer to quantity, but that it remains largely undifferentiated from 'more', with 'more' as the consistently dominant interpretation for the undifferentiated pair"

(1968:470)

Represented featurally this means that the lexical entry for more is presented as [quantity] [+ pole] whereas less is simply presented as [quantity].

Since this initial work many experiments have been carried out in several different lexical domains, all considering various predictions of the featural approach to meaning: eg. dimensional adjectives such as long-short, narrow-wide etc.: Donaldson and Wales, 1970; Wales and Campbell, 1970; Brewer and Stone, 1975; Eilers, Oller and Ellington, 1974; Townsend,

1976; Temporal reference such as before-after, first-last: Clark, 1970, 1971, 1972; Amidon and Carey, 1972; Barrie-Blackey, 1973; Locatives, in on and under: Clark, 1973b; Wilcox and Palermo, 1974; Hoogenraad, Grieve; Baldwin and Campbell, 1978; Grieve, Hoogenraad and Murraray, 1977; Comparative adjectives more-less, same-different: Donaldson and Balfour, 1968; Donaldson and Wales, 1970; Palermo, 1973, 1974; Glucksberg, Hay and Danks, 1976; Carey, 1977; Gordon, 1977; Grieve and Stanley, 1980; Spatial relational terms, in front of behind: Clark, 1973; Kuczaj and Maratsos, 1975.

Recently Richards (1978) has reviewed this literature with the aim of evaluating three of the basic assumptions of Clark's theory. For ease of interpretation I will list these three as predictions:

Prediction 1: Given the componential nature of word meanings, it is predicted that the more general or perceptually congruent features are learnt first and the more specific features are gradually entered into the lexicon over time. So that in the case of spatial adjectives the pair big-little would be learnt before any others (cf. Carey, 1978a).

Prediction 2: By corollary of prediction 1, terms varying in the number of criterial features will be acquired in the order from simpler terms to more complex.

Prediction 3: The unmarked member of an adjective pair will be acquired before the marked member and there will be a stage where the marked term will be treated synonymously with the unmarked one, eg. less as more.

Certain pairs of adjectives exhibit the property of markedness (cf. Greenberg, 1966). Roughly, one member of the pair has a wider distribution than the other and occurs in some contexts where the contrast relating the pair is neutralized. It is said to be unmarked for the semantic contrast whereas the other term is said to be marked. Other properties (such as simpler form and psychological primacy (cf. Clark, 1973)) have been claimed for the unmarked member of such pairs.

Richards' conclusions are not very promising for the semantic feature hypothesis. Many of the predictions fail. The prediction which fares worst of all is the third one which Richards states is completely unsubstantiated. It appears that certain non-linguistic biases either within the child or originating from the structure of the experiment lead the child to treat the marked member of a pair as an apparent synonym of the unmarked member. Moreover, if one inserts a nonsense word into the question frame instead of the marked lexical item one gets the same pattern of responses (Carey, 1977). So, unless one cares to argue that the child has a partial meaning for a previously unheard nonsense word, we have no grounds to suggest that a synonymy stage occurs.

The first prediction holds up best, but only in the domain of spatial adjectives. I will be discussing these in greater detail subsequently.

Richards concludes that the evidence to support prediction 2 is equivocal: for example, unmarked terms are acquired before marked terms in the case of long-short, wide-narrow; in the majority of cases, more is acquired before less but no asymmetry appears to exist in the cases of: before-after, first-last, front, back, side; in, on, under; same-different; come-go; bring-take, or if it does exist it goes against the prediction.

It would not be surprising if one was initially disheartened after this review of the literature for it would appear that we really know very little about the word learning process. We now know that many of Clark's predictions appear not to hold, but what does hold? Before discussing the latter point I should like to pinpoint some of the lessons to be learnt from these studies.

Glucksberg et al (1976) replicated Donaldson and Wales (1970) study with the comparatives same-different. They obtained similar results to the original study suggesting that in certain tasks different was responded to in the same manner as same. However, they introduced an important control condition which was absent in the original design - a group of adult subjects. The adults responded in the same manner as the children did for the request

"one that is different from this one", that is they handed the experimenter another instance of the same class of objects as the standard. Surely, we would not wish to conclude that adults do not differentiate between same and different. The design of the task placed inappropriate demands on the child. We must be wary of setting tasks for children which are necessarily going to present them as incompetent with regard to some experimental standards as opposed to the standards of the mature speaker of the language.

Many of the studies have indicated that children have a repertoire of non-linguistic and linguistic response biases which come into play in such situations. For example, Grieve and Stanley (1980) have shown that children respond to less as more (apparent assimilation of meaning) in a context where a response bias operates in favour of an appropriate response more, but they respond to less at random in a context where there is no such response bias. However, Grieve and Stanley's results leave us in a quandary as to how the child does acquire the meaning of less since their second set of results suggest that the difficulty does not rest with the underlying concept of lesser amounts. How do they work out the meaning of less ?

The second set of experimental results which are pertinent here and which give us some insights about the children's ability to cope with the language system are those of Hoogenraad et al (1978) and Grieve et al (1977). Through a number of well-designed experiments and careful interpretation of their data these authors have been able to isolate a number of important variables affecting the young child's comprehension (apparent comprehension) of the locatives in, on and under. They make the point that the child's interpretation of the experimenter's request "Put the x in/on/under the y" will be constrained by how the child views the objects natural 'canonical' relations as well as the nature of the request, ie. whether an action is required or not. When the child has no understanding or only partial understanding of the locatives involved the child will respond in a manner which

he construes as appropriate from the context, eg. cups go on saucers not under them. These authors emphasize the initial asymmetry between context and text for the child. Now this is an important point for the experimenter since he must, at least, attempt to discover what pre-existing biases the child has. However, it may be that the child's biases and the contextual constraints provided in particular situations in fact help the child build up meanings for a new term. Some contexts will restrict the meanings a child will guess more than others just as his response biases will predispose him to respond in one way rather than another. These restrictions may limit the children's hypotheses to one particular semantic domain therefore limiting the possible meanings of the word. Hence, the child may progress from being correct in context to a later stage when he has abstracted the criterial features for acontextual meaning. We have yet to show that early contextual responses help the child get from an imbalance of text to context to a balance of the two. Campbell and Bowe (1978) have shown that in some cases text can dominate over context.

We have amassed considerable information concerning the preschool child; about his understanding of tasks in contexts, about his particular response strategies and biases, about what he does not do - eg. treat marked terms as synonyms for unmarked ones - but we are still unclear as to how the child acquires semantic features and the nature of his partial representation of words. The work of Carey (1978a) is important here and appears to be a significant advance in our understanding of the word-learning process.

Carey evaluated the child's processes in working out the semantic features of spatial adjectives. She was interested in the acquisition of the feature [dimension] having argued convincingly that [spatial extent] and [polarity] were worked out earlier. Carey found that individual children's error patterns on five tasks, testing the production and comprehension of spatial adjectives, were inconsistent with the notion that children had simply failed to include [dimension] in their representation.

Rather there was evidence (which did not show up on single task evaluations) that the child had a fuller meaning than the semantic feature hypothesis suggested, ie. more than simply spatial extent and polarity. Carey argued that the child not only extracts a subset of components of the adult meaning for the word, but also more specific information about the typical objects to which that word applies:

"Thus sample lexical entries might be

tall: [adj.] [comparative] [+pole] [building, ground up;
person head to toe]

short: [adj] [comparative] [-pole] [person head to toe;
hair root to end;
distance direction of motion]"

The child has not differentiated those relationships which are criterial from those that are contingent. In other words, he has not mapped out which features in the language are lexical organizers. From Carey's perspective

"The child learns object by object, and particular part by particular part, what spatial adjective applies to what kinds of variation"

Carey's analysis implies that there might well be a significant role to be played by Roger's semantic extensions, eg. enumerating the particular instances which are appropriate uses of an icing syringe, and likewise context strategy exemplified in the in, on and under studies the children might well be provided with potentially valuable information.

Carey suggests that the development of a word's meaning will be a reflection of the child's haphazard encounters with the word, hence her new theory ... missing feature plus haphazard account of the acquisition of word meaning. The process of working out the lexical organizers will be a slow one for the child and as such would appear to be consistent with the emergence of Bowerman's late errors, discussed earlier. Until the features are worked out by the child the word appears to function as a "unitary label" encompassing a number of irrelevant aspects with respect to the true meaning of the word.

Carey's results are particularly relevant in that they offer a number of testable hypotheses. In the first instance it is possible to investigate other semantic domains with this particular theory in mind. Secondly, there is a suggestion that features that are available to the child as lexical organizers because of previous knowledge should be mapped more easily on to new words than those that are not yet available. It is worth investigating semantic domains other than those of relational terms, which appear to be particularly complex for the child.

However, before such predictions are tested we are missing two important pieces of information: what "bits" of information can be used by the child in a single exposure to a new term; secondly, we must try and trace the acquisition of a new term so as to investigate the gradual accretion of relevant and irrelevant features. The next section addresses the former point. The latter issue is discussed and investigated in Chapters 4, 5, 6 and 7.

1.6.3 Experimental Studies 2

The preceding experiments all deal with cases where the child had had previous exposure to the lexical item and hence time to assimilate some information, be it necessary or contingent, about the denotation of the word in question. The experiments to be discussed use nonsense words, conforming to the intonational and spelling patterns of the English language, and are therefore unknown to the child. As I have previously stated, the child normally has three sources of information about the meaning of a word: the linguistic and non-linguistic context in which the word occurs and his own general knowledge. The first experiments discussed offer the children both sources of information. The use of nonsense words reduces the semantic information available to the child and forces him to focus on the other sources of information to infer the meaning of the unknown item.

Brown (1957) presented children (age range 3-4 years) with a picture of an unfamiliar action being performed on an unfamiliar substance in an unfamiliar container. Children were tested in three conditions, each

condition involving a different nonsense word and a different intended referent. The order of presentation was balanced across subjects as was the nonsense word chosen. The three conditions were as follows:

- 1) Do you know what it is to sib ? In this picture you can see sipping. Show me another picture with sipping in it.
- 2) Have you ever seen any sib ? This is a picture with some sib in it. Show me another picture with some sib in it.
- 3) Have you ever seen a sib ? This is a picture with a sib in it, Show me another picture with a sib in it.

The experimental stimuli consisted of three pictures containing either the unknown action, object or substance. The study is discussed in more detail in Chapter 3 where I have modified Brown's technique. Brown's study was actually concerned with children's recognition of syntactic cues to parts of speech but what his results also indicate is almost 'instant' learning about semantic properties on the basis of information about syntactic class. A referential relationship has been established - children can identify an unknown object, action or substance on the basis of one exposure to a new term.

Braine (1971) provides similar data for an even younger child. Braine introduced his daughter to two nonsense words, niss and seb. The terms were introduced as isolated words to prevent giving the child any cues to their part of speech. Niss denoted a kitchen utensil which the child played with and seb denoted the action of Braine's "finger walking". Both words were rapidly and correctly taken up into the child's speech.

In a similar manner Wykes and Johnson-Laird (1977) provided children (mean age 3;10) with an opportunity to learn some verbs. The authors suggested that the subject and object occurring with a verb might help to define its meaning, by elucidating the selectional restrictions for a particular verb's use. The verbs were nonsense words which had no single word corresponding to them in English. The verbs were presented three times in a story which was supported by a non-linguistic context, ie.

acting out. In contrast to Brown's single exposure technique the story was told four times. On the first two occasions it was acted out by the experimenter and on the final two by the child. The child was then presented with four items, unrelated to the story, and asked "Which one can X?" In all the tests at least half the children learnt something about the selectional restrictions of the verbs from the stories they heard and the acting out they witnessed. The authors conclude that children learn the meanings of verbs very rapidly, often using cues provided by the selectional information of the sentence as a whole.

Durkin (1980) reports an experiment he carried out with a group of 4-5-year olds investigating the elicitation and comprehension of novel prepositions. Durkin substituted six English prepositions (above, near, round, in, under, between) with nonsense words in sentences with both regular and irregular syntax. Children were presented with two sentences each containing the nonsense word. The sentences were provided with non-linguistic context by the presence of the two objects referred to in the sentence, in the appropriate relationship to one another, eg.:

Linguistic context

The brick is fep the cup (in)

The man is fep the box

Make it so the man is fep the jar - Comprehension

Tell me about the brick now (in box) Elicitation

Non-linguistic context

Brick in cup

Man in box

I shall not discuss the results from the irregular syntax condition because of a number of obvious methodological inadequacies, eg. irregularity of the sentence varied considerably between test items.

Durkin's main results may be summarized as follows: children's ability to infer the meaning of a novel preposition increases with age. Comprehension was good; it was scored on a simple incorrect/correct basis with an average of 10/12 correct for the older group and 7/12 for the younger

group. Both sets of results are significantly above chance. The preposition involved as test item was only a significant variable with the younger children with above and between being significantly harder than the rest. Durkin devised an ordinal scoring system for the elicitation results, but since 90% of the children's responses can either be classed as incorrect or fully correct, I shall only use these data. It should be noted that of the preceding studies only Braine's data relate to production. In this study slightly less than half of the responses were incorrect, the rest being correct ... quite a remarkable result.

Durkin draws the following conclusion:

"Children are able to take into account the syntactic role of the novel word, the semantic information of the rest of the sentence as well as the perceptual cues provided in the initial example"

(p29)

Data from Hoogenraad et al and Grieve et al suggest that knowledge of normal relationships between objects and the syntax of the sentence will also be important.

All these studies suggest that from a single presentation the child is extremely competent at inferring something about the referent of the term from the context of the encounter. It is impossible from these data to disentangle effects of linguistic context from non-linguistic context since all the studies present the child with both sources of information. To what extent can the child use solely linguistic information ?

Werner and Kaplan (1952) designed a task - 'the word context test' - to determine the ways in which children (aged 8½ - 13½ years) could grasp the meaning of an artificial word appearing in a solely verbal context. The nonsense word always replaced an already existing English noun or verb. The children were tested with 12 six-sentence series. Each sentence in each series gave progressively more information about the nonsense word. The task was presented in a written form one sentence at a time and responses were given verbally. Werner and Kaplan's discussion of their data is lengthy but their main result is clear - children did not/could not complete

the task successfully until they were about 11 years of age. The average correct score at 9 years was 6.7% and only 47.7% at 13. Werner and Kaplan note that the major problems for the younger children were isolating the word from the sentence and failing to integrate the meaning between successive sentences, though often succeeding on individual items. If we make a direct inference concerning the abilities of the preschool child, the conclusions do not look promising. However, the children were required to give a full verbal definition of the word and the concepts involved were generally quite abstract.

Recently, Campbell and Bowe have modified Werner and Kaplan's techniques for use with younger children. They presented a group of three and four-year olds with six verbally presented 3-item series. The nonsense words all replaced concrete nouns which would already have been present in the child's lexicon, eg.

John painted a clat

Sue went in a clat when she went to see her granny

Clats go on rails

Less than half of the responses to the first sentence were appropriate, from which they concluded that children at this age can to a certain degree make a reasonable guess as to the meaning of a noun from a single sentence in which it occurs. Children responded with "don't know" frequently and from my perusal of the raw data there was a definite failure on the child's part to integrate the 'meanings' from the three sentences. There was an important modification in their design which was not present in the original. Their experiment was designed so that the linguistic context of the second sentence would offer conflicting information to the linguistic context of the first. Now this modification was included to test a specific hypothesis concerning text/context asymmetry (cf. Campbell and Bowe, 1978) but I think for our present purposes it may only serve to confuse the issue.

There is a further series of experiments which might lead us to qualify and modify the conclusions arising from the initial experiments

discussed in this section. Braun-Lamesch (1972) conducted an extensive series of experiments on a large group of 5-9-year olds. Twenty subjects were tested in each age group for each experiment. The first experiment was a modification of the Werner and Kaplan task. On this occasion there were four sentences in each series and the nonsense word replaced known nouns and verbs. Again the overall results are not promising; in the five-year old group only 2 responses of a possible 120 were correct, where 94/120 were correct for the nine-year olds. If we look at the individual sentences, rather than the series, the results are slightly more encouraging. So, although the task appears more appropriate for the nine-year olds than the original version, it seems to be well beyond the competence of the five-year old. The second experiment involved the same materials but this time the nonsense word was replaced by a gap in the sentence. The children were effectively asked to fill in the blank. This produced higher correct responses in the individual sentences. Braun-Lamesch (1972:81-92) suggests three possible reasons for this difference:

- 1) a new and unknown element in a sentence could distract the child and affect understanding of the sentence as a whole.
- 2) the relationship between a gap and its context could be of a different nature than that of a context word and its context.
- 3) in the cases where a nonsense word is present the child has a double task that is identification of the nonsense word and determining the appropriate word in context.

There is of course a fourth possibility, the nonsense word may draw attention to slang associations, something which occurred in both the Werner and Kaplan and Campbell and Bowe studies.

It would seem that the presence or absence of non-linguistic context is a significant variable in the child's performance. The conclusions are, however, not that simple. In the first place Braun-Lamesch (1973) presented children with several opportunities (in one session) to learn 5 new animal names with object present (E1) and 5 new verbs (E2) and the

results indicated that the children had great difficulty in associating the new name and the new animal in the first experiment and even more difficulty ($p < .05$) in learning the relationship between the known animal and the noise it was said to produce (E2). The majority of the children learned only one or two words. It is certainly possible that the simultaneous processing of all five items was too much for the child, but it also suggests that non-verbal context might play a role in limiting the alternatives for the child, eg. if four of the items were known and one not, as well as offering support for the utterance.

Another significant factor which must be considered is that in both Wykes' and Brown's studies the method of assessing the child's knowledge was different. Picking out one item of a limited set is clearly less informative than selecting a verbal response from an unlimited set. In the former case the adult chooses the range of objects for the choice response and the child is limited to that range. Whereas in the latter case the child chooses the item he deems to be correct from a self-selected range of possible and appropriate lexical items (this range is only limited, in theory, by the size of the child's actual vocabulary). Moreover, in Wykes' and Brown's case children are only required to identify a single referent whereas in Werner and Kaplan's, Campbell and Bowe's and Braun-Lamesch's (1972, expt.1) studies the children must work out the denotation of the term, that is discover the range of objects to which the word may be applied.

There is a final issue which must be considered, that is the lexical item the nonsense word replaces. In Werner and Kaplan, Campbell and Bowe and Braun-Lamesch (1972) the word replaces a known lexical item for the child. As such, the possibility of pre-emption must be considered, although Durkin's results suggest that this might not be an important factor. Pre-emption occurs when there is already a pre-existing term in the vocabulary with the same sense and denotation as the new word. So when Campbell and Bowe introduce the children to the term clat (cf. earlier discussion of their study) the term is pre-empted because the child already has an appropriate

alternative in his vocabulary (i.e. train). On the other hand, since Wykes and Johnson-Laird use nonsense words to replace words for which there is no corresponding word in English, the problem does not arise. But is pre-emption a problem? There is no empirical evidence to suggest that it is. Clark (in press) does suggest that pre-emption by synonymy is a constraint on which nouns can be used innovatively as verbs. She demonstrates that nouns are used innovatively as verbs only when a lexical gap exists; that is they supply a meaning not otherwise expressed by any lexical items to the speaker in question. This does not necessarily mean that this is true for other terms which are pre-empted in the child's lexicon. There are three possible strategies for a child encountering a pre-empted term. Assuming that reference is established, he can either accept the new term and discard the one with which he is familiar, or he can reject what he is being told somewhat bemused by the whole process or he can infer that the two terms are synonyms. As yet we have no concrete evidence to suggest that pre-emption is a problem let alone which alternative the child will take in any particular situation. It will be necessary to return to this issue in Chapter 3.

In conclusion, data which appeared to be uncontroversial and enlightening are now overshadowed by a number of qualifications and seeming inconsistencies. These qualifications need to be investigated by the implementation of a number of control conditions. It is with some of these issues that the first set of my experiments will be concerned.

1.7 The Structure of the Thesis

The present thesis is divided into two parts: Part I examines children's performance in a series of tasks involving minimal exposure to a novel word. Part II attempts to trace the course of acquisition of three new terms in three different groups of preschoolers. The experiments in Part II involve following the word's progression over a period of months.

Part I attempts to elucidate the following points:

- 1) To clarify the anomalies in the results concerning children's performance with nonsensewords.
- 2) To discover exactly what information the child acquires about the meaning of a new word after a single presentation or minimal exposure.
- 3) To assess the child's ability to derive the meaning of a new word when it is encountered in a solely linguistic context, that is how competent is the child when there is no supporting non-linguistic context.
- 4) To investigate whether the theoretical distinction between sense, reference and denotation is an empirically useful way of interpreting the data acquired from studies in semantic development.
- 5) Finally this section will discuss the validity of procedures, involving minimal exposure, for assessing the child's competence as a word learner.

CHAPTER 2

WHAT INFORMATION DOES A CHILD ACQUIRE WITH MINIMAL EXPOSURE
TO AN UNKNOWN TERM?Introduction

In Section 1.6.3 I discussed a number of experiments which have attempted to assess the preschool child's ability to infer meaning from minimal exposure to an unknown term. In the present Chapter I shall concentrate on two of the experiments reported, that of Wykes and Johnson-Laird (1977) and Campbell and Bowe (1978), in an attempt to clarify their conflicting results.

It is a truism to state that the child's ability to acquire a new word will be a function of both the nature of the term and the sort of experience leading to its acquisition. It is, nevertheless, precisely these features which lead me to choose these two tasks for experimental investigation. The two tasks deal with different word classes, nouns and verbs, and both tasks present the child with different types of experiences before testing the representation of the term. Wykes and Johnson-Laird's story format with contextual support is arguably more familiar as an activity to the child and potentially more informative than the sentence series presentation of Campbell and Bowe, which lacks non-linguistic contextual support. There are, however, so many differences between the experiments that it is impossible to isolate the main variable or variables which lead to their very different results.

The studies differ (in design) with respect to the following five variables: parts of speech, verbal context, non-linguistic context, type of response required and whether the term was pre-empted or not. Wykes and Johnson-Laird tested their subjects with verbs, which were not pre-empted in the child's lexicon, in a story task with a supporting non-linguistic context and obtained results which suggested that the children were reasonably competent at deriving the meaning of a new term from a minimal number of exposures. On the other hand Campbell and Bowe presented children with

three exposures to each new word, words which were likely to be pre-empted in the child's lexicon, in a wholly verbal context. Their results suggested that children were particularly bad at guessing the meaning of the new terms from such information. What variables might then account for these differences ?

The literature on the acquisition of verb meanings is sparse and where it does exist there is no evidence to suggest that verb meanings are acquired faster than nouns, in fact if any prediction were to be made it would run counter to this suggestion (cf. Goldon-Meadow, Seligman and Gelman, 1976). However, Brown's data (1957) suggested that children perform in a similar manner with both nouns and verbs when presented with limited information with respect to meaning. As such there is no obvious reason to assume that this variable accounts for the higher success rates in Wykes' and Johnson-Laird's study. However, it does seem that part of speech is a variable which should be considered in such studies for it may well be that different word classes involve different processes of acquisition.

The second difference between the two studies is the verbal context in which the new word is encountered. There is no evidence in the literature that children should pick up the meanings of words more readily in a story context than in a sentence series context. However, children may pay attention to different aspects of discourse in the two situations. For example the story presentation may deter the child from focussing on the individual lexical items by placing more emphasis on the theme running through the story, whereas the sentence presentation may lead to local identification of the linguistic elements involved. Such hypothesising would need to be empirically validated. On the other hand it might be that the children are more familiar with a story framework and their very familiarity with the situations helps them to respond appropriately. There is no a priori reason to assume that this variable accounts for the different rates in performance.

The third difference between the two studies has to do with the

presence of a non-linguistic context. Wykes' and Johnson-Laird's study provided children with non-linguistic information in the form of acting-out. Much emphasis is placed on the importance of non-linguistic context in the acquisition of word meanings and it therefore seems plausible that this was a significant factor in the differences between the two sets of results. However, the studies also differed in the type of responses that the children were required to provide. Wykes and Johnson-Laird asked the children to choose the appropriate actor for the action from a range of four objects, whereas Campbell and Bove required a verbal response. A choice response condition clearly limits the possible alternatives for the child. On the other hand, in the verbal response condition, responses are only limited by the size of the child's vocabulary. One would expect that responses would be limited to the domain of lexical items which the child deems as appropriate to the context. The limited choice of response items may therefore be a significant factor in the children's higher success rate in the Wykes and Johnson-Laird task.

The final difference which exists between the two studies has to do with the word which the nonsense word replaced. In Wykes' and Johnson-Laird's study nonsense words were used in situations where there is no English counterpart, eg. sib denoted an action which involved both soaking and spilling, whereas in Campbell's study known lexical items were replaced with nonsense words. There is no evidence in the literature to suggest that children should have greater difficulty learning a new name for an object which they already have a pre-established name. In fact it would be impossible to learn superordinates, subordinates and synonyms if this was the case.

Two experiments were designed bearing the first four of these five factors in mind. Table 2.1 presents the main differences between the two studies, which are the basis for this work, as well as whether the variable was manipulated in the present study and whether any a priori predictions were made about the children's performance in a particular condition.

Experiment 1A was designed to investigate the importance of the word class replaced by the nonsense word in a story context similar to Wykes' and a sentence task similar to Campbell's. Each child received either nouns or verbs in the two different verbal contexts. From these data we should be able to determine whether part of speech and/or verbal context is responsible for Wykes' and Johnson-Laird's superior results. However, to maintain comparability with Wykes' and Johnson-Laird's original study experiment 1A presents the story with acting out and choice response. It is therefore necessary to design a second study which separates these two variables. Hence experiment 1B was designed. In this task children were presented either with stories acted out with a choice response or sentences acted out with a choice response, or with stories not acted out and a verbal response or with sentences not acted out and a verbal response. Hence there were four groups of subjects, each subject being tested with both nouns and verbs in one of the previously enumerated conditions.

What sort of predictions can be made? In the first instance we would expect children to respond more successfully in the choice response condition regardless of the verbal context in which the nonsense word is presented. In the second instance we would expect children to respond more successfully when acting out accompanied the presentation of the new word. Since in both experiments acting out and choice response are conflated, we would expect significantly higher results for this condition regardless of word class or mode of verbal presentation.

Clearly if these predictions were supported it would be necessary to design a task where choice response and non-verbal context were separate variables, but as the reader will see the children had such difficulties with the task that it was decided not to continue with this method of assessing the word learning process.

Table 2.1 Main experimental differences between the studies of
Wykes and Johnson-Laird and Campbell and Bowe

Variable	W & J-L	C & B	Variable manipulated in this study	A priori Predictions
Part of speech	Verb	Noun	Yes	No
Verbal context	Story	Sentences	Yes	No
Non-verbal context	Present	Absent	Yes	Presence of non-verbal context an advantage
Response required	Choice	Verbal	Yes	Choice response better performance
Pre-emption	No	Yes	No	-

EXPERIMENT 1A

METHODSubjects:

The subjects consisted of 40 children, - Twenty nursery school children mean age 4;2 (range 2;8 to 4;11) and 20 primary 1 children mean age 5;2 (range 4;11 to 5;10). The subjects attended local state schools in the Alloa area.

Materials:

The materials consisted of four sets of three sentences and four stories (verbal stimuli) and a variety of toys (designed for use in a doll's house) to act out the stories.

The verbal stimuli were designed specifically for the task and are presented in full in Appendix 1A. In the sentence condition each sentence contained a nonsense word in CVC format, of low meaningful association (cf. Noble, 1961), which remained constant throughout each set of three sentences. Each new sentence within the set was designed to give progressively more information about the denotation of the nonsense word. In the story condition each nonsense word appeared three times within the story. In both conditions the nonsense word always replaced an item which should have been present in the child's lexicon at this stage (Burroughs, 1957). A pre-test in another nursery containing a similar sample of children supported this assumption.

Design:

The children were divided into two groups which were balanced for age and sex: I and II. Group I received sentences and stories where a noun was replaced by a CVC. Group II received sentences and stories where a verb was replaced by a CVC. Within each block of stories and sentences the order of presentation of the stimuli was randomized. Half the children received stories first and half the children received sentences first.

In the sentence condition children were asked for a verbal response

whereas in the story condition a choice response was required. Before the beginning of each test session the child received a trial item.

Procedure:

The children were tested individually in a mobile laboratory (caravan) parked adjacent to the school. The caravan was specifically designed for experimental purposes. Within the caravan the child sat opposite E. The children, who had previous occasions to meet the E, were asked to play a guessing game:

"Let's play a guessing game. It's a very easy game, it goes like this" at which point the child was presented with the trial item. The trial was always in the format of the initial condition. For example, if the child was to receive sentences first, the trial consisted of a three-sentence series similar to the experimental condition. After each sentence the child was asked:

What do you think an x is ? for the nouns

What do you think to x is ? for the verbs

In the story condition the story was read and acted out. Once the story was completed all the materials were removed from the table and four individual toys were placed on the table. Two of these toys represented animate entities, eg. boy and duck, and two of the toys represented inanimate entities, eg. plate and ball. After each story the child was asked:

Which one of these is an x ? for the nouns

Which one of these can x ? for the verbs.

Any spontaneous comments from the child were noted. All sessions were tape recorded.

RESULTS

The initial discussion of the results deals only with a quantitative analysis of correct and incorrect responses. A correct response is defined as an initially unambiguous correct choice for the story condition and a correct guess at the meaning of the nonsense word in the third sentence for the sentence condition (cf. Appendix 1A for correct responses). So for the following three sentences the child must guess duck for the third sentence to be classified as being correct:

- 1) Jenny saw a ged on the pond
- 2) I play with my rubber ged in the bath
- 3) All geds make quack quack noises

For the following story the choice of objects for response were a cat, a fish, a car and a plate. The child must choose the cat to be classified as giving a correct response:

Paul was walking along one day when he saw a lup run across the road. Soon he heard a lot of barking. There was a dog chasing the lup. The lup ran up the tree.

A qualitative analysis incorporating children's spontaneous utterances from both studies will be presented after the quantitative results of the second experiment.

Two main factors were varied in the present experiment: the part of speech the nonsense word replaced and the context in which the nonsense word occurred. Figure 2.1 presents the number of correct responses in each experimental condition by the two age groups.

There was no significant difference for part of speech replaced in the story condition for either group of children. However, whether the nonsense word replaced a noun or a verb did significantly affect performance in the sentence condition. Both younger children (Mann-Whitney, 2 tailed, $p < .05$) and the older children (Mann-Whitney, 2 tailed, $p < .05$) performed better with noun sentences than they did with verb sentences.

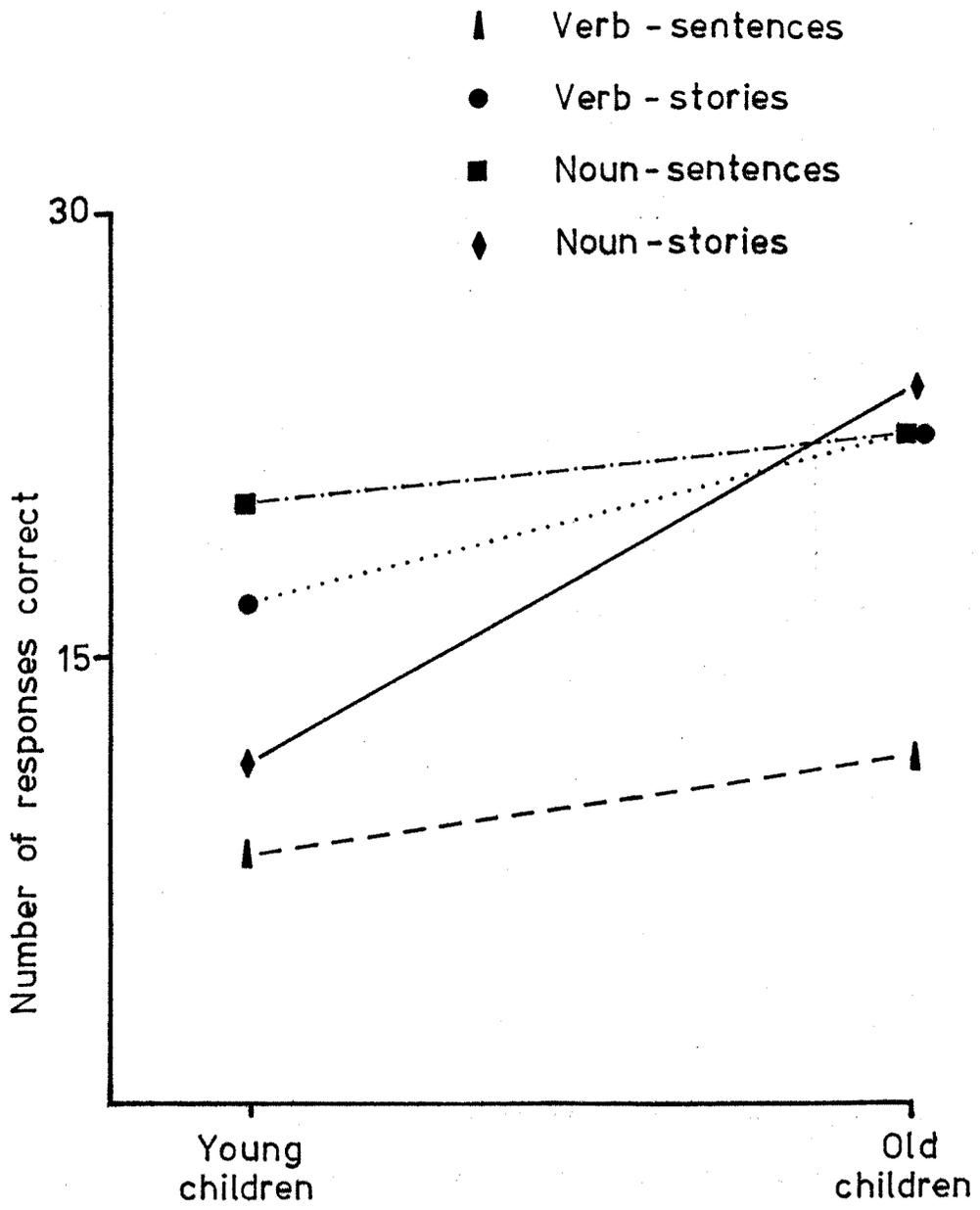


Fig. 2.1 Total number of correct responses in Experiment 1A, by age group and condition. (possible no. correct 40)

The results of the two age groups were combined and a stricter criterion for success devised. To reach this criterion it was necessary for the children to make more than two correct responses. Three reasons exist for setting this criterion. In the first instance a more rigid criterion for success would separate those children who had gained a generalized understanding of the task from those subjects who were successful because of some irrelevant strategy or because of something peculiar about a particular stimulus item. (Appendix IB presents percentage success rates for individual test items) In the second place a more rigid criterion of success reduces the possibility of getting three responses correct in the choice condition to about five percent. Finally, such a criterion would allow a closer statistical analysis of children's differential performances with nouns and verbs in the sentence condition - that is, is the difficulty with verbs peculiar to a small set of children or are all children performing at a low level in the verb sentence condition?

Table 2.2 presents the results of the criterion analysis. The results of the earlier analysis are supported. There is no significant difference between the noun and verb story conditions whereas there is a significant difference ($X^2 = 8.025$, $p < .01$) between noun and verb sentence conditions.

The second factor that was varied in the present experiment was the context in which the word occurred. There was no context effect for the younger children's results. The slight significant effect for verbs stories versus verbs sentences for the older children (Wilcoxon 2-tailed, $p < .05$) is eradicated when a guessing criterion is included.

In an attempt to gain a clearer picture of the results, the results from the two age groups were combined and an Anova was calculated. The assumption of normal distribution of error scores is not met but by incorporating both factors and combining the two age groups and therefore increasing the N within each condition, inferences are legitimate from such an analysis (cf. Hays, 1974:481), though clearly the detail brought out by a non-parametric comparison will be lost.

It could be argued that a guessing criterion should be applied to the data before the analysis is carried out. However, since the analysis reveals no significant difference between choice and verbal response and since application of a guessing criterion only serves to reduce the differences to a greater extent, for ease of interpretation I have not included the data here. If the analysis had shown the story condition to be significantly easier, a guessing criterion would have been required.

The Anova summary table is presented in Table 2.3. From this analysis we may conclude that there is a significant interaction between the part of speech replaced and the context in which the nonsense word is placed, $p < .02$. Children perform significantly better in the noun/sentence condition.

Table 2.2 Results of criterion analysis for Experiment 1A

Stories/Choice			Sentences Verbal		
	<u><2</u>	>2		<u><2</u>	>2
Noun	14	6	Noun	10	10
Verb	14	6	Verb	19	1

Table 2.3 Summary table Anova for Experiment 1A

Source	DF	SS	MS	F	P
Subjs.	39	57.987			
Nouns/Verbs (B1)	1	2.113	2.113	1.3870	.2448
Error	38	57.875			
Sentences/Stories (W1)	1	2.112	2.112	1.6128	.2093
W1/B1	1	6.612	6.612	5.0482	.0293
EW1/B1	38	49.775	1.310		

DISCUSSION

The children demonstrate a definite progression in their ability to deal with the problems set. The hardest condition for the children is the verb sentence condition. In the story context, nouns and verbs are of equal difficulty and with noun sentences children are most successful, with 50% of the children being correct on three or more trials.

Who do the children perform differently in the two tasks? It may be that they require different modes of solution. The story is global in nature. It gives the child a general impression of the intended denotation of the term. The new term is embedded in a continuous text and the information pertaining to the term's denotation is indirect. The intended referent in the sentences on the other hand, is explicit. In the noun cases it is physically present and with verbs the action is clearly acted out. The sentences present the child with information adequate to identify one intended denotatum. In theory the sentence task requires a coordination of the new linguistic information with the previous responses given if the child is to infer the appropriate denotation of the term. The child may be either helped or handicapped by having to make a series of explicit responses. Either way, the final sentence provides the child with sufficient information to make a correct guess, the possible range of application of the term being severely limited. The task appears to be more a matter of problem-solving than mapping meanings onto words. If the term had not been pre-empted in the child's lexicon we would be presenting the child with information which would count as Rogers' (1975, 1978, 1979) "elaborative linkages" and "semantic extensions" but since the term is pre-empted we are in fact asking for a translation from one language (English) to another (Experimentese) by means of the information presented ... solving a problem.

The discussion of children's differing performance with nouns and verbs will be dealt with after I report the second experiment.

EXPERIMENT 1B

This experiment was designed to permit within-child comparisons for noun/verb effects and to supply the needed controls for the (confounded) effects of acting out and mode of response with context in Experiment 1A.

Subjects:

The subjects consisted of 48 children - Twenty-four nursery school children, mean age 4;3 (range 2;7 to 4;11) and 24 primary 1 children, mean age 5;2 (range 4;10 to 5-6). All the older children attended a local state school as did half the nursery school children. Twelve of the nursery school children attended the student-run university nursery.

Materials:

As in 1A.

Design:

The children were divided into four groups of 12, balanced for age and sex: groups I, II, III and IV. As Figure 2.2 shows, group I received the story condition requiring a verbal response with each child receiving both nouns and verbs. Group II received a sentence condition requiring a verbal response with each child receiving both nouns and verbs. Group III received a story condition including acting out and choice response with each child receiving both nouns and verbs. Group IV received sentences including acting out and requiring a choice response with each child receiving both nouns and verbs.

Procedure:

As in Experiment 1A.

	Condition	Response	Stimuli
Group I	Story	Verbal	Nouns & verbs*
Group II	Sentence	Verbal	Nouns & verbs*
Group III	Story (acting-out)	Choice	Nouns & Verbs*
Group IV	Sentence (acting-out)	Choice	Nouns & Verbs*

* presentation of blocks of nouns and verbs were
randomized between children

Figure 2.2 Experimental design - 1B

RESULTS

The pattern of correct responses for all 48 children is summarized in Table 2.4. The difference between nouns and verbs in the sentence condition found in Experiment 1A is replicated and this difference is maintained across different forms of response. Mode of response (verbal versus acting out and choice) does not affect children's performance in the sentence task. However, performance in the story task is affected - fewer correct responses are given in the verbal condition. This reduction in overall performance has no effect on the children's differential rates of success with nouns and verbs. In the story task the difficulty of dealing with nouns and verbs is the same regardless of which type of response is required.

Table 2.5 presents the results of an Anova carried out on the data. The Anova supports the intuitive analysis of the data. There is a significant effect of the part of speech replaced by the nonsense word, $p < .0005$, and there is a significant interaction between the part of speech replaced and the context in which it occurs, $p < .0009$.

Table 2.4 Pattern of correct responses for children in Experiment 1B

Stories				Sentences			
Verbal		Choice		Verbal		Choice	
Noun	Verb	Noun	Verb	Noun	Verb	Noun	Verb
12 (48)	14 (48)	24 (48)	21 (48)	31 (48)	16 (48)	34 (48)	14 (48)
26 (96)		45 (96)		47 (96)		48 (96)	
71 (192)				95 (192)			

Note: numbers within brackets are total possible score

Table 2.5 Summary table Anova for Experiment 1B

Source	DF	SS	MS	F	Prob.
Subjects	47	89.958			
Sentences/ Stories (B1)	1	6.000	6.000	3.4547	.0665
Response (B2)	1	4.167	4.167	2.3391	.1246
B1/B2	1	3.375	3.375	1.9433	.1668
E B12	44	76.417	1.737		
Nouns/Verbs (W1)	1	13.500	13.500	14.6969	.0005**
W1/B1	1	12.042	12.042	13.1093	.0009*
W1/B2	1	1.042	1.042	1.1340	.2931
W1/B12	1	.0000	.0000	.0000	1.000
EW1/B12	44				

DISCUSSION

Perhaps the most interesting result which arises from the present study is the lack of effect of the mode of response and a supportative non-linguistic context. In theory the presence of objects or actions in front of the child should help in establishing reference and hence developing a subsequent meaning. For instance Braun-Lamesch (1972) found that children, of the same age range as those tested here, performed significantly better in a condition that offered non-linguistic support (a picture) in contrast to any similar wholly verbal task. However, in Braun-Lamesch's task children were not required to identify an intended referent but merely report whether a sentence and picture were compatible or not. In my own study children must identify the intended referent and it appears that this is where the difficulty lies.

There is one significant difference between the natural situation and that provided in the present experiment. In the natural situation the new phonemic sequence is paired with an object, quality or action for which the child does not have a name. There is a gap to be filled. In contrast this experiment poses exactly the opposite problem for the child - the child is presented with a variety of objects for all of which he has a familiar name - the term is pre-empted. The acting out gives the child no unfamiliar, unnamed element to focus on. Similarly when responding the child is asked to identify the referent of a new unfamiliar word from a group of objects all of which he can already name. What strategy should he resort to? Choose any object that was used in the story? Perform randomly? Perhaps the child's failure to solve the problem illustrates not a lack in his abilities to acquire language, but rather an inability to see the problem objectively, to disembed his thinking, to see the problem as symbolic - as a problem of the language system, that of synonymy.

There is, however, evidence blatantly in contradiction with this suggestion within the experiment itself. How can one account for the children's higher success rates with the noun sentences if we are postu-

lating interference because the child knows the name of the intended referent ? Why should he be able to cope with synonymy in one situation and not in the other ? It is not simply a matter of saying that there are no tangible objects in the sentence condition to confuse the child. For there is no enhancement of performance in the story condition when verbal responses are required and acting out is omitted as there is no decrement in the sentence condition when choice response and acting out are included. The sentence task draws the child's attention to a particular defining attribute of the new word's denotata in a way reminiscent of young children's guessing games, eg. I spy with my little eye something that is blue. If we assume that the child is familiar with this game the unambiguous information in the final sentence provides him with the basis to make a guess and we have seen he is often correct. An alternative psychological account is that the children only pay attention to the last few words in the sentences. This would mean that in three of the four noun sentences, the child could be successful without paying attention to the nonsense word at all. Since the last few words contained highly specific information the children's guesses had a good chance of being correct. In the one case where the sentence ended with the nonsense word rather than the "defining words" the children showed a reduced rate of success but not to the level of the majority of verb cases.

How then do we account for the significant and robust difference in the child's ability to deal with noun and verb sentences ? Is the result simply an artifact of the experimental stimuli, that is, is there a lack of internal validity ? Are the children not receiving enough information about the denotation of the verb to make a correct response ? Miller and Johnson-Laird (1976) have suggested that

"Verbal semantic fields exhibit meaning patterns more complex than the relatively simple hierarchical structure we found in nominal semantic fields"

(1976:523)

Certainly in designing the stimuli it was a simpler matter to produce a series of sentences which gave progressively more information about the intended referent when it was a noun than when it was a verb. Miller and Johnson-Laird's comment suggests that the problem is not peculiar to the present experiment and there is, of course, the possibility that verbs might be a problem in their own right for the child.

Let us first discuss another methodological criticism which might be raised. One methodological difference between the two situations is the type of question asked. Now there is an abundance of evidence in the developmental literature (eg. McGarrigle, Grieve and Hughes, 1978) that the type of question asked can significantly affect the type of response given by the child. It might be argued that the results of Experiment 1A are due to the form of the question, in that asking "What do you think x is?" is more complex than asking "What do you think an x is?". However the fact that the form of the question does not produce a difference in performance for nouns and verbs in the story, verbal condition in Experiment 1B seems to refute this hypothesis.

Experimental results from Kean and Yamato (1965) suggest that the mean homogeneous response (that is children gave nouns in response to nouns) for count nouns remains relatively stable through the three age groups they investigated, whereas the mean homogeneous response for verbs continued to increase from kindergarten to fourth grade. They attempt to explain this phenomenon by postulating that "in a child's life, the static world becomes increasingly dynamic". Rather than resort to explanations which involve the child's basic representation of reality it might be more feasible to suggest that there is some element in the nature of verbs per se which cause the difficulty.

The final sentence in the preceding paragraph brings to light two

implicit problems of dealing with verbs: what exactly do we mean by the nature of verbs, semantically ?; and is there any relation between parts of speech defined syntactically and what they denote ?

In discussions concerning the semantics of verbs psycholinguists tend to restrict themselves to one particular semantic domain (Abrahamson, 1975; Bendix, 1966; Gentner, 1975, 1978; Miller and Johnson-Laird, 1976), and within that domain proceed to examine the necessary components for a re-presentation of that particular class of verbs. This type of analysis is appropriate for a fully developed semantic system or one in which the term has acquired more than an initial referential relationship, but it may be an inappropriate method of analysis for a child's initial encounter with a word. Bowerman (1974) has suggested an alternative way of viewing the problem. In her discussion of the acquisition of the structure of causative verbs, she suggests a two-level model which would:

"differentiate between hypotheses about a child's non-linguistic (sensory-motor or representational) understanding of an event and those about his knowledge of which aspects of that understanding have special linguistic relevance within the semantic system"

(1974:159)

This distinction is implicit in the work of Gentner (1975). Bowerman develops her line of argument by presenting evidence which indicates that causative verbs are initially "unanalysed forms". The child is using these lexical items as

"unitary labels for various types of events without yet recognizing the underlying presence of combinatory independent semantic components which contribute to both the meaning and syntactic properties of the word"

(1974:160)

It seems that a single presentation of an unknown word and a subsequent investigation of the child's comprehension of that word could only examine the "unitary label" stage, that is a word being investigated as an "unanalysed form", a representational understanding. Brown's investigation (1957) of children's knowledge of the intended reference of parts of speech

must necessarily be of this nature and he found no discrepancy in children's performances with nouns and verbs. On the other hand, a similar investigation by Herriot (1968), again entailing a unitary label level of analysis, found that children had significantly more problems when a verb was substituted by a nonsense word as did Braun-Lamesch (1973):

"The difficulty of the nonsense sentences was localized in the verb and was explained in terms of the relational nature of the referent of a sentence"

(Herriot 1968:273)

Schlesinger (1974) has argued that what he calls "relational speech" involves semantic relationships which are fundamentally different from naming. It is therefore possible that there is a problem which is inherent in the verb and that this lies in the relational nature of the term. If Herriot and Schlesinger are correct in that it is the relational nature of the term which is the critical aspect, then I am wrong in confining the problem specifically to verbs. It may be a problem which can be applied to all relational terms. This would also include relational nouns as well eg. mother, brother*

Golin-Meadow, Seligman and Gelman (1976) postulate a different explanation for a similar discrepancy. They report two stages in the development of the vocabulary of two-year olds. The important issue for the present discussion is the fact that "nouns were easier to produce than verbs". Their explanation rests in what they suggest is a fundamental difference between simple nouns and simple verbs:

"We can point to a concrete noun's referent, but not to any instantaneous referent of a verb"

They continue:

"Of course, we realize that such differences between nouns and verbs also lead to task differences in our testing procedures. Those task differences, however, seem unavoidable and to a certain extent are part of the phenomenon itself"

(1976:199)

*Note: Inhelder and Piaget's (1964) investigation of the pre-operational child's difficulty in realizing that "his brother has a brother"

Whether the problem is the relational nature of the term or the transient and changing nature of the referent of the verb, verbs do appear to be complex even as an unanalysed form.

As a final point in support of the preceding argument about the complex nature of the verb, I should like to quote an excerpt from a paper by Granger (1977). Granger in designing a computer program, the aim of which was to "figure out likely definitions for unknown words, and to create context-specific definitions for such words" continues:

"Nouns are typically slot-fillers, builders of small structures containing relatively little of the overall information present in a given conceptualization. They also have a reasonably consistent and complete representation in terms of conceptual classes. Thus the process for figuring out unknown nouns from context is relatively straightforward. Verbs are builders of large structures which contain most of the expectations for a given sentence, and which supply most of the structure to conceptualizations. They also have a consistent and complete representation in terms of primitive acts. Thus they are more difficult to figure out from context than nouns"

(1977:178).

What information is available to the child to derive the meaning of the unanalysed verb form? Basically the child has two sources of information; the first being the syntactic properties of the word, and secondly the arguments of the unknown predicate. We might postulate that one of the basic "bits" of information used by the child is the elements with which the new word occurs, so that deciphering the initial meaning of the nonsense word involves, in the case of verbs, focussing on nouns which occur in conjunction with it. Fillmore (1968) has suggested that within symbolic logic itself there are essentially three ways in which the properties of predicates can be explored, the extensional, the intensional, and the definitional (p374). He suggests that

"Predicates are described extensionally as the set of objects, or sets of pairs or triples of objects etc, for which the relationship of properties in question hold true"

(1968:375).

Now Fillmore argues that:

"No use of the extensional properties of predicates
can serve us in identifying linguistically interesting
properties of verbs"

(1968:379)

However, Fillmore is referring to the internal structure of the lexical item, Bowerman's analysed forms. What I would like to argue is that in the case of the unanalysed form, that is a lexical item lacking internal structure, it is precisely these features which may be important.

It seems that although we cannot conclude from the present experiment, because of the problems with the verbal stimuli, that verbs have special problems of their own, an interesting problem has been posed. This and the indications from other scattered sources in the literature suggests that the actual processing involved in the two levels of semantic representations of verbs warrants further exploration. Both the immediate and the extended semantic representation should be investigated.

Implicit in the discussion to this point has been the assumption that there is a clear relation between syntactic and semantic definitions. The distinction between nouns and verbs is syntactic: it is a grammatical classification and it is questionable as to whether this distinction is made in all languages (Robins, 1952). The association between the grammatical and semantic properties of words is complex (cf. Lyons, 1977:423). In discussing parts of speech verbs are typically characterized as denoting actions, states, qualities etc, but as Lyons (1968) points out this is not a satisfactory procedure:

"Adjectives are frequently said to denote 'qualities' and verbs to denote either 'action' or 'states'. But the difference between a quality and a state (if it is not entirely illusory) is less striking than the the difference between an 'action' and a 'state'

(1968:324)

The present experiment is therefore naive in its use of syntactic terminology in an investigation of semantic representations. It is a logical consequence of this naivety to associate a semantic problem with a certain kind of syntactic element, an analysis which is evidently misguided. In the first instance it would seem much more appropriate to use

such terms as 'relational speech'. However, 'relational speech' is a much wider phenomenon and as such precludes the detailed investigation which I feel is necessary at such a preliminary stage. A more satisfactory procedure might be to retain the term verb, because as Lyons (1977) states:

"It is because there is an intrinsic connexion between syntax and semantics with respect to the definition of focal subclasses which contain the most typical nouns, verbs, adjectives and adverbs that we can ask sensibly whether all languages have nouns, verbs, adjectives and adverbs"

(1977:423)

In so doing and in maintaining the awareness that many of the properties of verbs are not specific to elements which we traditionally describe as verbs, eg. events or actions, the distinction of 'analysed' and 'unanalysed' forms discussed earlier is pertinent here. Using the term verb is less questionable for 'analysed' forms where the investigation of meaning patterns lies within a particular semantic field, eg. travel, possession or vision, than it is for 'unanalysed' forms. 'Unanalysed' forms must be denoted in some way and traditionally this has been by the use of syntactic labels. The difference between the 'analysed' and 'unanalysed' form is that in the former case the analysis is internal (to the lexical item) and in the latter case the analysis aims at establishing a relationship between the lexical item and some other linguistic or non-linguistic element. Until a more systematic investigation has been performed we must use general terms such as action word or verb, perhaps one day to be replaced by expression classes or first order properties (cf. Lyons, 1977).

QUALITATIVE ANALYSIS

Coding responses as correct or incorrect is an empirically sound procedure, assuming of course that the experiment is internally valid. However, much information is lost by ignoring the nature of the responses that the child gives on one or more occasions. In fact, the majority of attempts to understand the word-learning processes of younger children depend explicitly on establishing interpretations of utterances rather than on a single criterion of correctness (eg. Bloom, 1974a; Bowerman, 1974; Halliday, 1975). An Braunwald (1978) states:

"Participants' processes of comprehension must not be mistaken for the literal referential meanings of the child's word"

yet she is aware that

"Laura's system of communication was effective as long as her listener could use the situational context to figure out the referent of her word and the intention of her utterances"

(1978:13)

Analysis of this type of data is coloured by the orientation of the 'interpreter'. The choice of responses discussed and the interpretation of these responses can only be subjective. It is, however, through the child's spontaneous utterances and the experimenter's subsequent interpretation that I believe we can understand a) how the child views the task, b) what information the child uses to make his response and c) to generate empirically testable hypotheses. This orientation originates from the traditional Genevan clinical approach.

The two types of tasks presented to the children in these experiments, ie. stories and sentences, are on the surface very different in what they require the child to do and as such they will be dealt with separately in the following analysis. The isolated presentation of the sentence forces the child to make an initial decision after a minimal presentation of specific linguistic information and in theory requires the child to integrate a series of separate guesses about meaning. The story situation on the other hand allows continuity and a final global assessment after a

unified presentation. The sentence task places an emphasis on deduction and inference, whereas the story attempts to present the child with a general picture allowing implicit connexion of the word and its referent.

Sentences:

The sentence task is a problem-solving task. It requires an abstract symbolic attitude to language and tells us how the child answers questions about the meaning of sentences when he does not yet possess the semantic structure necessary for correct interpretation. Although each sentence was designed to follow on from the previous one, solution of one sentence allows a concrete analysis whereas interpretation of several requires a more abstract approach to language and words, which of course presupposes that the child is capable of associating the three in a meaningful series. I believe that in the present task the children are treating each sentence as a discrete entity. Whether this is because they are unable to make the logical leaps or because the child does not realize this is required or that the task inhibits this for some reason is unclear. Werner and Kaplan (1952) report a similar phenomenon which they call incomplete-final solutions:

"These results reflect a young child's lack of recognition of the necessity for integrating by a single solution, the cues offered by all six sentences"

(1952:75)

The same problem manifests itself in the work of Braun-Lamesch (1972):

"A 5 ans, 8 sujets enoncent deux ou souvent même trois fois le mot pertinent sans avoir l'idée de l'appliquer a toute la serie ..."

(1972:74)

An analogous factor appears to be influencing the solutions in the present set of experiments. The majority of children appear to be treating the sentences independently. For example there are cases where the subject's response is congruent for the presented sentence but totally incongruent with the previous presentation.

Subject No. 60: There are zums in the park. "swing"

Daddy bought a Christmas zum. "pudding"

On the other hand there are cases where the child gives a correct response for the second presented sentence which would be correct and congruent for the third, but changes his response.

Subject No. 14: Mummy juked at the dog. "Don't know"

I can juk very loudly. "shout"

The teacher juked at us when we were naughty. "hit us"

The final response would seem to be coloured and dominated by the child's own private experience. This factor will be discussed in greater detail later. There are also cases where children initially give a correct response for the term yet in the second sentence response "don't know" and in the final sentence are again correct. The existence of such a response pattern is interesting in itself because it suggests that even when children do have a preferred response they are sometimes unable to use the responses already given even if only in a perseverative manner. On the other hand there are cases where the child responds with "don't know" for the first and third presentation and gives the correct response for the second sentence.

Finally there are cases where a series of correct congruent responses are tied directly to the sentence given.

Subject No. 66: There are zums in the park. "pond"

Daddy bought a Christmas zum. "present"

All zums have branches. "railway track"

Each individual response is correct in this sequence, but there is no evidence whatsoever that the child has attempted to integrate his individual solutions into one overall correct solution. The fact, therefore, that many children are correctly identifying the intended referent of the last sentence has more to do with the amount of information given in that particular sentence than the child's ability to coordinate the information presented in a series of isolated sentences. The fact that children give more correct responses to final sentences with nouns than they do to final sentences with verbs may be a direct reflection of the amount of information

that I have given them.

Of course any child who repeats a single response throughout the series of sentences may be offered as contradictory evidence to the preceding suggestion. It could be argued that such a child has grasped the "nature" of the task, ie. that the responses to the sentences are related. Very few responses of this nature were given, out of a possible 256 responses, 14 repetitive ones were given. Only 4 of these were correct repetitions. The other 10 gave no indication that the children understood the task at all. Frequently no attempt was made to integrate the repetition with the presented sentence.

Subject No. 30: Paul threw the lev.	"caravan"
There are lots of games you can	
play with a lev.	"caravan"
Most levs are round and bounce.	"caravan"

Other children might add a preposition or change a verb ending in an attempt to make the repetition more congruent with the presented sentence.

Subject No. 19: Bad dreams are tissing	"jump"
It is not nice to tis people	"jump on"
Mary started to cry when she was	
tissed by the noise.	"jumping"

On the whole, however, repetitions are rare and although on its own this does not show that children treat the sentence independently, in conjunction with the other evidence, especially the number of correct first guesses and ensuing changes, I believe at best it can be regarded as supporting and at worst not in contradiction.

Effectively then what I am arguing is that the majority of children, despite the repetition in the test sentences of the new term, treat each sentence as a separate entity, a good reason to conclude that this task does not mimic the natural word-learning situation for in vivo the child must associate a number of independent presentations to grasp the term's meaning. This does not invalidate the information that can be gained by

examining the single responses given by the children. It is not unrealistic to assume that the types of responses given by the children reflect the information that they pick up and therefore regard as salient and may be used in a more natural task. The passage of time that normally ensues between a child's initial encounter with a word and a subsequent one may result in a considerable modification of the information retained, perhaps with the more idiosyncratic responses being eliminated. I think this line of argument can be substantiated by illustrating that some of the information that the children use to make these single responses is similar to those reported by authors for much younger children. For example, Lenneberg (1964) discusses the phenomenon of phonetic association and Braunwald (1978) and Bloom (1974) discuss the importance of contextual associations for the development of meanings for their subjects. What the following qualitative analysis attempts to do is to suggest some of the sources of information (both from the child's own cognitive framework and from the presented linguistic information) that the child can use in an attempt to arrive at an initial reference and a stable denotation of the new term.

What information do the children use? There are a variety of strategies that the children employ: these range from the very primitive use of phonetic information in "clang" associations to correct responses which utilize all the information given in an individual sentence. The most advanced form of response for this task is undoubtedly one where the child progressively develops the correct meaning of the word taking into account the information presented in each sentence. As I have stated, the children did not appear to treat the task in this manner, but these types of responses are not totally absent, eg.

Subject No. 30:	1.	Jenny saw a ged on the pond	"swan"
	2.	I play with my rubber ged in the bath	"boat"
	3.	All geds make quack quack quack	"duck"

Although it could be argued that each sentence is being treated in isolation here it is equally plausible that there is a systematic development with each response being appropriate for the preceding sentence(s) as well as the present one.

"Clang" associations are responses of solely phonetic origin. They have frequently been recorded in the initial speech attempts of much younger children. Of a possible 160 responses in Experiment 1A only 14 could be traced to phonetic origin. Interestingly, these responses were equally distributed across the two age groups.

Examples:

<u>Lev</u>	"Lavy pan "
<u>Lev</u>	"living at home"
<u>Tis</u>	"teasing"
<u>Tis</u>	"kiss "
<u>Jod</u>	"jug"

All of these responses make no sense whatsoever in relation to the test sentence and could only be traced to phonetic origins.

Responses which are solely situation-bound are another primitive kind of response, eg. mentioning objects in the testing room or the caravan in which the testing occurred. Once again this phenomenon is recorded in the early language literature. Examples can be found in Bloom (1974), Bowerman (1974) and Braunwald (1978). These responses tend to reflect something which is salient in the testing environment. Again very few responses of this nature were recorded - three out of a possible 160 for Experiment 1A. Responses of the two former types are of no constructive use to the child. They are learning nothing important about when to use the word or about its possible contextual determinants.

The third type of response I wish to illustrate deals directly with the issue of contextual determinants, but rather than spurious connections drawn from the physical situation of testing these responses, reflect associations which are (appear to be) directly generated from some assoc-

iation with the linguistic elements presented. In many cases they appear to integrate some aspect of the child's world knowledge and elements within the presented sentence. Often these responses appear bizarre if an attempt is made to replace the new term by the children's "explanation" of it, but the associations are clear. The child is attempting to make sense of the task.

Subject No. 8: Paul threw the lev "stairwell"

Follow-up: E "Is the lev a stairwell?"

S "Yeh. You go through the stairwell to go home"

The child has interpreted threw as through although this interpretation is syntactically impossible.

Subject No. 15: It is not nice to tis people. "slamming your fingers in the door"

Explanation: It does not appear wildly improbable to conclude that at one point the child had either slammed his fingers in a door and decided it was not nice or slammed someone else's fingers in a door and been told that it was not a nice thing to do. Regardless of which interpretation is correct the incident is salient to the child, regarded as not nice and a possible interpretation of tis. It is therefore possible that the child's next encounter with tis in a different situation will bring to mind two associations 'fingers in door' and 'not nice', the appropriate interpretation being governed by the new situation and the old information.

Subject No.20: Daddy bips in an office. "daddy cleans curtains"

Explanation: Whether the association here rests with a) something that daddy does or b) somewhere daddy cleans curtains or c) some implicit understanding of 'bip' and work, is unclear. In any event the child has learnt something to attach to further presentations of the word bip.

Subject No. 28: I play with my ged in the bath. "to put over your head"

Explanation: Here the reference is to a rubber bath cap.

There are many more such examples, some of which stretch the interpretive

powers of the experimenter more than others. The point to be made is that there is an attempt on the part of the child to make sense of the problem by using associations which originate from his own experience. Clearly some of these associations are more appropriate than others and some would be more useful than others in the mapping processes involved in deriving the meaning of the word if a) the child remembers the initial presentation and b) sees the connection between the two presentations of the word. It is b) that I have argued is lacking in the majority of cases in these experiments, a problem which I believe reflects the children's inferential abilities in this task rather than their word-learning abilities.

Uses of such contextual abilities are documented in the early word-learning literature and interestingly enough the only factor other than perceptual features that Anglin (1977) has found to be important in concept formation is contextual association.

The occurrence of this type of response is much more evident in the case of verbs than it is for nouns. There is a problem in interpreting this result, however. It might be intuitively satisfying to argue that the derivation of a verb's meaning is bound to a greater extent to a series of presentations of the term (eg. problem of deriving reference in one attempt Granger (1977)), and it is therefore possible that the only interpretation is this type of contextual association sparked off by some word or some inherent sense in the sentence and some previous experience/experiences of the child. In other words, since the child can't derive the meaning of the predicate he relies on some association with or interpretation of the argument. For example, Nelson (1978) found that

"When the term to be defined is an action or function
it elicits people, places and things which are
related though that action or function to the self"

(1978:64)

The problem, here, is that children were also much less likely to give multi-word responses to nouns and this allowed the experimenter more scope to develop the origins of these responses for verbs. So although the

single noun responses appeared to be less coloured by the child's associations with his own experience, we cannot say whether this is due to the hypothesized complex nature of verbs and the necessity to build up the features to complete a semantic domain, or whether children's single word responses to nouns were equally affected by previous experiences but the methods employed in the task did not allow the appropriate investigation ... or ultimately that the very nature of a verb requires multi-word definitions regardless of their semantic complexity.

The nature of the responses discussed up to this point gives no evidence that the child is treating the word as a functional entity in its own right. Rather, they look more like global attempts to make sense of the situation. These global attempts can provide the children with information which may be used. The responses to be discussed now seem to me to show a direct attempt by the child to use the word in relation to the information given in the sentence. It might loosely be suggested that they are attempts on the part of the child to give information adequate to define the word.

These responses can broadly be divided into two groups: those responses where the child uses information given in the sentence to define the word and those responses where the child uses the new term in a different sentence suggesting that they have achieved some understanding of the intended denotation.

In the first group of responses identification is tied directly to the specific information given to the child, eg.

Subject No. 4: All geds made quack quack noises "Ged, something that makes quack quack noise"

Subject No. 6: There are zums in the park "find 'em in parks"

On the surface all the child is doing is restating the information already presented in the sentence. It seems that more might be involved.

1) Children recognize that the information presented to them is relevant to their understanding of the new term.

- 2) The children define the term as an entity/event not as an association with other situations.
- 3) There is also a suggestion that the design of the task is wrong for this age group, that is, we are not going to extract the information we are looking for - the specific referent of the term. It's a silly question if the child doesn't see that the aim of the task is to produce a synonym for ged. What would the child do if we'd said that a duck makes quack quack noises and then asked what a duck was ?

The second group of responses shows the same failure to identify the denotata, yet again the children use their understanding to suggest some partial representation of the term. Here the child uses the general sense of the sentence to derive a representation, eg.:

Subject No. 12: When I am full I don't want to biv anymore. "need a plate
to biv"

Subject No. 20: The teacher told us to biv all our dinner "to biv it
all up"

Subject No. 48: Mummy juked at the dog. "I can juke too" - the child
proceeds to yell.

Let us suppose that the child can retain some of this information. From the first example the child in another situation seeing an animal making a quack quack noise has the information to deduce that it is a 'ged'. Even if mapping is not complete he can now add more features to the initial mapping, say certain perceptual ones. Similarly from the second set of examples the child with the information that you "need a plate to biv" has one bit of information to help him in the task of developing the meaning of the word biv. There is not a high proportion of these responses and several factors may account for this:

- 1) The children who give these responses may be verbalizing information that the other children retain but do not explicitly state because they can't or because they do not see it as relevant information to give to the experimenter.

2) The actual stimuli presented to the children may play a role in the number of such responses generated. For example, some words are more easily placed in novel contexts than others. Biv seems easy for the children to handle in such a manner whereas jod (nonsense word for bed cf. Appendix I) does not. Equally, some of the defining criteria presented in the sentence are more appropriate than others, for example "All geds make quack quack noises" as opposed to "The teacher juked as us when we were naughty".

The final group of responses I should like to examine are those which suggest that children have problems accepting that an object which the child already has a name for can have a new name, that is, the new term is pre-empted. This line of reasoning is supported by two quite distinct types of responses. There are children who correctly identify the intended referent but rather than accepting for example that a 'zum' is a tree, they reply that "it's like a tree" or that a 'ged' is "like a duck". For some reason there appears to be a refusal on the part of some children to accept that a 'ged' could be a duck. The second type of response which appears to support this explanation occurs when after a wrong response from the child the experimenter prompts with "Could an x be a y?". Frequently these responses were followed by vehement denials or responses of "don't know". The denials were often followed by spurious justifications "a zum couldn't be a tree cause then you could take its branches off". It is as if the children reject the possibility of having two separate labels for the same entity. Clearly this is also a time-saving strategy. If you are learning a lot of new names then it makes sense to assume that once you have learnt a particular name - natural kind pairing that this natural kind will not be referred to by another name. The problems children encounter with class inclusion and understanding of subordinate and superordinate categories may well reflect this difficulty. It may be that a basic linguistic competence is necessary before the children realize that there is no incongruity in referring to the same object by two distinct

names. Clark (1980) cites data from Fantini (1976) which suggest that bilingual children will at one stage reject having two separate labels (from different languages) for the same entity.

The fact that these types of responses are only given for nouns suggests that a clear indication of the intended referent exacerbates the problem. The vagueness associated with the verb terms appears not to draw the child's attention to the problem. If I am correct in attributing some of the children's difficulties in the fact that the terms are pre-empted (this assumption must, of course, be empirically validated) then the task as set may not be testing the child's competence with respect to learning the meanings of new words but rather assessing his ability to learn new names for objects and actions for which he already has a name.

Stories

On the whole the verbal responses to the stories are less informative than the verbal responses to the sentences. It must be remembered that the data base is much smaller in this case. Only 12 children gave verbal responses to the stories and in each case there is only one response per story as opposed to three verbal responses per sentence series in the sample of 42 children.

There appears to be a high proportion of spurious responses, eg. subject no. 21's response "plum" to story no. 2 (noun). Several of the children use words which occur in the story in attempts to define the term eg.

Story No. 2 (noun)	dog for <u>lup</u>
Story No. 3 (verb)	hit 'em for <u>pid</u>
Story No. 1 (noun)	push 'em for <u>kog</u>
Story No. 4 (noun)	burning people for <u>riz</u>

Again, as in the discussion of the sentence task, it might be argued that at least the children are attempting to use the information provided in the stories to answer the questions. They may retain some information which would be useful if they were to encounter the term again.

There are few responses which appear to originate from the child's own experience, eg.:

Subject No. 25: Response to story No.4 (verb) "crab bite 'em"

Presumably the child's response reflects an encounter with crabs at the seaside. This may help the child in his next encounter with piv, viz. something to do with the seaside.

There are no responses where the child uses defining criteria in the story in response to the question just as there are no responses where the child uses the new term in a new but appropriate context. This most likely reflects the way the information is presented in the stories rather than an inability to perform such operations. It would appear that it is this more general representation of the new term which is responsible for lowering the successful performance with nouns and therefore equating them with verbs. There are, however, a few "like a" responses:

Subject No. 78: "like a lion"

Subject No. 81: "like a book"

The most interesting suggestion as to the children's difficulties with the story task come from the discussions held with the children after a choice response. These interactions were generally initiated by the experimenter. There are many cases where a totally wrong choice response by the child is followed by comments from the child which indicate that he has some global understanding of the story. Indeed, in some cases he knows exactly what the intended referent of the term is. The following are clear examples of this phenomenon:

Subject No. 6 chooses a plate for Story No. 2 (noun). His explanation is that it is for the cat (correct response) to drink from. Subject No. 64 chooses the cat in response to Story No. 3 (noun), yet when questioned about the story reports that the little girl was allowed to see the fire engine (correct response). Subject No. 10 chooses a little girl for her response to Story No. 3 (noun) but when asked about the story says "Ben was reading a book" (correct response).

The children are finding it difficult to coordinate what they know has happened in the story with their particular choice response. It is as if the child has grasped some global sense yet has difficulty articulating the story element which goes with the word.

There are a number of possible explanations of these results. In the first instance, the child may well be hampered because of the existence of pre-emption. So while the child knows what is occurring in the story, he need not make any inferences about the new word because he can make sense of the situation without doing so. If he does try and make sense of the new word what he finds is that all the objects and actions occurring in the situation already have names - a problem exists.

Alternatively it might be that the nature of the story does not require specific identification of a referent, so that the problem of pre-emption does not arise (in contrast to a situation like "Pass me the x"), the child does not objectify his thinking so as to consider the word-object pairing.

Regardless of whether all or any of these explanations are correct, the responses, as measured, dramatically underestimate the child's ability to make sense of the story. The task is not appropriate as set. Performance in this instance seems to be a poor indicator of competence.

SUMMARY AND IMPLICATIONS

The present experiment was designed to clarify the conflicting results of two studies designed to investigate children's abilities to gain information pertaining to the meaning of unknown terms. Four variables were isolated and the results may be summarized as follows: part of speech appears to be a significant factor when the unknown word is presented in the sentence condition, with nouns being easier than verbs, though these results may simply reflect the difficulty of standardizing materials; verbal context without non-linguistic support can be informative to the child provided the linguistic information is sufficient to specify the denotation of the term. Acting out and choice response appear not to have enhanced performance significantly, though this result may reflect the fact that in all cases the new term was pre-empted by a term already present in the child's lexicon.

It has not been possible to isolate a single variable that might account for the differences between Wykes' and Johnson-Laird's study and that of Campbell and Bowe. The one variable which reaches statistical significance in relation to the children's performance does so in the opposite direction to what would be predicted by the original studies. Why is it that Wykes' and Johnson-Laird's subjects perform well with verbs? The children's superior success rate with verbs appears to be inconsistent with the results of the present experiment and the present explanation of these differences. A more detailed investigation of the differences which might exist between nouns and verbs is required before any conclusions can be reached. It would appear that part of speech is a variable which must be considered in its own right when investigating the word-learning abilities of young children.

Despite the failure to explain the two different sets of results a number of potentially important variables has been elucidated, many of these arising from the qualitative analysis. The importance of word class has already been mentioned. The second issue which came to light was the

possible importance of pre-emption. Initially pre-emption was excluded as a relevant difference between the two original tasks on the basis that children must learn subordinate and superordinate relations. It would appear that this assumption might be misguided. Children appear to be having difficulty accepting that two names can be used to denote the same object. This speculation, based on qualitative data, must be empirically tested. If children do have difficulties with pre-empted terms not only might we be able to explain the differences between the Campbell and Bowe study and that of Wykes and Johnson-Laird, but such a result would also have repercussions for children's abilities to handle subordinate and superordinate terms and the traditional Piagetian class inclusion task.

From the qualitative analysis a suggestion was made that children have difficulty associating several presentations of the same unknown word. The methodological implications of this are two-fold. In the first instance if we are looking at children's abilities to develop a referential relationship we should confine our presentation to a single example of the unknown item. If, on the other hand, we wish to look at the child's ability to coordinate a number of different pieces of information the present task is clearly inadequate - a new means of assessing the child's competence must be devised. Interestingly, this lack of coordination on the child's part suggests that we are not in fact looking at a task which investigates semantic acquisition, since semantic acquisition necessarily entails coordinating information gained over a number of exposures.

It is significant that despite these problems with the task, children did, in single responses, provide definitions (responses) which suggested that they were using sources of information similar to the child in the natural situation. They were able to draw on their own experiences and upon the linguistic information present in the sentences in an attempt to gain some representation of the term.

These tasks do have a number of inherent problems. For example, the story task as set failed to reflect the child's abilities to comprehend

the text. Intuitively, such a task appears to be a sensible way of investigating the young child's abilities, since story-telling is a familiar activity to the child. However, the child need not pay any attention to the individual words in the text. Tasks must not only conform to the demands of the experimenter but also to the expectations of the child. Secondly, the children showed little enthusiasm for the task. Failure to maintain a child's attention will inevitably lead to an underestimation of the child's competence. As far as possible the child should be involved in the task with the experimental manipulation being a natural part of the interaction. Finally, although the experimental approach attempts to assess what information the child can gain in a single presentation of an unknown lexical item, such structured tasks are hardly representative of natural word-learning situations.

This experiment was designed to clarify a set of conflicting results. It has not been successful. It has been possible to suggest certain ways in which different types of experiences and different word classes may affect the child's performance. The next experiment attempts to develop and clarify some of the issues presented here.

CHAPTER 3

ESTABLISHING REFERENCE FOR NOVEL NOUNS AND VERBSIntroduction

The previous set of experiments brought to light a number of factors which may be of importance for the child in the process of acquiring new words.

One of the possible explanations for the children's poor performance in the first set of experiments was the fact that the children already had a lexical entry for the objects/actions referred to, that is pre-emption was a variable, and hence were hindered in identifying the referent of the new term. Without pre-testing the child it is not possible to ascertain whether the child does in fact have a pre-existing term and because of the large numbers of children tested and the variety of stimuli presented this approach is not practical. At any rate, unless carefully done this pre-testing may in fact prime the child as to the key variables. It is possible to design sets of stimuli which either contain terms which children are likely to be familiar with or terms which are likely to be unfamiliar. Information from vocabulary counts eg. Burroughs (1957) can be used as an objective guideline. For ease of discussion these terms will subsequently be referred to as known or unknown. Following this line of reasoning it would therefore be possible to test the hypothesis that knowing the name of an object/action hinders establishing reference when an unknown term is used in the referential act. For example, 'Pass me the lup' when names for the objects present are already incorporated in the child's lexicon, would be problematic but if one unknown/unnamed item was present the same difficulties might not arise. This variable should only be a problem when the term's level of specificity is clearly determined by the accompanying discourse.

Level of specificity is a difficult concept to characterize since to a certain extent the appropriate level of specificity will be determined

by the context. Brown (1965) suggests that the name we use to designate common objects categorizes at the 'level of maximum utility', for example we would normally refer to an apple as apple rather than fruit or MacIntosh Red. Brown maintains that it is this 'level of maximum utility' which governs adults' communication with the young child. The adult, as it were, anticipates the appropriate level of reference for the child. There are a number of problems with this suggestion. In the first instance it is clear that there will be situations when a more specific eg. MacIntosh Red or less specific eg. fruit reference is required and appropriate. Secondly, if the child learns terms only at one 'level of utility' how does he master the hypernym relationship? Even if we dismiss these two problems we are left with a more persuasive one: what determines 'maximum level of utility'? Rice may well be 'maximum level of utility' for Western Europeans, but not so for Indonesians. Cruse (1977) has attempted to clarify this issue. He describes Brown's 'maximum level of utility' as an inherently neutral level of specificity (INS). Cruse defines the INS as 'level of specificity which is least motivated contextually'. Cruse's analysis also allows for a contextually neutral level of specificity (CNS), that is the level of specificity which is neutral in the given context. Frequently the INS will be the CNS but where this is not the case abnormal communication will result. The crux of Cruse's analysis, into which he incorporates various elements of Grice's (1975) conversational postulates, is that the linguistic and non-linguistic context in which the term occurs will affect the appropriateness of the term chosen. The relevance of this analysis to the present study and series of studies is two-fold. We must be aware that there is a level of specificity which the child is most likely to assume is being used but, in addition, the context will play a significant role in supporting or questioning the initial assumption made. Insofar as this study is attempting to assess the child's inferences concerning the referent of the new terms, the INS and the context will be

in harmony, that is they will conform to the normal requirements of conversation, the level of specificity indicated by the universe of discourse and the intended referent will be the same. An example will perhaps clarify this. Suppose that in the sentence "the children are playing with the ball" ball is replaced by a nonsense word. I think it is reasonable to suggest that the INS in this situation is ball though toy and basketball are obvious alternative referring terms. However, in this study, the supporting context picture clearly indicates a ball and there is no extraneous reasons why the type of ball should be specified. As such I would like to say that the level of specificity, in some senses, is determined in the present study.

As well as the possibility of pre-emption, a second interesting and significant result arose from the previous set of experiments. That was the difference in the children's performances with nouns and verbs, a difference which was not initially predicted. There is, however, evidence from diverse sources in the literature which suggests that such a result might have been expected. Despite the suggestions that such a difference might exist, there is no explanation as to when in the word learning process this factor is important, nor in reality any clearly valid empirical evidence as to the nature of the difficulty. If we accept that the acquisition of nouns and verbs does differ we must discover where the problem arises - is it referential, conceptual or methodological? It may be that the difficulty lies in the transient and changing nature of the intended referent of a verb so that establishing the referential relationship is the difficulty and that once this link has been formed, the word learning process proceeds in much the same way for all words. Alternatively, it may be the complex nature of verbal semantic fields which causes the difficulty for the child, so that establishing reference is not the problem but the more detailed conceptual semantic mapping of the term is. At present we have no way of disentangling these two hypotheses and clearly we must if we wish to characterize the child's

difficulty with action terms. Unfortunately, the data from Chapter Two shed no light on the latter problem and any support which is provided for the distinction between nouns and verbs must be accepted with caution because of the nature of the experimental stimuli. A solution to the methodological problem would be to design materials which could be standardized with respect to the amount of 'information' they contain for both nouns and verbs. Prior to any such design modifications a decision must be made whether to investigate the analysed or the unanalysed verbal form. Since investigating verbal semantic fields is complex both theoretically and experimentally and because it can be argued that unless the initial referential relationship is established no subsequent representation of the new term can be developed, it is reasonable to suggest that initially we should look only at the unitary label stage, that is the unanalysed form. It would then be possible to contrast a response to one referential presentation of a noun with one referential presentation of a verb directly.

One of the major problems of designing tasks of this nature is that the task construction is approached from an adult perspective. There is no reason to assume that the child will treat the task in a similar manner to the adult and in fact there is considerable evidence to the contrary (cf. Donaldson, 1978). Using the verbal responses of children in the previous study it was possible to circumvent some of these difficulties and (a) to identify a number of methodological inadequacies in the design of the experiment and (b) to enrich our understanding of the cues the children were using to solve the problems. There were still a number of problems with these responses. A simple verbal definition leaves the option open for the child simply to say "don't know", a response which frequently occurs and gives the experimenter no information at all. The verbal responses which were collected were difficult to classify and posed a number of problems of interpretation. Also there was a suggestion that

when a series of items was presented verbally (and a response to each was required) that each item was being treated in isolation. Rather than the child being able to build up a systematic representation of the term as the experimenter might expect, each item appeared to be a separate problem. So although the experiment was designed to investigate the problem of denotation the children treated each sentence as an isolated referential act. Clearly reference must be initially established in this situation before the child can decide upon the extension of the terms. In the first instance we must see whether reference is established. What is needed is a method which in a single presentation of an unknown term provides sufficient information for the child to identify the intended referent followed by a testing procedure which forces the child to choose a stimulus. Having chosen a stimulus a verbal response would supplement the already obtained non-verbal information. We would then have at least one if not two sources of data.

To gain full benefit from a choice response situation we need to know the distribution of responses among the incorrect items as well as the ratio of correct to incorrect responses. The information in such a distribution is only valuable if the alternatives differ in some significant way. If we vary the information presented in each alternative we may be able to ascertain the situation in which one source of information is more salient or valuable than another. First, we must be sure that the child does in fact make the association between the test and choice situation. There was evidence in the stories that even testing with the same objects that were used for acting out the story did not meet this requirement. Constructing a 'universe of discourse' and a set of responses which were clearly related to this world, possibly because the child was familiar with such situations, would circumvent such problems.

Bearing each of these factors in mind the present experiment was designed and a number of specific predictions about ratios and distributions of response were made. A pictorial task was chosen for two reasons.

Brown (1957) had shown that such a method could be used successfully with children of this age, although he was asking a different psychological question. Secondly, presenting pictorial test stimuli and pictorial response stimuli allows the child to set up a framework for the referential act which is appropriate in both sections of the task - a universe of discourse is established.

Pictures have the added advantage in that we can vary their content in specific ways and in so doing construct a group of test stimuli which focusses on different elements present in the original stimulus. Four choice stimuli were used in the present experiment, each one fulfilling a specific function. One item would depict the correct referent, a second would depict a similar but incorrect referent, a third would depict the original context excluding the correct referent and a final one would be totally irrelevant to the original picture.

The next methodological problem which has to be tackled is the manner in which the children would be introduced to the new term. Giving verbal criteria for the use of the new term is not satisfactory as we have already discovered. A child presented with the sentence 'A ged goes quack quack' is quite correct in defining a ged as something that goes quack quack. The new term must be incorporated in a sentence so that it is commenting on the picture rather than focussing on the new term. It was therefore decided to have a single sentence which accompanied the picture and was constructed in such a way as to comment on the picture, the new term being presented as a known item, eg. 'Look, the little boy is lapping in the lake'. Hopefully this would help to restrict the child's responses to some item of the picture. It would then be possible to follow the pictorial identification with a request for a verbal definition of the term without the task being regarded as bizarre from the child's perspective.

In what follows a known item is an item for which the subject has a readily available lexical referring expression whereas an unknown item is

an item for which the child does not have a readily available lexical referring expression.

In conclusion, in a referential situation two main experimental variables were to be tested - known versus unknown items and nouns versus verbs. The following predictions were made:-

- 1) Bearing in mind the results of the previous experiments and the evidence in the literature, it is predicted that children will be more successful in their identification of nouns than verbs.
- 2) Overall performance for known items will be poorer than performance for unknown items.
- 3) Where children do not correctly identify the referent the distribution of responses will not be random.
 - a) in the case of verbs there will be a greater tendency for the child to choose the context picture, due to the difficulty in actually identifying the element which is being referred to. This should be true in the case of known and unknown items.
 - b) in the case of nouns there will be a greater tendency for the child to choose the picture containing the similar but inappropriate reference, due to the fact that establishing reference should not be a problem but the precise perceptual criteria may well be.
 - c) we should expect greater variation in the case of known nouns where the known object is clearly referred to by a term the child does not know. This should produce confusion as to the important element or in other words the response required.

METHOD

Subjects

Sixty children were selected for the present experiment. Twenty of the children attended a local day nursery and had a mean age of 4;2 (range 3;8 - 4;5). Forty children were in their first year at primary school with a mean age of 5;4 (range 4;5 - 5;6). The catchment area for both schools is deprived, with high levels of unemployment.

Design

The children were randomly assigned, subject to balancing for age and sex, to one of two main experimental groups: Group A received pictures and test sentences with a nonsense word replacing a known object or action and Group B received pictures and test sentences with a nonsense word replacing an unknown object or action. Words were categorized as known if they were of the highest frequency count for children of this age and if every child in the control group* identified the object or action with that word. Words were categorized as unknown if they were of the lowest frequency in the vocabulary counts. Within each main experimental group half the children received the object items in a block first, see Table 3.1.

Each block consisted of one unscored trial item and four test items. The trial item was consistent across children whereas the order of presentation of the test items was randomized across children. A short break occurred between the two block presentations.

Each test picture had an accompanying informative sentence. The informative sentence (IS) contained a nonsense word referring to an object or action in the accompanying picture. All nonsense words were of low meaningful association value and of the CVC format (cf. Noble, 1961). No nonsense word occurred more than once. All sentences conformed to the noun-verb-noun format with the nonsense word always appearing in the third position for nouns, eg:

* Sixteen children, mean age 4;6 (range 3;6 - 4;11), from the student-run University nursery were used as a control group.

The children are playing with the *NS-Ball

The boy is NS-running to the house

Materials

The materials consisted of 20 test pictures and 80 response pictures. The pictures were constructed individually. The pictorial elements were cut out of felt and placed on a plain background and subsequently photocopied. Each pictorial element was then emphasized by tracing the outline with a black felt tip pen. The resulting pictures contained silhouettes of objects, people and animals portraying simple scenes. As discussed in the Introduction, each response picture contained different types of information. In the case of nouns R1 (response picture number 1) the picture always contained the object referred to in the test picture and hence was deemed the correct response. There were no contextual 'filler' items as in the original stimulus picture; simply the original object. R2 was constructed in the same manner as R1 but it contained a contextually plausible but denotationally incorrect alternative. R2's were all uncommon objects. R3 was an exact replication of the test picture but lacking the object referred to and R4 was an irrelevant full context picture. Examples are presented in Table 3.2.

In the verb cases R1 depicted the correct action but being executed by a different person or animal. R2 contained a contextually plausible but denotationally incorrect alternative. R3 was a replication of the test stimuli lacking the appropriate action: a different individual was added to the picture to keep the content balanced. R4 was an irrelevant full context picture. Examples are presented in Table 3.3. Figure 3.1 depicts the materials used for the IS, the girl is NS-sitting at the table.

* The abbreviation NS will be used to refer to a nonsense item. NS-run will indicate that a nonsense word replaced the following item in this case run. NS_N or NS_V will indicate that the nonsense word was either a noun or a verb respectively.

TABLE 3.1

DESIGN OF EXPERIMENT 2

GROUP A	GROUP B
* (i) Trial item 4 Test items	(i) Trial item 4 Test items
(ii) Trial item 4 Test items	(ii) Trial item 4 Test items

(i) Nouns

(ii) Verbs

* Half children received (i) first and the remaining children received (ii) first.

TABLE 3.2

EXAMPLES OF RESPONSE ALTERNATIVES FOR NOUNS

NS _N - Known			
IS: The indians are dancing around the NS-fire			
R1	R2	R3	R4
Fire	Teepee	Original stimulus minus fire	irrelevant
NS _N - Unknown			
IS: The girl is playing the NS-violin			
R1	R2	R3	R4
Violin	Trumpet	Original stimulus minus violin	irrelevant

TABLE 3.3

EXAMPLES OF RESPONSE ALTERNATIVES FOR VERBS

NS _v - Known			
IS: The boy is NS-running to the house			
R1	R2	R3	R4
indian running	different boy jumping	original stimulus minus boy running. Boy kneeling on ground	irrelevant
NS _v - Unknown			
IS: The horse is NS-tangled in the rope			
R1	R2	R3	R4
Cat tangled in a ball of string	Horse rearing up	original stimulus minus rope	irrelevant

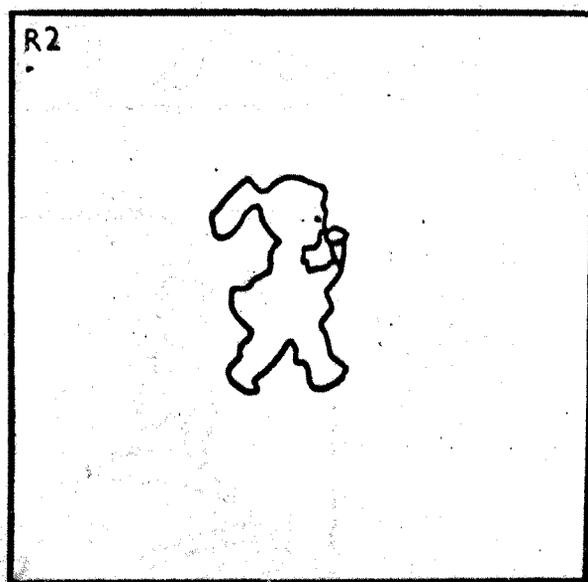
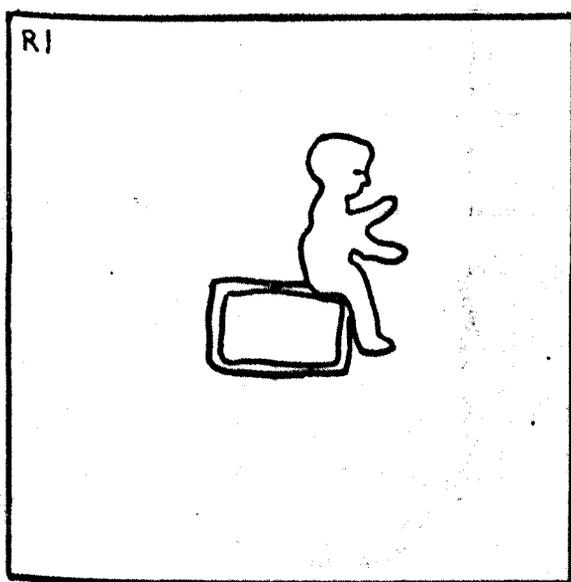
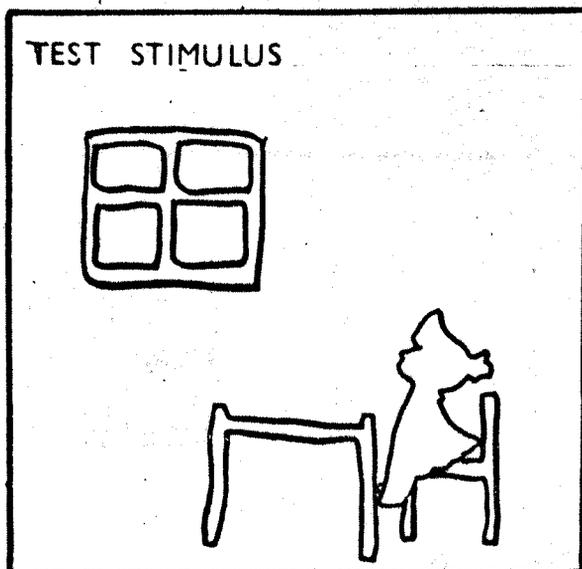


FIG. 3.1 Miniaturized version of experimental materials for -
The girl is NS-sitting at the table. Contd. next page.

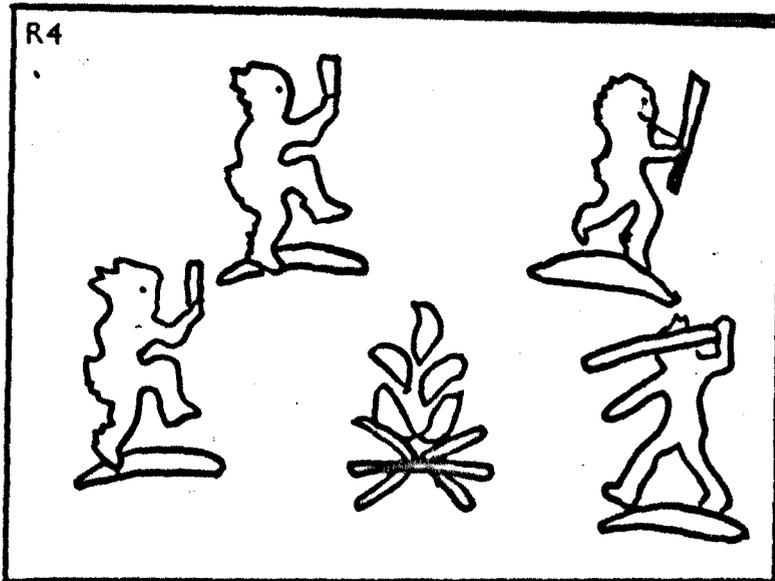
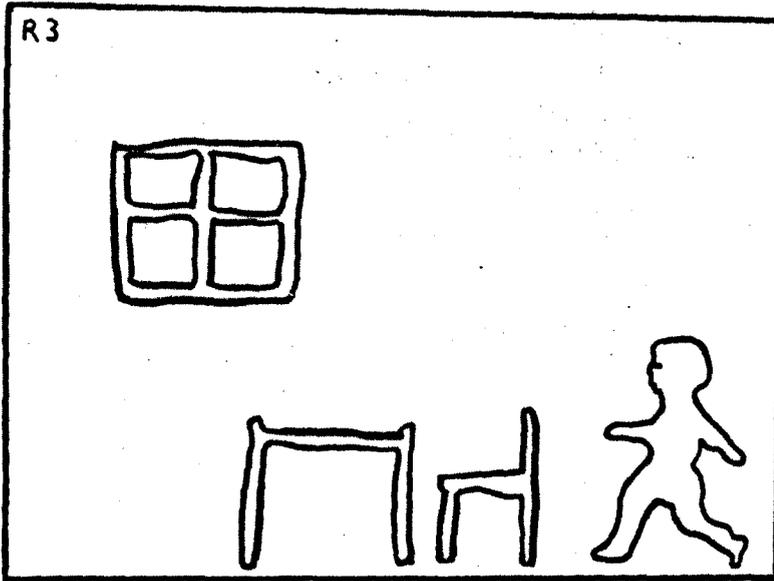


FIG. 31 - CONTD.

Procedure

All test pictures were shown to a group of adult subjects to ensure that the action/object that E intended to depict and emphasize with the sentence was clear. The pictures were also presented to a group of pre-school children who were required to identify each silhouette in the picture. This was done to ensure that the materials were appropriate for the intended experimental population.

Each child was tested individually. There was a brief period of introduction where the child and E discussed books and looked at pictures in books. The child was presented with a single test picture and allowed to examine it. E then uttered the appropriate IS. The sentence was articulated in such a way as to suggest that the information being given applied to the picture. The IS was prefixed by exclamations such as "Look" or "See". The child was asked to repeat the IS while looking at the picture, another means of ensuring that the child was paying attention to the two elements of the task.

The test picture was then removed from the child's view and the four response pictures were placed one by one, in a random order in front of the child, see Figure 3.2. The actual position of each response stimulus was varied on each trial. The child was then asked to: "Look at all the pictures carefully and show me which picture has a NS_N in it" or "someone NSying in it". After the child had made his response the pictures were removed from view. Depending on the conditions one of the following questions was asked:-

- 1) "What do you think NS_N is ?" or
- 2) "What do you think to NS_V is?"

If no response or a "don't know" was obtained, E asked the prompt questions. The prompt question referred directly to the original picture and the intended object or action. For example, in the case of the following IS, "The children are playing with the NS-ball", the child was asked "what were the children playing with?"

The same procedure was followed for all test items. The informative sentences can be found in Appendix II.

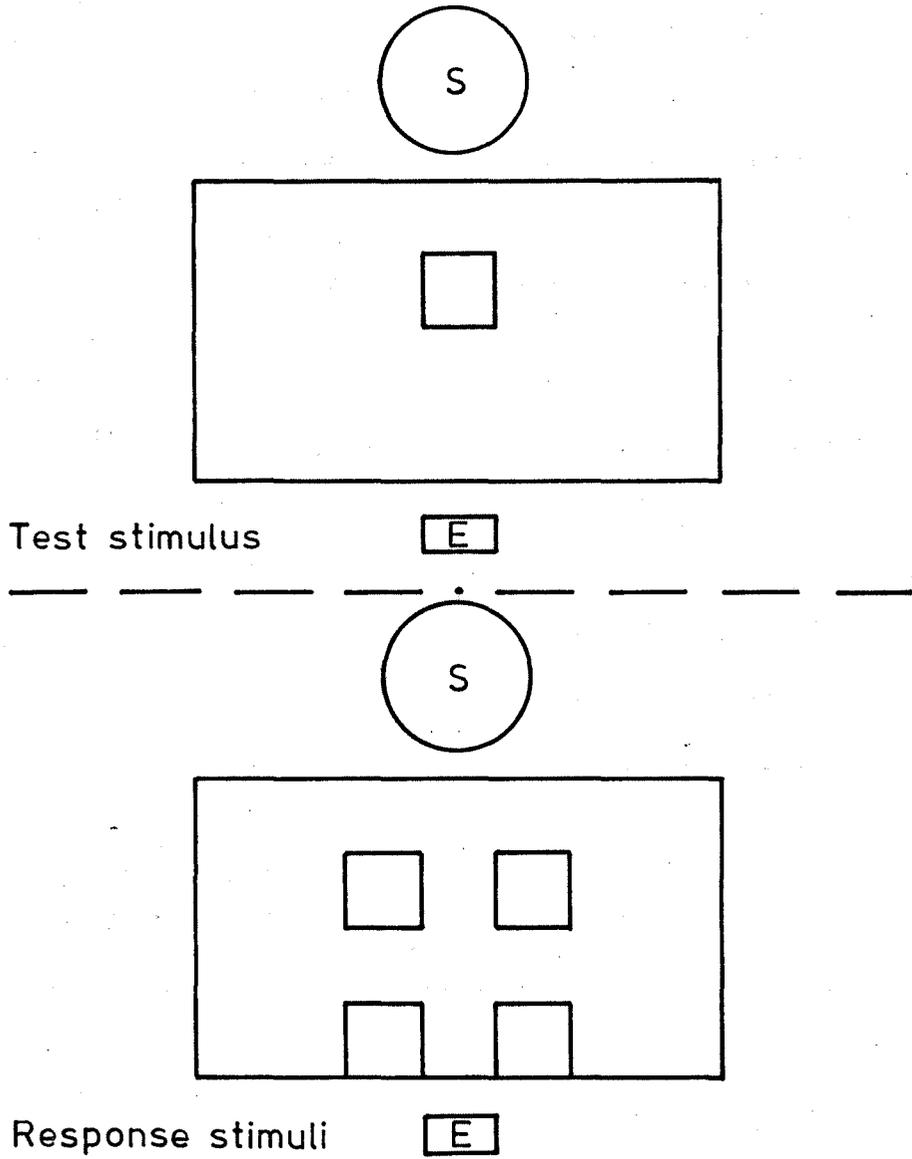


Fig. 3.2 Presentation of Test Material

RESULTS

Before discussing the main results of the present experiment, it is necessary to validate empirically the assumption that the probability of correct responses does not differ significantly between items within each condition, that is for our present purposes the test items are homogeneous. A Cochran Q test was carried out on the items within each of the four conditions: Known nouns, unknown nouns, known verbs and unknown verbs. There was no significant difference between items in each condition. Therefore in the following analysis each condition is treated as a unit.

Choice response

The distributions of responses for each condition and for the two different age groups are presented in Figures 3.3, 3.4, 3.5 and 3.6. Because of the small number of correct responses given by the younger children (cf. Figures 3.5 and 3.6) and the fact that apart from responses to unknown nouns they do not deviate from chance, the present statistical analysis will deal only with the responses of the older group of children.

Choice response, older children

Table 3.4 presents the total numbers of correct responses in each conditions and the distribution of wrong responses across stimuli. An Anova looking only at correct responses, ie. R1, was carried out. Table 3.5 presents the results of this analysis. As the results indicate, there is a significant difference between known/unknown items, with known items producing fewer correct responses, $p = .0033$. Similarly there is a significant difference between nouns and verbs with verbs producing fewer correct responses, $p < .00001$. There is however a significant interaction $p = .01$ which may be interpreted as the variable known/unknown affecting nouns to a greater extent than verbs (cf. Table 3.4). In fact the variable known/unknown has very little effect in the verb condition but a powerful effect in the noun condition. The importance of this finding will be

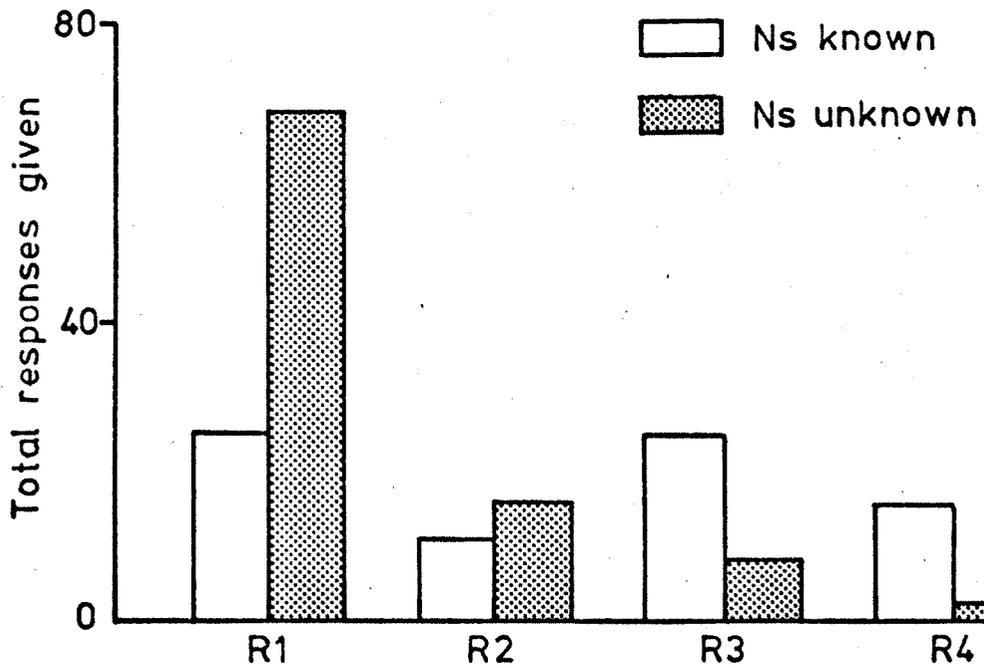


Fig. 3.3 Distribution of Responses given by Older Children to Nouns

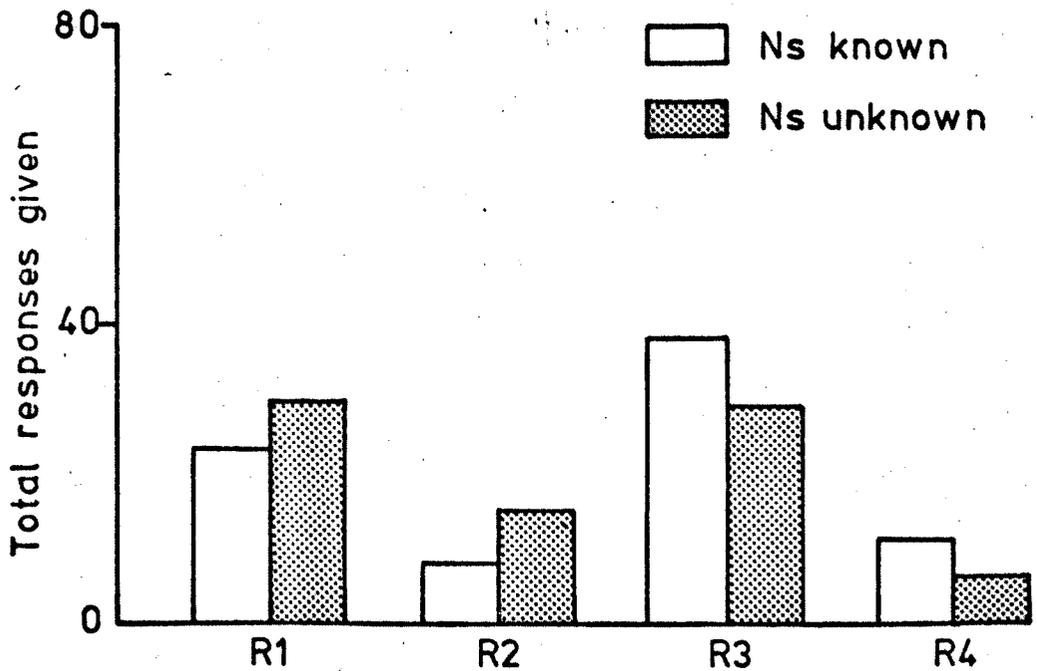


Fig. 3.4 Distribution of Responses given by Older Children to Verbs

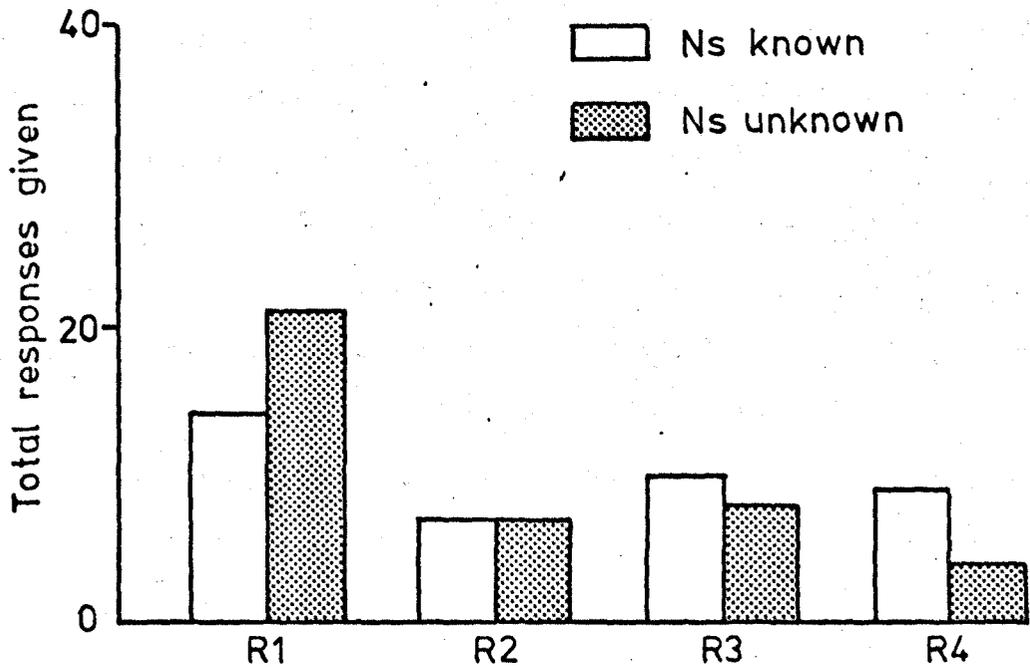


Fig. 3.5 Distribution of Responses given by Younger Children to Nouns

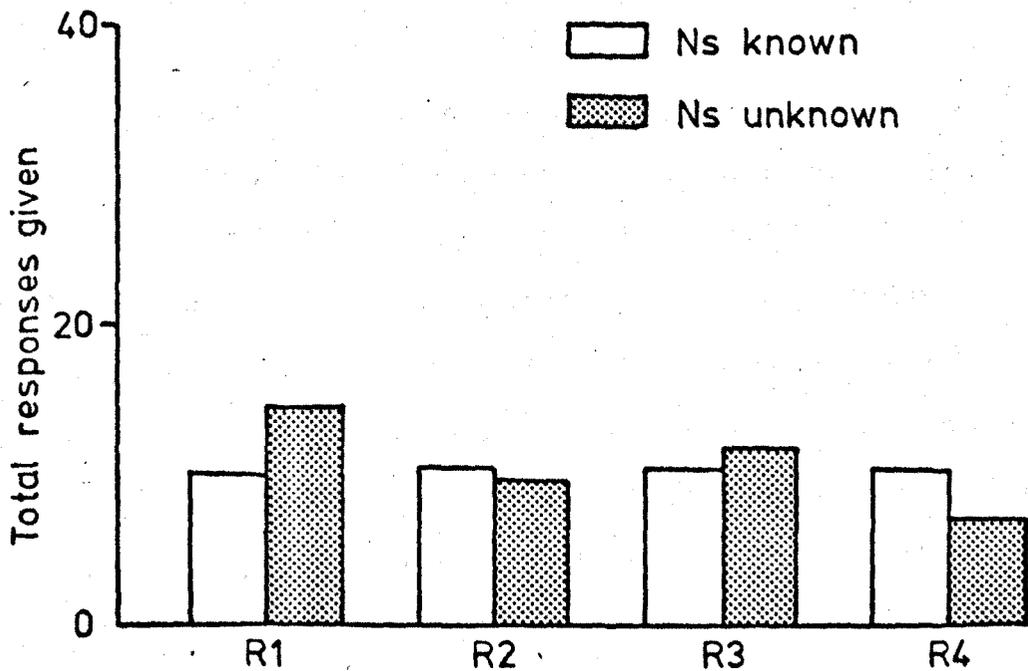


Fig. 3.6 Distribution of Responses given by Younger Children to Verbs

amplified in the Discussion. It is interesting to note that the only change in response to different conditions which occurred for the younger children was with the known/unknown variable for the noun group, with children performing better in the unknown noun condition.

It is not only the number of correct responses which is of interest here but also the distribution of the children's choices when the correct stimuli is not chosen. Therefore the individual hypothesis presented in the introduction concerning the likelihood of particular choices given that the correct response was not chosen was tested. Each condition was analysed separately using the Binomial Theorem. The actual raw distribution scores can be seen in Table 3.4.

The number of correct responses was subtracted from the total number of responses and the probability of the distribution of errors calculated. It was predicted that in the case of verbs for both the known and the unknown condition that if the child failed to select the correct picture he would choose picture 3, that is the picture that depicted the initial situation but did not contain the action referred to. This prediction was supported for both known verbs $F(z) = .99, p < .001$ and unknown verbs $F(z) = .99, p < .001$. In the case of nouns it was predicted that if the child failed to choose the correct picture there would be a greater tendency to choose picture 2, that is the picture which contained a perceptually similar but incorrect referent. While this prediction was not supported in the case of known nouns there was a significant effect in the case of unknown nouns, $F(z) = .99, p < .01$. In conclusion we can say that although children are making a high proportion of errors in this task, the distribution of these errors is not random and in three out of four cases can in fact be predicted a priori.

Verbal response (sense of term)

Again, I shall only deal with the responses given by the older group of children. Having made their choice responses children were asked

TABLE 3.4 DISTRIBUTION OF RESPONSES GIVEN BY OLDER CHILDRENCHOICE

GROUP A (KNOWN) N=20

GROUP B (UNKNOWN) N=20

54 (160)				89 (160)											
NOUNS		VERBS		NOUNS		VERBS									
31 (80)		23 (80)		59 (80)		30 (80)									
Responses →		Responses →		Responses →		Responses →									
R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4	R1	R2	R3	R4
31	11	21	17	23	8	36	13	59	12	8	1	30	14	29	7

Note Brackets indicate total possible score

TABLE 3.5 RESULTS OF THE ANOVA BY EXPERIMENTAL GROUP AND WORD CLASS

Source	DF	SS	MS	F	P
Subj	39	82.987			
B1	1	17.112	17.112	9.8712	.0033**
(Known/Unknown)					
EB1	38	65.875	1.734		
W1	1	17.112	17.112	22.5203	.0000**
(Noun/Verb)					
W1B1	1	5.513	5.513	7.2545	.0101*
EW1B1	38	28.875	0.760		
W	40	51.500			

verbally about the referent of the nonsense term. Table 3.6 presents the breakdown of verbal responses given. This table is not directly comparable with Table 3.4. Whereas the breakdown in Table 3.4 initially deals only with the correct responses, Table 3.6 deals with numbers of children who gave any verbal response. It might be expected that giving a verbal response in the case of known objects and actions might be easier because the child actually had a word present in the lexicon, but this difficulty was avoided by accepting 'definitions' which could adequately refer to the object/action though not actually containing the appropriate term. In effect these responses were very clear, see Table 3.7 for examples. In some cases children appear to be relying on the picture to produce their definition, eg. "like a guitar but you get a stick with it". In other cases the accompanying sentence appears to be the critical factor, though of course the sentence is supported by the scene depicted in the picture, eg. "play it" for IS "the girl is playing the NS-violin". On the whole it was not possible to separate these two variables.

Strictly speaking, it is only the sense questions as opposed to the prompt questions which allow us to infer anything about the 'meaning' of the new term for the child. All the prompt question does is focus the child's attention on the intended object or action in the original picture and ask for a description, eg.:

What was the girl pushing along the path ?

What was the girl doing by the tree ?

Accordingly I will deal mainly with the responses to the sense questions. There is no significant difference between the number of such responses given to NS_N-known and the number of responses given to NS_N-unknown ($X^2 = 1.6129$) though the trend is in the same direction as the choice responses. Similarly, there is no difference between the number of sense responses given to NS_V-known and NS_V-unknown.

TABLE 3.6 TOTAL NUMBER OF VERBAL RESPONSES PROVIDED BY THE CHILDREN WITHIN EACH CONDITION

GROUP A (KNOWN) N=20

GROUP B (UNKNOWN) N=20

99 (160)				79 (160)			
NOUNS		VERBS		NOUNS		VERBS	
53 (80)		46 (80)		50 (80)		29 (80)	
Sense	Prompt	Sense	Prompt	Sense	Prompt	Sense	Prompt
26	27	13	33	36	14	13	16
A*	B	A	B	A	B	A	B
20	7	21	2	2	12	10	6

*A - real word

B - repetition of nonsense word

Note Brackets indicate total possible score

TABLE 3.7 EXAMPLES OF ACCEPTABLE RESPONSES FOR SENSE QUESTIONS

CHILD'S DEFINITION

INTENDED REFERENT

Giant animal

monster

Goat or something like that

monster

Big animal

monster

Thing with horns

monster

Indian boat

canoe

Kind of boat

canoe

Toy and thing you throw

boomerang

Sticks that are bent

boomerang

Thing you throw

boomerang

Like a guitar but you get a stick with it

violin

Thing you play

violin

Play it

violin

To my knowledge there is no statistical test available to contrast the responses for the within-group differences for nouns and verbs. So without drawing any definite conclusions I should like to mention that in the case of both known and unknown items rate of response for sense questions to nouns was greater than the number of sense questions to verbs.

Table 3.8 contrasts choice responses with the sense responses. It can be seen that although children are less accurate in sense responses, the pattern of responses for sense and choice follows the same trend. In both cases nouns are easier than verbs and the NS_N -unknown are easier than the NS_N -known. There is little effect of the known/unknown variable for verbs in the choice response and no effect for sense responses.

A brief comment on responses to the prompts is now warranted. Since the prompt question refers specifically to the picture and does not use the nonsense word, we would expect a higher proportion of correct responses, as opposed to simple repetitions of the nonsense word for pictures which depicted known objects or actions rather than unknown ones. This is the case for nouns. Seventy-four percent of these responses for known nouns identify the object in the picture whereas only 14% do so in the case of unknown nouns. This is not the case for verbs. Sixty-three percent of the responses to prompt questions for the NS_V -known are appropriate and 62% are appropriate for the NS_V -unknown. In the NS_V -known condition children identify the action intended by E whereas in the NS_V -unknown condition it is always the case that the children are using a known but potentially appropriate alternative eg.:

1. IS: the donkey is NS-refusing to go with the boy.

Prompt: What is the donkey doing ?

Child: Looking at the boy

In effect this is accurate because in the picture the donkey is looking at the boy. This child's choice response for this item was R3.

TABLE 3.8 TOTAL OF CORRECT RESPONSES GIVEN IN ALL CONDITIONS
FOR CHOICE AND SENSE RESPONSES

NOUNS				VERBS			
KNOWN		UNKNOWN		KNOWN		UNKNOWN	
CHOICE	SENSE	CHOICE	SENSE	CHOICE	SENSE	CHOICE	SENSE
31	26	59	36	23	13	30	13

2. IS: The dinosaur is NS_V-attacking the rabbit

Prompt: What is the dinosaur doing ?

Child: Chasing the rabbit.

This is not exactly what is depicted in the picture and no adult offered this response even when pushed, but it is possible that the child believes this to be the case. However, her choice response of R3 is not interpretable in this way. Certainly the dinosaur and rabbit are present, but in this picture the rabbit is sitting looking at the clearly stationary dinosaur's front.

So in contrast to the NS_N-unknown, where children do not offer a known alternative when they cannot identify the intended object in the picture (that is, they repeat the nonsense words instead), in the NS_V-unknown condition the majority of children produce a response referring to an alternative action. I would like to argue that this pattern of responses supports the prediction that in the verb case it is harder for the children to identify the intended referent and the child given a prompt simply reports an action which he believes could be occurring. In other words, in the NS_N-unknown condition the child knows he does not know the object and hence gives the NS as a response whereas in the NS_V-unknown the child is unaware that he does not know because reference has not been established. It is significant that in the NS_V-known condition the children produce a response referring to the action intended by E - it is not simply that in all cases the interpretation of the action is ambiguous.

The responses to the prompt question tell us two things:

- 1) Children can identify known objects and actions in the pictures though this may not be reflected in the choice of responses to the NS. The complete lack of "don't know" responses supports this interpretation.

- 2) They always respond with the appropriate part of speech to the question. Again this is not reflected in their choice responses for in the case of verbs there is a tendency to choose R3 - a picture which does not show an appropriate action.

I believe we can therefore conclude that any responses are due to the child attempting to determine the referent of the NS rather than any inherent problems with pictorial representation of NS_V-known, NS_N-known and unknown. The interpretation of NS_V-unknown results is unclear. Children may function exactly as they do in NS_V-known conditions because of the existence of alternative known actions in their vocabularies.

DISCUSSION

An initial perusal of the results might suggest some unambiguous conclusions. Children find the verbs in this task harder than the nouns and the known replaced lexical items harder than the unknown lexical items. Patterns of responses to choice and verbal items are similar though performance with verbal responses is poorer. There are, however, a number of issues which need to be clarified. In the case of the known/unknown distinction we must explain why this difference arises whereas in the case of the verb/noun distinction there are a number of methodological as well as conceptual issues which must be clarified.

Known/unknown appeared to be a significant variable only in the case of nouns. The most likely explanation for this result is that although identification of the correct response is easy for NS_N-unknown, this is not so for NS_V-unknown. I will deal at this point only with the noun case. Let us envisage the task from the child's perspective. The child hears a sentence in conjunction with a supporting pictorial scene. In the case of the known object he has a previously established label for each item in the scene whereas in the case of the unknown object there is one item depicted for which he has no label. In the latter case there are two unknown elements, a strange object which is being acted upon by a known and labelled animate being and an unknown phonemic sequence, whereas in the former case there is only the unknown phonemic sequence. Note that in the noun case the expression always refers to a concrete object - there can be no doubts about the nature of the object. It seems reasonable to suggest that the establishment of reference is pre-empted in the known noun situation because of the existence of an appropriate label. The strategy I am proposing that the children adopt is that if an unknown phonemic sequence is heard, whose reference is made clear because of the linguistic elements which accompany it or because of non-verbal information, the child will look for an unknown object; if no such object exists the child will

have to adopt an alternative strategy. It is significant to note at this stage that when children fail to identify the unknown referent in the NS_N-unknown situation they opt for a close alternative.... again unknown. However, in the case of the NS_N-known referent the whole process appears to be disrupted with a random choice of items ensuing. Note that children did have the alternative of making an R2 choice which contained an unknown referent. However, it seems in this case that knowing the name of the intended referent interferes with choosing an unknown but potentially appropriate alternative. Although such an interpretation is intuitively pleasing it does raise a number of conceptual difficulties - the key one being how do children come to learn that an object can be referred to in more than one way? A dog can be referred to as dog, Fido, animal etc. There are three points which should be kept in mind. In the first instance we must consider the age of these children. Three and four-year olds have fairly well developed lexicons and the size of the lexicon is increasing rapidly (cf. Carey, 1978a). A strategy of pre-emption would be a useful way of limiting alternatives. The second issue which is relevant here is the level of lexical specificity which the speaker uses. As I mentioned in the Introduction to this Chapter both Brown and Cruse discuss the fact that there is a level of lexical specificity which is neutral; one which is more likely to be used than another unless some contextual element in the discourse requires a greater or lesser degree of specification. Brown has argued that adults use this criterion when speaking to children. This ability of adults to anticipate the nature of the child's world is likely not to lead to children being presented with instances of synonymy or subordinate/superordinate relationships unless some extra form of information is included. There is evidence from Curtis (1974) that learning to master such relationships does in fact cause difficulties for the early word learner. Interestingly, McGarrigle, Grieve and Hughes (1978) have evidence which reflects on this issue though it was not intended to do so directly. McGarrigle et al were investigating children's

solutions to the traditional quantification class-inclusion task. This task requires a comparison between class and subclass. The child is presented with an array of wooden beads four of which are white and two of which are brown. This child would then be asked "Are there more white beads or more beads?" (cf. Inhelder & Piaget, 1964). The typical response of the preoperational child is that there are more white beads. McGarrigle et al found that altering the presentation of the task and giving a greater emphasis to the total class helped the children in solving the problem. I shall report one of McGarrigle's experiments so the reader can gain an idea of the manipulations involved.

McGarrigle used four toy cows, three of them black and one white. The cows were placed on their sides and the children were informed that they were 'sleeping'. The dependent variable in the experiment was the children's performance on two different questions:-

- 1) Are there more black cows or more cows? (traditional Genevan form)
- 2) Are there more black cows or more sleeping cows?

McGarrigle found in this and a series of other tasks that the children were more successful in answering the question when the appropriate distinction between class and subclass was linguistically and perceptually marked (cf. McGarrigle, Grieve & Hughes, 1978 for greater detail). What I am arguing is that by the inclusion of terms like sleeping cows (or, in other cases, the exclusion of distracting words) children are given information as to level of reference intended. Grieve and Garton (1980) have shown that children succeed in making comparisons between sets of objects when the comparison questions are symmetrical with respect to the referential status of the term, that is comparison of set with set or subset with subset, but when the comparison questions are referentially asymmetrical, calling for comparison of set with subset, young children typically fail. Again this is evidence that children are capable of using referential information, but it is comparisons between different levels of

lexical specificity which causes them difficulty.

This brings us to the third issue which is relevant here. Not only do adults tend to use terms of a set level of specificity (INS), but they also supplement the information by using such devices as lexical contrast. The two most commonly used devices are mothers' linkages of words to words in the same semantic domain and their supplying of comments which would add to the child's knowledge about a word, or about a world in which the word could be used.

In essence, what I am arguing is that children have two good reasons not to expect the new word in this situation to refer to a known named object; their own strategies for word learning and the lack of any linguistic information which would indicate that a change in level of analysis is required. Yet they are confronted with a referent clearly demarcated lexically and pictorially. They are, not surprisingly, confused. The present task emphasizes the difficulty in such situations because it is highly constrained. We must be aware that interpretation of this known/unknown dichotomy will vary between children and situations as well as with the degree of certainty the child has about the real word. For example, one can envisage a task in which while the new term refers to a known named animal the child interprets the new phonemic sequence as a proper name. Katz, Baker and McNamara (1974) have illustrated that the nature of the object is also of significance in such situations. Children 17-24-months old learned nonsense names for dolls and blocks. These authors concluded that for dolls children first discriminate individuals and learn their names; for certain other objects they do not discriminate individuals and learn only the class names. Clearly there must be a time in the child's development when he will be able to cope with expressions which explicitly refer to known named objects - a topic which warrants further investigation. In conclusion I would like to reiterate one point. In the choice of alternative responses in the known noun condition the situation potentially allows for a referential link to be established but

because of the child's lexical competence this process is inhibited.

The results of the present experiment indicate that children's performance with verbs is poorer than their performance with nouns. Despite my initial attempts to control for any such result being a consequence of methodological artifact, we are once again left with problems of interpretation. It can be argued that actions are not satisfactorily presentable pictorially. The core element of a verb for children is action (Brown, 1957) and the use of static displays is an unacceptable way of depicting action. Bruner (personal communication) reports that children enumerate the pictorial constituents and only later (6-7 years) begin to describe the relationships among the objects. This does not seem to be a satisfactory explanation. As I stated earlier, one of the reasons for choosing to present the task in a pictorial fashion was because Brown had used a similar procedure and obtained results which suggest that children were happy to have an action presented in a static picture. Brown found that children could clearly differentiate between nonsense words referring to movement, particular objects and extended substance (mass noun). Brown's choice stimuli were three pictures each containing an action, object and extended surface so there is no reason to suggest that one stimulus was more salient than another. Brown's study was directed at a different issue. He was concerned to know whether children could determine semantic properties on the basis of morphological and syntactic cues to parts of speech membership. He argued that the semantic distinction between parts of speech is much clearer for children than it is for adults. So we can only conclude that children are able to use such syntactic information and that with the prototypical examples of noun denotata - concrete objects - and verb denotata - actions - they are very successful. My results on the other hand suggest that children haven't grasped the part of speech because not only do they not choose the appropriate action but their alternative choice is not a similar action but rather the stimulus that

depicts the original scene lacking the action. Despite this, their response to the prompts do suggest that they know the intended part of speech. There are a number of possible explanations for the difference between the present study and Brown's but I shall focus on two, a methodological one and a conceptual one. The options which Brown offers in the choice situation are more limited than in the present one. Brown offers neither a pure context picture nor an irrelevant option. Each picture contains one of the original pictorial elements. It may be that if the opportunity of making a context choice had been available the children might have found this more salient. This alternative is lacking and the other two picture options were representing quite different actions; in one case the container was actually being raised. These are both actions which can be clearly depicted and ones which the child is likely to be able to name. The child's choice is more sharply circumscribed.

The conceptual explanation involves the nature of the verbs used. In the present study all the verbs used are two-place predicates, stating a relationship between two elements which are pictorially represented, eg. 'The boy is running to the house'. We might like to represent this semantically as run (x, y). Seen in this light the child 'knows' x and y perceptually and linguistically but not the word run and may be unsure of the exact action being depicted. What appears to be happening is that children are treating their knowledge of x and y, which are stable elements, as their criteria for choice response. They are not using their knowledge about parts of speech. Brown's terms are one-place verbs. However, we cannot conclude that it is the relational element which is critical for R3-type responses because as mentioned earlier Brown offers no context picture. In fact Brown's presentation of the new words to the children is somewhat artificial*, allowing no associations with actors or objects (cf. 1.6.3.) Surely this approach lacks external validity. It seems to

* In this picture you can see sipping, show me another picture with sipping in it.

me that if these tasks can be said to be externally valid and to reflect the child's competence as a word learner at all, then my task has parallels in the child's own experience. Consider a story situation. Even in the case of an ostensive definition one is more likely to say 'Johnny is running' than 'you can see running' as Brown does. I am arguing that with verbs of a relational nature the problem is establishing what kind of relationship is being indicated in a single referential act. It may take a number of encounters with the term for the child to tease the important elements out. In fact Gentner (1975) has suggested that motion is rarely used when establishing criteria for application of a new term. In Gentner's experiment both children and adults will tend to use form and use in preference to action, which suggests an extended learning process if the motion is in fact the key element.

Why is it then that children succeed in the tasks designed by Wykes and Johnson-Laird when the verbs are presented in sentence frames that clearly associate a subject and object with a particular action? My initial explanation of this difference suggested that part of the children's success was due to the fact that none of the terms used had a corresponding single term in English. However, the failure of the known/unknown variable to affect response rates in the verb condition indicates that this is not an adequate explanation. It seems to me that the difference may lie in the choice of verbs and in the range of response alternatives presented to the child. The published report of these studies does not contain detailed description of the stories presented or the objects presented in each response condition and it has been impossible for me, despite repeated requests, to obtain this information. One example is given and since this example represents a condition in which 60% of the children gave correct responses and was the second highest rate (66%, 60%, 46%, 33%), I do not feel I am being unjust by using it to put forward an alternative interpretation. I have argued above that it is the objects (x and y) that occur with the verbs that the children

initially focus their attention on. This is similar if not identical to the argument these authors put forward:

"In particular the subjects and objects that occur with a verb might help the child to infer its meaning.."

(1977;326)

The difference that I see between the two studies is two-fold. In the first instance the range of actions associable with the subject or object in the story must be restricted because of the design of their experiment. So, for example, in the story that we are given, the term mib denoted the action of spilling and soaking and therefore always occurred with a subject noun phrase denoting a liquid. The possible actions associated with my subjects was much greater. In the second place the choices for response offered in this instance were highly constrained. There was a female doll, a car, a ball and a container with orange juice in it. The story contained no female doll, no car, no ball but did include a cup with coffee in it and mention of another liquid (water). The container with a liquid in it is the closest physical possibility for response especially considering that all the noun phrases occurring with the novel verb denoted a liquid. What I am arguing is that the children need only have associated the occurrence of liquid with the presentation of the novel verb and learnt nothing more about the nature of the verb. So while focussing on the objects which occur with the verb in Wykes et al's study is informative and may lead the child to make a correct response, such a strategy in my study is less fruitful because the subjects and objects which occur with the verbs are not highly constrained and because the choice of responses allows the child to be misled by the context occurring with the verb. In one case the context is highly informative and a good basis for starting to construct a representation of the term; in the other case the context is less informative and will entail a longer mapping process. This example brings home the fact that although paying attention to the subjects and objects that occur with relational terms can

be an informative means of constructing a meaning, the extent to which such a strategy will be successful will depend on the number and nature of the selectional restrictions associated with a particular verb. I think it is the latter factor which may well explain the failure rate of the children in experiments 1a and b. In these story situations the verbs used were often nebulous, in that the subjects and objects occurring with them lacked the explicit restrictions forced in Wykes' study. As such Wykes et al's results can be seen as supporting the present hypothesis that it is the subjects and the objects occurring with the verbs that the children initially focus on when attempting to discover the intended meaning of a verb.

It is possible that the differences between the verb studies discussed here and my own one is due solely to the methods used or to the problems of using stative verbs. Alternatively, they may be due to a combination of the methodology and an intrinsic problem of establishing reference with a verb. At present I am in favour of the latter interpretation but there is no unequivocal evidence on which to base this claim. The implications of raising these issues as potential problems for the child as a word learner are fascinating. For example, it might be more appropriate for the child to deal with the acquisition of terms of concrete reference in a different manner from verbs, adjectives and relational nouns. This dichotomy might be associated with different strategies for establishing reference and discovering the denotation of a term. Clark and Clark (1977, Chapt.13) discuss two hypotheses concerning the acquisition of word meanings. The first hypothesis they discuss concerns semantic inclusion relations. The suggestion is that more complex meanings include simpler meanings - that is the one with the least semantic components. For example, in the case of dimensional terms the order of acquisition reflects the relative semantic complexity of the terms, with big and small being learnt before tall and short or long and short etc. (cf. 1.6.2).

Evidence from Gentner (1975) on the acquisition of verbs of 'mixing' follows this same pattern. The alternative hypothesis that the Clarks discuss to predict the acquisition of terms concerns basic level categories. Basic level terms name a middle level of categorization, Cruse's INS. Rosch et al (1976) argue that basic level terms should be acquired before more general or specific level terms. As such a child should learn the word dog before he learns animal or Irish setter. However, not all categories can be placed in such neat hierarchial arrangement (cf. 1.5.1). In certain instances the basic level hypothesis and the semantic inclusion hypothesis lead to different predictions about the order of acquisition. As the Clarks point out the semantic inclusion hypothesis would predict that children should learn the term animal before they learn dog because animal is less semantically complex. In this instance the data support the basic level hypothesis rather than the semantic inclusion hypothesis. However, data such as Gentner's conform to the predictions of the semantic inclusion hypothesis. There is, I believe, an underlying problem with these relational terms as to what exactly a basic level might be. It is surely a strange question to ask what the basic level for verbs of stirring is. The Clarks suggest that such a difference might be explained in the following manner:

"Semantic complexity of the inclusion type applies to relational terms and the simpler the relation the easier it is to acquire. But since category names are not relational in this sense those predictions do not apply and basic level predictions do"

(1977;501)

Speculation of this nature is stimulating but we do not have definite information that the acquisition strategies are different let alone that there are differences in semantic representation. In any case, differences in acquisition strategies do not necessarily imply differences in semantic representations.

CHAPTER 4

THE MISSING LINK4.1 The story so far

In section 1.7 I identified a number of experimental issues which I hoped to investigate in the first part of this thesis. A reappraisal of successes and failures is warranted before we examine the child's ability to deal with unfamiliar words from a different methodological angle.

An attempt was made to clarify some of the anomalies in the literature concerning children's competence with single presentations of previously unknown (novel) lexical items. It is suggested, there, that if the child identifies the referent intended by the speaker he can subsequently identify another instance if the new lexical item is not preempted in his vocabulary. As the reader will have realized, the situations presented to the children are highly constrained and when it is stated that the child can identify "another instance" I am in effect saying that the child chooses the most appropriate instance from a limited set. One of the major shortcomings of these experiments is that they make no attempt to determine the child's denotational boundaries. What these studies do provide us with is a systematic investigation of the child's (potential) data base for the ensuing development of denotational and sense relations.

If the child identifies the intended referent of the nonsense word and if this new term is preempted by a known appropriate term in the child's lexicon, the process of establishing reference is impaired. It is as if the children have made the inference that if an object already has a name it cannot be referred to and hence denoted by a different name. This confusion, which occurs in the case of preempted words, does not arise because the children do not know which item is being indicated. The data from the story task follow-up discussions and from the final sentence in the three sentence task suggest that the child does know which item is being indicated (only in the noun case) but is confused by the use of a new term for a previously named item.

The fact that children are able to isolate the correct object in these cases indicates that they are sensitive to the cues presented by the experimenter which indicate the intended level of specificity (CNS). If the child were not aware of the intended level of specificity we could not get the effect of known versus unknown nouns in Chapter Three. That is, if the children had not isolated the intended level of specificity it would have been possible for them to infer that the new word denoted some previously unnamed object or attribute of the object in the known noun condition and hence eradicate any difference between the conditions. It may be that the children do not identify the correct "action" because information concerning level of specificity is not appropriate for such terms and that to examine the acquisition of verb meanings we must use different cues to help the child identify the referent initially and then to proceed to discover the terms denotation, perhaps by the use of more specific selectional restrictions as in the Wykes and Johnson-Laird study.

What the child learns about the novel lexical item depends to a certain extent, as I have argued, on the nature of the new term. In the case of new terms denoting objects it seems that children pick up information pertaining to the object per se whereas in the case of the verbs studied, in Chapter Three, many of the children focus on the elements involved in the relation rather than on the specific action of state. It is suggested that this occurs because a specific action is harder to isolate and that one of the possible ways of isolated the elements or components of the verbs meaning is to discover which actors and objects can appropriately accompany it. Further work is necessary to test this hypothesis. It may be that different types of words require different systems of semantic representation, but this is by no means a necessary result. It is possible to use different routes on a map to reach the same destination; alternatively taking a different route may in certain cases entail arriving at a different destination.

As is often the case in studies concerning cognitive or language development the children's erroneous responses and their general comments about the task are often as informative as their correct responses. The studies discussed here are no exception. If we focussed solely on the correct responses it would not be unwarranted to conclude that learning the meanings of words is a complicated and haphazard affair and that children really aren't very good at it. Beneath the superficial confusion I think there is some important information both concerning the child as a word learner and for the psychologist designing such experiments. In Experiments 1a and b, where children are performing extremely poorly, many of their responses attempt to draw on the linguistic information presented in the sentences. Few of these responses are semantically empty. As we saw in Chapter Three when children make incorrect responses there is often an underlying pattern, as in the case of verbs where children choose the original context picture.

There is a basic problem with such tasks and it manifests itself in the difficulty the children have in successfully completing them, whereas in other ways they demonstrate some semantic competence. The crux of the matter is what we are requiring the children to do. The tasks fail to mimic the natural word learning situation if only because the child is required to reflect back on the linguistic input in a meta-linguistic manner. The child is being forced to pay attention to the word, an awareness which he may not have until later (cf. Papandropoulou & Sinclair, 1974), in a way that the normal process of communication may not require him to do. Although I have attempted to make the tasks as realistic as possible by the introduction of pictures and suchlike it seems evident that by asking a question of the form "What do you think an x is?" we are forcing the child to become explicitly aware of a process which may normally be functioning tacitly.

Litowitz (1977) argues that children must learn how to make verbal definitions. Dealing with words that are functionally present in the

children's vocabularies (ages 4.5 - 7.5) she describes 5 levels of verbal definitions:

- Level 1 - A non-verbal statement or a verbal statement which is semantically empty.
- Level 2 - Word associations to the original stimulus.
- Level 3 - Concrete examples of actual experiences associated as a predicate to the stimulus word. Occasionally the attribute given will be evaluative or an affective marker of the original stimulus.
- Level 4 - Some awareness of a definitional form (a set predicate) and a beginning abstraction from the individual experience towards social information.
- Level 5 - An abstraction from the individual experiencing of a lexical item in terms of class inclusion or membership and salient attributes or properties.

There are three points which I will make about Litowitz's data. The first concerns her own results. Even by the age of 7.5 no child had reached level 5 for any of the terms used and the verbs were extremely difficult for the children to define, a late acquired skill (cf. Wolman & Barker, 1965). The second point relates the form of definitions Litowitz received and those produced in Experiments 1a and b here. Many of the children in my study were responding in a manner which could be equated with level 3, that is they were attempting to draw parallels with their own experience to define the word. So the responses to nonsense words are not so different to those of known words. The nonsense word task places extra demands on the child since it involves either translating the unknown term into a known one, ie. lup = cat, or constructing an initial representation of a new term, and therefore the child may use more primitive definitional strategies. However Litowitz's data suggest that the form of these definitions is not solely experimentally generated.

The final point relates to any study which attempts to get children to define words and has to do with the level of linguistic sophistication

required to succeed in these tasks. There is considerable evidence that the emergence of meta-linguistic skills is a process acquired after a considerable degree of linguistic competence (cf. Levelt, Sinclair & Jarvella, 1978) and we may be underestimating the child's semantic competence by forcing an awareness which is particularly difficult and not required in the normal word use situation. The difficulties with meta-linguistic awareness are compounded when we take into consideration the work of Karmiloff-Smith (1979) which suggests that the processes by which children make linguistic decisions are not necessarily the same as the one's they say they are using.

So far I have gathered some useful bits of data. It is now necessary to attempt to integrate them into a more complete whole. To do this we must investigate the development of the child's denotational boundaries for comprehension and production (if possible); the semantic representation of the new term in relation to other words in the same semantic field; the importance of the linguistic input in determining the appropriate semantic domain. All these issues require that the children's knowledge of words is tested over a period of time rather than in a single presentation situation.

4.2 Where to next ?

We find ourselves in an experimental dilemma. On the one hand we must design tasks that make human sense to the child (cf. Donaldson, 1978), that is the tasks must have external validity and as such not force the child to respond in a meta-linguistic manner, yet we wish to do this without abandoning our goal of isolating the important variables in the word learning process. It appears that either we make the task realistic to the child and by so doing present him with a wide range of linguistic and non-linguistic information pertaining to the meaning of a new term or we severely limit the amount of information presented and hence force the child to place undue weight on single sources of linguistic or non-linguistic information. Similarly, since we require a response, either we wait for the child to present evidence of comprehension or production of the word spontaneously, and possibly never get our data, or we force the child to show signs of comprehension and production and in so doing possibly make the child aware of a process which is arguably tacit. The problem of designing experimental tasks is a practical one and ultimately rests upon the questions to which we want answers. The questions must be clearly formulated before attempting any empirical investigations. In this section, therefore, I will initially consider the key theoretical issues and will then discuss a methodological approach which has the potential to be developed so as to incorporate these issues and hopefully present us with some enlightening data.

Four topics concerning the acquisition of word meanings will be discussed: the formation and representation of semantic categories; the relationship between comprehension and production; the conceptual/semantic framework into which the new word enters; linguistic contrast as a source of semantic information. Each of these issues has been raised in some form or another with respect to the methodology or results of the preceding experiments. Consequently, each of these issues is viewed as critical and

worthy of further investigation; the missing link is how to investigate these variables experimentally for the age group under consideration.

4.2.1 The formation and representation of semantic categories

Acquiring the meanings of most words involves a categorization process - that is, the production and comprehension of terms of reference implies an underlying organizational process which is capable of guiding the application of a given word to an assortment of objects, actions etc. It is this categorization process, which objectively manifests itself in the child's actual choice of denotata for a given word, which constitutes the basis of a theory of the development of word meaning: What criteria do children use for restricting and extending the denotation of a new term? In turn, what kind of relationship eventually holds between the various denotata such that they form a coherent whole, - a concept?

The studies that were presented in Chapters Two and Three dealt with the sources of information children draw on in an attempt to grasp the meaning of a term in a single presentation. There was no means of assessing the denotational boundaries of these terms, nor if and how the delineation of these boundaries changed over time. Though the basis for future development of a word's meaning may begin from the first referent for which a word is used (Anglin, 1977; Bowerman, 1978) this is only the beginning of the word learning process. The development of word meaning is not, as I have emphasized, a simple one-trial affair; rather the process of learning the meanings of words is done slowly by repeated encounters with a word in a number of specific contexts (Campbell, 1978; Carey, 1978 a & b; Clark, 1973; Rogers, 1978). En route the children make two distinct errors (although it is arguable there are other less evident ones): errors of over-extension and under-extension of a term. Cases of over-extension are cases where a child's application of a word to a denotatum is seen from the adult's perspective as lying outside the denotation of that term, eg. the use of the term dog to refer to a cat. In

under-extension, on the other hand, the child's denotata are only a subset of the denotata that an adult would include in the denotation of a particular term. That is, denotation is more restricted for the child.

Since acquiring the meaning of a new word is a lengthy process, ideally one would wish to trace its progression from the child's initial encounter with the term to a later date when a case for the existence of full meaning could be made. As I stated in Section 1.6.1 this has not been done with preschoolers for a variety of methodological reasons. The data for this age group are either of the partial meaning stage (cf. Section 1.6.2) or of initial encounters with a previously unknown item (cf. Section 1.6.3). Most of the evidence concerning the semantic development of lexical items comes from diary studies

" For it is necessary to be in frequent contact with
a child to discover spontaneous applications "

(McShane, 1979:895)

One of the criticisms made about studies in semantic acquisition is that the strategies the children manifest are strategies for processing language rather than acquiring language. Nelson (1973) for example argues that the difference between these two strategies can be characterized in the following manner - Acquisition strategies are ones which add new elements to the original repertoire whereas processing strategies deal with how elements from the existing repertoire are employed in production and comprehension. I think there can be little doubt that the data from the diary studies reflect upon acquisition strategies.

What is the basis for children's early semantic categorization? Two opposing explanations have been proposed: those of Clark (1973, 1974b) and Nelson (1974). Clark maintains that children's extension of words to novel objects are based on perceptual similarity. Shape is regarded as the primary basis for extension but other perceptual features such as size, texture, movement and sound are also important. An example from Clark will serve to illustrate this point:

" Let us suppose that the child has learnt the word dog (or doggie); however, he only uses one feature to characterize the meaning of this word, so the set of objects that he will put into the category named dog will be larger than the set in the adult category. For instance, he might have characterized the word dog as meaning four-legged; the set of objects referred to as dog, therefore might include cows, sheep, zebras, llamas, dogs and anything else that is four-legged "

(1973:72)

I have discussed the semantic feature hypothesis in some detail in section 1.6.2 and concluded that the theory needs some modifications. This aspect of the theory does not concern us at present. The crucial point here is that to Clark the children pick out specific perceptual features as criterial when they first encounter a new word.

Nelson, on the other hand, stresses the primacy of functional or action-based categories. She argues that children are unable to break the object down into its perceptual constituents initially, and so the child first experiences the object as an unanalysed whole and classifies it according to the actions associated with the object and the relationships into which the object enters. Words are extended to new instances if the objects are regarded as functionally similar, ie. acted on or act in a similar manner. Perception in this theory plays a secondary role. It is not the basis for classification but plays a predictive role only. According to Nelson, therefore, the child must learn which relations are concept defining and which are not.

There is an implicit assumption in Nelson's theory that the child need not perform a differentiation analysis since the object is viewed as an unanalysed whole. It is as if somehow functional based categories are cognitively easier because the problem of analysing the object into components is removed. However, it appears to me that isolating which actions are criterial with relation to an object requires exactly the same type of selection and might in fact be harder because objects can be acted on in innumerable ways whereas perceptual features are possibly more restricted. It is noteworthy that despite the emphasis Nelson places on

the importance of relational and functional activity, her theory does not attempt to explain how words for actions and relationships are acquired.

Nelson's theory is in conflict with the ideas put forward in the preceding chapters that words denoting actions and relationships are in fact harder to acquire than object words. So far I have only established that children have difficulty identifying the referent of a relational term. But if actions and relations are the givens by which objects are classified, how is it that children have difficulty isolating relations as semantic categories per se ? It might be suggested that Nelson's argument is specific to the child learning his first words but in a more recent paper dealing with three to five year olds she concludes:

" We have found, then, that young children have a definition of object and category words which differs from their general knowledge and that this definition is functional "

(1978:66)

In this same paper Nelson makes the point that the definitional criteria which words elicit depends on the type of word:

" Thus, when the term to be defined is an action or function, it elicits people, places and things which are related through that action or function to the self. When the term to be defined is, however, an object or category, the functional aspect of the relation is central and the people, places and things are peripheral "

(1978:64)

As far as older children's categorization processes are concerned, despite Nelson's initial claim, it seems that different word classes produce different types of definitions, a result she acknowledges. Her conclusion here seems somewhat empty. It appears that all she is saying is that in defining a word children will give definitions which contain elements which are associated with the denotata of the word in real life eg. "eat"- "apple". Learning theorists have said such things for a long time.

Further, there is empirical evidence which casts doubts on a solely functional basis for semantic categorization. For example Anglin (1977),

examining the relationship between lexemes and their denotata found that perceptual features were the best predictor of over-extensions. Over-extensions by contiguous associations also occurred but there were no over-generalizations with a functional basis. It is possible that Anglin's lack of functional over-generalizations occurred because of a methodological weakness - his use of static pictures. However the same criticisms cannot be made of the data from Clark (1975) and Bowerman (1976, 1978). Both of these authors report cases of over-extensions which involve the use of given words for objects that are perceptually similar but have different functions. The children know from personal experience that the objects have different functions. Similarly, the fact that children first use particular object words to label objects in a non-action context (cf. Greenfield & Smith, 1976:213) seems at odds with Nelson's predictions that

" When instances of first concepts come to be named, it would be expected that they would be named only in the context of one of the definitionally specified actions and relationships"

(1974:280)

Clark's theory is not without its difficulties. The perceptual basis for over-extensions is not a satisfactory explanation when we consider relational categories. As Bowerman (1978) states:

" Something other than perceptual similarity is clearly involved in the acquisition of words like 'more' 'allgone' 'up' etc. since the objects or activities involved in the contexts in which children say these words are extremely varied. For many such words the governing concept or cross-situational invariance involves a certain kind of relationship between two objects or events or between two states of the same object or event across time "

(1978:268)

Gruendal (cited in deVilliers and deVilliers, 1978:134) reports data from a child who used the word bep to denote objects that were round and the word hat to denote any object he could put on his head regardless of form. Rings, marbles, lollipops and so on were bep; keys, a newspaper and a box he put on his head were hat. Such evidence would suggest that for the young child a variety of systems are at work and that which

categorization process is activated may depend on the isolatability and saliency of criteria as well as the context in which the child first meets the word and what the child initially believes is being referred to.

Accepting that we may find differences both within a particular child and between children as to their basis for categorization, what relation holds between the various denotata to which the child ascribes a word? Is it, as Vygotsky (1962) suggests, that the child's concepts are associative and diffuse, or should we assume as Clark and Nelson do that the denotata to which children extend words share particular attributes or features; these features, be they perceptual or functional, constituting the meaning of the word to the child? Bloom (1973) suggests that complexive association, that is the shifting from one feature to the next as the basis for categorization (cf. Vygotsky, 1962; Werner, 1948), occurs prior to any featural analysis. So that from Bloom's perspective there is a development from an initial complexive stage in word meaning to a featural stage. In contrast to Bloom, Bowerman (1978) provides data which lead one to conclude that both associative complexes, complexes where individual members do not necessarily share anything with each other but all share at least one feature with a central instance or prototype, and single feature analysis may occur contemporaneously. Different words may be represented in different ways. Such a conclusion is the most harmonious interpretation of the data accumulated so far.

4.2.2 The production-comprehension dichotomy

By their very nature diary studies reflect the productive linguistic competence of the child and tend to capture children's over-extensions rather than their under-extensions. It is obvious to the parent when the child over-extends a word to an inappropriate denotatum, whereas a variety of reasons may account for failure to name an object. Production data may provide us with a biased sample of the errors made by young children. Furthermore, the data from the child's productive vocabulary may underestimate the number of words in the lexicon - there may be words

the child can comprehend but not produce.

A common view, held until recently, was that comprehension develops in advance of production. That is, that children understand many words and grammatical combinations before they produce them (cf. Fraser, Bellugi & Brown, 1963). Goldin-Meadow, Seligman and Gelman (1976) conclude that young children initially have receptive vocabularies several times the size of their productive vocabularies. The logic of the comprehension-before-production argument rests on the assumption that while comprehension entails only identifying the item referred to, production includes both identification and a procedure for selecting a word appropriate to the initial identification and is therefore cognitively more complex. However, Clark, Hutcheson and Van Buren (1974) suggest that production and comprehension are less divergent than normally assumed. They suggest that there is an association between the child's capacity to produce an item and its availability for comprehension. That is, a word that is in the child's productive vocabulary is also more readily perceived and responded to. These authors make an important point by emphasizing the redundancy in the interactional setting for the child interpreting what is said to him, eg. pragmatic factors, intonation and various non-verbal cues. It is therefore possible that what might initially be seen as comprehension of a lexical item may in reality not involve semantic knowledge at all.

It is possible, as I have stated above, to argue that by focussing on the child's productive vocabulary the diary studies are in fact rather a stringent test of the child's linguistic competence, albeit one that tends to obscure phenomena like under-extension. This argument is viable only if Clark et al's suggestion that the two processes, production and comprehension, are intrinsically related is true. We have reason to question this conclusion.

Clark (1977) suggests that comprehension and production draw on a common lexical store. If, as she suggests (1973), the child's over-extended word use arises from the word's underlying semantic feature

structure we would expect that words over-extended in production would be over-extended in comprehension. The empirical evidence indicates that an alternative theoretical explanation is needed.

Thompson and Chapman (1977) have evidence that some words are over-extended in comprehension and production, others are over-extended in production only. This is an indication that:

" the child's representation of word meaning and its development cannot safely be based on production data alone "

(Thompson & Chapman, 1977:371)

Over-extensions in production are explained in a number of ways. Gentner (1978) suggests that children prefer to use a word they know well whereas Huttenlocher (1974) suggests that retrieval errors occur in labelling a referent. Bloom (1973) proposes that productive over-extensions arise because of vocabulary limitations. When a child doesn't know the correct term he may use some word related to it in meaning. Presumably, relation in meaning is based on either perceptual or functional criteria or degree of similarity to a prototype. The over-extension of words in production is seen as a communicative strategy. However, there were instances recorded in Thompson and Chapman's data where words were over-extended to inappropriate examples when the child had the appropriate word in his vocabulary. Bloom's limited vocabulary explanation cannot account for these instances. In summary, there is an indication that an asymmetry between the child's production and comprehension abilities exists.

Campbell and Bowe (1979) come to some startling conclusions after studying the production and comprehension of children's colour terms. Not only do they find evidence of inclusion of the comprehension range in the production range, as just discussed, but they also find instances where the pattern is reversed: that is, where the comprehension range is broader than the production range. These authors even report instances where the production and comprehension ranges are disjoint. In an attempt to develop further their idea that children's comprehension and production

ranges are "simply not inherently related" a supplementary study was carried out. Two groups of 12 children were presented with a sequence of three alternating sessions of elicitation and comprehension training with two kinds of unknown animal. The children were presented with a large array of animals, some known and some unknown, for the comprehension session and were taught to select anteaters when asked for tapirs and llamas when asked for gizmos. In the elicitation task the denotata were reversed, so while gizmo is correct for the anteater in production, it denotes a llama in the comprehension task. I ran a third group of children to examine the case where the denotation remains constant across the elicitation and comprehension sessions, as well as including the reversed denotation condition. Children were no better at learning the word with constant denotation than the words with systematically varying denotation and raised no objection to this bizarre procedure. This seeming lack of association between the two ranges raises a number of important questions. Is this lack of connection between comprehension and production applicable to all lexical domains or only particularly complex areas like colour? Does the relationship vary with the linguistic competence of the child or with the nature of his initial introduction to the term?

The reversed denotation data are insubstantial on its own. For example, the child's failure to comment on the bizarreness of the procedure may simply indicate that he is unwilling to question the adult experimenter. Hughes and Grieve (1980) have shown that children are willing to make judgements about bizarre propositions such as "Is milk bigger than water?". The willingness of children to respond to such questions without comment may mean that the children's failure to comment in the reversed denotation task is due to the nature of the adult-child interaction and the child's reticence in such situations. Alternatively, the child may be so overwhelmed by the minimal exposure to several animals that he is unable to maintain any systematic pairing. When Braun-Lamesch (1973) attempted to teach children five new animal names she frequently found that the children

were using the wrong name for an animal. In her study there was a very low rate of learning to criterion. Certainly her results are most satisfactorily accounted for in terms of processing limitations. The processing limitation criticism is perhaps more pertinent to my own replication and extension where three new animal terms were introduced.

Irrespective of such methodological problems I think the ground is clear for a revision of our ideas concerning production and comprehension. We are no longer sure if an initial relationship between production and comprehension can be assumed and any attempt to comment about the child as a word learner must take both sources of data into consideration. We must also continually bear in mind that evidence of comprehension may not be evidence of semantic knowledge because of other strategies for understanding available to the child. It is only through a systematic evaluation of these two systems in various contexts and with different word classes that we will be able to evaluate the relationship between production and comprehension.

4.2.3 Semantic fields

I suggested in the introduction to the thesis that knowing the full meaning of a word entails knowing the sense of the word as well as its denotation. The previous two sections have been predominantly concerned with denotation. The important issue at this point is what relationships between words are significant to the child? When a child learns a new word, how is it viewed in relation to other words, that is, what meaning does a lexeme have vis a vis other lexemes that the child knows?

One way of regarding the lexicon is to envisage it as divided into various semantic fields. Semantic fields are groups of words which are related to a particular conceptual domain. So for example the conceptual domain of colour is articulated linguistically by colour terms, the number of which vary between languages. As Lyons (1977) points out:

" the set of lexemes in any one language system which cover the conceptual area and, by means of the relations of sense which hold between them, give structure to it is a lexical field; and each lexeme will cover a certain conceptual area, which may in turn be structured as a field by another set of lexemes (as the area covered by 'red' in English is structured in turn by 'scarlet', 'crimson', 'vermillion' etc)

(1977:254)

The crucial question for someone considering the child expanding his vocabulary is when does he become aware of relationships within and between semantic fields. Bowerman (1974) believes that the child's knowledge of the relationships that words contract with other words in the lexicon is acquired after the child has been using the term in a denotationally correct manner (cf. discussion of the hypothesis in Chapter 6). In contrast, evidence from children's knowledge of colour terms suggests that they know something about the sense of the word before they are sure of the denotation of the term. Children realize that X is a colour before they have mapped out which colour X actually denotes.

In deriving a sense of a new term I think a number of factors will be significant for the child. In the first instance if the new word is a member of a semantic field for which the child, because of previous knowledge, has a number of features which are already established as lexical organizers (as long as the child realizes the new term belongs to this semantic domain), it may be acquired more easily. Similarly, if the child's conceptual knowledge regarding a particular domain is differentiated, eg. in the case of animals (Nelson, 1973) and the child is aware that the object being referred to is an animal, he is given considerably more information than he would be in being told that X is a polysaccharide, for example. In fact Harris (1975) has demonstrated that if an unknown word is predicated as a familiar entity, eg. a mib is a bird, five-year-old children will ascribe properties to it that they would ascribe the entity itself. Harris assessed this knowledge by asking children questions about the attributes of the novel word, eg. can a mib fly ?

There are certain meaning relations that are undeniably sense based such as synonymy, antonymy, converseness and hyponymy. A child saying that 'red' is a colour or 'dog' is an animal indicates that they have grasped the hyponymous relationship between the two lexemes. There are cases where the borderline between semantic knowledge and conceptual knowledge is difficult to determine, especially when dealing with children. Is a child who states all animals are alive presenting evidence of semantic knowledge or world knowledge? One could argue that [animate] is a component of the word 'animal' and that the child has grasped this; alternatively it might be that the child knows from his real world experience that animals are alive, or at least has not encountered any evidence to the contrary.

Nelson (1978) has attempted to draw an empirical distinction between the child's concept of a thing and his semantic representation of a thing. Nelson used two questions which were intended to illuminate the difference between lexical knowledge and knowledge about the world: 'What is x?' and 'What do you know about x?'. Nelson argues that:

"if the semantic system is originally undifferentiated from the general knowledge system, one would expect that the two questions would elicit similar amounts and types of information for younger children, but that both the amount and type of information would become increasingly differentiated as the child's semantic system contracted and the knowledge system expanded"

(1978:54)

Nelson's results support this expectation. There is a less interesting, but perhaps simpler, interpretation of these results and this is the questions simply produce different amounts of information with older children knowing more. Certainly the "amount" of data that Nelson has collected supports this interpretation and the data collected from the "type" responses does not contradict it. Children always give more information when asked the "What do you know about" question and this is true for all "types" of responses. The child being asked "What is x?" responds with a simple response, whereas the child being asked "What do

you know about" presents a multiple response. The amounts of information required are implicit in the question. There is no logical reason to assume that the single response is based on semantic knowledge whereas the multiple responses are based on conceptual knowledge. The single response might simply indicate a salient conceptual feature if the child has no single defining criterion.

Nelson's work demonstrates how difficult it is to separate semantic from conceptual knowledge for the child already in possession of the vocabulary items under investigation. Is it possible then to assess a new word's semantic representation and hence its relations with other words? I believe so, but it means maintaining a degree of flexibility with regard to conceptual versus semantic knowledge. The basis of this approach is that children will respond to words in the same semantic field in a similar manner. If a new term is treated in the same way as other words in a semantic field, we can infer that the child has some understanding that the two lexemes are related. So for instance if a child has just begun to produce the word banana, the sort of question which I am arguing is critical is whether it is used in the same context as other fruit words ... does the child even realize it is a fruit, that it is eaten etc? If the child knows, in some sense of the word, that banana is a fruit, he may attribute it with certain characteristics of his prototypical example of fruit, eg. that it is eaten for dessert. The latter is an example that reflects real world knowledge but if the child treats all fruits in a similar manner he is presenting evidence of a sense relation between the newly acquired term and a previously established semantic field. An experimental development of this idea would allow us to distinguish between lexemes which have sense and denotation and those that have only sense or denotation.

4.2.4. Lexical Contrast

We are interested in two aspects with respect to sense relations: the sense relations the child develops upon acquiring a new word; and secondly

the information the child can obtain from the linguistic context in which a new word occurs. 'Linguistic context' is without a doubt a vague and relatively uninformative phrase. Since the previous set of experiments were exploratory in nature they did not allow an identification of which source or sources of linguistic information were valuable to the child. There was an indication that if synonymy was not explicitly indicated, it was a difficult relation to grasp. That is two words denoting the same entity caused the children problems.

It is possible to present the child experimentally with different kinds of relations between words and to see whether this affects their representation of the new item. Hyponymy, synonymy, antonymy, part-whole relations and lexical contrast are all possible alternatives. It was impossible in the time available to investigate all of these variables, so it was decided to focus on one particular relation, that of lexical contrast.

Lexical contrast by its very nature allows one both to set up a semantic field and to limit the denotation of the term involved. When two terms are contrasted lexically this serves as an indication that the two terms are similar but that they differ in some manner that is not explicitly defined, eg. this is a boy, not a girl. The informative nature of the contrast depends on the terms involved and their semantic fields. Provided with a lexical contrast such as the one given above, the child not only knows that the two lexemes are related but also it limits the range of denotata to which the term can be applied, that is human juveniles that are not female. Barrett (1978) has proposed a theory of semantic development in which learning the relevant contrasts between objects is crucial. Barrett's theory is in reality only a variant of the semantic feature hypothesis (cf. Nelson, 1979) but it does emphasize an important aspect in the acquisition of word meanings - the differentiation process.

For the child to make use of lexical contrast he must (a) have some idea of which semantic field is involved and (b) be able to differentiate

the field.

Rogers (1979) has pointed out that mothers use two different forms of lexical contrast in their speech to young children: contrast within fields and contrast between fields. The existence of contrast between fields causes some difficulties for my suggestion - that it is an important source of information to the child. Contrast between fields does not delimit the child's denotation nor help to structure the semantic field in the same way that contrast within fields does. Rogers makes a similar point and his qualification concerning the nature of the between-field contrasts suggests that his data are not quite as awkward for my arguments as might initially seem:

"Clearly, contrastive linkages, cannot serve as an infallible indicator of relations between terms in a domain, because of the occurrence of between-category [field] contrasts. However, these are usually well marked as corrections, and show some intonational differences from within-category [field] contrasts"

(1979:13)

4.2.5 The Method

Recently, Carey (1978a) has devised a novel experimental approach which combines both longitudinal and cross-sectional methods in examining the acquisition of unfamiliar terms by preschool children. She studied the course of development of a single colour term in the lexicon of 14 three to four-year olds. The term Carey chose was chromium and it was intended to denote the colour OLIVE GREEN. The children first encountered the term in a situation which, Carey maintained, allowed the child the possibility of gaining the full meaning of the novel lexical item. Carey does not attempt to define "full meaning", so I shall resort to my own operational definition for guidelines at this stage. "Full meaning" entails knowing the sense and the denotation of a term.

In the introducing event children were asked to "Bring me the chromium tray, not the blue one", there being only two trays available. Clearly, successful performance in this introducing situation did not require the

child to pay specific attention to the new word per se. Carey plotted the development of the new colour term over a period of six months, both in a natural playgroup situation and in a number of production and comprehension tasks. Prior to the introduction event the children were presented with a colour identification task and their preferred term for olive green was established. Children tended to label olive green either as green or brown. Throughout the six-month testing period it became clear that two distinct forms of response to this experience emerged: one group of children interpreted 'chromium' as a synonym of green and the other group of children seemed to realize that olive was an odd colour and that it required an odd name but did not necessarily produce this name. Carey describes these two types of responses as fast mappings. In a fast mapping the child picks up some but not all of the relevant information about the new word. Only one child by the end of the six months had established full meaning of the term. It is, however, impossible from the limited nature of the assessment to see whether full mapping had been established as there were no checks for the sense/conceptual representation of the term. Carey herself is aware of this and repeated the experiment employing a number of design modifications (1978b). These alterations included a hyponym task. This task assessed whether children had learnt that chromium named a colour regardless of whether they had learned that it designated a particular hue. Children were asked if purple was a colour, cold was a colour etc. Included in these question frames was chromium and a nonsense word tearval. To be credited with a correct response children has to respond that all the named colours and chromium were a colour and that tearval and the non-colour terms were not colours. The task was not very informative as the majority of children replied to all questions in either the negative or the affirmative, although there were a few children (6/20) who gave the correct response sequence. In the replication, two of the children had established full mapping, six children could clearly be credited with some information about the novel term, eight children demonstrated no learning whatsoever

and two children were difficult to score. Carey concludes:

"At one level, these results are demonstrational: they show that half of the children picked up something about the new word "chromium" or the naming of olive from a single experience with the word. They managed to display that knowledge at an assessment one week later, in a context totally different from the one in which the introducing event had occurred.

That almost half of the children learned nothing indicates that these presentation and assessment conditions might be close to the limit of a three-year old's ability to achieve a fast mapping for a new colour word. Nonetheless, the first demonstrational results confirm the existence of a fast mapping, at least under these conditions"

(1978b:28)

Carey's method is the missing link for investigating word meanings. Her method allows us to trace the acquisition of a new word over time, to contrast comprehension abilities with those of production, to attempt to analyse the relations between words, to use linguistic contrast as a means of setting up a semantic field and to control the information that is presented to the child without making the task appear contrived.

There are a lot of questions which remain to be answered. Are children's mapping strategies always as idiosyncratic as Carey's data suggest? Is the lexical domain to which the word belongs important? Does Carey's procedure really test the limits of the child's abilities?

4.3. Aims of the second part of the thesis.

Using Carey's minilongitudinal method as a framework, the aims of the second section of the thesis are as follows:

- (1) To attempt to trace the development of word meaning over time and to therefore get a clearer picture of the development of the child's denotational boundaries.
- (2) To examine whether the distinction which manifested itself between different parts of speech in the first section of this thesis is upheld.
- (3) To examine both the child's comprehension and production of the novel lexical item and the relation of this new term to other terms in the same

semantic domain.

(4) To investigate the role of linguistic contrast as a source of information restricting meaning for the preschool child.

CHAPTER 5

A NOVEL ANIMAL TERM

This experiment is designed to trace the acquisition of a new animal term in the vocabularies of a group of three and four year-old children.

A simple concrete noun was chosen for two reasons. Firstly, there is very little information in the literature, at present, about the acquisition of simple nouns by children who are reasonably advanced in the word learning game, that is three and four year-olds. Is the older child so advanced that acquiring a new name of this sort causes no difficulties? Secondly, I suspect that part of the reason that Carey found so few children reaching full mapping of the colour term is due to the complex nature of the colour vocabulary. Several studies have suggested that the colour vocabulary is rather complex (cf. Miller and Johnson-Laird, 1976: 350-355). The correct use of colour terms by children generally develops rather late and as Campbell and Bove's data (1979) suggest there is something idiosyncratic about the acquisition of the colour lexicon. The difficulty with colour terms appears to be a semantic one since children are able to sort objects into their respective colour piles and children as young as 15 days have been shown able to discriminate between colours (Chase, 1937 cited in Miller and Johnson-Laird). It may be that because colours are on a perceptual continuum that children have difficulty isolating the appropriate denotational range. By choosing an animal term I am presenting the children with a distinct perceptual entity. There is evidence (Nelson, 1973) that small concept domains such as animal terms are differentiated from the beginning of the acquisition period. By the age of two or three, children have fairly firm ideas of what constitutes animalness, though this need not necessarily be in accordance with adult ideas. How does a child go about learning a new word which fits into a firmly established conceptual framework?

By the use of linguistic contrast I hope to make clear to the child that the new term denotes an animal. Of course it is not certain that the children will associate the word with my intended referent, animal. The

child may choose to associate the word with a salient aspect of the object that I present as the prototypical example of this new word, eg. its patterning. Alternatively, the child may associate the new word with a more general idea, for example in this case all animals who are found on farms.

However, assuming that some children will associate the new term with the particular animal, choosing a new word which fits into an already established concept allows us to examine how the child incorporates new instances of a category into an existing conceptual framework. Even in the initial stages of word learning children are by no means passive entities. By the age of three or four, children bring a great deal to the task at hand in the form of pre-established frameworks and expectancies. One of the main aims of the present experiment is to see how children can use their knowledge. A series of questions was, therefore, designed to assess whether children would ascribe the qualities they associate with animals to the new term.

The present experiment is designed to give children a series of quasi-natural contexts to develop the meaning of a word and to pursue the following goals. To explore the child's ability to acquire a new animal term and his ability to produce and comprehend this term in natural conditions with his peers. To look, in a series of experimental tasks, for any disassociation between comprehension and production within and between experimental situations. To extend Carey's work and to examine the possibility of fast mappings and the important elements in these mappings. To investigate whether the child does associate the new word with a particular type of animal, and if so, how it relates to his general concept of animal.

METHOD

SUBJECTS

Sixteen nursery school children, mean age 3;9 (range 2;11 - 4;8) participated in the study. Ten of the subjects were female, mean age 3;8 (range 2;11 - 4;8) and six were males, mean age 3;9 (range 2;11 - 4;7). The sample included all the full-time attenders of the Stirling University playgroup.

MATERIALS

One large toy farm, including two barns, a loft and a shed; an assortment of farm animals, four plastic cows, four plastic sheep, four plastic pigs and four plastic tapirs (whose function will be explained later). Ten photographs of these plastic zoo and farm animals were used in the follow-up session.

PROCEDURE

The children received a number of tasks in the following sequence.

Stage 1: Pretest

Each child was withdrawn singly from the playgroup and asked to name a number of plastic animals that were placed on the table in front of them. These were a pig, sheep, cow, tapir and wildebeest. The purpose of this section was to ascertain that the children could correctly name the farm animals and that they had no correct or consistent lexical entry for the animal to be chosen as unknown. This also functioned as a baseline for later production data.

Stage 2: Introducing event

One week later children were again withdrawn singly from the playgroup. Upon entering the testing room the children found four toy animals on the table. E explained that these had been left from a previous session and that they must be removed before the game could be begun. The children were asked to pass the animals one by one to E as she named them so that they could be put away properly. E then gave the child the necessary syntactic

and lexical information to form a full mapping, as defined by the experimental task, of the unknown referent - "Pass me the patas, not the pig, the sheep or the cow but the patas". Patas was the name given to the new animal. Children were then asked for each of the other farm animals in turn.

Stage 3: Comprehension task

One week later children were again withdrawn singly from the playgroup under the pretext of playing a new game with E. The conditions for the game are clearly delineated. Children are given the farm with 4 pigs, sheep, cows and tapirs on it and are allowed to play for a few minutes. They are then informed that E is coming to buy the animals from the child because she has no animals on her farm. E then "buys" each one of the animals from the child. The order in which each one of the four animals is requested from the child is randomized both between trials of four animals and between children. Once this sequence has been completed the materials are removed from the table and the child is asked whether he/she will answer some questions for E. The questions were designed to assess the child's ability to attribute animate characteristics to the sense of the new term.

Six question frames were used:

1. Can an x run ?
2. Can an x be painted ?
3. Can an x drink ?
4. Can an x break ?
5. Can an x eat ?
6. Can you step on an x ?

An extra question was included. The child was asked whether the item could make a noise and if an affirmative response was given, the child was asked to give an example, eg.

E "Can a car make a noise ?"

C "Yes".

E "What kind of noise can a car make ?"

C "It goes B rmm B rmm".

Eight individual lexical items were inserted in the 7 question frames; 3 inanimate objects, ball, car and plate; 3 farm animals cow, sheep and pig; patas and a control meaningless word withy. Any child that asked what a withy was, was told that it was a long piece of straw. A group of children from a different nursery who had not had the introducing event carried out the same task. This was done to assess the effect of the introducing event. *

Stage 4: Longitudinal sessions

Two weeks were allowed to elapse before this section of the experiment was begun. A play situation was arranged twice a week for the children in the nursery. On each occasion the nursery nurse brought the farm and the animals into the playgroup and placed them on a table. Playing with the farm and animals was completely voluntary. Occasionally the nursery nurse would sit around the table with the children and join in their games or generate discussion about the animals. These sessions were continued for a period of six weeks. During this period E had no contact with the children or the nursery. Video recordings were made of all these sessions through a 1-way mirror.

The role of the nursery nurse in these situations is obviously a key variable. For the first four sessions the caretaker was asked not to use the new animal term. After this period natural use of the term by the adult present was encouraged so that any reference she might make to the animals on the farm should include the tapir if appropriate. Similarly, any situation which involved questions about the children's activities in relation to the animals should also include the tapir if the situation demanded it.

Stage 5 Follow-up session

Two weeks after the last play session each child was tested in a series of production and comprehension tasks.

* Ten children, mean age 4;2 (range 3;3 - 4;11) from the student-run University nursery were used as a control group.

Section A: Children were asked the following question:

"Tell me all the animals that you can remember"

Questioning is continued until at least 5 animals are named.

Section B: Children were presented in a random order with ten pictures of toy animals: pony, anteater, tapir, cat, bear, panda, bull, tiger, wildebeest and a pig. The following questions were asked about each picture:

- (i) What's this picture of ?
- (ii) Have you ever seen one of these before ?
- (iii) Where did you see it ?

Section C: The questions that were put to the children following the comprehension task was repeated.

Figure 5.1 presents a flow diagram of the experimental procedure. The control group were presented with Stage 3 and Stage 5(i) only.

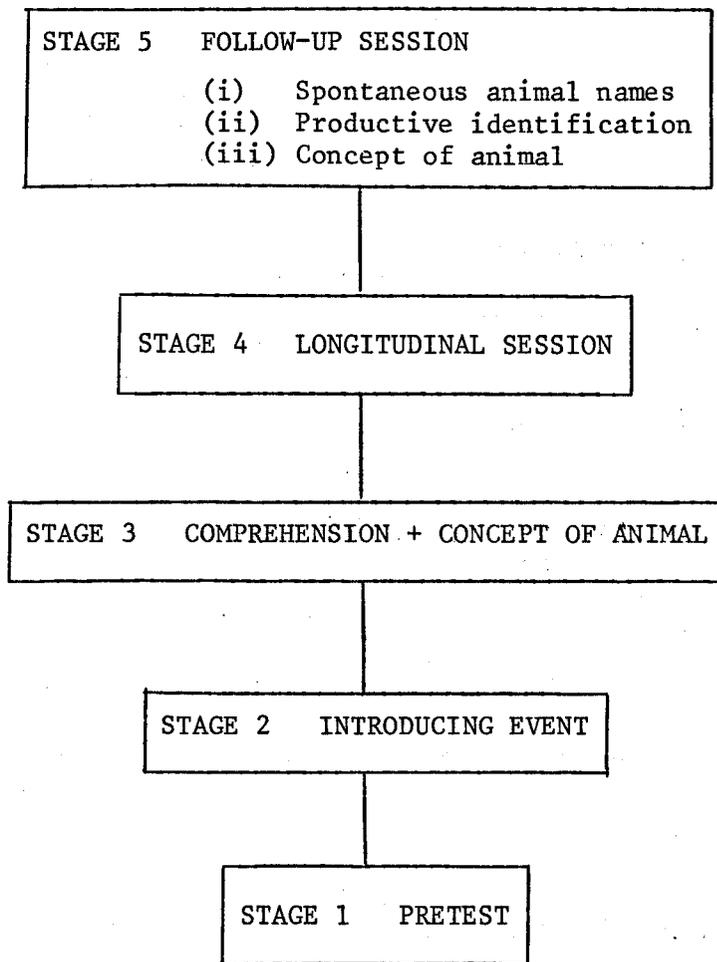


Fig 5.1 Flow diagram of testing procedure for experiment

RESULTS

I should like to work through the results for each Stage of the experiment independently.

Stage 1: Pretest. All children could correctly identify the farm animals. The two unknown animals elicited a number of responses. In the case of the wildebeest there were 5 "don't knows" and 11 attempts at naming. Children called it either a bull or a billygoat. In the case of the tapir "don't knows" were much more prevalent and the 6 incorrect namings were either pigs or cows.

The tapir was chosen as the experimental animal because for the majority of children it was not pre-empted by another animal term and for those children who did offer an alternative the animal name they chose to use to refer to the tapir would have a preferred 'bearer' present in the actual introduction event, an implicit suggestion that their original choice was wrong.

Stage 2: Introducing event. Surprisingly, in this situation, where children are given all the necessary lexical, syntactic and non-linguistic information for "full-mappings" the children have problems. Eight of the children began visually to search the room "looking for the patas". One child even got up and after looking around the room claimed that she couldn't find the patas. All children passed the tapir after a single repetition of the informative sentence by E.

Stage 3: Comprehension Session. Thirteen of the 16 children correctly chose the tapir as the referent for patas on the first trial and continued to do so thereafter. Only one child, the youngest (2;11) had (considerable) difficulties with the task, saying that she "couldn't find the patas": This child also had difficulties in the pretest. The other two children who were classed as initial failures were categorized as such because they asked for reassurance that they had chosen the correct object. It should

be noted that simply because the children choose the correct object as a patas it does not mean that the denotation of the term patas is being taken to be a particular animal. The word may be taken to denote a distinctive feature about the object that the children regard as salient. How the children represent the word 'patas' is shown more clearly by their answers to the questions following the comprehension session.

Only initially correct or incorrect responses were coded for the present analysis. Children often gave qualifying statements to their initial judgements which suggested that the initial judgement should be altered (generally towards a correct response) but because these comments were spontaneous they do not occur with all judgements or with all children and therefore any re-analysis would be biased.

It can be argued that the questions concerning inanimate properties are not related to the sense of the animal terms. It is not a matter of the sense of 'sheep' that you can or can't paint it, merely that one would not normally treat animals in such ways, ie. break a cow or step on a pig. In my experimental design I have fallen into the trap of confounding real world knowledge (what we normally do not do) with semantic knowledge. However, I think it is important to present these data. In the first instance it shows that the children are not simply responding in the affirmative to all questions containing animal terms. Secondly, it highlights the difficulties in designing these sorts of questions and hence investigating the sense representation of a term.

As Figure 5.2 indicates, the data show that the children treat the term patas as an animal term and that patas is unambiguously differentiated from the meaningless control word.

Children did not respond randomly to the question frames including the term wityy but predominantly answered the questions with "No" responses. A negative response is possibly the safest strategy in this situation where the child has no knowledge about the attributes of the object which is being denoted. Until the child has some reason to believe that an

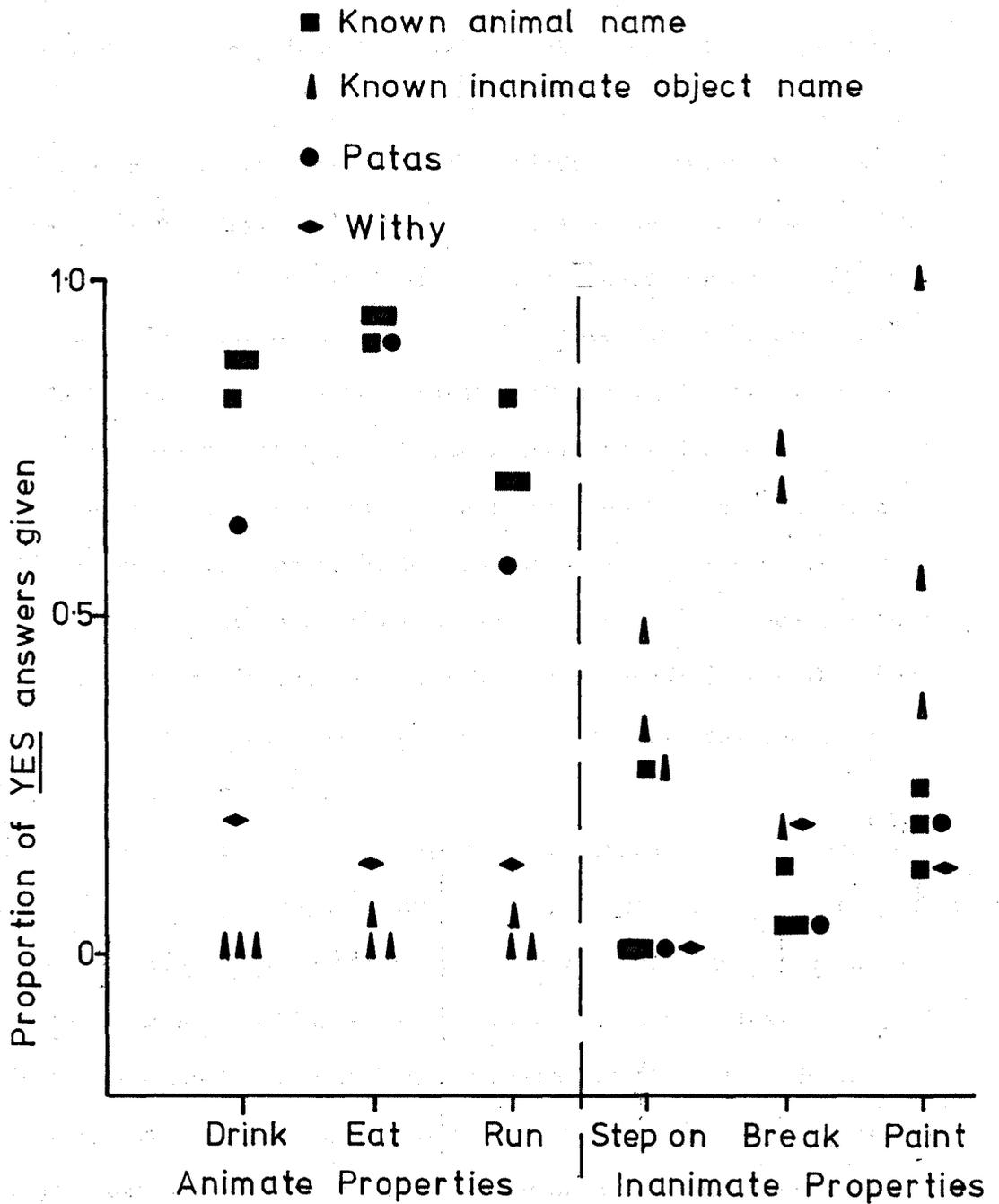


Fig. 5.2 Answer Pattern for Longitudinal Group in Comprehension

object has a particular attribute or functions in a particular manner (and if the child refuses to say 'don. 't know') negation is not a surprising response.

One of the interesting aspects of the children's answers to these questions is their qualifying statements. For example a child might deny that a cow could run but then say "only at fast speeds" or on the other hand deny that a plate could be stepped on "because you might break it".

There appear to be several factors at work here. Denials were followed to a far greater extent with qualifications and three classes of these can be identified. There is the child that denies that an event or relationship is possible because he has not seen or experienced it, or the child who denies an event is possible because of the consequences of that event and finally there is the child who denies an event is possible but qualifies it so as to allow some subcategory of the original event, eg. "run quickly" or "drink, only milk".

I have reanalysed the data for the final question because nearly all children gave qualifying responses here. The responses to patas are rather inconclusive (cf. Fig. 5.3) in contrast to the responses to patas in the other question frames. Looking at simple binary responses less than half the children accept that "patases" make a noise but if we include the qualifying responses we get a rather different picture (cf. Fig. 5.4). The "no" responses can be subdivided into three groups; denials because the child has never heard the animal make the noise (6), denials because the child does not know (3) and bizarre responses (1).

Control group: Figure 5.5 presents the data indicating the probability of successfully choosing the tapir as patas per trial in the comprehension sessions for both the longitudinal and control children. The difference in the curves is slight and analysis shows that the introducing event has no significant effect on the children's performance in the comprehension session (Fisher exact probability, $p = .18$).

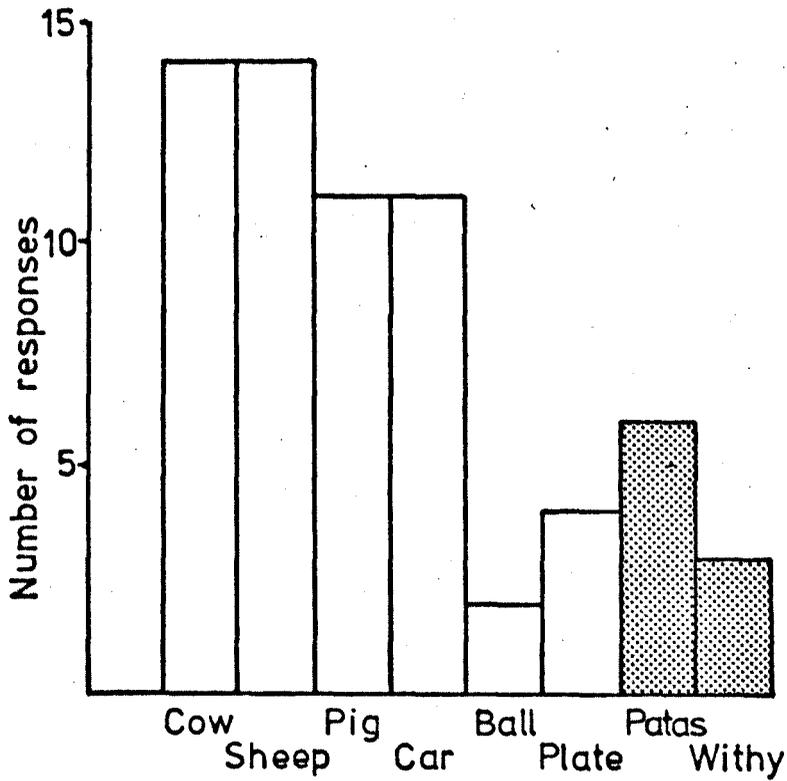


Fig. 5.3 Responses to question frame "Can an x make a noise?" (Longitudinal follow-up)

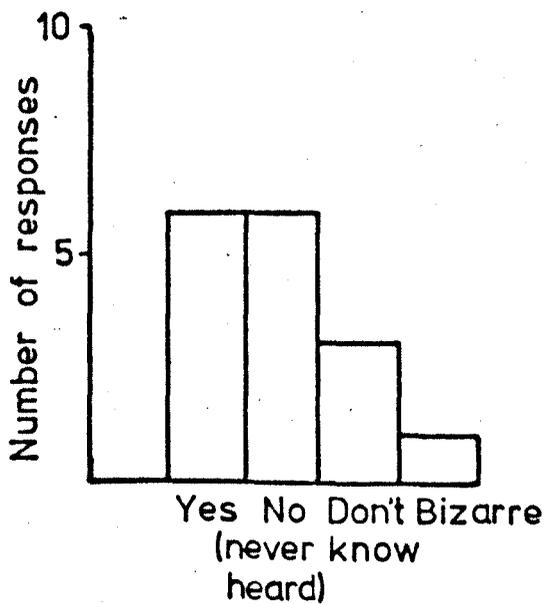


Fig. 5.4 Qualitative responses to question frame "Can a patas make a noise?" (Longitudinal follow-up)

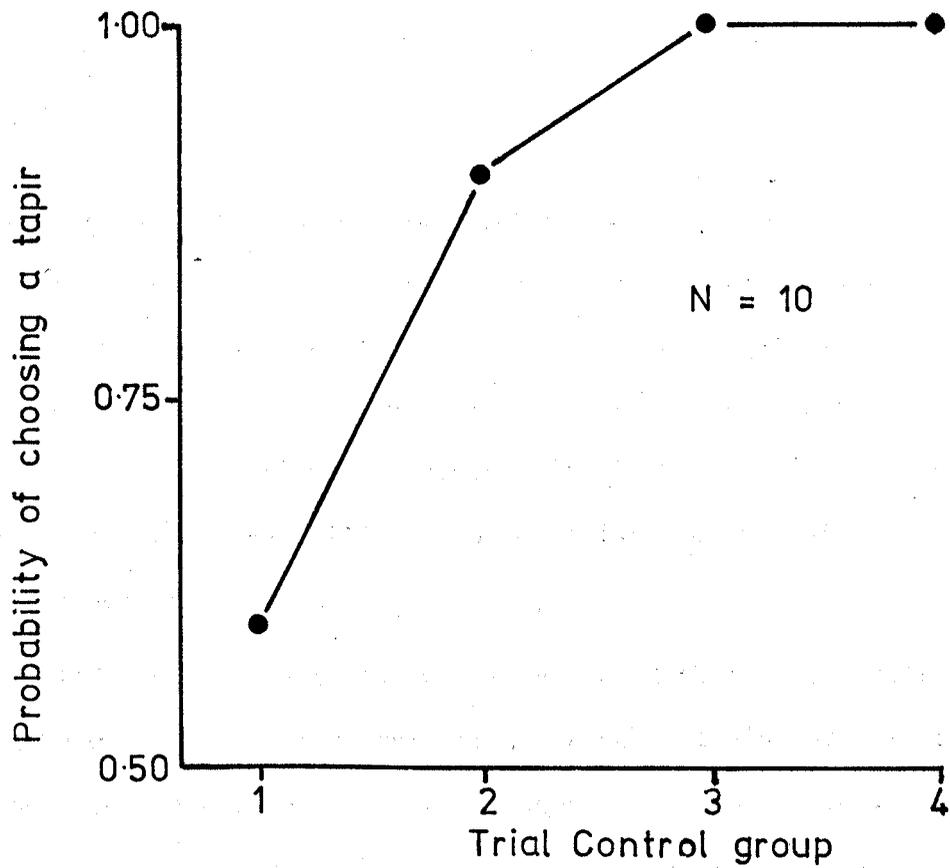
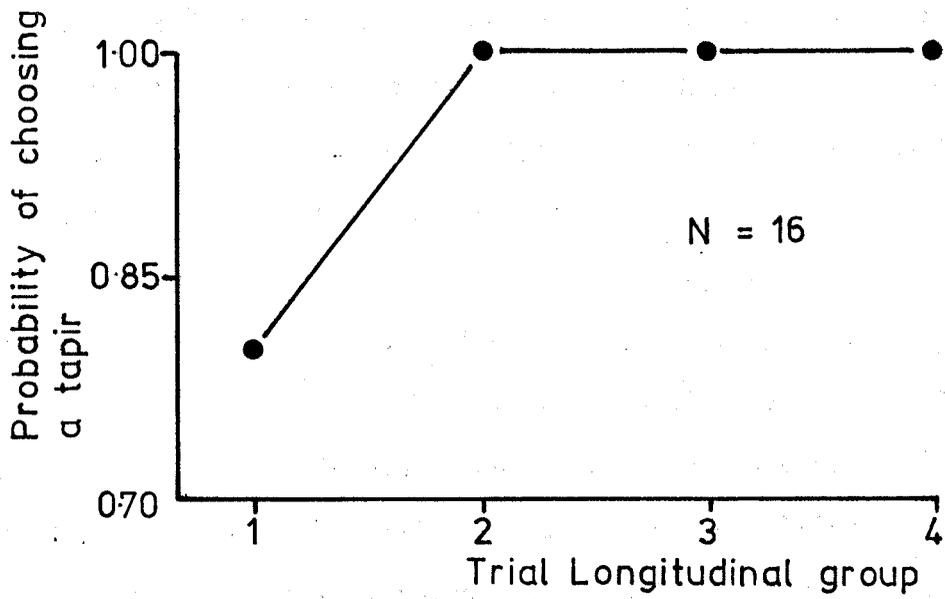


Fig. 5.5 Probability of correctly choosing PATAS to denote tapir over the four trials (comprehension)

However, it seems obvious that a ceiling effect is operative here both for the control and experimental groups. The children are extremely efficient at figuring out that an unknown word refers to an unfamiliar object and therefore to the tapir. Accordingly, even the control group (with no prior information about 'patas') perform at a high level immediately - an unanticipated result.

As Figure 5.6 illustrates, animate characteristics are attributed to the term patas by this group of children, but responses to withy are by no means as consistent as those in the experimental group. It could be argued that the experimental group's extra exposure to patas gives them an added advantage of familiarity, and hence an ability to distinguish between the familiar term patas and the unfamiliar withy. The lack of effect of the introducing event upon the children's performance suggests that this is a highly unlikely explanation. At present we must conclude that such variance is due to the random nature of these children's responses.

Withy responses: As previously mentioned, a meaningless word withy was incorporated into the experimental design to see whether the children actually learned anything specific to the term patas.

One interesting fact here is that well over half the children (9) responded to questions containing withy without any apparent signs of discomfort. Those children who were disturbed by this new word dealt with it in one of three ways:

1) Four of the children simply stated that they didn't know what a withy was, but asked no further questions. I did not tell them but continued to use the word in subsequent question frames. All these children responded from this point onwards without hesitation.

2) One child used what I will call the context strategy. She realised that I was interested in animals and she responded appropriately "I don't know all these different names of animals". This strategy becomes important in the longitudinal follow-up session.

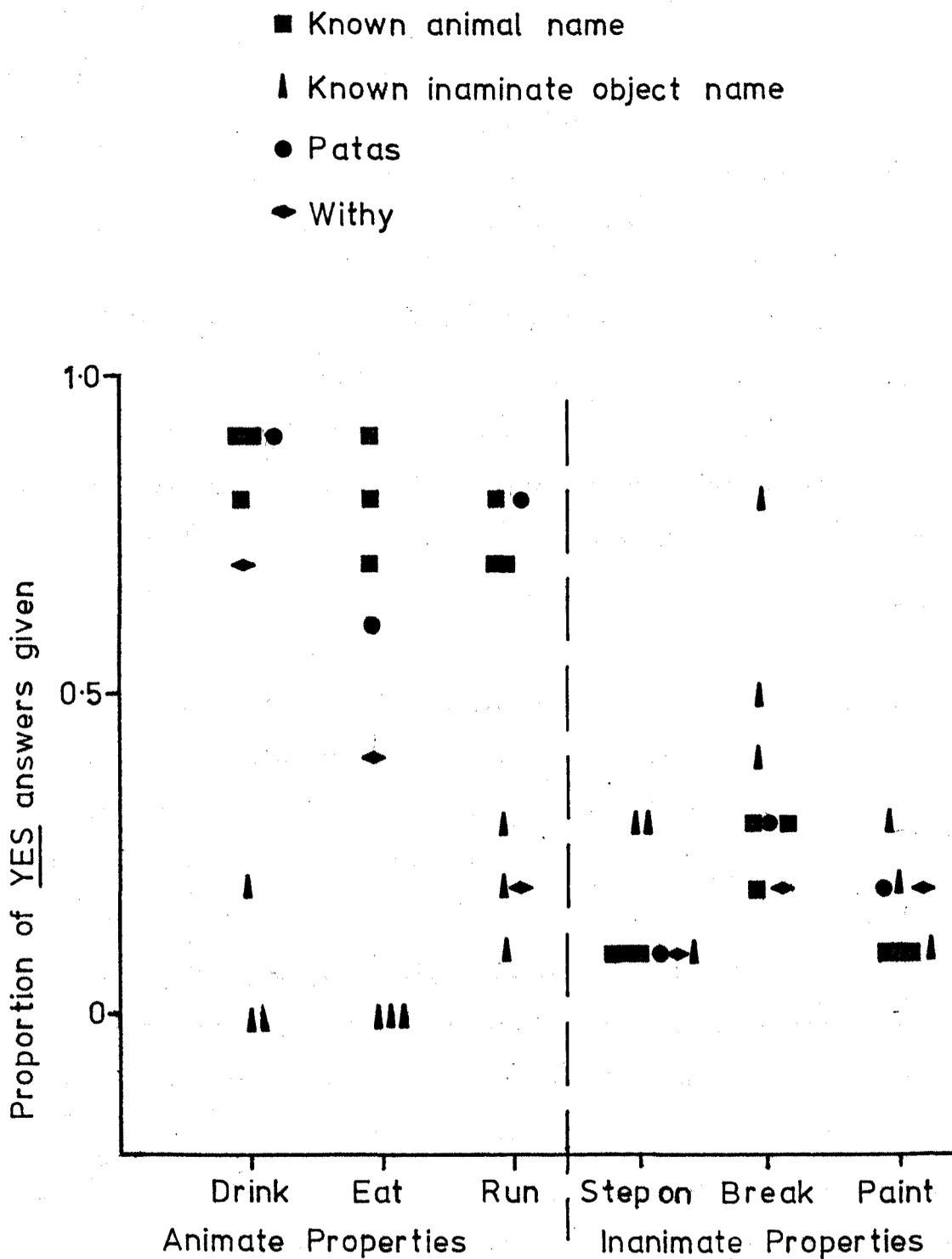


Fig. 5.6 Answer Pattern for Control Group in Comprehension

3) Finally two children used what I will call the informative strategy. When asked whether a withy could run they in turn asked whether it had legs. If it didn't have legs it couldn't run. Children were told in such cases that a 'withy' was a piece of straw. The responses to withy are interesting in their own right, for they tell us what a child does when he has no extrinsic information about a word found in a particular linguistic context. Even here there are ways to get a meaning.

Longitudinal results: Since the children immediately produced and apparently understood the term I shall give anecdotal examples from the video recordings to give the reader the flavour of the children's usage. First I should like to report my evidence for making definitive statements about the children's production and comprehension of the term. There was no significant difference between the mean production of the term patas ($\bar{x} = 4.2$) and the mean production of the other animal term ($\bar{x} = 3.83$), within sessions. Similarly, there is no significant difference for production of patas and the other animal terms between sessions. Neither can the production of patas be attributed to only a few children responding frequently. Fourteen of the children produced the term patas at least once. There is no evidence that there is anything idiosyncratic about the children's production of the term patas, see Figure 5.7.

Failure to understand the term can only be assessed if the child were to show evidence of misunderstanding, eg. asking for more information or pointing to the wrong animal when asked for a patas. No such errors occurred. The children appeared to have grasped the denotation of the term and spent a large proportion of their time when discussing patases deciding what they ate, drank etc.; that is they appeared to be constructing a store of knowledge relevant to 'patases'.

The following five examples will allow the reader to grasp the nature of the children's interactions.

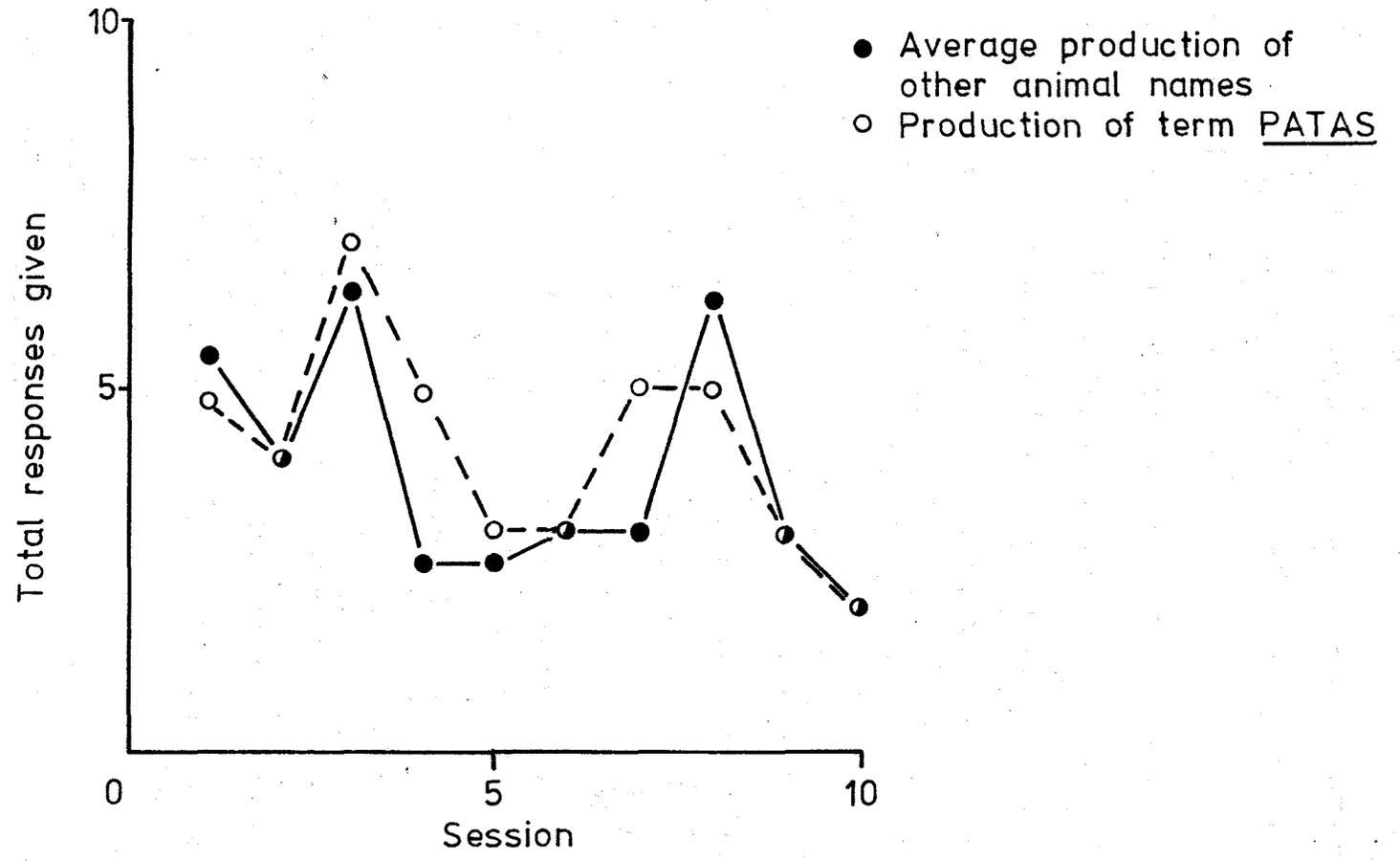


Fig. 5.7 Comparison of Productive use of PATAS and other Animal Terms over Test Session

1) During the first video session one of the children was sitting in a corner looking through a picture book with animals. After a while she approached the nursery nurse asking why there was not a picture of a patas in the book.

2) The children played many games on the farms but one favourite one entailed the tapir running and jumping over a fence. This was accompanied by frequent exclamations "Here comes the patas". "Quick make the patas jump".

3) When a new child entered the playgroup and was playing with the farm one of the older children took it upon himself to inform the new child that the tapir was called.

4) An interesting correction incident occurred when one of the children playing with the tapir made mooing noises. She was corrected by one of her peers being told "that's not a cow".

5) The nursery nurse was asking the children what the various animals ate. She was told definitively by one little girl that "patases eat grass".

The final anecdote does not come from the nursery situation but from one of the children's parents. I was approached by one of the parents and asked what a 'patas' was. He explained to me that he was driving two of the children home and they were discussing what they had done in the nursery. They said "played with pigs and patases" and recounted that the "patases were running and jumping".

Stage 5: Follow-up session

No children in the control group identified the picture of the tapir as a 'patas' and in the ensuing discussion about animals no child mentioned the name patas. These results contrast dramatically with those of the experimental group.

Twelve of the 15 children produced patas when asked to list animal names. The fact that 10 of these 12 children produced patas first suggests that the children had been sensitized to the new term in some way. It is

possible that they associated their first encounter of the term with the experimenter, though the spontaneous use of the term when the experimenter was absent is evidence that the term was not restricted to this initial association.

Thirteen of the 15 children correctly responded with the term patas when shown a picture of a tapir. Eight of the 15 children said that they had seen the animal before. There is a problem of interpretation with this question in that children may well make the assumption that the question refers "to seen in real life". This idea is partially supported by the fact that three of the children who said that they had not seen the animal could associate it correctly with an environment. Ten of the 15 children gave appropriate responses to where the animal is found, six said a farm, three said a field and one said a house. All these responses are appropriate considering the knowledge children have about 'patases'. The tapir had been seen by the children on a toy farm which had a field and there was a special house which the children had kept for the patases.

The children's responses to the question frames including patas do not differ significantly from the earlier presentation of these questions. They still clearly treat patas as a name for an animal. The interesting change here is the responses to the meaningless control word. Some of the children are beginning to attribute animal characteristics to withy. The demand characteristics of the task are plain to some of the children by this stage, since they know I am interested in animals. As one child reported "These are funny animals - I don't know these names".

DISCUSSION

The perceptual and linguistic contrast in the present experimental paradigm allows children to form an initial referential relationship between a fairly sharply circumscribed set of objects. This the children do almost immediately. The children's failure to overextend the term to the other strange animals in the picture identification task suggests that the denotation of the term has been limited. However the precise criterion that each child has settled on has not been examined. So we are unsure to what extent denotation has been mastered. However, not only do children recognize that patas denotes a physical object satisfying some set of perceptual criteria but they also realize that patas designates an animal, that is the new term has been incorporated into a particular semantic domain. It is worth noting at this point that there was no observed disassociation between comprehension and production. The term was used and apparently understood both in the structured testing situation and in the free play in the nursery and with peers and other adults.

We have, I believe, strong grounds to suggest that the child knows the sense of the term and is in the process of delineating denotation. It seems that for all the children full mapping of this new term is well on the way to completion. Superficially these data might appear contradictory to Carey's results where only one child established "full mapping" after a period of six months. However, I do not believe the results to be in conflict. There are two major differences between her study and the present one; colour vocabulary may well be more complex and the conceptual framework on to which the term is be mapped may be less well established.

The actual physical characteristics of the animal are qualitative and salient as opposed to the (gradable) differences in colour. It is interesting to note that many of the playgroup interactions that focused on the tapir elicited comments about the object's salient perceptual features, eg. its long nose or its clear black and white markings. No such comments were

noted about the other animals. Being able to identify distinctive features of an object is a clear advantage in isolating one particular referent from a group of possible referents. There are no defining attributes of a particular colour and even adults may have problems identifying a particular colour. Another peculiarity of the colour lexicon is the ease with which colour terms denoting perceptually similar groups of colours can be interchanged. While I might label an object as blue another adult might label it as green and yet another as turquoise. It would be a bizarre situation indeed were the same object to be labelled as cat, dog and rat by different adults.

As I have already mentioned children of three and four have fairly firm, if often erroneous criteria for animal concepts. Suppose a child already knows what an animal is. When he is exposed to a new term which he takes to denote a type of animal, he need only add this new animal term to his previously established lexical/conceptual framework. Bartlett (1978) in a discussion on the acquisition of colour words makes a similar point:

"we must emphasize once again that lexical development depends on both the store of phonological units available for the child to use as words and the conceptual system available for mapping meaning onto these units"

(p104-105, 1978)

New words which are members of semantic classes that have not been firmly defined or that are themselves ill-defined are open not only to the ambiguity of the referential situation but also the ambiguity or possibly complete lack of conceptual organization of the appropriate reference domain. If the child does not realize that certain verbs are relational, he is unlikely to succeed in deriving their meaning regardless of the situation in which he encounters it. It may be that in such situations the context of the word's presentation is given undue weight (cf. Donaldson and McGarrigle, 1974). In these cases the ontogeny of word meanings is a long drawn out procedure with many possibilities for errors.

These factors are only important if the child sees the new word as referring to an animal. I think it is clear that in this situation he does, although it is perfectly justifiable to argue that in this situation there may be no alternative. What governs the level of analysis that the child chooses to use? Here the initial choice of the tapir is governed by the alternatives given to the child and the structure which controls the comprehension task. There is a farm on which there are three animals for which he has already firmly established lexical entries; he has previously received information as to the nature of the game, ie. that animals are to be passed between E and the child. So once explicitly and once implicitly the child has been told what the key items are ... animals. So in many ways the level of analysis is determined by this information and the child appears to be sensitive to these cues. Anglin (1977) has shown that children first learn words at intermediate levels of generality, usually at the level at which the objects are behaviourably equal for him (in this particular case animal). I doubt that the task would have been as easy if the new word referred to the specific colour patterning of the animal and had been contrasted with the patterning of the other animals.

The present experiment has not shown that linguistic information, in this case lexical contrast, is sufficient for the child to start the acquisition of a word process. Rather I have shown that lexical and perceptual contrast in one particular semantic domain allows the child to be extremely adept at picking up certain aspects of a word's meaning.

If more unknown animals had been present, as in Braun-Lamesch (1973) or if the contrast had been purely linguistic, eg. I like bananas not Ns-aubergines, or if the new word was pre-empted, the results might have been very different.

In conclusion I should like to reiterate the fact that children with no previous experience of an unknown lexical item will choose a previously unnamed stimulus as its referent almost immediately. I have replicated this study with a different semantic domain, that of fruit terms, and the

conclusions remain the same. This is an extremely useful strategy for the early word learner and contrasts dramatically with the results of the story tasks (Experiments 1A and B) where the child had names for all the items presented in the choice situation.

CHAPTER 6

A NOVEL TERM FOR A MODE OF LOCOMOTION

The results presented in Chapter 5 suggest that children can use contrastive information in a restricted referential situation to grasp the denotation of a new term. The term can be subsequently used in comprehension tasks and in spontaneous and referential production. These results contrast dramatically with the performance levels described in the earlier studies. It is not my intention, at this stage, to comment on these discrepancies but rather I would like to expand on the data reflecting this difference. I shall do this by drawing on a difference in performance revealed by the earlier studies - the difficulty that children experienced with verbs in contrast to nouns.

It was suggested that by their very nature verbs might be harder for the child to analyse in a single presentation. Theoretical support for this contention came from authors who suggested that verbal semantic fields had more complex meaning patterns than nominal ones (Miller and Johnson-Laird, 1976:666). In a single presentation the element, an unanalysed form, may be described extensionally by the set of objects it relates to on that occasion. Subsequent encounters would allow a child to extract the criteria for use and to analyse the term semantically, that is to allow a semantic rather than a referential representation to develop. The reasons for conducting the present experiment are: to increase our understanding of the child's acquisition of word meaning over time and to investigate whether the difficulties encountered with verbs in the earlier cross-sectional studies are still present in a situation where a child has a series of exposures to draw on.

What sort of results might we expect? The only experimental study which traces the acquisition of a novel verb is one reported in Ervin-Tripp (1971) by Wick Miller. In this study a single child was taught artificial words by an experimenter over a period of about a year. The experimenter

and a two-year old child played a game with plastic beads. The experimenter used the noun po to refer to beads of a particular kind and the verb sib to refer to actions of a particular kind. The child first used the noun at age 2;2 after 67 inputs; the verb was not used until 8 months later after 164 inputs. This experimental evidence would corroborate naturalistic data from Goldin-Meadow et al (1976) suggesting that production and comprehension of verbs lags behind production and comprehension of nouns.

From a rather different angle Rogers (1979) has examined mothers' ways of specifying potential use of kitchen utensils to young children and has found that by far the most frequent manner of doing so was by pairing an action and an object rather than simply specifying action or object or consequence (cf. Section 1.6.1 for greater detail). Evidence from Nygren (1972) suggests that this sort of pairing is important for early use of a verb. Nygren presented 3-11 year olds with questions containing instrumental verbs, many of which had a semantically unusual combination of elements, eg. can you saw cheese with a knife ?; can you chop wood with an axe ?, or can you shave wood with an axe ? Nygren found that kindergarten children in contrast to older children had the largest percentage of responses that indicated that usual verb/instrument pair had to be kept intact. The younger children had the largest percentage of "common" situation responses for the instrumental verbs. Nygren concludes from her data:

"It seems that two phases of differentiation occur. First the differentiation of the elements of verb, object and instrument from the usual situation, and then the differentiation of the elements of meaning from these three elements and the decision about which is crucial. The decision about which is crucial is a long process and it seems like the strategies for finding crucial elements swing back and forth from overdifferentiation to overgeneralization"

(1972:67)

It is worth emphasising two points about these studies. In the first place verbs appear to involve a longer acquisition period than nouns. Secondly initial understanding of a verb often pairs the action with a particular object or situation response, eg. sawing wood with a saw. Interesting

evidence from a different perspective in support of this second contention comes from Clark (1980:7). She noted that:

"To communicate about particular actions many children take up the option of coining new verbs from nouns where the noun in question designates one of the objects involved in the particular action they talked about, eg. watching a truck pass - "it's trucking" "

The most detailed analysis of children's acquisition of verbs comes from observational data collected by Bowerman (1974, 1978a & b). She discusses children's initial meanings for lexical items and how they develop over time, a process which she claims exhibits semantic reorganization. Her thesis is supported by a series of systematic errors produced by her children after a period of apparently correct use. It is possibly significant that the majority of these errors occur in the child's use of relational terms, eg. verbs or locative particles. From the data that Bowerman collected pertaining to the child's errors with causative verbs, she concludes:

"In her initial usage the child is not yet in any sense aware of their internal structure in the way that she must become before she could begin to create novel causative verbs by analogy with existing ones"

(1974:154)

A similar line of argument is taken for the occurrences of errors with words which encode motion/manner/cause, verbs that are prefixed by un and substitution errors, eg. behind for after. In all cases initial correct usage is followed by a period in which particular rule-governed errors occur, a period of semantic reorganization. A similar point is argued by Walkerdine and Sinha (1977). Their

"Results suggest that children initially understand and use spatial relational terms as a part of the global, undifferentiated functional context of their experience"

(1977:164)

Initial use is in terms of normal functions in instances where the term is habitually applied (cf. also Hoogenraad et al, 1978).

It seems to me that this account which implies a gradual abstraction of elements of the meanings of individual words has a number of important

consequences. In the first place, it allows a qualitative distinction to be drawn between earlier and later uses of these types of terms. This distinction may be that the initial word meaning is a referential relationship between word and world, whereas the latter relationship involves word-word relationships within a semantic field in addition to the denotation of the term. In the second place it raises a number of questions about the acquisition of other types of words. Must we make more qualitative distinctions or simply quantitative ones? Errors with nominals tend to occur early on in the child's language development and are reflected in errors of over- and underextension. The only type of error pattern which seems similar to the one that Bowerman reports is the child's difficulty in dealing with subordinate and superordinate nominal categories. Grieve and Hoogenraad give an example of a child who initially uses car correctly but having learnt the subordinate Mini no longer accepts that minis are cars. Though this error seems to be similar in kind it appears to be more closely associated with classification and with the hierarchical arrangement of nominal categories. A more appropriate comparison would be if the following error occurred with the acquisition of verbs, i.e. correct use of the term run for all types of running; acquisition of the term sprint and denial that this is running. Bowerman's errors on the other hand are intrinsically related to the nature of the word, eg. causatives and the situation of use, though situation can be a critical variable for very early acquisition of nominals (Braunwald, 1978; Nelson, 1974). Situational variables do not appear to be as critical for acquiring the meaning of nominals and is reflected in the fact that the children appear to learn to produce and comprehend nouns before verbs and the early errors with nouns, such as they are, are very early.

Bowerman (1978), on the other hand, suggests that acquiring the sense of non-relational terms, i.e. nouns, will be a longer process.

"This asymmetry in the distribution of errors may be a function of the order in which semantic integration occurs for different words: children may come to appreciate the semantic similarities among relational words earlier than other kinds"

(1978:984)

To make this suggestion Bowerman draws on results by Gentner (1978) which suggest that the components of verbs and other relational words are "both less redundant and less densely interrelated than those of simple nouns". Bowerman's suggestion is that children might be able to tease apart the important meaning elements of relational terms and recognize them as having recurrent organizational significance and that analysis will be harder in the case of concrete nouns. But Gentner, herself, does not arrive at the same conclusion:

"First, verb acquisition is a slower process. Verbs enter the vocabulary later than nouns and the rate of vocabulary increase is lower for verbs than for nouns. Further, the meanings of many common verbs are not fully acquired until the age of 8 years or older"

(Gentner, 1978:996)

Moreover, there is evidence that the object categories a child learns to label first normally differ in a large number of dimensions and that these dimensions are interrelated in a complex manner. Ricciuti (1965) and Nelson (1973a) have shown that young children can perform well with sorting tasks when it is members of a natural kind (ie. a complex cluster of attributes) that are to be grouped, but use of a single attribute as a basis for sorting or matching is a much later acquisition (cf. Vygotsky, 1962). Furthermore, evidence from the Patas study (Chapter 5) suggests that three and four-year old children do have an organized semantic domain at least for animal terms. I would suggest that this is probably true of other nominal categories, eg. fruit, despite the dense and related nature of their components. It may in fact be the case that the dense and related components along with the possibility of a concrete referential act allows the child to build up a conceptual framework faster, although this framework need not be identical to that of the adult.

Alternatively, one might wish to take a completely different linguistic stance and argue different animal terms are distinguished simply by an index (cf. Leech, 1974:106-108). Whichever view one advocates, it seems doubtful that the sense relationships of non-relational terms are acquired after relational ones.

My earlier use of verbs in Experiments 1A and B and 2 exposed a number of methodological problems. In effect these can be summarized by my attempt to treat verbs as a homogeneous group of lexical items, an assumption which is clearly unjustifiable (cf. Lyons, 1977). The experiments reported in Chapter 1, although emphasizing the lack of hierarchical organization in verbal semantic fields, present the children with a selection of verbs, from various semantic fields, the crucial constraint in this experiment being that they conformed to the prerequisites of the experimental design. The pictorial data, in contrast, use only stative verbs but as Lyons (1977:706) says

"Most verbs, in all languages, are inherently dynamic, in that they normally denote either events (including acts) or processes (including activities) rather than states"

It was therefore decided in the present experiment to choose a single verb which epitomized our common understanding of the term, a verb of motion,— "purest and most prototypical form" (Miller and Johnson-Laird, 1976). Verbs of motion are verbs:

"denoting a process in the course of which some entity changes in physical location"

(Lyons, 1977:494)

I chose the semantic field of verbs of travel for two reasons. Firstly, Miller and Johnson-Laird (1976) have attempted to work out meaning representations for this semantic field, so I would have some theoretical notions for comparison. Secondly, pilot studies indicated that children have some sort of framework for these kinds of verbs of motion so the new word would not be learned in isolation.

Having decided on what type of verb to study it was necessary to choose a mode of locomotion that was novel for the children and corresponded to an actual (and accidental) lexical gap in the child's vocabulary. Similarly it was necessary to choose an object that would locomote in this manner. Nygren's results suggested that we should be wary about introducing the child to a novel form of locomotion for a known object since some other

verb of motion may well be 'tied' to the object. Hence it was decided to introduce the children to a new but plausible object for locomotion. Bearing these factors in mind the children were introduced to a means of travelling that entailed going across snow called zutting. It was possible to contrast this new means of locomotion with motion verbs such as sailing (going through/across water), flying (motion through the air). The object which would 'zut' was called a skidoo (a form of snowmobile common in Canada). The term for the new object was introduced by implicit ostension. That is children were not explicitly told "This is a skidoo".

To investigate the child's semantic representation of the term, a series of questions was designed. An attempt was made to determine which semantic components could be used as specifically relating to verbs of travel and then to test whether the children incorporated these features in their notion of zut. One set of questions attempted to investigate whether modes of locomotion were tied to a particular object. These questions were repeated at two different intervals in the experiment to see whether any systematic change in meaning occurred over time.

If the children have difficulties in grasping the intended denotation of the term we might expect some combination of the following results:

- i) longer acquisition time in contrast to the noun study
- ii) difficulties even in a restricted choice task
- iii) lack of production and erratic comprehension
- iv) avoidance of the term, ie. use of more general terms, eg. go, move etc. Alternatively the child might avoid the situation entirely and in a free choice situation fail to play with the skidoo.

Changes in representation of meaning over time will be harder to trace, but markedly different response rates to the questions is one possible criterion for such change. Overextension/underextension of the term is another.

The main question under investigation is whether the acquisition of a new action term causes difficulties which were not present in the acquisition of a nominal.

METHODSubjects:

Twelve children with a mean age of 3;8 (range 3;1 - 4;6) completed the study. All children were full-time attenders in the Psychology Department playgroup.

Materials:

The materials consisted of four different types of vehicles: cars, boats, airplanes and skidoos. There were four examples of each type. The cars, boats and airplanes were Dinky Toys and the skidoos were constructed by the E using Lego. A toy garage was present for the "storage and repair" of the vehicles. A small doll was also used.

Procedure:

Pretest: A baseline of children's productions of the appropriate means of locomotion for each vehicle was established. The toy was shown to the child and the child was asked: "How does this move?" Unsatisfactory responses were followed with probing by E, eg. S: "up in the sky". E: "how does it go in the sky?" S: "flying". Responses to the skidoo were recorded.

Introducing event: One week after the pretest children were introduced individually to the action of the skidoo. The children were asked: "Show me the one that can zut, not the one that can fly or the one that can sail or the one that you can drive, but the one that zuts".

Comprehension session: A week elapsed before the children encountered the toys again. The children were asked to play a game with the experimenter. The child was presented with a garage that stored and repaired transport vehicles. E passed the child the toys identifying them as she did so: "These x's have to be kept in the garage until someone comes to collect them. Would you put them away please". It should be noted that this is the first time the children encounter the term skidoo, and from this point the name is used naturally and children are informed that the skidoo is used on the snow.

The S and the E played for a short time with the toys at which point a

toy doll was introduced. The doll had come to collect one of the vehicles because he was going on holiday. The doll wanted to go either sailing, flying, driving or zutting. Order of request was varied randomly within blocks of four vehicles. Once the child had passed the correct vehicle, the doll would 'climb in' and enact the appropriate motion.

On completion of the 16 requests the toys were removed and the child was asked a series of questions:

Questions: The questions were designed to investigate the child's understanding of this new means of locomotion in contrast to known means of locomotion.

Question A was designed to investigate the child's notion of travel:

"Can you travel in a x ?"

Question B tested the appropriateness of each specific action for a man:

"Can a man zut ?"

Question C looked at whether the children believed the motion could be accelerated:

"Can you sail quickly ?"

Question D assessed children's knowledge of restrictions of modes of locomotion to specific vehicles. A meaningless word was included in the question frames to see whether the children had learned anything specific to the new words, eg:

"Can you sail a car ?"

A control group of adult subjects was run to establish norms.

Table 6.1 presents a complete set of the questions asked.

Longitudinal session: A six week break occurred. During this break video-recordings were made twice weekly of the children playing with the vehicles and garage. Recordings were made through a one way mirror and each session lasted one hour. These periods provided the children's only access to the toys. No contact with the experimenter occurred during this period.

Follow-up session: A period of one week elapsed between the final video session and the follow-up session. The children were asked the

Table 6.1 Questions asked concerning vehicles and mode of locomotion

- A) Can you travel in a car ?
 Can you travel in a cup ?
 Can you travel in a book ?
 Can you travel in a plane ?
 Can you travel in a skidoo ?
 Can you travel in a chair ?
 Can you travel in a vob ?
 Can you travel in a boat ?
- B) Can a man fly ?
 Can a man lup ?
 Can a man eat ?
 Can a man drive ?
 Can a man walk ?
 Can a man zut ?
 Can a man sail ?
 Can a man drink ?
- C) Can you scream quickly ?
 Can you sail quickly ?
 Can you drive quickly ?
 Can you lup quickly ?
 Can you rest quickly ?
 Can you fly quickly ?
 Can you zut quickly ?
 Can you throw quickly ?
- D) Can you sail a boat ?
 Can you drive a skidoo ?*
 Can you sail a car ?
 Can you fly a plane ?
 Can you lup a bicycle ?
 Can you drive a car ?
 Can you fly a boat ?
 Can you zut a skidoo ?
 Can you ride a bicycle ?
 Can you zut a plane ?

* Altered to fly a skidoo - drive could be appropriate

following sets of questions:

- 1) If I lived a long, long way away from you tell me all the ways you could come and see me.
- 2) Children were shown 10 pictures of transport vehicles. As each picture was presented the child was asked the following questions:
 - i) How does that one move ?
 - ii) Have you ever seen one before ?
 - iii) Where did you see it ?
- 3) The questions asked in the Comprehension Session were repeated.
- 4) You can sail a boat. What other things can you sail ?
You can drive a car. What other things can you drive ?
You can zut a skidoo. What other things can you zut ?
You can fly a plane. What other things can you fly ?

RESULTSPretest:

In this session only one child (J.P.) refused to answer the questions as set. However, when asked to pass the object that could fly, sail or you could drive he responded correctly. The eleven remaining children all responded with the correct mode of locomotion for the airplanes, ie. fly/flies. Three of the children specified where this action could occur, ie. "flies in the sky". Nine children correctly replied that a boat sailed; the remaining two said that "it floats on water". In response to the question about the car all 11 children said that you "drive" it. Eleven of the 12 children reported that they didn't know how the skidoo moved. The remaining child when asked about locomotion responded that it was a bridge (L.C.).

From these results we are justified in concluding that all these children have a lexical framework for modes of transportation and their appropriate means of locomotion. Only in one case does skidoo present a possible conflict for the ensuing linguistic contrast, in all other cases there is a gap in the lexicon for both vehicle and mode of locomotion.

Introducing event:

All 12 children chose the skidoo as the object that could 'zut'. Eleven of these responses occurred immediately, one child hesitating. All other modes of locomotion were associated with the appropriate vehicles.

Comprehension session:

Six children passed the skidoo without hesitation when told that the man wanted to go zutting. Three children responded with initial 'don't knows' and after some hesitation passed the skidoo. The remaining three children gave the following responses:

- 1) "Where is it zutting?"
- 2) "Can't find one, where is it?"
- 3) "Do you mean the garage?" (J.P.)

J.P. was the only child to fail the following comprehension tasks and attempted to pass E the car instead.

Their own knowledge and the limited choice of objects practically forced the inference that the skidoo was needed for zutting. However, despite this and the high rate of success with the introducing event, half the children have problems in identifying the intended referent.

Questions:

It should be noted that before responding to these questions the children have heard the term zut five times. The children clearly differentiate between objects which can be travelled in, eg. cars, boats, airplanes and skidoos and objects which cannot be travelled in. The situation in which the children have encountered the term skidoo has allowed them in this situation to differentiate it from a meaningless control term (cf Table 61).

Children were also asked to define the term travel. Nine children attempted to define travel. Four of the children associated the term with a particular vehicle or action, eg. "you travel in a car" or "drive". Two children reported that travel means "to go somewhere", a definition that would be regarded as acceptable by adult standards. Two children gave definitions which suggested associations with particular occurrences of travelling, eg. "you eat sandwiches - lots of food" and "put engine on". One child gave a response which was related to the present situation "over snow" - it was snowing outside. Children cannot always articulate their criteria for use of a term yet they can still differentiate between appropriate and inappropriate contexts of use.

All children accept that a man can eat, drive, walk and drink. The majority of children denied that a man can lup, fly or zut. Why should children accept that a man can sail yet deny that he can fly? I think the answer lies in being able to associate flying with other animate objects other than man, eg. birds. Alternatively children may be more familiar with the causative sail, drive than with the causative fly, ie. he flew the plane. Adults accept that a man can fly if they are asked about sail and

Table 6.2.Question a: Number of children accepting you can travel in an x.

	Car	Boat	Plane	Cup	Book	Chair	Skidoo	Vob
Adult response	10	10	10	0	0	0	-	-
Child response	9	10	10	3	3	2	8	3

Table 6.3.Question b: Number of children accepting that a man can x

Fly	Lup	Eat	Drive	Walk	Zut	Sail	Drink
4	3	12	12	12	5	10	12

drive first, otherwise they deny that a man can fly ($n = 10$). Children's responses to zut cannot be differentiated from their responses to the meaningless control, lup.

Question c: Responses to question c suggest that as a group the children are not in agreement as to whether an action can be performed quickly, see Figure 6.1. The clear result is that the majority of children deny that you can zut or lup quickly whereas nearly all the children accept that you can drive quickly. The possible interpretations of these results will be discussed later. What should be noted at this point is that in contrast to the responses given to question a) children do not differentiate between the word they have been introduced to and the meaningless control.

Question d: Responses to question d for known objects and actions are quite clear, eg. you can sail a boat but not fly one, see Figure 6.2. A particular mode of locomotion is associated with a particular object. Interestingly, children are just as likely to say that one can zut a plane as to say that one can zut a skidoo. The mode of locomotion is clearly not tied to the object. A possible interpretation is that children have not limited the extension of zut to a skidoo. It is certainly not the case that they have no alternative mode of locomotion for the plane. Initially, it was intended to use drive in the framework with skidoo, to maintain balance, however since drive is in fact appropriate fly was inserted in the question frame instead. A point worth noting at this stage is that a third of the children respond in the affirmative to "can you lup a bicycle ?".

Longitudinal session: Allowing the children freedom of choice to play with the toys appears to be a satisfactory way of stimulating verbal exchanges. The average number of children playing with the garage at any one time was 4 (range 1-7). Although the average varied between sessions, the range was the same for each session.

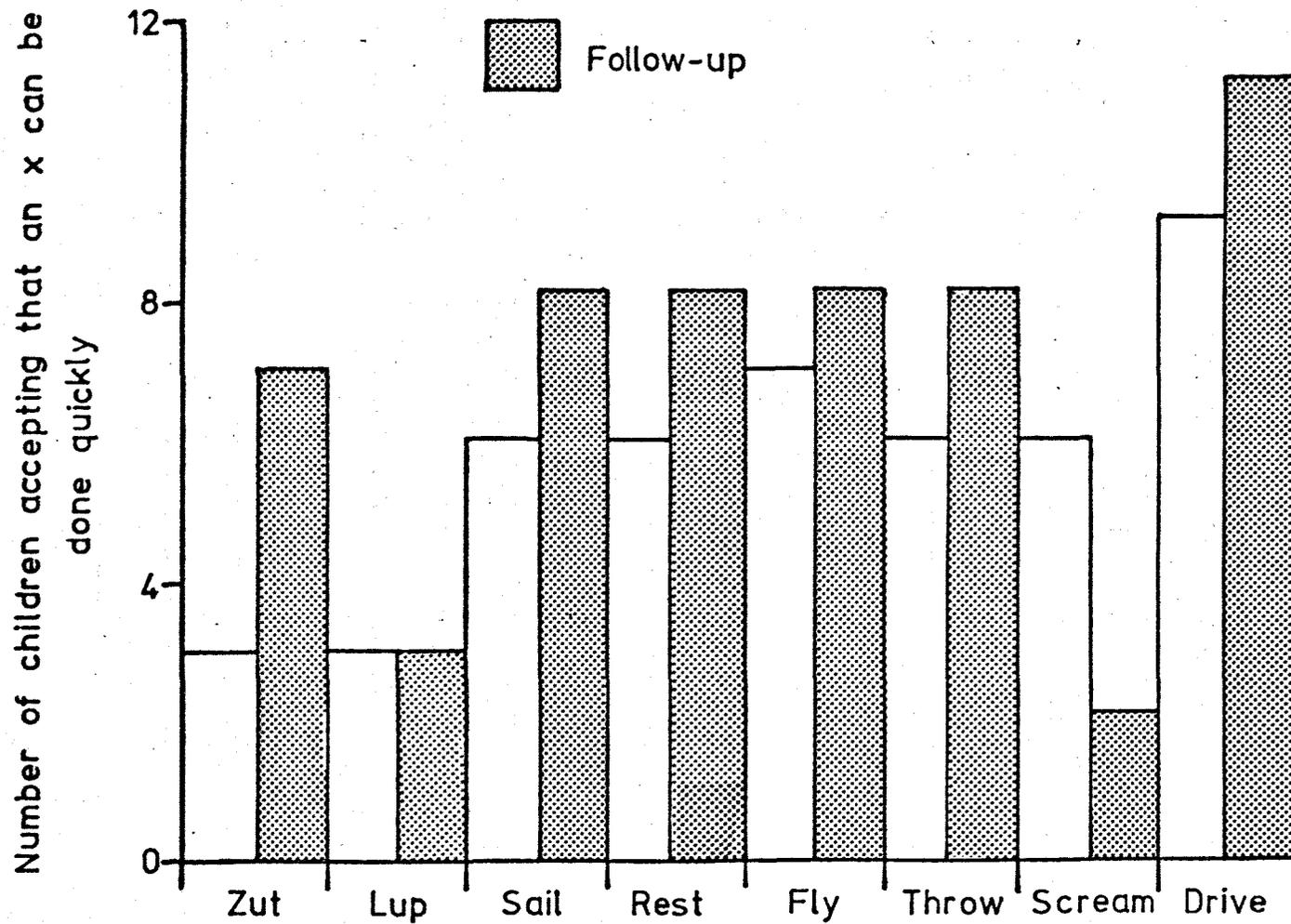


Fig. 6.1 Responses to question "Can you x quickly?" (comprehension and follow-up session).

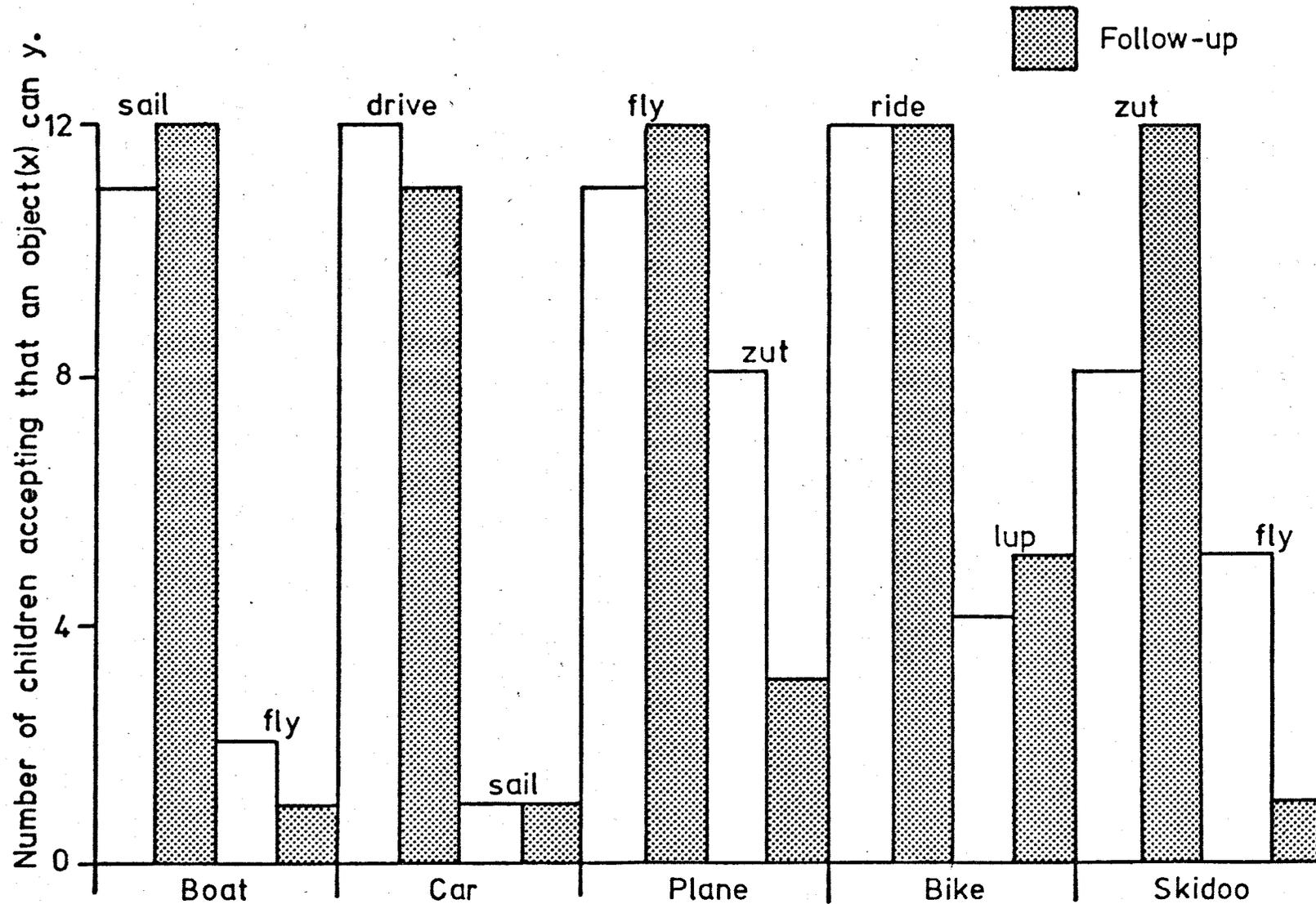


Fig. 6.2 Responses to question a – appropriate object/action pairing (comprehension and follow-up).

The children invented a number of games to play with the toys. As one might expect specific reference to either the objects or the modes of locomotion was not necessary, as in many situations joint reference was already established. Also, children can play quite happily simply mimicking the noise the object normally makes. The games the children played included "going for petrol", "washing the vehicles", "crashing", "giving the man a ride", "buying vehicles" and "taking people far away".

On only one occasion did a child specifically ask for the name of the skidoo. This occurred in session one and the N.N.* responded with the correct name.

Children always referred appropriately to the boat, car and the airplane. However, in the case of the skidoo for the first two sessions children referred to the object by modifying the verb in some fashion, eg. 'zutting thing', 'zutter', or 'thing that goes zutting'. This form of reference occurred only once after session two and this was in session 7 where a child who had already used the word skidoo appropriately said: "He's going in the zutting thing". Otherwise the children used the term skidoo.

Throughout the 12 sessions, children referred to the car on 57 occasions, the plane on 52 occasions, the boat on 27 occasions and the skidoo on 24 occasions. Although references to the skidoo and boat were less frequent than references to the other two objects, as Figure 6.3 illustrates, references made to the objects varied randomly within and between sessions. There is no reason to conclude from these data that the children find the skidoo unusual. Their initial references to the 'zutter' indicated that they had picked up the appropriate action for the object and that the implicit reference to the object's name was not as successful as the initial lexical contrast. Although this difficulty is overcome through time and the natural use of the term by the N.N.

As a supplementary way of analysing the video tapes, the frequency of appropriate motion terms paired with the vehicles and the frequency of alternative but appropriate modes of locomotion were noted. For example, an

* Nursery nurse

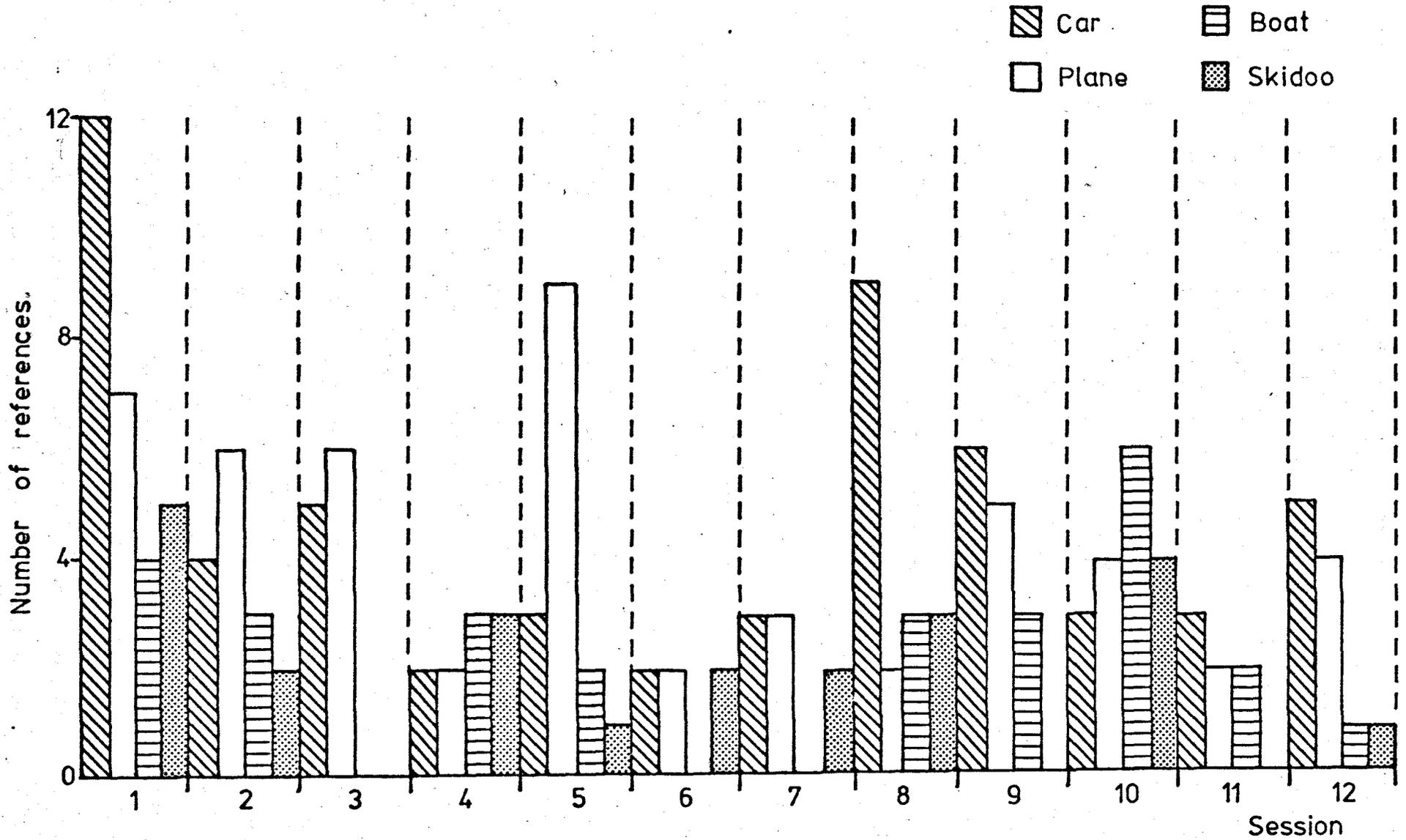


Fig. 6.3 Number of verbal references made to each stimulus per session.

inappropriate pairing would have been an utterance such as "the airplanes are zutting". No inappropriate pairings occurred during the video sessions. On the whole occurrence of verbs of locomotion (29) were considerably less frequent than occasions of nominal reference (160).

The verb flying occurred 11 times and was the most common motion verb that the children produced. Zutting was produced 5 times, driving twice and sailing once. Alternative action terms were produced 5 times in the case of cars; go was used 3 times, race once and ride once. Alternative motion terms were produced 3 times for the airplane; go, "having a ride", and driving, twice in the case of the skidoo; "going away" and go. There is no evidence from the children's production of these verbs that they are treating the new verb in an unusual way or that it can be distinguished from known forms of locomotion.

Children have also acquired some additional knowledge about the skidoo and where you can zut, that is they associate it with snow. Examples from video tapes:

- 1) "Snow thing"
- 2) "Now it's snowing so they can zut along"
- 3) "There's skis on the bottom for it to go"
- 4) "The runners run on the snow best"
- 5) "The skidoo is zutting in the snow"

Follow-up session: The first section of the follow-up session required children to respond to the following question: "If I lived a long, long way away from you tell me all the ways that you could come and see me". Four children failed to respond. The remaining 8 children produced a number of responses all of which can be classed as acceptable. Car was produced 8 times, airplane 4 times, bus 3 times, van twice and boat, transporter, landrover, train, tractor, donkey and horse only once each. No child mentioned that a skidoo might be an appropriate means of transport.

In the picture identification section, 6 children correctly identified

the skidoo but only one child correctly named its mode of locomotion. No child overextended either the name or the action. Five children reported that they had seen a skidoo before. These responses included "on ice", "at nana's", "on the snow" and "I play with them". The reader should recall at this point that all these children had been exposed to the skidoo frequently during the preceding 10 weeks and it is highly unlikely that they had ever seen one anywhere else. Three cases occurred where children labelled the picture of the skidoo as something else, sledges - 3, snowplough - 1.

Responses to comprehension questions

The questions from the comprehension session were repeated at this point. At no time in the follow-up session prior to this point had the experimenter used the term zut .

Question a: Table 6.4 presents the numbers of children accepting that you can travel in an x. As in the comprehension session children clearly differentiate between objects which can be travelled in and those that cannot. A skidoo is treated in a similar manner to objects which can be travelled in and those that cannot. A skidoo is treated in a similar manner to objects which can be travelled in and quite differently to the meaningless control. The responses follow the same pattern as those obtained in the comprehension session.

It is interesting in the light of responses to the first section of the follow-up session, where no child suggested that a skidoo was an appropriate form of locomotion to a distant place, that in this situation for over half the children change of location is part of the term's meaning.

Children's definitions of the term travel were once again idiosyncratic. Five children explicitly stated that they did not know what the word travel meant. The remaining children associated it with one particular aspect of travelling, eg. "sleeping in the car", "eating in the car" or "luggage". It should be noted that no child repeated the response that they had given in the comprehension session. It would appear that for these children a number

Table 6.4. Numbers of children in Follow-up Session
accepting that you can travel in an x

	Car	Boat	Plane	Cup	Book	Chair	Skidoo	Vob
Adult response	10	10	10	0	0	0	-	-
Child response	8 (9)	8 (9)	9 (10)	1 (3)	0 (3)	0 (2)	7 (8)	2 (3)

Note: Responses in brackets are those from the first comprehension session

Table 6.5. Numbers of 'yes' responses given to "Can a man x ?"

Fly	Lup	Eat	Drive	Walk	Zut	Sail	Drink
1 (4)	3 (3)	11 (12)	12 (12)	12 (12)	7 (5)	10 (10)	11 (12)

of experimental occurrences are associated with travelling and that no particular one appears to be consistently dominant. The association the children reported varied and presumably this will continue to occur until some stable criteria are established - a core meaning.

Question b:

As in the comprehension session children accepted that a man can eat, drive, walk and drink (see Table 6.5). The majority of children deny that a man can lup or fly. Children's denial of a man's ability to fly was more consistent in this session than in the comprehension session. I would again like to suggest that children associate flying with a certain group of inanimate objects and birds and they did not interpret this question as asking if a man can fly a plane.

Responses to lup remained consistent between the two sessions whereas responses to zut showed a slight increase toward the level of sail and drive. However, since responses to these questions showed slight variation over time I believe there is insufficient evidence in this case to suggest any change in the child's representation of the terms.

Question c:

Figure 6.1 presents the data for question c. Over half the children claimed that you can zut, sail, rest, fly, throw and drive quickly. The only anomalous response from an adult perspective being "rest quickly", but as one child informed me "you can rest and rest and rest until you fall asleep". The implication is that some form of repetition is important.

The only response which remained consistent between the sessions was the response to lup. In all the other cases except scream the numbers of children accepting that the action can be performed quickly increased. The greatest increase occurred with zut, which only in the Follow-up session could clearly be differentiated from the meaningless control though not from sailing or flying. I would like to suggest that the children's representation of zut was beginning to change. However, this suggestion is difficult to substantiate from these data for if we make this assumption we must also suggest that the children's representation of scream has changed.

It is possible that in the case of scream the children were interpreting the question in a different way, but that in the case of zut the word meant something more, that is, the children change their interpretation of the question in the follow-up session for scream, but their interpretation of the question for zut remains unchanged - it is the meaning of 'zut' which changes. This contention is supported by the fact that no change whatsoever occurred for lup.

Question d:

Responses to question d are presented in Figure 6.2. Particular modes of locomotion were associated with particular objects and children's responses to skidoo and zutting were nearly identical to the responses for known objects and modes of locomotion. If we examine Figure 6.2 we can see that the only substantial changes in responses (ie. more than 3) occurred for questions including the terms skidoo or zutting. The children's responses had become more restricted. The particular action had, in this set of alternatives, become tied to the object.

Finally, in response to the question "a skidoo can zut; what else can zut?" the following responses were obtained: six children mentioned skis or sledges which is interesting in the light of the 4 misidentifications of the pictures. Only one of these children had identified the skidoo as a sledge in the pictorial task. One child informed me that "another skidoo could zut, silly".

DISCUSSION

In a contrastive situation with known verbs children perform in an identical manner to the way in which they do with nouns; that is, they hand over the strange object emphasized by the lexical contrast. In the case of nouns, the information obtained in this explicit contrast transfers quite easily to a request situation with implicit contrast one week later. This is not the case for the verb of motion studied here. In the request situation half the children had initial difficulties. These difficulties occurred despite the fact that there was only one novel referent. Two interpretations of these results exist. It may be the case that in using a verb form the child expects some sort of action to occur and that the lack of any action causes the difficulties. This interpretation is questionable for two reasons. Firstly, the child was asked for "the one that can zut" and secondly the children had no difficulties with the known verbs of motion - that is, they could select the one that could sail, fly or be driven. An alternative interpretation is that in the case of nouns children are aware that the denotatum is likely to be an object which is not going to change in any significant degree whereas actions can be performed by any number of different types of objects - eg. unlimited numbers of objects can go. It may take some time or the presentation of more explicit information for the child to make the initial association between object and action and only after this has occurred could we expect any degree of restriction of the term (cf. Nygren, 1972). For half the children in this study the introduction event did not give sufficient information for the child to restrict the term to a particular mode of locomotion by a particular object. One might expect that after the four subsequent requests in the comprehension session that a stabler mapping would have developed. Children's responses to the questions after this session suggest that this is not so, there being no difference between the meaningless control and zut. This argument will only carry weight if the children realize that zutting is an action. Evidence for this is only circumstantial; in the comprehension

session we have one child who asks "where is it zutting?" but in the Longitudinal session 5 different children treat the word as a verb. At least six children have picked up the syntactic class of the word. This type of result is supported by evidence from Brown (1957) where young children were successful in their use of particular syntactic classes.

Syntactic class-membership is only one aspect of a word's meaning. What other information has the child acquired? A feature which the children have isolated and incorporated into their representation of the term is that the object travels over snow. This is the information they use when requested for examples of other objects that can zut, eg. skis and sledges. The incorrect identifications of the picture of the skidoo draw on this information. Mistakes are objects which are associated with locomotion in/on snow, eg. snowploughs or skis. It seems reasonable to suggest that this is one of the features the children regard as criterial.

A more detailed understanding of the children's representation of the terms skidoo and zut can be gained from their responses to the questions. From the very beginning children treat skidoo differently from a meaningless control and in a similar fashion to the words with which it was contrasted (Question a). Children's responses to the question entailing the feature [+ travel] remain constant over time. It is precisely those features related to the locomotion of the skidoo [+ speed] and specific action that do change, see Figures 6.1 and 6.2 respectively). Initially we cannot distinguish zut from the meaningless control, it is only after the six week break that responses to zut are similar to those for the other motion terms and different from the meaningless control. This contrasts dramatically with the question responses for patas where children treat the term as an animal term almost immediately (cf. Chapter 5).

The question then arises, why is there such a difficulty in breaking into the conceptual framework for the verb? Assuming that I am correct in arguing that a framework for verbs of locomotion exists, the difficulty here must be in gaining access to that knowledge. Again I believe we must take into consideration the ambiguities of a referential situation with

the type of term being considered. Until the child is convinced of the relationship being denoted there is no reason for him to draw on his knowledge of other similar terms of locomotion. The difficulty is in establishing the relationship between the word and the world. Once this is established relationships between similar types of words can develop. Note that the word-world association developed over a period of six weeks when the child plays with the toy but does not use the term very often. Is it the action with the object which allows him to make this association? Does the experience help him to restrict the possible alternatives? Lack of production of the term in the Follow-up session would go against such an interpretation, but let us look carefully at what the children say. Only one child produces the term zut, but of the remaining 11 children, eight produce responses that indicate that the object moves from one place to another and that it does so over snow. The verbs they use are ones which they are more familiar with, eg. "go" in four cases, "goes over snow", "skidding", "sliding", "zooming". Children have grasped the relationship between the objects' action and the world, but they depict this by using terms with which they are more familiar and which include the feature [+snow]. Gentner (1978:998) predicts such a result:

"My guess is that children often choose in production to extend words whose meanings they know well, rather than use words they are less sure of"

The children know that a skidoo locomotes over snow, though they do not produce the exact term, and hence can make the association with other terms of locomotion.

It might be argued that the children's difficulties in this task cannot be attributed to a problem with verbs per se; rather children have difficulties with this task because it is more demanding than either the patas or the chromium task - not only is the child required to learn a novel verb but also a novel noun and the association between the two. If this factor is responsible for the slower learning process there would be no reason for the children to have difficulties in the introducing event because a) the test situation is identical to that of the previous tasks, ie.

there is only one unnamed/unknown item and b) the term skidoo has not been encountered. However, children do have initial difficulties with this situation and the only explanation appears to be the use of an action term. Secondly, if the presentation of two unknown words causes problems for the child, one might expect that the term that is introduced secondly and tangentially, ie. skidoo, would pose problems for the child. It is precisely those questions which include the term skidoo which contain the initial differences in response rates - an indication that something has been acquired. Children immediately pick up something about the meaning of skidoo. It may be the case that presenting the child with two unknown terms is a more complex task for the young child, but I do not feel that it is a satisfactory explanation of the children's initial comprehension difficulties, the extended mapping process and later failures to produce the term zut. There seems to be something more fundamental involved in the initial mapping procedures for the term which causes these difficulties.

Two points are quite clear. Despite minimal exposure to the terms in the longitudinal session, it is precisely over this period of time that the children's semantic representation changes. The second point refers to responses to question d in the Follow-up session. Although the term zut is no longer overextended to any of the terms in these question frames, we can not simply explain this by a tying of the action to the object (skidoo). Children have restricted the mode of locomotion (over snow) not the object that can perform this mode of locomotion. Hence the productions and the alternatives for the objects that can zut.

Finally, what do the results of this experiment tell us about the development of a verb's meaning? Does the fact that the children don't form a restrictive bond between 'zut' and 'skidoo' contradict my initial arguments about the subject and object referred to being the salient features in a child's first encounter with a verb? I do not believe so; the children's initial encounters with the verb are of a different kind. There are a number of differences between the present introduction to the verb and those presented in Chapters Two and Three. In the first place the verb here is not

introduced with an actor. Rather the denotation is restricted by the lexical contrast. The same ambiguity of action does not exist. Therefore the need to focus on the subject and object occurring with the action is eliminated. What the lexical contrast does, in theory, then is to eliminate Nygren's first stage of the differentiation process by contrasting the novel mode of locomotion with other particular modes of locomotion. The second, though I believe less important factor, is that the subject/actor involved is novel as well. So whereas previously the children were familiar with the subject and object, in this case the children have just encountered the term skidoo and may be less certain of it as a subject per se. What I am arguing then is that the presence of lexical contrast restricts the denotation of the novel verb in a manner that did not occur in the early verb experiments and so these results do not contradict my earlier ideas. Indeed, they are supported by the fact that even with lexical contrast the mapping is a more prolonged one.

CHAPTER 7

A NOVEL SHAPE OR PATTERN OR COLOUR TERM?

Carey's study and my own two, developed along similar lines, have attempted to look for a particular gap in a specific semantic domain. These studies present the child with sufficient information to determine the referent intended by the experimenter and proceed to assess performance in a series of well-defined contexts.

Apart from the denotation intended by the experimenter what alternatives did the child have? The opportunity for the children to make wrong guesses is sharply circumscribed in these studies. If we assume that any guess will be consistent with the information given, Carey's testing procedure forces the inference that chromium denotes a range of colours including olive green, and my procedures force the inference that patas denotes a range of animals including tapirs, and that zut denotes a mode of locomotion including that of skidoos. This argument, of course, assumes that the child can infer the equivalent ostensive definition: for all x, x is a 'patas' if and only if x is similar to this. Three-year old children can make these inferences, though the time involved varies both within and between word classes.

In the patas and the chromium tasks the initial linguistic contrast was supported by a single supporting perceptual contrast, ie. colour or type of animal. In the zut task the linguistic contrast did not have a corresponding perceptual contrast in the introduction event. That is, while the reference was to modes of locomotion the perceptual contrast was between objects that could perform these modes of locomotion. By the time the comprehension questions were asked the children had seen the toys in simulated action. However, the point is that in each situation there was only one critical attribute that differed, be it kind of object or colour. By contrast, it seems evident to me that there must frequently be cases where there is a doubt about which attribute is being referred to as well as which value (range of values), because of the referential situation and

the child's limited vocabulary. As we have seen both Rogers (1975, 1978, 1979) and Bridges (1979) have evidence which indicates that mothers of young children are aware of this and sometimes structure the information which accompanies the encounter with the new term so as to restrict the range of possible denotations.

The present experiment was designed to trace the acquisition of a single term where the range of possible denotations spanned three distinct attributes: shape, colour and pattern.

Building blocks were used as the experimental stimuli. The test stimulus was a hexagonal block with an unusual pattern on it (tangerine stripes on a silver/grey background). Would the child take the new term to denote the shape*, the pattern or the constituent colours? Two groups of children were given different introducing events to see whether it was possible to affect their guesses by means of different lexical contrasts. A series of questions was designed in an attempt to assess their knowledge of shape and colour terms and of how the new word entered the lexical/conceptual framework.

Before embarking on the actual experiment, I would like to comment on two major criticisms regarding the experimental stimuli. In the first instance it might be argued that for some reason one of the attributes might have some kind of potency or saliency for the child and therefore there might be a tendency to assume that the potent or salient attribute was what was meant by the unknown term, without any account being taken of the particular lexical contrast drawn. The general consensus from the literature is that nursery school children tend to prefer colour, there being a shift to form preference around the age of four and a half to six

*To save space and spare the reader the following conventions will be used:

Hexagonal: hexagonal shapes

Multigonal: a range of shapes including hexagons but excluding circles and squares

Tigrine: orange and silver striped patterns

Stripes: striped patterns, any colours

Pattern: a range of patterns including stripes, eg. polka dots, zig-zags etc.

(Suchman and Trabasso, 1966). Preferences do appear to depend on the type and complexity of the stimulus. A prediction from this conclusion might be that children should find it easier to learn an unknown colour term, but there is no guidance about the relative salience of pattern. Moreover, such findings tell us little about the salience of particular colours and shapes. However, if the introducing event has any effect these perceptual criteria might be overruled. The second possible criticism is of the use of pattern as a stimulus. Contrasting pattern with known colour is clearly unusual. However, there is good reason for this choice. It was found in a pilot study that when children encounter colours for which they have no name, they overextend known colour terms to include this new instance. This did not occur with unknown shapes or patterns and since I was looking for a gap in the lexicon, I chose pattern for the main experiment. I have, however, included a supplementary control study where an unknown colour is contrasted with known colours. This study is reported after the results of the main study have been presented.

METHODSubjects:

Sixteen children, mean age 4;0 (range 3;0 to 4;11) participated in the study. The sample consisted of the full-time attenders at the Stirling University nursery. Fourteen children completed the study, six in the shape contrast group and eight in the pattern contrast group.

Materials:

The materials consisted of a selection of wooden blocks painted specifically for the experiment, one toy puppet and a number of toys as filler items described in the following section.

Procedure

Stage 1: Pretest: Prior to any exposure to the new word, a baseline level of performance was established. Children were individually brought into a test room in which a number of different objects were present on the table. The objects included a toy cupboard, a cup, a plate, a cardboard banana, a car, an airplane, a boat, a skidoo and a semicircular block. All these items were filler items for the present experiment. The key stimuli were a green square block, a red circular block and a hexagonal block with tangerine stripes on a silver-grey background. The child was asked a number of questions about each item. The key question for the blocks were:

- 1) What's this ?
- 2) What does it look like ?
- 3) Do you know what kind of shape it is ?
- 4) Do you know what colour/colours it is ?
- 5) Is there anything else you can tell me about it ?

All these questions were used at least once for the filler items. Questions 1 - 5 were used for all test items. The toy cupboard was always the first item presented to the child. The remaining items were presented in a random order. The aim of this pretest was to establish the extent of the children's productive vocabulary for shape, colour and pattern terms.

Stage 2: Introducing event. Before any testing had begun, the children had been divided into two groups. Group A, the shape group, received the following instructions:

"You see those blocks over there? Could you please bring me the gombe one, not the square one or the round one, but the gombe one".

Children from this group are designated by an (SC) after their first name. Group B, the pattern group, received the following instruction:

"You see those blocks over there? Could you please bring me the gombe one, not the green one or red one, but the gombe one".

Children from this group are designated by a (PC) after their first name. After the gombe block had been surrendered, the other two blocks were requested using the attribute mentioned in the original question. The children then proceeded to do a task unrelated to the present experiment.

Stage 3: Comprehension 1: Coincident attributes: One week later children's comprehension of the term gombe was examined. Each child was withdrawn from the playgroup on the pretext of meeting a new puppet (Buzby) and playing a game with him. Buzby had a set of blocks (3 striped hexagons, 2 green squares, 1 red square, 2 red circles and one green circle), with which the children could play and construct anything they liked. The child was allowed to play with Buzby and the blocks for approximately five minutes, at which point Buzby objected strongly that he had not had a chance to build anything. The child was first asked what Buzby should build and then asked if he/she could assist the puppet by passing him the blocks he requested.

For children in group A, the blocks were requested by using shape terms and gombe, e.g. "I want a square block". Children in group B were asked for blocks by using colour terms and gombe, e.g. "I want a red block". The tasks were continued until all the blocks had been used in the construction. Each of the three blocks was asked for three times, the order of these 9 requests being random within blocks of three. The child was then allowed more time to play with the blocks and, if they wished, to ask Buzby to pass

the blocks. All comments were recorded.

At this point the child has heard the new word four times with both unusual shape and unusual pattern present in the same object. There are no opportunities for the child to extend 'gombe' beyond its known range unless the children assume that its range is so wide as to include colours/shapes already pre-empted by existing lexical items.

Stage 4: Comprehension 2: Separated attributes. One week later the children were again taken out to play with Buzby. This time, in addition to the blocks present in stage three, Buzby had a green hexagon, a red hexagon and a square and round block with the unusual pattern on them. The two variables shape and pattern have been separated. The game was played as in stage three. Once the game had been completed the child was asked to hold Buzby while E put the blocks away. The blocks were removed from view and after a short break the child was asked a series of questions.

A control group of eight children was presented with four blocks (a square striped block, a red circle, a red hexagon, and a square green block). The children were requested to "Pass the gombe block". This allowed a comparison with the experimental group in case a preference for one or other of the unnamed attributes existed.

The Questions:

The questions were exploratory in nature. They were asked in an attempt to discover the child's understanding of shape and colour terms. Some of the questions were unusual. However, it is not simply the child's "yes" and "no" answers which are critical here but the manner in which he justifies his responses. An adult control group* answered the questions as well.

Included in each question frame was the new lexical item and a meaningless control word. The purpose of this section of the task was to see if the new word comes to "mean" anything. How was it conceptualized? Was it simply a sound/object association? Was it differentiated from an unknown sound pattern?

*

Six psychology postgraduate students served as the adult control for these questions.

The question frames can be divided into 2 subcategories: implicit (and unusual) questions about shape and colour and explicit questions about shape and colour.

Implicit Questions:

- C1: 1. Can you paint a car red ?
 2. " square ?
 3. " nerk ? (meaningless control)
 4. " green ?
 5. " gombe ?
 6. " round ?
- C2: 1. If you went to a shop do you think you could get an x shirt ?
 (1 - 6 in a randomized order). This question was made more relevant to the child's knowledge if necessary, eg. does daddy have an x shirt ?
- S1: 1. If I gave you a piece of paper could you cut it into an x ?
 (1 - 6 in a randomized order)
- S2: 1. Can you draw an x ? (1 - 6 in a randomized order).

Explicit Questions:

1. Is x a shape ? If a negative response is given he is asked what he thinks it is.
2. Is x a colour ? If a negative response is given he is asked what he thinks it is.

Stage 5: Longitudinal recording: A minimum of one week was allowed to elapse before the blocks were introduced into the playgroup.

Buzby became an important feature in the playgroup and I decided to use this situation to introduce the blocks into the playgroup. The children had frequently made "things" for Buzby and sang him songs so Buzby was going to give his blocks to the children in repayment. This would allow a smooth and natural introduction of the blocks into the playgroup. The nursery nurse (N.N.) could then (working in conjunction with myself)

decide on appropriate times to bring the blocks out.

Extra blocks were added to the original group. These included novel shapes - triangles, parallelograms and oblong blocks, two new colours - brown and purple, different colours of stripe patterns - purple and yellow and the two original colours in the stripe pattern separated and painted uniformly on square, round and hexagonal blocks.

The N.N. was asked not to use the new word. If she was asked any questions she was to ask for clarification. She was not to give the children any new information. The sessions were video-recorded through a one-way mirror.

Stage 6: Follow-up session. Five weeks elapsed before the start of this session. This section consisted of three standardized and one free-ranging tests. The first task was one of perceptual classification. The child was presented with a card on which there were three shapes of three different colours or patterns. The child was required to pick out the one that was different. No reference is made by E to the varying attributes. A total of 13 such stimuli were presented to the child. The purpose of this task was to examine the children's conceptual organization of the attributes. Would shape children (group a) regard shape as the defining criteria for judging difference? Would colour children (group B) regard colour as the defining criteria for judging difference? Would children who in the separated attributes comprehension task required both attributes to be present to identify the block as 'gombe' perform differently? The second task involved a reversal of the "game" procedure which occurred in the comprehension tasks; that is, children had to ask Buzby for the blocks so that they could build. Buzby on this occasion was obstreperous and always asked for clarification. The point of this modification was to see whether the children would produce the word gombe and if so, what would be the intended referents. The task also made it possible to record the verbal criteria that the children used to identify the blocks.

The third task included specific use of the term gombe by the E. The

context in which this occurred was one of clearing away blocks. The child was required to pass all the blocks, one by one, so that they could be put away. Shape terms, colour terms and gombe were used to request the blocks. The requests for the gombe blocks terminated when the child said there were "no more gombe blocks". The blocks were requested in such a manner that there was always a selection of blocks left after the final request for the gombe block. Both the production and the comprehension tasks presented the child with opportunities to extend the term to other shapes, other colours and other combination of colours (patterns).

Finally there was an attempt to get the children to verbally define gombe. This interaction between child and E was purely exploratory and adapted to the needs of each child.

Figure 7.1 is a diagrammatic representation of the experimental procedure and is supplemented by photographs of blocks presented through the various stages (cf. Figures 7.2, 7.3, 7.4 and 7.5).

'GOMBE' = 

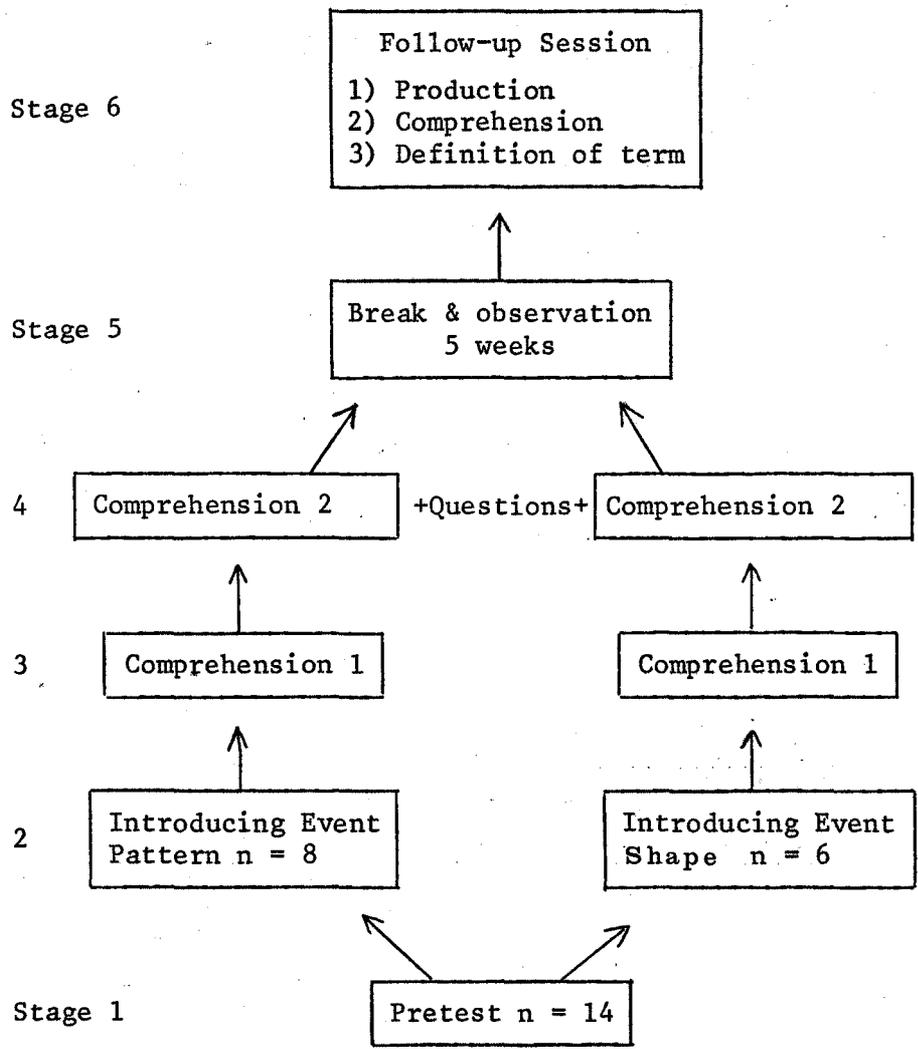


Figure 7.1: Experimental Procedure

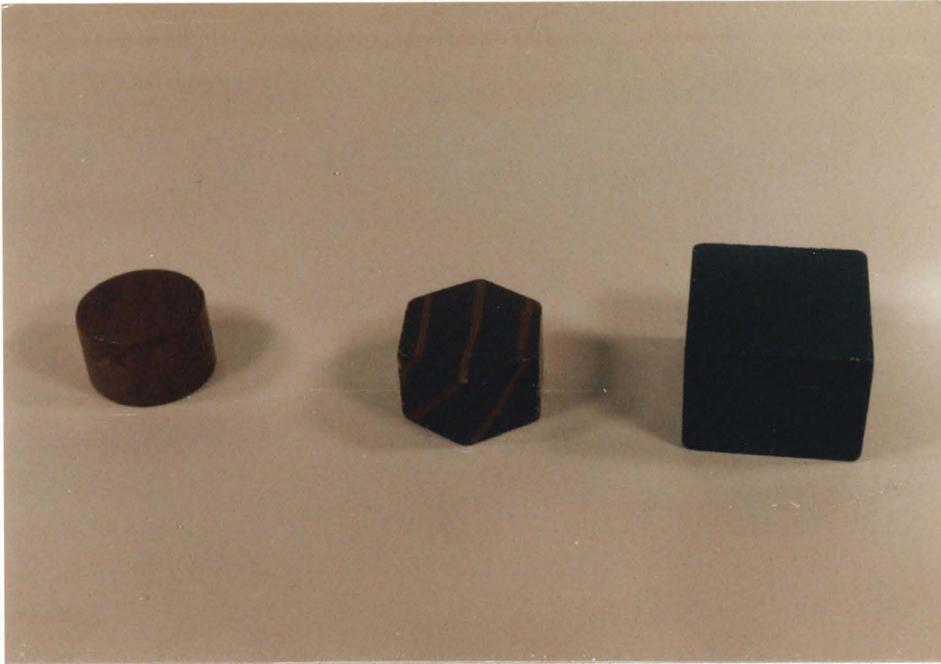


Figure 7.2 Experimental stimuli for introducing event

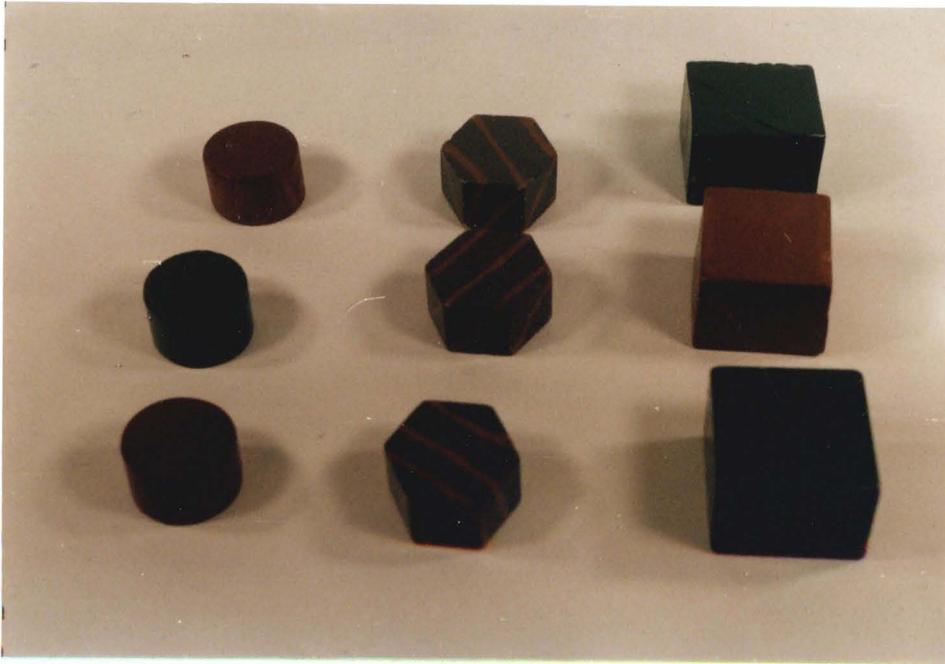


Figure 7.3 Experimental stimuli for Stage 3 - coincident attributes

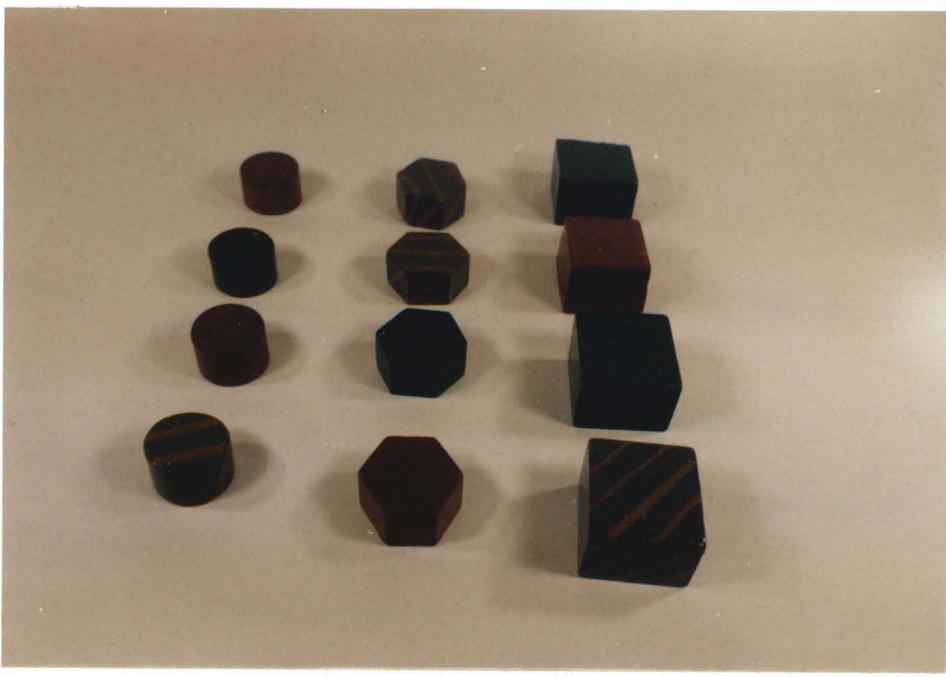


Figure 7.4 Experimental stimuli for Stage 4 - separated attributes



Figure 7.5 Experimental stimuli for Follow-up session

RESULTS

The results are analysed in two ways. Initially I shall deal with the two groups' responses through the various stages of the experiment and in relation to the control group results. The second results section examines the children's individual mapping strategies.

Throughout the Results section an asterisk is placed beside any child who is exhibiting or who has exhibited an unusual response. There is an accompanying number indicating the stage at which the first idiosyncratic response was given. These responses are cases from which we might predict that the child will develop an idiosyncratic denotation of the term. Criteria for being "at risk" are subdivided into two categories: direct and indirect criteria. These are presented in Table 7.1.

Section 1 - Group responses

Stage 1: Pretest. Only responses pertinent to the present experiment will be reported. These include responses made to the colours and shapes that were chosen as experimental values and the test stimulus, the striped hexagon.

All but one child, Louise (PC)^{*1}, produced the colour names red and green and the shape names round and square. The hexagon elicited the following comments with respect to shape (see Table 7.2); five children explicitly stated that they did not know what shape it was, three children produced a combination of square and round, one child called it a triangle, one child described it as a "stool", one child described it as a "star" and one child simply stated that "it was a shape". All of these are inappropriate ways of referring to the hexagon. Though they serve the communicative purpose in this context, they are not restricted to that particular stimulus as are other shape terms.

Table 7.3 presents the responses given to colour and patterning of the test stimulus and, as the table shows, fewer children attempted to respond. This is possibly due to the fact that the object was not of a simple solid colour. Four of the children used a combination of colours,

Table 7.1 Criteria for being "at risk"

Direct criteria	<ol style="list-style-type: none"> 1. evidence of underextension or overextension of the term in a comprehension session 2. altering criteria for the denotation of the term eg. from a pattern to shape 3. confusion or refusal to complete the task
Indirect criteria	<ol style="list-style-type: none"> 1. production of a term which would qualify as a synonym for E's intended denotation (ID) of <u>gombe</u>, eg. striped in the case of the pattern group, since this may pre-empt <u>gombe's</u> ID 2. evidence that the semantic domain in question is not clearly differentiated in the child's mind, eg. confusion in comprehension of colour and/or shape terms, since this entails lack of structure into which the ID may fit.

Table 7.2 Children's descriptions of the shape of the test stimulus

Don't knows	Combination	Inappropriate
5	3	4

Table 7.3 Children's descriptions of the colour(s) of the test stimulus

Combination (correct colours)	Combination (incorrect colours)	Solid colour	Note patterning
3	2	1	2

"grey and orange", "grey and blue" and "brown and blue". One child labelled it "sort of brown, orangy, grey". Finally one child simply produced grey. Only two children commented on the pattern saying "long lines on it". No child produced the word striped though it would be most surprising if this word was not present in at least some of the children's lexicons.

I shall first work through the comprehension data for the shape group followed by the pattern group.

Shape Group

Stage 2: Introducing event: The possible denotations of gombe are restricted in all cases because the children appropriately produce the names of the other attributes. The only object in view with any unknown attributes is the test stimulus. All the shape group immediately passed the intended referent when requested.

Stage 3: Coincident attributes: All the children immediately chose the correct block and proceeded successfully with the task.

Stage 4: Separated attributes: All these children used hexagonality as their criterion for choosing the gombe block. In this situation the alternative variables pattern and colour, which were correlated, were redundant.

Pattern Group

Stage 2: Introducing event: In this group there is one child (Louise*1) for whom the denotation of gombe is not restricted, since she does not know the other appropriate colour terms. She failed this stage completely by failing to pass any block. A second child, Anna*2, also had difficulties. She pointed to each block in turn and then receiving no feedback, simply a repeated question, passed the correct block. All the other children succeeded.

Stage 3: Coincident attributes: Both children *1 and *2 hesitated at this stage but when the request was repeated passed the correct block. All the other children chose the correct block immediately and proceeded

successfully with the task.

Stage 4: Separated attributes: Only two children *2*4 failed to use the pattern as their criterion for choosing the gombe block. Interestingly, these children both produced the word striped at this stage. Another child, Michael*4, replied that there were "no more gombes" when there were two striped blocks left. In contrast to the other children he did pass the blocks when the request was repeated.

Regarding the sample as a whole, 11 of the 14 children chose the original stimulus on the first trial in stage 4 and nine of the children chose the other copy of the original stimulus on the second trial. It was only when these safe options had been exhausted that the children were forced to show the extent of his/her mapping of the term.

Saliency control group (Stage 4 only)

A control group of eight children responded to the request "pass me the gombe block". Their responses are presented in Table 7.4. Asking the children a second time for a gombe block resulted in confusion and a number of random responses, eg. green circle, red square and the red hexagon. These results indicate the importance of the implicit and explicit contrasts for the experimental group and they also show that the results obtained cannot be explained in terms of prior saliency.

Responses to the questions:

To ensure that the questions were internally valid, they were put to a group of adult subjects, $n = 6$. If my intuitions were correct we would expect responses for S1 and S2 always to be "yes" for shape terms and "no" for colour terms. The opposite response pattern would be expected for C1 and C2. Table 7.5 presents the responses obtained from the adult sample. The results from the adult sample support the original predictions, apart from one anomalous response to S2. It seems likely that the interpretation of this question depends on the prior assumptions made by the S, that is you can draw a red if you have a red pencil. Henceforth the expected answers will be taken to be those exhibited by the sample of adults.

*
The control group consisted of eight children drawn from a local nursery school, mean age 4;3 (range 3;11 - 4;4).

Table 7.4 Choices of blocks by the Saliency control group

Red hexagon	Striped square	Red square	Green circle
3	4	1	0

Table 7.5 Adult "Yes" responses to the questions concerning colour and shape

		C1	C2	S1	S2
C O L O U R	Red	6	6	0	1
	Green	6	6	0	1
S H A P E	Square	0	0	6	6
	Round	0	0	6	6

n = 6

Table 7.6 Experimental group "yes" responses to colour and shape questions

		C1	C2	S1	S2
C O L O U R	Red	12	13	5	7
	Green	14	11	5	7
S H A P E	Square	3	2	13	9
	Round	4	2	13	14

n = 14

As we might expect, there is variation in the children's responses, not only intersubject variation, as occurs with the adult samples, but intrasubject variation between similar items. Apart from responses to S2, children's response patterns are similar to those of the adult sample as can be seen in Table 7.6.

The data from the two experimental groups are tabulated separately in Table 7.7a. The two groups' responses do not differ significantly. As can be seen from Table 7.7b there are no apparent within or between group differences in response to gombe and nerk.

These data suggest that the children had not learnt anything about 'gombe'. However, since responses to these questions are likely to underestimate their knowledge the data were reanalysed. The new analysis involved a re-interpretation of the initial responses in the light of follow-up comments (RI responses). These results are presented in Table 7.8 a & b.

Initial responses were altered where a child provided evidence that either the action was possible, but he could not perform it or if some extra condition was met the response would be appropriate. If one or other of these conditions was met the response was altered without regard to its correctness. This was done so as to maintain consistency within the analysis. If the two types of responses were contradictory, the follow-up response was used. No change was made if the justification was either pragmatically or logically irrelevant to the initial response. Examples of pragmatic and logical irrelevance follow:

Pragmatic irrelevance - E "Can you paint a car red?"

S "No"

E "Why not?"

S "I don't want to"

Logical irrelevance E "Could you have a square shirt?"

S "No"

E "Why not?"

S "Cause you can't buy one in the shops"

Table 7.7a "Yes" responses to questions by Group A and B

		Pattern Group n=8				Shape Group n=6			
		C1	C2	S1	S2	C1	C2	S1	S2
C O L O U R	Red	7	7	2	5	5	6	3	2
	Green	8	6	2	4	6	5	3	3
S H A P E	Square	3	2	7	6	0	0	6	6
	Round	2	2	7	8	0	0	6	4

Table 7.7b "Yes" responses to gombe and nerk

		Pattern Group n=8				Shape Group n=6			
		C1	C2	S1	S2	C1	C2	S1	S2
	Gombe	2	2	3	2	0	0	2	4
	Nerk	2	1	2	2	2	1	2	3

Table 7.8a RI analysis of "yes" responses to questions

		Pattern Group n=8				Shape group n=6			
		C1	C2	S1	S2	C1	C2	S1	S2
C O L O U R	Red	8	8	2	3	5	6	0	1
	Green	8	8	2	3	6	5	1	0
S H A P E	Square	3	2	7	8	0	0	6	6
	Round	3	2	8	8	0	0	6	6

Table 7.8b RI analysis of "yes" responses to gombe and nerk

		Pattern Group n=8				Shape Group n=6			
		C1	C2	S1	S2	C1	C2	S1	S2
	Gombe	5	3	4	5	0	0	6	6
	Nerk	1	1	2	2	2	2	0	2

A random selection of RI responses is presented in Table 7.9.

Many of the children were treating the questions concretely rather than abstractly, so that often a child would deny the possibility of performing a particular action because of his own ability or a lack of tools. It was the subsequent comments that made it possible to conclude that the child knew what was possible and what was not. As such the RI data make the children's competence appear much closer to that of the adult with respect to colour and shape terms.

The RI responses also allow a better evaluation of children's understanding of 'gombe' and 'nerk'. The shape group treat gombe as a shape term and clearly differentiate it from the meaningless control term nerk. In contrast, although the pattern group responds differently to nerk and gombe, gombe is treated neither as a colour term nor as a shape term. This may well reflect the odd nature of the question if 'gombe' is viewed as a pattern, but equally this may indicate that different children are treating gombe in different ways and as we shall see it is within the pattern group that a variety of different mappings occurs

Tables 7.10 and 7.11 present the results of the explicit or hypernym questions. These questions are not dealt with competently by the children. Some children accept round and square as colours, others regard red and green as shapes. Five out of six shape children accept gombe as a shape term but this result is uninterpretable since four out of the same six children also say that it is a colour term. The results to these questions appear random and are certainly uninformative about the children's representation of the new term. In fact what the questions appear to show is that many of the children have not grasped the hypernym relation for these terms. However, this conclusion is questionable since children responded correctly to questions concerning colour and shape in the pretest.

Stage 5: Longitudinal recording : During this five week break six video sessions of one hour in length were recorded. During these recording sessions there were always groups of children playing with the blocks.

Table 7.9 Examples of follow-up responses to questions

	<u>Original</u>	<u>RI</u>
E1: Can you cut a piece of paper into a round ? No but my daddy can do it	No	Yes
E2: Can you paint a car gombe ? No cause it would look funny	No	Yes
E3: Could you have a red shirt No I don't like red Have you seen a red shirt ? Yes	No	Yes
E4: Could you have a nerck shirt ? Yes, but you can't make any	Yes	No
E5: Can you draw a red ? Yes, but you would have to colour it in	Yes	No
E6: Can you draw a green ? Yes, if you coloured it in	Yes	No
E7: Can you cut a piece of paper into a gombe ? That would be difficult I can only cut into a round	No	Yes
E8: Can you draw a square ? That's too difficult for me	No	Yes
E9: Can you draw a gombe ? That's too difficult for me	No	Yes

Table 7.10. 'Yes' responses to question "Is x a shape?"

$x =$ Group	Red	green	round	square	gombe	nerk	
Shape	2	2	6	6	5	1	n = 6
Pattern	2	3	6	6	3	1	n = 8

Table 7.11. 'Yes' responses to question "Is x a colour?"

$x =$ Group	Red	green	round	square	gombe	nerk	
Shape	4	4	4	4	4	0	n = 6
Pattern	7	5	3	2	4	4	n = 8

Attempts were frequently made by the children to gain control of as many blocks as possible. Gombe was never produced in any recording session. Nor did any situation arise where the children appeared to be searching for the term but could not retrieve it from memory. Since the N.N. was ignorant of the new term it was impossible for her to produce it. Children's references to the bricks on the whole were very general. They did not, in general, resort to other colour or shape terms either. Children used shape terms only four times (square once and round three times) in the six recorded sessions. All four times the terms were used in requests. Colour terms were used only once, when a child noticed "red and green - just like my trousers".

Children tended to play by themselves with the blocks. Each child was involved in building something, eg. lighthouse, fire engine, spaceship, banana, train, chimney, window and animal. All these were constructed in session two. Discussions with peers and the N.N. revolved around these constructions. These sessions therefore inform us neither negatively (because children rarely used the other shape and colour terms they knew) nor positively (because children never produced gombe) about the children's acquisition or representation of the new term.

Stage 6: Follow-up session: The initial task in this session required the child to make 13 oddity judgements for a series of sets of three shapes, each set being presented individually. Only one set is relevant for our present purposes. This set contained a striped hexagon, a striped circle and red hexagon. Would the shape group use shape as their criterion for similarity? Conversely would the pattern group use pattern as their criterion for similarity? The results are presented in Table 7.12. This difference is non-significant (Fisher Exact Probability). Whatever the children have learnt about the denotation of gombe, it does not affect their judgements of similarity in this task.

In the comprehension session the two groups differed dramatically. These results are presented in Table 7.13. As the table indicates all the six shape children took gombe to denote HEXAGONS and no other shape

Table 7.12 Children's oddity judgements

Criteria for similarity Group	Shape	Pattern
Pattern	2	6
Shape	4	2

known or unknown present. That is, requests for a "gombe block" produced responses until all the hexagons were eliminated from the array. In contrast, of the eight children in the pattern group, two children took gombe to denote TIGRINE, one child took gombe to denote STRIPED, two children *4*4 reversed their criterion and took gombe to denote HEXAGONS, two response patterns *2 suggested that the term could be applied to objects which were either hexagonal or striped or both and finally one child*1 performed randomly. The development of these responses are dealt with in greater detail in the following section. The classification of being at risk identified four of the five children producing unpredicted response patterns in stage 6. No child categorized as being at risk followed the expected mapping process.

Production:

A summary of these results is presented here. They will be dealt with in greater detail in the following section. Productions were not frequent. This may well reflect the problems encountered in stage 5. Children do not regard it as necessary to include specific attributes when requesting a block. The context allows a number of non-linguistic devices to be used appropriately, eg. pointing and grabbing. It was the puppet's ability to feign ignorance of the intended referent which forced the productions which occurred. Table 7.14 presents the productions which occurred in this session in relation to the child's final comprehension of the new term. Once again these will be discussed in greater detail in relation to the individual child.

Throughout the experimental stages nine children produced the term. In the early testing sessions children did produce the term spontaneously. However, actual production of the term tells us nothing about the child's understanding of it. This fact becomes clear when it is realized that the one child who had no criterion for denotation actually produced the term twice. It is the wider linguistic and non-linguistic contexts in which the word occurs that allow us to make inferences about the child's

Table 7.13 Comprehension results in the Follow-up session

Criteria for denotation	Shape group	Pattern group
Hexagonality	6	2
Tigrine	-	2
Pattern	-	1
Either/Or	-	2
None	-	1

Table 7.14 Relation of Comprehension to Production - Stage 6

Subject	Production of gombe for	Comprehension
Andrew (PC)	1. tigrine on half moon shape 2. grey hexagon 3. original stimulus 4. tigrine on square	only as tigrine
Becky (PC)	1. tigrine on half hexagon 2. original stimulus	only as a hexagonal shape
Johnathon (SC)	1. hexagon	only as a hexagonal shape
Grahame (PC)	1. original stimulus 2. original stimulus	only as a hexagonal shape
Matthew (SC)	1. hexagon 2. hexagon	only as a hexagonal shape
Anna (PC)	1. tigrine on square	either hexagon or tigrine or both

understanding. One example will make my point. Rosalind - a shape child - uses the term in conjunction with the colour and the pattern associated with the required block: "red gombe", "red round", "striped gombe", suggesting that gombe is being treated as a shape term, since it has the same distribution as shape terms like circle and square.

MAPPING STRATEGIES

The use of the term strategy in the following discussion is not meant to imply that the child is explicitly aware of these processes. In fact the evidence runs counter to such a hypothesis, less than half the children (6/14) articulate criteria which are consistent with the criteria they use to make their responses. The use of the term strategy here indicates that there are certain regularities in the child's decision-making. In the present section I will deal with the children's individual response patterns. To aid the reader Table 7.15 contains a list of the children's names in each condition.

The first pattern of responses to be described will be those of the shape group. Since all the shape children followed a common path, their data are combined.

Shape group - common strategy

In Stage 1 none of these children had any problems in producing the required colour and shape terms, though some of the children clearly had larger colour vocabularies than others. No problems were encountered in choosing the intended referent in either Stage 2 or 3. In Stage 4 all children chose the blocks as if they had made the inference that gombe denotes HEXAGONAL SHAPES. However, at this stage it is not possible to distinguish between the inference that gombe denotes HEXAGONS or that gombe denotes MULTIGONAL SHAPES. By Stage 6 it becomes apparent that not only had the children made the inference that gombe denotes SHAPE but that it denotes a particular shape, HEXAGONS.

The groups' responses to the questions in Stage 4 were reasonably homogeneous especially if we examine the RI responses, see Table 7.8 a & b. Children clearly treat gombe as a shape term and their responses to gombe are inconsistent with their responses to a meaningless control.

Four children from this group produce the term. Ruth produces the term 'correctly' in Stages 3 and 4. In both cases there can be no doubt concerning her intended referent because she points as well. Both these productions

Table 7.15 The names of the children in each experimental group

Shape Group	Pattern Group
Ruth	Andrew
Rosalind	Becky
Zoë	Rachel
Jonathan	Michael
Matthew	Graham
Hazel	Anna
	Lucy
	Louise

are requests for a "gombe block". Rosalind uses the term in conjunction with the colour and the pattern associated with the required block (see previous page). The following utterance - a response to one of the questions - is also good evidence that Rosalind is treating gombe as a shape term. "First you cut it into a square, or a round or a gombe. Then you colour it in". Jonathan and Matthew both produce the term in Stage 6 when requesting blocks. Their productions are consistent with the manner in which they comprehend the term, since they were requesting plain-coloured hexagons.

The pattern of the children's responses deviates only when we consider their responses to the final question in the experiment - "What do you think gombe is ?" Three children give definitions consistent with their earlier responses and illustrating an ability to respond objectively.

Rosalind - "Shape, but not colour"

Ruth - "Shape"

Zoë - "Shape, has lots of sideways".

Hazel denied that it was either shape or colour. Jonathan said it was a brick and that it had both shape and colour and Matthew refused to respond.

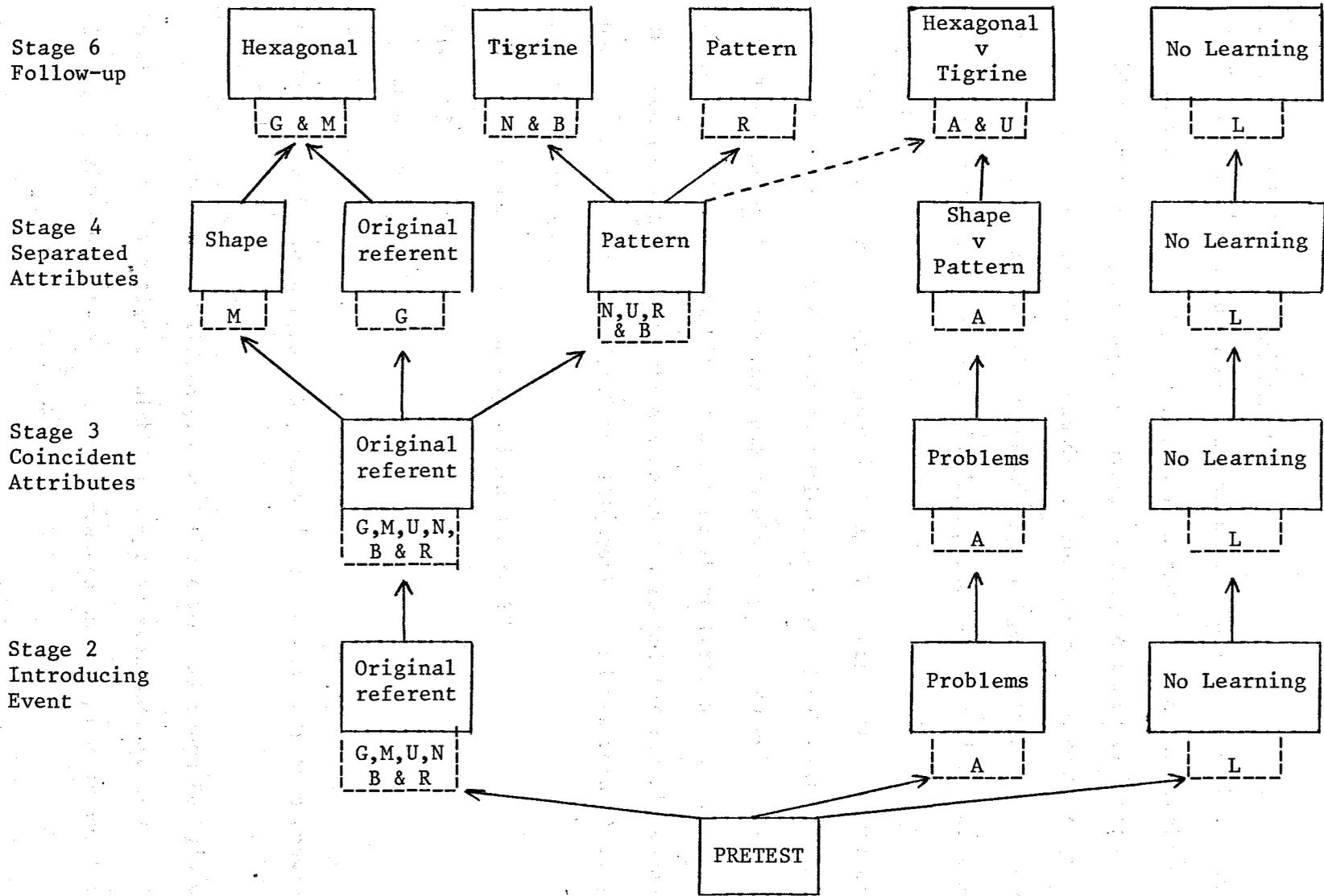
It is within the pattern group that variation in mapping strategies occurs and these are presented diagrammatically in Figure 7.6. In principle at least, the experimental design allows for at least three distinct patterns of response corresponding to the following three hypotheses:

H1: the inference that gombe denotes TIGRINE. That is a specific pattern.

H2: the inference that gombe denotes STRIPED - The constituent colours being irrelevant.

H3: the inference that gombe denotes a range of one of the constituent colours of the original stimulus.

No child produced a pattern of responses consistent with H3. Perhaps the children already knew terms which could be appropriately applied to the colours presented. This might then block the inference that gombe



Key

□ = denotation

G = Grahame
 M = Michael
 U = Lucy
 A = Anna
 L = Louise
 N = Andrew
 B = Becky
 R = Rachel

Figure 7.6 Pattern Group mapping strategies (comprehension data)

denotes a particular colour (cf. discussion of pre-emption in Chapter 3).

This explanation is partially supported by the fact that the children did name the colours, albeit usually wrongly. This evidence for pre-emption will be considered in more detail when the results of the colour control group are discussed. On the other hand we cannot yet dismiss the possibility that the pattern was simply more salient than either of the constituent colours.

The specific pattern strategy H1:

Two children produced response pattern consistent with H1. Andrew and Becky both passed through Stages 1, 2 and 3 in the same fashion as the children in the shape group. However, in Stage 4 their responses are clearly different from these children. Both Andrew and Becky chose the original stimulus on the first request for a "gombe block" but on the second and third request, both children passed striped blocks of a different shape.

In response to the questions in Stage 4 (except S2) Andrew's treatment of shape and colour terms was equivalent to that of the adults. Andrew's responses to gombe were the same as his responses to colour terms and therefore differed from his responses to shape terms as well as the meaningless control. Becky's question responses were uninterpretable because of her response bias to say "yes" to all questions and her refusal to justify her responses, eg.:

E "Can you cut a piece of paper into a nerk ?"

B "Yes"

E "How would you do that ?"

B "Don't know!"

Of these two children then, only Andrew's responses indicated knowledge of sense.

In Stage 6 both children produced the term. Although Becky's production was not inconsistent with her comprehension data it is not very informative since both uses were references to the original stimulus as a

"gombe block". In contrast one of Andrew's four productions was inconsistent with both his prior and subsequent comprehension (see Table 7.14). He referred to a plain coloured hexagon as a "gombe brick".

Both children chose only blocks with the original striped pattern in the Stage 6 comprehension session and reported that there were no more "gombes left" when there were in fact only plain coloured hexagons and blocks with differently coloured stripes left, that is, there were no tigrine blocks left.

Becky refused to define gombe but Andrew produced the following responses:

E "What do you think gombe is ?"

A "Don't know"

E "Can't you guess ?"

A "Gombe - with stripes"

E "Is it a colour ?"

A "Yes"

E "Is it a shape ?"

A "Yes"

E "Is it a pattern ?"

A "Yes".

Despite the fact that Andrew both produces and comprehends the term, he cannot offer a satisfactory definition. Two points should be mentioned about Andrew's results. Andrew produces the word striped in Stage 6 yet this does not preclude his comprehending gombe as 'striped'. It is, of course possible to argue that for Andrew 'gombe' is not synonymous with 'striped' because for him gombe denotes TIGRINE. However, as we shall see this is not a satisfactory explanation.

The second point relates to the asymmetry between Andrew's production and comprehension in Stage 6. Andrew's comprehension data are unambiguous: gombe denotes TIGRINE, yet his production data suggest that gombe denotes either TIGRINE or HEXAGONS. There seems to be no simple explanation of such a result.

The generalized pattern strategy H2:

One child, Rachel, followed the pattern predicted by H2. Rachel's responses in Stages 1, 2 and 3 were identical to those of the shape group and the specific pattern group. Her responses in Stage 4 were identical to those of the specific pattern children. At this stage she responded on trial 1 by passing a striped square. Responses to the questions about shape and colour were identical to the adult pattern. However, responses to gombe could not be differentiated from those given to the meaningless control word since responses to both were negative throughout.

In Stage 6 Rachel made no productions of gombe. She did, interestingly, produce "stripey". Again we have evidence that existence of the word stripe in the child's productive vocabulary does not preclude the comprehension of gombe as 'striped'. Here there is no justification for arguing that gombe denotes TIGRINE; for in the comprehension section all striped objects were passed, regardless of colour, in response to gombe. She reported that there were "no more gombes left" when there were no striped blocks left - though there were plain-coloured hexagons.

Rachel's definition for gombe is as follows:

E "Do you know what gombe is ?"

R "No"

E "What do you think gombe could be ?"

R "Don't know"

E "Could gombe be a shape ?"

R "No"

E "Could it be a colour ?"

R "No"

E "Could it be a pattern ?"

R "Yes".

It should be noted that the possibility of overextending the term to other patterns (eg. polka dots) was not present in this study. We cannot therefore distinguish between two possible meanings that gombe may have had for

Rachel: 'striped' or 'patterned'. If Rachel views gombe as denoting PATTERNED it is not possible to argue that stripey pre-empts gombe. However, her comprehension of the term pattern suggests that if this is an alternative, pattern might pre-empt gombe.

The strategies I have described so far are hardly anomalous. I have described shape children who treat gombe as a particular shape and pattern children who treat gombe as a particular pattern. However, there were four children who produced anomalous response patterns. Two of these were complete reversals of the anticipated strategy, that pattern children who treated gombe as a shape term.

The reversed denotation strategy:

The children who produced this sequence of responses passed through Stage 1, 2 and 3 in an identical manner to the pattern children previously discussed, but both were noted as being "at risk" in Stage 4. Michael so was so classified because of his initial denial of the presence of gombe blocks when there were still two striped blocks (not hexagons) left. Buzby's insistence that he wanted "a gombe block" resulted in Michael passing the remaining striped blocks but no others. Despite this interaction Michael proceeded to map gombe on to hexagonal shape in Stage 6. On the other hand, Graham's refusal at Stage 4 was absolute. On the first two trials he passed the original stimuli. At this point there were no hexagons left, only circles and squares, two of which were striped. Graham said there were "no gombes left, only stripey ones". From these responses we cannot tell whether Graham has mapped gombe on to hexagon, multigon or whether both shape and pattern are necessary, the critical test block being no longer present.

Graham's initial question responses show a confused pattern. Appropriate responses were given for S1 and S2 but random responses were given for the other questions and in response to gombe. Michael responds appropriately for C1, S1 and S2 for both colour and shape terms, but gave no indication that he could distinguish between 'gombe' and the meaningless

control. We can draw no conclusions about the children's semantic representation of the new term.

Graham's production of gombe in the follow-up session was restricted to the original stimulus. Although Michael did not produce gombe he did appropriately produce the word striped. Both children responded in comprehension as if gombe denoted HEXAGON. Michael's definition makes this explicit:

E "What's gombe ?"

M "Shape, silly "

Graham refused to define the term.

Despite the initial lexical contrast and for Michael the forced choice of striped blocks in Stage 4, both children comprehended gombe as denoting HEXAGONAL. Why did these reversals occur? The most satisfactory explanation and the one I have been advocating throughout the thesis, would be that because both children have the word striped in their vocabularies, there is no gap to be filled but there is a lexical gap for 'hexagon'. The tendency to assume that a new word denotes a new attribute may be very strong. However, we must be wary of being too narrow in our interpretation for, as we have seen in the case of Rachel, having the word striped in the lexicon does not necessarily preclude taking gombe to denote STRIPED.

The either/or or both strategy

The strategy to be described now has a direct analogy in the field of concept attainment: the inclusive disjunctive, that is for an instance to be defined as 'gombe' it must either be hexagonal, tigrine or both. Two children's Stage 6 results suggest that this strategy was operative. Anna's *2 initial uncertainties became apparent in Stage 2 when she pointed to each block in turn in response to the request for a "gombe block". A request by the experimenter resulted in Anna passing the correct block. A similar instance occurred in Stage 3 when Anna asked for reassurance: the request was simply repeated. It was in Stage 4 that a completely individual response pattern occurred. As do the majority of children Anna

passes the test stimuli for the initial two trials. On trial three she selects a green hexagon, suggesting that shape is her criterion for choice. However, on the fourth trial when no hexagon is available she chooses a striped round block. Anna's choices indicate that no single attribute suffices to define gombe. Her production at this stage suggests that gombe denoted SHAPE: "red gombe", "striped gombe". It also showed that striped is in her vocabulary.

Anna responded appropriately to C1, C2 and S2 for shape and colour terms. Responses to gombe and the meaningless control word varied randomly and between question types. So although Anna responded to colour and shape terms as if she has a conceptual framework, gombe has not been incorporated into these semantic fields.

Requests for the "gombe block" in Stage 6 produced three different types of response: the original stimulus, plain-coloured hexagons and tigrine blocks. Her penultimate comment was "only got round gombes left". Her use of gombe is different from that of Stage 4 where she used gombe in conjunction with red and striped. Anna's productions of the term gombe were therefore consistent with her comprehension of the term. That is, gombe could denote either HEXAGONAL or TIGRINE. However, her final comment when pushed for more gombe blocks was to pass a tigrine square saying "gombe cause it's got stripes on it". If we had not had access to Anna's previous performance it would be tempting to conclude that Anna had grasped the intended denotation of gombe despite the fact that the term was pre-empted in her vocabulary. Her response to the final question adds little clarification:

E "Anna, what is a gombe?"

A "A brick, a gombe brick"

E "Is it a shape?"

A "No"

E "Is it a colour?"

A "Yes".

Anna's criterion for the denotation of gombe seems to be simply resemblance

to the original referent (ostendent). It appears that she was in the process of mapping out the denotation of gombe by testing various hypotheses based on the first presented instance. On several occasions she looked for feedback from the experimenter to see if she was correct - a good practice in normal discourse. The initial linguistic contrast was not effective, either because colour was contrasted with pattern or because the term striped already existed in Anna's lexicon.

In contrast Lucy, who produced similar Stage 6 data to Anna, followed the expected sequence of responses for a specific pattern child until Stage 6. Lucy produced gombe in Stage 4 in the same way as she was using other colour terms "big red" "big gombe". However, Anna's results suggest that we should be wary of a simple interpretation based on production. When asked what she thought gombe was, Lucy said:

L "Don't know"

E "Is it a colour?"

L "Yes"

E "Is it a shape"

L "No".

No learning:

Despite the fact that Louise produced the term twice, it was not possible to identify her intended referent. She failed to show any learning whatsoever. Louise was the only child who failed the pretest for colour and shape terms and this fact may well explain her results.

It might be argued that the variety of strategies evidenced in the pattern group is specifically due to the fact that the striped pattern is not a novel colour - as the lexical contrast suggests. To control for this possibility a study contrasting colour with colour was run.

COLOUR CONTROL GROUP

This experiment was designed to answer the question raised at the end of the preceding section: viz did the diverse, anomalous strategies of the pattern group arise because the lexical contrast invited a search for a new colour which could not be found? Accordingly a lexical contrast between gombe and known colour terms was employed as an introducing event (as formerly), but the ostendent differed from the other objects in shape and colour only. That is, all blocks were self-coloured, without patterning of any sort. The colour chosen for the ostendent was selected so as to minimize the possibility of pre-emption of other known colour terms.

METHOD

Subjects:

Seven children completed the experiment. All children were full-time attenders of the University nursery group. The children had a mean age of 3;3 (range 2;8 to 4;0). These children were not in attendance at the nursery when the main study was carried out.

Procedure:

The procedure was identical to that of the main experimental group apart from the alterations in the design implemented in the following stages.

Stage 1 - Pretest: The pretest was designed to assess the children's productive colour vocabulary. The children were introduced to a monster who had one eye that changed in colour. The children's task was to identify the colour of that eye. The experimenter controlled the change in eye colour and randomly presented 14 different colours; brown, red, pink, green, yellow, navy blue, purple, orange, black, white, grey, rust and two shades of blue/green. The two shades of blue/green are labelled silver fern and green slate on Berger paint colour charts.

Stage 2 - Introducing event: In the introducing event gombe was contrasted with red and green. The ostendent colour was silver fern. It was the colour labelled least consistently in Stage 1. Children were asked

to: "Pass me the gombe brick, not the red one or the green one but the gombe one". The ostendent was a hexagon, the other objects being a circle and a square block as formerly.

Stage 5 - Longitudinal gap: The gap between stages 4 and 6 was reduced to three weeks. Play sessions and hence video-recordings were omitted.

Stage 6 - Follow-up session: This section consisted of two sub-sections - a production and a comprehension section, as in the main study. The choice of objects was extended to include dark blue, slate green and silver fern squares, circles, triangles, hexagons, parallelograms and oblong blocks.

RESULTS

Stage 1 - Pretest: The numbers of correctly identified colours ranged from 3 to 11. Six of the seven children labelled at least seven colours correctly. Only four times did children acknowledge that they did not know the names of colours. The colours concerned were rust, silver fern and green slate. The tendency for children to label all colours with colour terms regardless of their appropriateness supports my argument for choosing pattern in the experimental study. There are no clear gaps in the colour lexicon. Rather children do not acknowledge the presence of a gap. Two colours had been included in the pretest as potential test stimuli, slate green and silver fern. Silver fern was chosen as the test stimulus because it received the greatest variety of colour terms including blue, brown, grey and green. I did not want a colour which all children consistently named in the same way. My assumptions are, of course, a) inter-child inconsistency is the best indicator of intra-child inconsistency and b) intra-child inconsistency of naming means that colours so named are not pre-empted by the known terms used to name them.

Stage 2 - Introducing event: Only one child failed this task, Julia. She refused to respond. Julia was the only child to exhibit an extremely restricted colour lexicon, identifying only 3 colours correctly in Stage 1. The children's mapping strategies are presented diagrammatically in Figure 7.7.

Stage 3 - Coincident attributes: Again only Julia had any problems at this stage. This appears to be directly related to her unstable colour lexicon. At this stage only one child, Niall, produced the term. He refers to the original stimulus as "gombe block".

Stage 4 - Separated attributes: Only two children, Niall and Myrianthe, responded as if gombe denoted the unknown colour, SILVER FERN. Tom responded as if either property, colour or shape, constituted an identification of a gombe block, and finally, four children (David, Lesley, Julia and Rebecca) completely reverted from the expected pattern responding as if

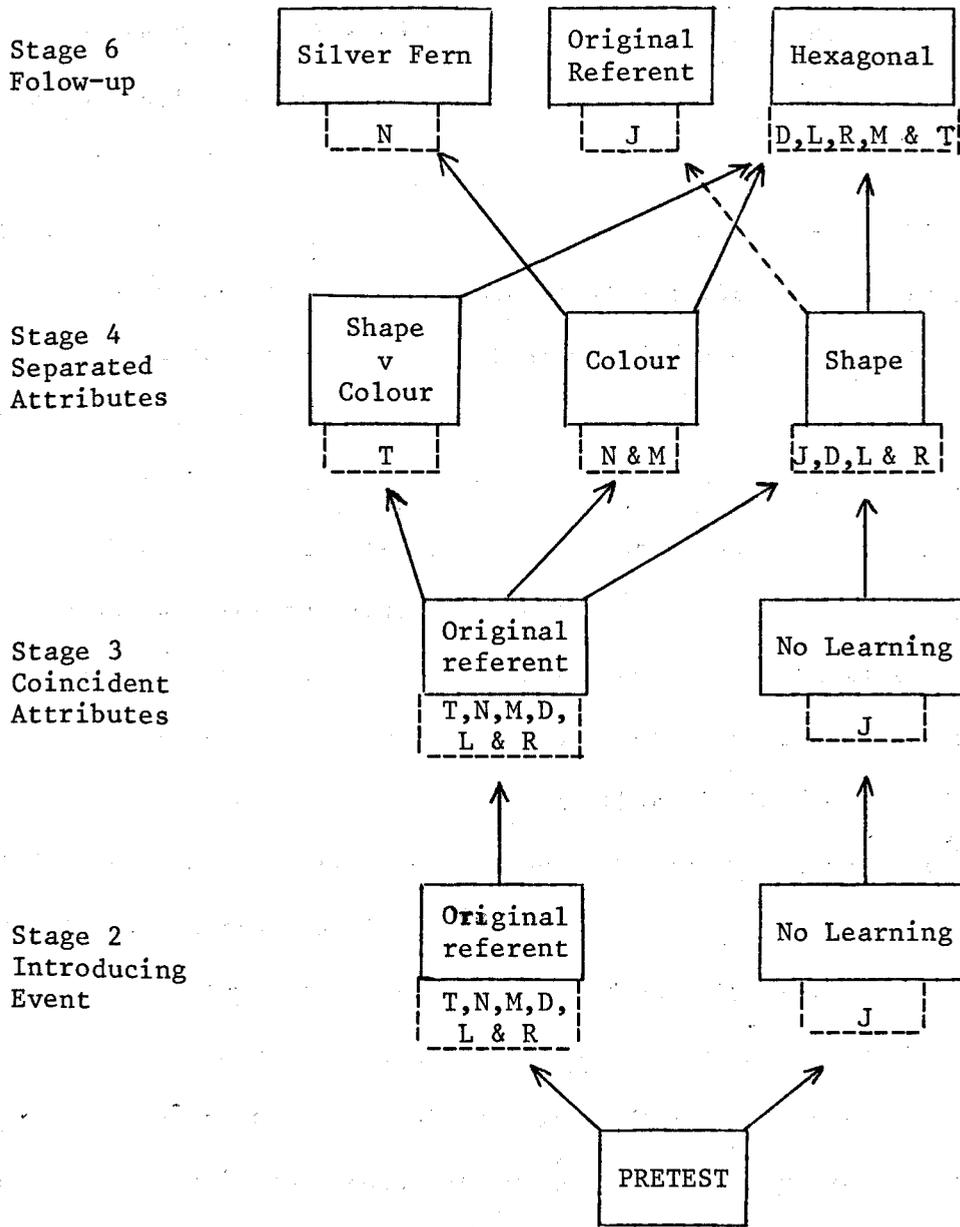


Figure 7.7 Colour Control Group mapping strategies (comprehension data)

Key

□ = denotation

- T = Tom
- N = Niall
- J = Julia
- M = Myrianthe
- D = David
- L = Lesley
- R = Rebecca

gombe denoted HEXAGONAL. Rebecca's response when asked for "another gombe" was "none left only blue ones". There is a direct comparison here with Graham's results (reversed denotation strategy) in the main experiment "none left only stripey ones". The difference here is that Rebecca has extended the term blue to include SILVER FERN. This was the same label she used in the pretest and since it appears Silver Fern is pre-empted, she has deduced that gombe denotes the unknown shape - the only other unnamed salient attribute.

Questions: Of the six children who could have responded to the questions three simply replied "yes" to every question and only two of the six were prepared to offer any justifications.

Niall distinguished between shape and colour terms and responded to gombe as if it denoted COLOUR. This is consistent with his comprehension data. Again, here, there is evidence that simple "yes"/"no" responses underestimate the child's competence. There are not sufficient data to warrant any further analysis.

Stage 6 - Follow-up: In the final session only Niall took gombe to denote SILVER FERN. Five children took gombe to denote HEXAGONAL and Julia took gombe to denote the original stimulus. The simplest interpretation of these results is that colour terms are more easily extended than shape terms; this leaves a gap in the shape vocabulary but not in the colour one and therefore children take gombe to denote SHAPE in this situation. Apart from the fact that children do learn new colour terms, albeit with difficulty (Bartlett, 1978; Campbell and Bowe, 1979; Carey, 1978a; Rice, 1978 cited in Carey, 1978b) and that they do learn synonyms and superordinates and subordinates, such an explanation fails to take into account two factors present in the control experiment. Firstly, children's denotation changed from Stage 4 to 6 and secondly, there were occasional asymmetries between production and comprehension.

Two of the children who responded as if gombe denoted HEXAGON in Stage 6 had responded quite differently in Stage 4. Myrianthe was the only child to

admit she had no term for 'silver fern' and in Stage 4 gombe to denote SILVER FERN - a mapping we might predict. Why does she change her criterion in Stage 6 and respond as if gombe denotes HEXAGONAL ? One possible explanation is that some semantic reorganization took place between Stages 4 and 6 - possibly in her colour lexicon.

Tom's performance in Stage 4 could best be described as an either/or both property strategy. By Stage 6 he has restricted the denotation to hexagonal. Why ? Certainly his Stage 4 strategy allowed for flexibility in the mapping process but what made him focus on shape and a particular shape at that ?

In contrast, Julia performed in Stage 4 as if gombe denoted HEXAGONAL. By Stage 6 she had restricted the denotation to the original stimulus. The reasons for such a restriction are somewhat obscure. Her willingness to label all colours with other colour terms may account for eliminating colour as criteria but why restrict gombe to shape and colour ? There seems no obstacle for mapping gombe on to shape or even unnamed shapes. Alternatively, why can't gombe be just another one of these randomly-assigned colour terms ?

It might be argued that the options in the two test situations are so different that no consolidation of meaning occurs - rather different situations entail different choices. However, I fail to see how offering a different choice can explain Julia's and Tom's restriction of criteria or for that matter Myrianthe's focus on one particular attribute - shape. Surely present theory would predict either no change or extension with a greater variety of responses.

Interestingly, I have evidence of semantic reorganization in the one child, Niall, who took gombe to denote SILVER FERN. The evidence comes from Niall's father who reported that at home Niall was labelling BLUE as gombe. It would appear that although the initial lexical contrast had made it clear to Niall that colour was being denoted he had not restricted the range of denotata.

The second point I would like to mention is the one case of striking

asymmetry between comprehension and production. Gombe denotes HEXAGON for David both in Stage 4 and Stage 6. Much to my surprise, when asked the colour of a particular block, at the end of the testing in Stage 6, he replied "gombe". The colour was Silver Fern, but I was expecting blue or some similar alternative. One possibility is that David has come to realize that he has no appropriate name for 'Silver Fern' and therefore uses the only name that has been associated with that colour - odd colour, odd name. This hypothesis is weak: since David performs as if gombe denotes HEXAGONAL - it is not an odd name.

Since five of the seven subjects take gombe to denote HEXAGONAL, despite the initial lexical contrast, my doubts about the potential for pre-emption by the colour lexicon appear to be substantiated.

DISCUSSION

At the end of ten weeks only one child had failed to learn something about 'gombe'. All the other children had formed some representation of the term. It is not possible to say how many, if any, had acquired a "full mapping" for we have no conception of what new contexts might alter these responses or what refinement will occur spontaneously (note the changes which occur between Stage 4 and Stage 6 when the child does not hear or produce the term). In any case, "full mapping" is a relative term. In this situation it can only mean the experimenter's intended denotation and sense. Normally the child's interpretation of lexical items is contrasted with an agreed consensus. The question is not which children reach the experimenter's criterion for "full mapping", but rather what do these individual and group strategies tell us about the child as a word learner.

Chapter 8 will contain a synthesis of all the mini-longitudinal studies and will consider whether they shed any light on the questions posed in Chapter 4. At present I should briefly like to mention the issues which are raised by the present experiment.

Rather than giving clear support to my ideas about pre-emption as an inhibitory factor in acquiring the meaning of a new word, the present experiment makes it clear that some qualifications are needed. The existence of a lexical gap when a child first meets a new word, assuming that the child can pick out the intended denotatum, allows a quick and direct mapping to take place. Certainly pre-emption places added strain on the process but it does not preclude the acquisition of the new lexical item, as having the same or a similar denotation to the previously known lexeme. Of course, this result should have been expected since children do learn synonyms. To my knowledge no work has been done in this area and it seems a fruitful field of investigation. At what age and for what word classes is pre-emption important ?

The second issue that this experiment sheds light on is the importance of lexical contrast. As I stated in the Introduction to this Chapter, in

the previous studies of this nature the range of possible properties being referred to was highly constrained. The question then is, is lexical contrast still informative to the child when a number of properties are available for reference? As the experiment has shown, lexical contrast can play a decisive role in the child's ensuing representation of a new lexical item (cf. shape group), but this contrast is less effective when the term is pre-empted (cf. colour control) or when the contrast is not accurate (cf. pattern group), and an alternative denotation is available. Children's solutions, when pre-emption and lexical contrast conflict, may depend on a number of factors including their ability to accept synonymy, the relative importance placed on linguistic information, the degree of ambiguity within the frame of reference, the salience of the attribute and other similar variables.

Thirdly, this experiment allows us to trace the development of denotation over time. Since the children's access to the new word is controlled by the experimenter, we can conclude with certainty that changes in either denotation or sense relations are due to internal reorganization, since there is no further exposure to the new term. Children appear to test out their own mini-hypotheses as to the term's denotation (cf. Anna, either/or or both strategy). By restricting the child's exposure to the first referent and subsequent instances we are also able to examine the proposals of Bowerman (1977) and Anglin (1977) that the first referent is often the prototype for future extensions of the term. The children who exemplify the either/or or both strategy are possibly uncertain as to the intended property but use the first referent, that is the striped hexagon, as their basis for use of the term.

Fourthly, within this experimental paradigm it is possible to identify children who are "at risk" of developing unexpected mappings. What this means is that we are able to identify some of the important variables in the word learning process. These include pre-emption, the existence of an immature semantic framework, and uncertainty concerning the intended referent.

The fifth point is a methodological one but bears upon our understanding of the child's semantic competence. As I have stated, knowing the meaning of a word entails knowing both its denotation and its sense. In an attempt to investigate the child's semantic representation of the new lexical item I discovered what appeared to be, in many cases, a series of unstructured semantic fields. That is, children responded inappropriately to the questions about colour and shape. Some of the problem may rest in the structure of the questions. But the children never responded to questions about shape with colour terms and vice versa. This suggests that a conclusion about unstructured semantic fields for colour and shape terms is unwarranted. Possibly I should have presented children with blocks consisting of one gombe attribute and asked about colour, shape and pattern, but this method places demands on the child's productive abilities. The point is that we must be very sure that the task we design tests the competence we wish to investigate.

The sixth point is also methodological and is an attempt to explain why there were no productions in Stage 5. The explanation may lie, not in the complexity of the term, but rather in the nature of the verbal interchanges. I assumed that children would use the only possible distinguishing criteria, either shape or colour, to request the blocks. This was not the case. The following are examples of what actually occurred: "I want a big brick like that one", "I need two of them", "I want some bricks", "I want one of those", "Do you want the brick?" (holding it up), "Where have my bricks gone?" or "I've got lots of bricks". The level of use which I assumed would operate was wrong. Children were functioning quite successfully without resorting to shape or colour terms.

The final point pertains to a possible built-in bias in the experimental design. Children used the bricks for building, and this very activity may predispose a child to consider shape as the more salient attribute. It is not possible to test this hypothesis directly. I am not sure what sort of stimuli would be used in such an experiment. However,

two points suggest that this predisposition might not be a critical variable. In the first place the only difference between the shape group and the pattern group was the lexical contrast, yet the two groups differ dramatically in their mapping strategies. So while building may engender a predisposition to focus on shape, it is not sufficient to eradicate the effect of linguistic contrast. Also the saliency control group showed no bias to select hexagons. Secondly, during the video sessions the predominant response was to build, but children also grouped blocks according to their colours and patterns, another suggestion that shape might not have been the only variable that the children focussed on. If the experiment made the children focus on anything it was the fact that they were dealing with bricks, not necessarily bricks of a particular colour or shape.

CHAPTER 8

THE MAPPING PROCESS

This chapter falls into three parts. In the first section I will bring together the overall results from the mini-longitudinal studies so as to present a synthesis for the reader and to provide further ground for the ensuing discussion. In the second section I will discuss the data accumulated in these studies in relation to the theoretical issues discussed in Chapter 4 (4.2). In the final section of this chapter I will speculate as to the possible progression in the acquisition of new terms by preschool-age children.

8.1 The mini-longitudinal studies as a whole

Carey's innovative experimental method has made it possible to trace preschoolers acquisition of unfamiliar words. New word classes and a number of other potentially important variables have been investigated by the introduction of a series of experimental modifications. Figure 8.1 is an attempt to view the experiments as a whole in relation to the variables involved and their relation to the final mapping of the new terms. From the figure it is possible to pick out those variables which can be regarded as carrying greater weight in the subsequent acquisition process. Undoubtedly these variables will interact in a number of complex ways, but at present the manner in which this interaction occurs can only be speculated upon.

Lexical contrast which specifies the intended semantic field without ambiguity is a decisive factor in the ensuing mapping process, providing a gap exists in the relevant area of the lexicon. If no gap exists the children either focus on an unnamed variable which is present or produce alternative strategies as in Carey's original work. The lexical contrast need not be supported by an analogous perceptual contrast, though the presence of an appropriate perceptual contrast does seem to accelerate the ensuing mapping process. This result should not, in fact, be surprising

UNFAMILIAR WORD VARIABLE	PATAS (Noun)	ZUT (Verb)	GOMBE (Adjective) Shape Group	GOMBE (Adjective) Pattern Group	GOMBE (Adjective) Colour Control
LEXICAL CONTRAST	✓	✓	✓	Unclear ?	✓
SUPPORTING PERCEPTUAL CONTRAST	✓	To object <u>not</u> action	-	-	-
SEMANTIC FRAMEWORK	✓	✓	✓	Lacking ?	Lacking ?
GAP IN LEXICON	✓	✓	✓	✓ + ?	?
MAPPING SENSE & DENOTATION	STRONG SENSE DENOTATION ✓	SENSE ✓ DENOTATION DEVELOPING	SENSE ✓ DENOTATION ✓	SENSE ? DENOTATION VARIABLE	SENSE ? DENOTATION REVERSED

Figure 8.1: Factors contributing to the development of sense and denotation in mini-longitudinal studies

since Harris (1975) has shown that linguistic information in the form of "a mib is a bird" allows children to make inferences regarding the attributes of 'mib' and to distinguish it from other members of the class.

The presence of a semantic framework into which the new word can enter appears to be more important for a sense representation of a term than for its denotational representation. The semantic frame is set up by the initial linguistic contrast. A semantic framework shows that the children know that relations exist between words, and therefore its existence potentially allows the new term to enter into these word-word relationships. As such the existence of a semantic frame may in fact be a necessary prerequisite for the development of sense relationships. So, for example, in the case of the pattern contrast group, although various denotational boundaries are constructed, the term does not enter into any coherent semantic framework. This may well be because the initial contrast is ambiguous. This is not the point, however. The point is that various denotations develop but there is not evidence of any sense relations. In a similar vein, in the 'patas' case, where a semantic framework exists, we are sure of the sense of the term for the children and can only infer the denotation of the term from the choices the children make from a limited selection of animals. It is, therefore, logically and empirically possible for sense and denotational mappings to exist independently. The sense of the term restricts denotation, and equally, knowledge of denotation may allow a sense representation to develop. When both of these representations are complete, the child may be said to have achieved full mapping of a term.

The existence of a gap in the relevant area of the lexicon accelerates the mapping process as we have seen in the case of patas, zut and the gombe shape contrast group. Although the absence of such a gap in the lexicon is likely to prevent the intended mapping, it does not necessarily do so. In support of the importance of the lexical gap theory we have data from five out of the six children in the colour control. These children, who have an alternative label for silver fern, treat the new word as a shape term

despite the initial linguistic contrast. Even the single child who does take gombe to denote COLOUR alters his own denotational boundaries and starts to label blue as gombe, an indication that for this child two words cannot denote the same entity. It is the existence of the word striped in the lexicons of Rachel and Andrew (pattern group - pattern strategy) which forces us to revise the lexical gap hypothesis. It may be that the difficulties children appear to have in associating pre-empted objects or attributes with new names underlies a second stage in the process of tackling word meanings. There may be an initial stage where the child has broad/general rules for identifying the referent of a particular word, for example, contextual ones. This process is not necessarily affected by previous "name" knowledge. Possibly because the child has either too few stable denotata for words or because he has not grasped the conceptual nature of language, so that it is not incongruous for one object to be labelled by two different terms. There may then be a second stage where the child's conceptual and linguistic knowledge has increased and he uses a number of labour saving devices (rules) to cope with the ensuing problems. Elements such as contrastive information, limiting features, eg. no name for x but names for all others, conceptual information, textual information etc. all come into play. All these rules can potentially work against the child, eg. in the acquisition of synonyms, possible superordinate and subordinate relationships and in understanding text/context asymmetry. Finally, there must be a stage of integration where subordinates are seen as members of the superordinate class, where the possibility of synonymy exists and where problems encountered with homophones (cf. Campbell and Bowe, 1978) are eradicated. The rigid rules which were originally designed to rescue the child from the amorphism of the earlier period become flexible. It may be that Andrew and Rachel, who are in fact the oldest children in the study, have reached the equivalent of stage 3, whereas the children who reverse their denotation for gombe because of the presence of the word striped in their vocabularies, are only at stage 2. Such a

suggestion would be refuted if it were shown that the same child is affected by pre-emption for some words yet treats others synonymously. This work has yet to be done. However the fact the young bilingual children will sometimes only label objects by words in one language denying the appropriateness of the word in their other language would support the stage theory proposed here (Fantini cited in Clark, 1980).

Carey (1978a, 1978b) identifies two phases in the acquisition process; a fast mapping and a more extended slow mapping. The present studies support Carey's description of the slow mapping period - a long period of semantic and lexical reorganization - however her description of the fast mapping process requires some qualification. To Carey, the fast mapping is only a

" Small fraction of the total information that will
constitute a full learning of a word"
(1978:18)

The first point is a simple qualification of Carey's initial conclusion. In some cases the fast mappings may provide the children with sufficient information to gain a considerably more detailed understanding of the term than Carey would have us believe (cf. patas study). The second qualification is more important. Implicit in Carey's definition is the fact that information acquired in the fast mapping process is relevant to the meaning of the new word. Certainly this is the case in her own study, but when the child has more options as to the attribute being referred to there is a greater potential for errors, and children make them. Therefore fast mappings need not necessarily provide the children with information which is relevant to the meaning of the new word but rather on some occasions the fast mappings may lengthen the word learning process because the child has made an initially incorrect guess. Fast mappings are structured by the linguistic and non-linguistic context in which the child encounters the word and by the nature of the episode; the more unstructured are the alternatives that are available to the child the more likely he is to make an error. It would seem then that the information

provided by children's mothers, which restricts the possible meaning of the new term, are extremely valuable guidelines for the child.

8.2 Theoretical implications of the mini-longitudinal studies

The data accumulated in the preceding studies serve as a clarification and expansion on some of the ideas and theories presented in Chapter 4, Section 2. In particular, the data present us with evidence from the preschool child with respect to the formation and subsequent representation of semantic categories.

Two main explanations of the development of denotation have been proposed; the functional core hypothesis and the semantic feature hypothesis (cf. discussion 4.2.1). The data from the patas study do not contribute directly to the evaluation of these explanations. From the children's discourse it was possible to extract features that they regarded as salient in an association with the new animal. Children talked about the animal's long nose, it's habitat and the actions they could carry out with the toy animal. Now while long nose and habitat may be regarded as perceptual features and might well have been a possible basis for over-extension, no child used these features though it is true that the possibilities of doing so were limited. Equally, children focussed on the actions which they could engage in with the toy. Again no overextensions on this basis were produced, but once more the possibilities for doing so were limited. Neither of these features appeared to be the basis for the children's representation of the term. Children treated the term as an animal term and attributed to this new word animate characteristics. The object as a whole rather than any independent feature was the basis for categorization.

In contrast, in the zut experiment children did overextend their use of the new verb to include actions carried out by other vehicles in similar situations. It is questionable whether this should be termed an overextension at all. 'Zutting' is a manner of locomotion in the same way that flying, driving and sailing are. Although there may be one particular vehicle that is predominantly associated with each of these actions this does not preclude statements such as "the car flew through the air".

It is arguable therefore that other objects *zut* as well. If we do regard these as overextensions then they are overextensions on the basis of action. There is no doubt that the overall basis for categorization here is the type of action but what alternatives are there? The lexical contrast provides the basis for the eventual mapping and children treat the term as an action term. What perceptual features could have been used? As far as I can determine no real alternatives are available apart from locomotion over snow. This is in fact the crux of one of the points made against the perceptual feature hypothesis earlier and that is that something other than perceptual similarity is involved when we consider words which denote non-object/relational categories. The key relationship for the children in this situation is that the action, a mode of locomotion, takes place across snow. However, such a result in no way forces the conclusion that all categories are action based.

It is the gombe experiment which provides us with the most insightful data vis a vis denotational development and the basis for categorization. A function/action based categorization process would presumably involve the possibility of building with the blocks and we would therefore expect overextensions to blocks of an unnamed shape that could be used for building in a similar manner to the hexagons. No such overextensions occurred. Some of the children do use a perceptual feature as their basis for categorization, either pattern or shape. Children may focus on this property either because of the preceding lexical contrast or because an alternative property is pre-empted (cf. colour control). Not all of the children's lexical categorizations are based on a single simple feature. Children also develop denotations which are best described as associative complexes (cf. Vygotsky, 1962). A red hexagon and a striped square share nothing in common with each other; they do each share one feature with a central instance, the striped hexagon referred to as gombe. In the colour control there is one child (Thomas) who uses this system as his basis for categorization in stage 4, but by stage 6 is only focussing on a single

perceptual feature. So not only is it possible for different children to have different bases of categorization and for the same child to have different bases of categorization for different words, it is also possible for the same child to change his basis of categorization. Now it can be argued that the strategies produced by calling something a "gombe block" and intending to denote colour are different from pointing to the moon and saying "moon". They are only different if the child knows that in one case a property is being denoted and that in the other case an object is being denoted. I suggested that in the cases of children who produce associative complexes this distinction has not been made. It seems that in both situations the child uses the original referent as a basis for discovering the denotation of the term. Lexical contrast when it is successful restricts the denotation.

Since the mini-longitudinal studies attempted to elicit production as well as assess comprehension, they provide us with data to evaluate the present theories concerning the relationship between comprehension and production. In the patas study both comprehension and production occurred at approximately the same time. Children showed evidence of comprehension from the first test session and spontaneous production occurred in the subsequent session. The children's productions were always consistent with their comprehension.

In contrast, in the case of the novel verb, children did not produce the term but rather produced verbs with which they were more familiar, eg. 'go' and then qualified the action stating that it was associated with snow. It would seem that children choose to use words with which they are more familiar. Arguably these terms are semantically less complex as well. It would have been impossible in the patas study for the children to produce terms which were semantically less complex and still establish reference. I believe that this is further evidence that concrete objects are best viewed in a hierarchic framework whereas verbs and other relational terms are best viewed in terms of semantic complexity of the inclusion type.

Looked at in this light [go] is included in the meaning of 'zut', ie. go over snow, whereas 'patas' is viewed as a hyponym of animal. Children's productions of more general verbs may therefore be seen as indicating that children's attempts at production are not in conflict with the manner in which they comprehend the term.

The majority of children in the gombe experiment produced the term in a manner that was consistent with their comprehension, although in some cases the production was restricted to the original stimulus. One child, Louise, produced the term but showed no evidence in the final analysis of acquiring any information whatsoever about either its sense or its denotation. It was as if Louise knew the context in which the word occurred, playing with blocks, but had no other principles governing the appropriateness of its use. Louise then presents evidence of a complete reversal of the expected pattern, that is she produces before she comprehends.

Apart from one instance of production before comprehension, the data here are not inexplicable in terms of the more common views of these two processes (Clark & Clark, 1977; Clark et al, 1974 ; Gentner, 1978; Huttenlocher, 1974). There are data from two children in the gombe study which are difficult to reconcile with any of the prevalent production/comprehension theories, except possibly that of Campbell and Bove (1979). Andrew (cf. Table 7.15) is a pattern child who comprehends 'gombe' as a specific pattern yet produces the term not only for the specific pattern but also when the only defining attribute is shape. While David (colour control) takes gombe to denote SHAPE from stage 4 onwards, it is only in the discussion after the main experiment that David produces the term and this is when he is responding to questions concerning colour. Why do these children respond in this manner? Must we conclude that the production and comprehension ranges are not inherently related? In effect I think this statement is too extreme, since in the majority of cases production and comprehension proceed in synchrony. The problems arise when the children encounter some difficulty in the mapping process either when the domain

under investigation is ill-defined (colour vocabulary) of when one source of information, eg. lexical contrast, conflicts with the child's knowledge, eg. the term is pre-empted (David), or when the initial encounter emphasizes one property yet there is still an equally salient possible unnamed alternative available (Andrew) or finally when the amount of information presented to the child overwhelms him so that he is unable to establish any consistent mappings (Campbell & Bowe's systematically varying denotation task). The relationship between comprehension and production is not always systematic: it will depend to a greater or lesser extent on the conditions in which the child encounters the term, his own semantic competence and the extent to which alternative appropriate labels are present in his vocabulary. This is very different from saying that the two processes are inherently not related.

I have already dealt with the importance of having a pre-established semantic framework for acquiring the sense of a new term. At this point I should like to bring the reader's attention to an interesting incongruity concerning children's understanding of sense relationships. It is precisely those sense-based relations which are seen as primary to the linguist which are difficult to evaluate in the child. Synonymy appears to be a late acquired relationship; children's responses to hyponym questions are often obscure (cf. Carey, 1978; and the data presented in Chapter 7). The relations of converseness and antonymy have not been examined here. Yet it is clear in many of the cases that children do have organized semantic frameworks; the problem appears to be in their ability to state the relationship explicitly. It is, therefore, necessary for the investigator to attempt to overcome these difficulties by inventing tasks which assess the child's semantic competence without explicitly testing the child's metalinguistic awareness. In fact the children's ability to use linguistic contrast to limit denotation illustrates that children are alive to the relationships which exist between words and can use such relationships to their own advantage.

8.3 Acquiring the meaning of a new word

In this section I intend to speculate on the preschoolers' process of acquiring the meaning of a new word. Needless to say, this speculation is based on the data collected in this thesis.

Provided that reference is established the child will use the first referent as the basis for his subsequent attempts at mapping the meaning of the new word. If the child does not identify the referent when relational terms are involved he will pay attention to the words which accompany the new term and any other contextual information which is regarded as salient until a consistent mapping can be established.

If the child is introduced to the new term in contrast with a set of related linguistic terms, and if there is a distinct gap in his lexicon, then the child can use the information given to infer a denotation of this new term which matches the linguistic information. In the same manner, providing that the semantic framework is stable the child will develop relationships between words as well.

If, however, no such gap exists the child may resort to a number of possible strategies:

- (1) He may focus on an unfamiliar property (if present) not emphasized by the linguistic contrast;
- (2) He may treat the word as a synonym of a known appropriate word, but see discussion 8.1 ;
- (3) Criteria for use of the term may fluctuate, but the basis for extensions will be one or other property of the original ostendent.

Strategies one and two are possibilities when the domain is structured and no piece is missing. Three, on the other hand, is more likely when no structure exists or when the child is unsure of which semantic domain is relevant. Clearly, if the child is sure of the original ostendent but unsure of the criteria for application of the term, testing by over-extension to exemplars with varying degrees of similarity is one way of

defining the limits of application. Responses of types one and two eliminate possible denotata rather abruptly, whereas responses of type three allow for a gradual development.

Children have great difficulty stating what they know about a particular lexical item. In fact it is not unjustifiable to say that they are often not aware of this knowledge - it is tacit. Not only are children not aware of what they know about a word's meaning, but frequently the child's tacit understanding of the term, as viewed in spontaneous production and comprehension, does not necessarily reflect what they say about the term. So, for example, Andrew (pattern group, specific pattern strategy) behaves as if gombe denotes TIGRINE, and clearly distinguishes between shape and colour terms, but cannot explicitly distinguish between shape, pattern or colour with reference to 'gombe'. On the other hand, Anna never responds as if gombe denotes COLOUR, does respond as if gombe can denote SHAPE, yet on occasion denies it is a shape and says it is a colour. There appears to be a disjunction between the children's two representations of the term. Campbell (1979) makes a distinction between what he calls phenic and cryptic representations:

"what is evident to the subject is
phenic, what is hidden, cryptic"

(1979:420).

This distinction may well be helpful in understanding the present apparent disjunction. If we view the child's production and comprehension of the term as processes employing cryptic representation, which occur without the child making inferences about its meaning, asking the child to make a conscious rational decision about its meaning may well involve a phenic representation which is not yet available for use.

"There is an inner domain [phenic] of the organism, the contents of which are constantly changing and available to awareness and whose dynamic is rational; there is an outer domain [cryptic], the contents of which change only slowly, are not available to awareness, and whose dynamic is causal"

(1979:420)

The fact that children's representations of the new lexical items change slowly over time when no information is encountered is another indication that we may in fact be dealing with a cryptic process when we are examining the acquisition of new words. It is not surprising, therefore, that if we attempt to examine something which is initially only cryptically represented by means that tap phonetic representations, we will find explaining the acquisition of word meanings a difficult if not impossible task.

CHAPTER 9

WHAT NOW ?

Chapter Eight ended on an optimistic note; it was possible to speculate, based on empirical evidence, about the process of acquiring a new word. This Chapter will outline some of the questions which remain unanswered and comment upon the methodological difficulties of studies concerned with semantic acquisition. In conclusion, I will return to the three-fold distinction between sense, reference and denotation and suggest a manner in which these three elements of word meaning might be related.

Whitehead (1932) distinguishes three stages in the development of learning—the stages of romance, precision and generalization. Whitehead suggests that the scientific questions asked at each stage are different types of questions. The stages do not necessarily reflect different empirical methods. Rather it is the manner in which the questions are asked and the data interpreted which is critical. Not only did my own thought processes parallel Whitehead's stages throughout the formulation and execution of this thesis but also Whitehead's model seems a useful framework for envisaging future research in the area.

Whitehead's first stage is the embryo of future work. He calls it the stage of romance, though wonder would seem an equally appropriate term for the stage. At this point investigations are not dominated by systematic procedures, rather it is a stage where the possible importance of bare facts are realized and the potential for unexplored relationships speculated upon. In essence this is where I began with the data which suggested a difference in children's performance with nouns and verbs. Similarly, the idea that the distinction between sense, reference and denotation might prove important was a speculation based on a distinction recently introduced into linguistics. I was searching for the possible role of these variables and looking for a framework into which they could be assimilated. It was only through moving to Whitehead's second stage, the stage of precision, that questions could be clearly formulated and empirically tested. The stage of

precision is one where specific hypotheses are tested (cf. Chapter 3), and facts are analysed bit by bit. The whole process forms a coherent approach. The approach manifested itself in the form of the mini-longitudinal studies. Whitehead's final stage, that of generalization, is self-explanatory. Bryan Dockrell (1980) has discussed this stage in relation to educational research. He suggests that the final stage is where

"We ensure that the relationships examined at the stage of precision are generally valid"

(1980:20)

As far as my research is concerned this stage has yet to be realized. Whitehead makes the point that these stages are not to be treated as discrete entities. Rather they are integrally related. Not only is it necessary to speculate before we can be precise and to be precise before we can generalize, but equally as we proceed we generate more facts which require speculation and precise investigation. The cycle is unending. This thesis is no exception.

9.1 The Stage of Romance

It is only with hindsight that I can look back and state definitively that this thesis has investigated the acquisition of word meaning from two sides of a three-sided coin. In the first part of the thesis I examined the child's ability to infer meaning from a single presentation of a term and I tested this knowledge at once. So the new word was encountered at time t_1 and testing took place at time t_1 . In the second part of the thesis I followed the mapping process over a period of time ($t_1, t_2 \dots t_j$) and testing occurred at several points along this time scale. In the longitudinal sequence each encounter with the new word after t_1 was always consistent with the meaning/denotation which was most plausibly attached to the term at t_1 . Thus in this situation the difficulties which arose for the children occurred when they failed to guess the most plausible meaning. There was really no viable alternative consistent with either the linguistic or non-linguistic context. So no viable alternative referent exists in any of the studies and despite the fact that alternative denotations do exist (eg. black and white animals in the patas study) these are circumscribed by the lexical contrast, and the subsequent linguistic and non-linguistic contexts are always consistent with the initially dominant denotation. However it is probably equally common for a child to encounter an unknown term at t_1 which suggests one dominant meaning and to encounter the word again at t_2 when a different meaning is predominant. The child must assimilate the information from both encounters with the term to work out the correct denotation and sense. If the child was not required at t_1 to give a precise indication of the term's meaning he could hold specific criteria, with respect to meaning, in abeyance until he encountered further instances. At any rate the child has no way of knowing whether his initial guess is correct until he meets the term again. How much meaning should the child invest in the new term?

Joos (1972) introduces a principle of semantic discovery which he calls Semantic Axiom Number One. Joos' maxim pertains to situations where

"Words are apprehended as mysterious in their environment"

(1972:257)

The central test of Joos' theory is that when a word is unknown the least meaning is the best meaning:

"The word should be defined in such a manner as to make it contribute least to the total message derivable from the passage where it is at home"

(1972:257)

Joos also suggests that the process of deriving a complete meaning occurs without the individual being aware of the process and that the final understanding manifests itself apparently spontaneously. Now Joos originally postulated this maxim to account for situations involved in translating, but it would appear that this principle of empirical discovery in semantics may have relevance for the child. How would it work?

Let us imagine that the child encounters the following sentence:

"The children are playing with the lud". Now if the child is required to or naturally makes a precise guess as to the meaning of lud, he might well say 'ball'. However he will find himself in considerable difficulties if he later encounters the sentence "Daddy is taking the lud for a walk". The initial specific guess 'ball' is inconsistent with this second encounter. If on the other hand the children follow Joos' maxim, all that is required is a very general guess, viz. 'something children play with', and on the second encounter this initial guess would need to be coordinated with the second context, viz. 'something that is taken for walks'. This process of coordination according to Joos would go on without the subject being aware of it; this idea of lack of awareness fits in well with the processes of semantic reorganisation that we have witnessed spontaneously occurring in the child. The precise meaning of a term would therefore be acquired through a process of semantic reorganization and with further experience with the word - a dual process and one which might be hampered if the child were required to make a precise guess as to the meaning of the term, as happened in Experiments 1 and 2. The process of semantic reorganization would be cryptic (cf. Campbell, 1979) and by interrupting it, as I did, it would appear that I was attempting to investigate it as if it were a phenic process.

Joos' principle of maximum redundancy makes sense, but this does not necessarily mean that it is put into practice. We are most definitely at Whitehead's stage of romance. Tacit processes do appear to underlie the acquisition of word meanings. That children initially endow a novel lexical item with the least amount of meaning, given the initial context, would need to be empirically investigated.

How might this be done? Two groups of children would need to be tested with a text containing an unknown word in at least two different contexts, each context suggesting superficially conflicting meanings. One group of children would be assessed on their comprehension immediately, the second group some time later. Do the children who have time for semantic reorganization to occur perform in a superior manner? Does requiring a precise definition at t_1 impair later operation of the semantic process? Ideally one would wish to design a means of assessing semantic representation at time t_1 without requiring the child to make a precise definition and then subsequently test representation at time t_2 after the child had encountered the new term in a different context. This testing of semantic representations at various time intervals is very similar to the mini-longitudinal studies but the goals would be different. We would be looking a) for assimilation of meaning over a variety of conflicting conditions and b) for initial vague criteria to define the term. The difficulties with getting children to define words at all might complicate gathering the latter type of information. On the other hand it might be worth designing an experiment similar to the sentence task in Chapter Two, but this time with the object of assessing the children's definitions from a perspective of amount of detailed information extracted from the linguistic context.

9.3 Precision

In many respects this thesis has raised more questions that require systematic investigation than it has provided answers to specific questions. At least now we are on firmer ground to investigate the word-learning process. I do not believe this necessarily detracts from the content of the thesis, for it is only through generating frameworks that we can ask specific questions in relation to those frameworks. There are, at least, three topics which require more detailed information.

The differences which appear to exist between different word classes with respect to both acquisition processes and final semantic representations need to be clarified. I have shown that with static pictures children have greater difficulty identifying the referent of a verb than that of a noun. It is not clear whether this difficulty is special to verbs or is inherent in all relational words. I have suggested that the problem lies in isolating the key components of the relation and therefore this difficulty should generalize to all relational words, including relational nouns. There is evidence in the literature that relational terms are in fact the terms which are acquired later on in the word-learning process (cf. Piaget on 'brother', 'tomorrow' etc). It would be possible to test this assertion by contrasting the rate of acquisition of relational nouns with non-relational nouns, as well as studying other relational words.

If the difficulty does rest in the 'relation', it should be possible to characterize to a greater degree than I have been able to, exactly what elements are crucial for meaning to the child - is it the global nature of the initial context or do specific contextual elements play a role? In the pictorial study it was established that children opt for the original context picture, lacking the relevant action, when they encounter an unknown/unnamed action. Can we be more precise about the criterial elements for meaning and can we show, as Nygren (1972) suggests, that these variables change with age? I believe so. A similar paradigm to that of Chapter Three could be used to investigate the phenomenon. For example, a child could be presented with a picture illustrating a girl skipping by a

tree and told: "the girl is NS-skipping by the tree". The test pictures could then be constructed in such a way as to vary only one key item (cf. Table 9.1).

Of course, these experiments are still open to the objection that the nature of the prototypical verb is not being accurately depicted. That is, the novel action is being depicted statically rather than actively. A different type of experimental paradigm could overcome this difficulty as follows: Children could play a game with a puppet, the puppet demonstrates a variety of actions to the child, some known and some unknown. To test comprehension the child is required to act out the action and to test production he is required to identify the action being performed by the puppet. By manipulating the choice of objects available in response conditions it is possible to assess the importance of the original objects in the child's representation of the novel verb. So, for example, the child is introduced to a verb denoting uncorking and the action demonstrated on a bottle of wine with an easily removable cork. The choice of objects for response includes, say, a bottle of wine without a cork, a storage jar with a large stopper and a bowl with a wooden spoon in it. Now to demonstrate uncorking the child must choose the storage jar but if the representation of the new verb is tied to the original objects he will choose the wine bottle.

The evidence from the minilongitudinal studies suggests that children do take longer to map out the denotations of novel verbs in contrast to simple nouns, but we need more information as to why these difficulties arise. Description is only one phase in scientific endeavour; it must be accompanied by explanation. I have suggested that part of the reason that the semantic process is extended is due to the semantic complexity of verbs and the fact that it is easier to use a more general verb without loss of adequate communication. How accurate is this assumption? In essence we need objective criteria of semantic complexity. Talking in terms of numbers of features avoids the issue and is misleading when we consider

Table 9.1 A hypothetical example for an experiment controlling contextual elements in initial presentations of novel verbs

Test picture	R1	R2	R3	R4
Girl	Girl	Boy	Boy	Girl
Rope	Rope	Rope	-	-
Action	-	Action	Novel Action	-
Tree	Tree	-	-	Tree

semantic domains like colour. Once reference is established what factors influence the child's subsequent mapping of a verb? A systematic investigation of a number of different types of verb is what is required.

The second issue, which is the subject of a thesis in itself, is pre-emption. In Section 8.1 I suggested that there might be a developmental trend in the manner in which pre-emption affects the child's increasing vocabulary. This hypothesis seems to be a sensible one. Such an investigation would necessarily entail both an element of longitudinal and cross-sectional data collection. Factors such as the intended level of specificity and the degree to which the new term was pre-empted would have to be carefully controlled. A useful back-up source of information could be obtained from bilingual children.

Finally, a more detailed understanding of the nature of fast mappings is required. It should be possible to classify the type of information children use in fast mappings, the nature of which may vary between word classes. For example, if I am correct in my analysis of relational terms, certain contextual elements may be more salient in the fast mapping for these terms than they are for object terms. For object terms the degree of similarity to the prototypical exemplar of that category may feature strongly in the fast mapping. In a similar vein it should be possible to specify the relative importance of syntactic, lexical and conceptual elements in the fast mapping. Finally, one would wish to investigate the differences between the fast and the slow mappings. Are they qualitatively different processes based on different types of information? To what extent is the fast mapping context dependent - that is based on the external objects and events and shared knowledge - and the slow mapping semantically dependent, that is, based on the child's pre-existing semantic structure?

9.3 Methodology

Throughout the thesis I have commented upon those methodological inadequacies which I felt may have distorted my results. There are several methodological problems which are inherent in this area of investigation and as such are worthy of note in their own right.

A possible lack of connection between the processes of comprehension and production has been postulated. Such a prediction implies that unless we wish to constrain our theorizing to one process both must be assessed. There is no doubt though that studies involving comprehension are easier to design and that even when we design experiments geared to eliciting production there is no guarantee of getting the data we want (cf. Chapter 6). Moreover, once we do design an experiment which succeeds in eliciting production we must be sure that the equivalent knowledge is being tested in the comprehension task - that, for example, the child does not have any alternative non-linguistic strategies available to cope with the comprehension task.

The second problem is one that is harder to isolate - that is the subject's attitude to the experimental situation. Children's conceptions of the task may change over time. A prime example of this occurs in the patas study where by the time the child reaches the follow-up session he is aware that I am interested in animal names and thus treats unknown words as names of animals. A more fundamental difficulty here is, where the child's whole approach to the problem changes, so that there may be situations which are initially testing a phenic process, but where through repeated exposures to a particular mode of testing, the child's responses become automatic.

Analogously we must be careful of the types of example we choose to assess the child's competence. Do the experimental stimuli generate ad hoc procedures, basic procedures or standby procedures used for regular exceptions? Certainly if we wish to make generalizations with respect to the actual word-learning process we must be quite sure we are not dealing

with ad hoc procedures. More specifically there is a danger that when we know the type of data we are looking for that we actually design experiments which artificially produce the expected results. Suppose I design a task to see whether strategy A exists and therefore specifically include a condition where this strategy may manifest itself. If my controls are not adequate, the strategy may well appear because there is no alternative mode of responding.

The two following problems are particularly relevant to the present set of experiments. Nonsense words are extremely useful tools but they should not be used without caution. I think it is significant that the studies reported here would not pass the ethical committees in American universities (Bowerman, personal communication 1979). At present such restrictions seem to overrate our understanding and our capacity to interfere with semantic acquisition, but the more refined our understanding of the word-learning process becomes, the more likely are we to tamper with the child's vocabulary successfully. At any rate, parents can rightly object to psychologists teaching their children "nonsense". Ideally one would want to investigate the acquisition of real words. Such studies are confounded by innumerable extraneous variables. Perhaps the most prominent are our inability to establish that a given word does not exist in the child's lexicon and to prevent interference from incidental variables. There is always the possibility with nonsense words, however, that the child is aware that the word is treated in some odd way, despite precautions to avoid this - even if it is only the manner in which the child is introduced to the word.

Despite a rather optimistic introduction to the concept of the mini-longitudinal study - the missing link - there are definite problems and limitations with this method. The number of words of interest that can be lexically and perceptually contrasted is limited. Simple dichotomous contrasts such as those that exist in the block task are rare. The child must have alternative denotations available to him to make the task ex-

ternally valid, yet if the experiment allows the development of too many different denotations it is difficult for the investigator to keep track of all the alternative mapping strategies and this leads to a lack of internal validity in the experiment. As we have seen, even with the semantic domains investigated here it is difficult to devise a means of assessing the sense of the term. This problem is bound to be exacerbated if we wish to investigate anything other than simple nominal fields. Finally, we must be aware that the context in which the new word is introduced may affect subsequent mappings, yet the new term must be introduced in relation to something. These are all issues which must be taken into consideration when designing such studies.

In summary there are a number of methodological difficulties in the area not all of which can be overcome by careful manipulation of variables. Perhaps the most frustrating problem for the experimenter occurs when an experiment has been well thought out and well designed, but fails to yield any response from children. Too frequently we fail to look at the task from the child's perspective.

Finally, all experiments contain an element of experimenter bias, even if it is only the orientation from which the problem is tackled. By defining meaning as involving sense, reference and denotation my orientation was stated at the beginning.

9.4. Sense, Reference and Denotation Revisited

In the introduction to this thesis I drew a three-fold distinction between sense, reference and denotation. It is now time to review the usefulness of this distinction and to speculate about the relations which might hold between these three components of meaning.

One of the main reasons for introducing the sense, reference and denotational (SRD) distinction was to clarify our understanding of the notion of meaning and hence to provide a framework for assessing the child's competence. Was it successful? Perhaps the best way of assessing the success of introducing such a distinction is to contrast the possible conclusions which may be made when no such distinction is made and those conclusions which can be formed when such a distinction is implemented. With respect to the noun-verb dichotomy if we fail to implement the SRD distinction we can only conclude that children have greater difficulty grasping the meanings of verbs than they do with nouns. We have no basis for pinpointing the difficulty with any particular component of the word-learning process for no a priori distinction between components existed. We would find ourselves in the same situation we were in in Chapter Two - verbs appear to be difficult for some reason. In contrast, by including the SRD distinction we can begin to investigate which component of meaning causes the difficulty in the word-learning process. So far we can state that establishing reference for relational verbs is difficult.

If we fail to draw the SRD distinction the concepts of full-meaning and partial meaning can only be subjectively assessed. Carey's (1978a) discussion of what full meaning entails is made in comparison to some adult norm rather than to any objective criterion. There is no possibility of a full meaning which is not equivalent to an adult meaning. Similarly, her concept of partial meaning refers to "some amount" of information which is not equal to full meaning (adult meaning). In contrast we can state what we mean by full meaning (SRD) and, by corollary, what components of meaning are present in a partial representation of a term - either sense, reference

or denotation. Talking only in terms of full or partial meanings we might have been tempted to say that in the patas study children have grasped the full meaning of the term, whereas it is more accurate to say that the children know the sense of the term but the precise denotation remains to be empirically established. Using the full- or partial-meaning approach with respect to the gombe study, either we would wish to say that most children know the meaning of the new term since they chose the correct objects when asked for the gombe block or we would say that nearly all children have only a partial meaning since they did not treat the new term in the same manner as they treated other shape or colour terms. 'Meaning' is not simply 'full' or 'partial', rather it is either 'full' or one of various types of partial meaning.

In conclusion, I suggest that the SRD distinction clarifies our conception of the word-learning process, adds precision with respect to the variables involved in the mapping process and allows us to define meaning in such a way as to be able to make predictions about the processes involved in acquiring the meaning of an unfamiliar word.

One problem which must now be investigated is the manner in which the various aspects of word-meaning are related. I would suggest that it is not the case that once two elements of meaning are known that the third can be deduced. Rather, knowing either sense, reference or denotation or some combination of the three, helps in discovering the third. Consider Carey's chromium task. Determining the reference of chromium means inferring that the tray intended is not the blue one, determining the sense of chromium means realizing that the trays differ saliently only in colour and knowing the denotation of chromium means knowing the denotation of other similar colour terms, eg. brown, green etc. Knowing that chromium is "not the blue one" and "a colour" does not necessarily force the inference that chromium denotes OLIVE GREEN. Similarly knowing that zutting is "not flying, driving or sailing" does not necessarily mean that it is a mode of locomotion, though there is a good chance that such an

inference will be made. Knowing one or other component of meaning restricts the range of possibilities but does not determine the correct one.

Sense and denotation are two separate aspects in the word-learning process; this is true for both child and adult alike. They involve two different semantic processes: establishing a relationship between words and establishing the relationship between word and world. For the adult, reference is an arbitrary relationship - an object can be referred to in any number of ways. If, however, pre-emption is a problem for the child then reference cannot be viewed as an arbitrary activity, rather it is intrinsically linked to denotation. The child does not, initially, realize that reference is an arbitrary act but sees it as related to the range of objects to which the term is applied. From the child's perspective an object can only have one name and therefore cannot be referred to by any other set of arbitrary names.

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APPENDIX IAMATERIALS USED IN EXPERIMENTS 1A AND 1BSentences

<u>A) Nouns</u>	<u>Intended denotation</u>	<u>Choice</u>
1. a) Jenny saw a GED on the pond.	duck	duck, horse, cup,
b) I play with my rubber GED in the bath.		chair
c) All GEDs make quack quack noises.		
2. a) There are ZUMs in the park.	tree	tree, cat, cat, boy
b) Daddy bought a Christmas ZUM.		
c) All Zums have branches.		
3. a) I climbed up on the JOD.	Bed	bed, bath, fish,
b) My JOD is big and soft and springy.		man
c) Everynight I go to my JOD.		
4. a) Paul threw the LEV.	ball	ball, plate,
b) There are lots of games you can play with a LEV.		chicken, horse
c) Most LEVs are round and bounce.		
<u>B) Verbs</u>		
1. a) I BIVed an ice cream cone.	eat	man, table, ball
b) When I am full I don't want to BIV anymore.		butter
c) The teacher told us to BIV all our dinner.		
2. a) BIPping hard makes you tired.	work	bird, man, plate,
b) Everybody must BIP when they grow up.		bath
c) Daddy BIPs in an office.		

- 3. a) Mummy JUKed at the dog yell/shout duck, boy, car,
 b) I can JUK very loudly. tree
 c) The teacher JUKed at us when we were naughty.

- 4. a) Bad dreams are TISSing Frightening baby, knife, bed,
 b) It is not nice to TIS people table
 c) Mary started to cry when she was TISSed by the noise

Stories

a) Nouns

1. On Christmas day some good little boys get KOGs. John was very excited when he saw his Christmas presents. The first one he opened had a big red KOG in it. John started to play right away. He pushed his big KOG along the floor.

Intended denotation: truck/car Choice: truck, plate, baby, duck

2. Paul was walking along one day when he saw a LUP run across the road. Soon he heard a lot of barking. There was a dog chasing the LUP. The LUP ran up a tree.

Intended denotation: cat Choice: cat, fish, car, plate

3. Ben was learning to read. For his birthday his mother gave him a MOG. Ben opened his MOG and began to look at the pictures. He put it down to drink some chocolate but by accident he spilt the chocolate all over his new MOG.

Intended denotation: book Choice: book, car, boy, dog

4. Jane was going shopping with her mother. All of a sudden they heard a siren. "There must be a RIZ somewhere" said her mother. Just then Jane saw the RIZ engine going along the road. "Let's go see" said Jane. "No"

said her mother. "RIZs are dangerous. They burn people".

Intended denotation: fire

Choice: fire, bird, boy, ball

B) Verbs

1. One day Billy and his friend were walking in the woods. They saw a horse LEPPing across the field. He was LEPPing very fast. Billy turned to his friend and said "Let's see how fast we can LEP". So off they went.

Intended denotation: run

Choice: women, duck, car, table

2. Mary woke up early on Saturday morning. She heard the birds FIMming in the trees. She was very excited because today was the day of the school concert. She was going to FIM all by herself. She decided to practice, but when she tried to FIM she couldn't. Mary had lost her voice.

Intended denotation: sing

Choice: women, dog, plate, chair

3. Helen was playing with her dolls. One of her dolls was very special it could PID. Helen decided to make her doll PID so she spanked it. As Helen was spanking her doll she hit her hand on the table and then she started to PID.

Intended denotation: cry

Choice: bird, boy, car, book

4. Last summer I learnt to PIV. It is great fun to PIV in the sea. Sometimes when I go PIVing I swallow water.

Intended denotation: swim

Choice: cup, chair, cat, fish.

	VERBAL RESPONSE								CHOICE RESPONSE							
	SENTENCES				STORIES				SENTENCES				STORIES			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NOUNS	68.1%	62.5%	43.8%	59.4%	50%	16.7%	16.7%	16.7%	83.3%	75%	41.9%	58.3%	62.5%	56.3%	31.3%	37.5%
VERBS	3.1%	15.6%	65.6%	58.3%	58.3%	8.3%	8.3%	33.3%	33.3%	33.3%	50%	58.3%	28.1%	53.1%	43.8%	59.4%

APPENDIX IB PERCENTAGE CORRECT FOR EACH ITEM IN EXPERIENT 1

APPENDIX II

INFORMATIVE SENTENCES

Nouns - Known

1. The children are playing with the ball.
2. The cat is climbing the tree.
3. The indians are dancing around the fire.
4. The cowboy is riding a horse.

Nouns - Unknown

1. The indian is paddling the canoe.
2. The girl is playing the violin.
3. The cowboy is throwing the boomerang.
4. The dog is being chased by a monster.

Verbs - Known

1. The girl is pushing the pram on the path.
2. The girl is sitting at the table.
3. The boy is rolling the ball on the box.
4. The boy is running to the house.

Verbs - Unknown

1. The dinosaur is attacking the rabbit.
2. The horse is tangled in the rope.
3. The donkey is refusing to go with the boy.
4. The fish are contained in the box.