

THE DEVELOPMENT OF NEGATION IN EARLY CHILD LANGUAGE

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PREFACE

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SHORT ABSTRACT

The development of early logic in the use of language is investigated in this thesis by studying the acquisition of negation in the language of children. In particular, the use of negation to express judgements about the truth-value of statements made by others is viewed as a linguistic manifestation of early logical abilities. The central hypotheses of the thesis are 1) the logical operation of negation to deny statements (truth-functional negation) becomes evident near the onset of syntax in the language of the two year-old child; 2) the developmental sequence for the emergence of semantic functions which negation serves progresses from the expression of internal states (rejection), to comments on external states (e.g., object disappearance), to comments on correspondences between external states and language use (truth-functional negation); and 3) the ability to judge negative statements as true is a later development than either judging misnamings to be false or judging another's denials to be incorrect, i.e., there is an interaction between PRAGMATIC factors (where the judged utterance is appropriate, given prior discourse) and SEMANTIC factors (where the judged utterance is correct, given specific truth-conditions), with an early overemphasis of pragmatic factors. Hypotheses (1) and (2) were supported by the studies of very young children reported here, while evidence for (3) was only suggestive.

These findings support several claims about early linguistic competence: First, that the child has abstract, reflective knowledge of at least one major feature of language, that it is a system relating to the world with logical structure, and second, that the child is nonegocentric in certain aspects of language use in that he or she evidences knowledge of truth conditions on the use of language which involve not only his or her own language but that of others.

ABSTRACT

Chapter I reviews several reasons for thinking that negation is a particularly important aspect of language development and cognition in general. Specific proposals from communication theory and psycholinguistics suggest that the use of negation as a logical operation to judge statements as being true or false is a central aspect of human communication. The development of such an ability is therefore of foremost interest. Special attention is given to the relevance of symbol formation, abstract representation, and the development of predication in child language as they relate to the problems of negation development. All of this work concerns what may be called SEMANTIC features of negation. Adult work which has shown that the context of use, or PRAGMATIC features, play a large role in conceptions of negation is reviewed and issues relating to the development of such conventions in the child's conception of negation are outlined.

Chapter II discusses previous accounts which have been given of the development of negation, from its earliest primitive forms to gesture, single words, and ultimately negative sentences. This research is reviewed with the aim of outlining a framework for a longitudinal study of

negation development. The detailed diary accounts of Leopold and Halliday indicate the importance of early dialogic conditions for negation, and after a consideration of the theories of negation development proposed by Bellugi, Bloom, Greenfield & Smith, Keller-Cohen, McNeill & McNeill, Volterra & Antinucci, and Wode, a sequence for negation development is predicted. This sequence stresses the development from negation concerning inner states (rejection) to negation concerning external states (nonexistence), and ultimately logical or truth-functional negation.

Chapter III describes experiments which have investigated aspects of children's performance with negatives. Research which emerged from early attempts at assessing the psychological reality of Chomsky's transformational grammar in sentence comprehension experiments (e.g., Slobin, 1963, 1966b) and the validity of a model of the plausible contexts of denial for adults as applied to children is reviewed and placed in perspective with more recent work which has emphasized simpler task demands and environments for the child. This recent work has suggested that young children are aware of the social (pragmatic) and logical (semantic) conditions for negation, but indicates the need for systematically testing very young

children for their knowledge of negation.

Chapter IV reports a sentence-verification experiment carried out with very young children aged 18 to 36 months directed at studying the development of strategies for the use of negation to correct false statements, and at documenting the early use of negation for such logical purposes. Additional findings indicate that children as young as 30 months of age have a reflective awareness of the correspondence rules of truth regulating the relation between sentences and the world they describe.

Chapter V reports the results of longitudinal studies of negation development with six different children, four from 8 to 20 months of age and two from 12 to 24 months of age. Gestural negation and verbal negation was the focus of inquiry, and all children were visited monthly, videotaped for thirty minutes in natural play settings with their mothers and observed for an additional hour. Detailed transcripts and interviews with the mothers constituted the data base, and the hypothesis for the emergence of negation meanings generated in Chapter II was tested. General results supported the hypothesis. All six children first expressed gestural negation in rejecting either objects or actions directed toward them, and this was also the first meaning of verbal negation for the four children who used

negative words in the period studied. Comments on the disappearance of objects, persons, and events and the use of negation in self-prohibition followed, but preceded the use of truth-functional negation to deny propositions expressed by others.

Chapter VI sets out the approach to negation development supported by the results of the studies of early negation carried out in the thesis. General findings indicate a number of different levels of knowledge about negation which emerge during the first three years of childhood. Implications for further research and certain unanswered questions are posed in conclusion.

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Chapter I: Negation in Language and Cognition

To determine what it is that happens in the case of assent or dissent besides putting two ideas together, is one of the most intricate of metaphysical problems.

J.S. Mill (1843/1956, p. 56)

As far as LOGICAL form is concerned, we can make negative any proposition we like; but in respect to the content of our knowledge in general, which is either extended or limited by a judgement, the task peculiar to negative judgements is that of REJECTING ERROR. Accordingly, negative propositions intended to reject false knowledge, where yet no error is possible, are indeed true but empty, that is, are not suited to their purpose, and just for this reason are often quite absurd, like the proposition of the Schoolman, that Alexander could not have conquered any countries without an army.

Immanuel Kant (1787/1963, p. 574)

1. Overview

Negation is a particularly salient conceptual tool of language. In ordinary language, much of our communication either requires or includes negatives: we refuse, prohibit, reject, chide, joke, deny, and lie. At the more formal end of a spectrum from our intuitions about the importance of negation, we find that negation is a central component of

logic, being the only major truth-function necessary (in combination with conjunction, "and", or alternation, "or": Quine, 1972) to represent all the major truth functions basic to our rules of inference (alternation, conjunction, equivalence, implication, and negation). The importance of negation from a logical point of view is reflected in the languages of the world, where it is universally expressed (Jespersen, 1917).

In addition to being so prevalent in our systems of reasoning and language, there are certain features of the oppositional nature of negation which communication theorists propose as central and specific to human language and not present in other animal communication systems. Such suggestions result in the position that negation is an operator upon sentences as part of a metalanguage, and thus of a higher logical type than the language it operates upon. Philosophical accounts of language and judgements involving negation are consonant with this approach in emphasizing that the ability to conceive of propositions as true or false (and hence involving the negation operation) is one of the most central aspects of actual language comprehension and use.

Both communication theorists and philosophers of language have stressed the logical features of negation, and

thereby emphasized the role of "truth" in the meaning of sentences. These theories are expounded in the discussions of the SEMANTICS of negation in this chapter, and have critically important implications for the cognitive representation of language use. But there are other features of negation which shift focus to the communicative contexts of the assertion of negative statements, and hence the PRAGMATICS of negation. The general point made by psycholinguists and language philosophers about the use of negation is that it normally functions in affirmative contexts where it acts to deny a positive state of affairs that someone is presumed to believe. So in addition to truth-conditions for negative statements, there are also assertibility conditions that involve standards of appropriateness for negatives.

There is something particularly difficult involved in the development of both the concept and the linguistic use of negation, since in important ways the child is learning about language, logic, communication, and the world simultaneously. Negation has no referent, as many other early words do, and is inherently relational. It is not even logically possible, as empiricists have proposed for the learning of nominal expressions, that the child could be taught the use of truth-functional negation by ostension,

for although there are a finite number of normally used descriptions which are truly ascribable to a particular object, there are an infinite number of such descriptions which are not truly ascribable to it. To put it more briefly, there are far fewer things that an object is, than that it is not. Such considerations have led many investigators of child development to puzzle over the fact that the child seems to begin to use negatives to deny the prior propositions of another speaker as early as the end of the second year of life. We intend to show that detailed considerations of logical constraints on concept formation, word learning, and the development of cognitive representation, as well as an emphasis on the social context of language acquisition, provide an empirically plausible formulation of the facilitating factors for the development of a conception of negation which involves both truth-conditions and conventional appropriacy conditions.

2. Semantic features of negation

There are many forms which negation takes in natural language, and there are many functions which it can serve. The central function of negation under consideration in this thesis is what will be designated TRUTH- FUNCTIONAL or PROPOSITIONAL negation. This is one type of negation, frequently expressed by means of "not" in English, which is used when one wishes to contradict something previously said. The critical concept is that of contradiction, and not merely opposition, a feature of most if not all types of negation (Ogden, 1932/1967).

The paradigm case to be considered is the following. A product of a speech act (which we might equally well call a "sentence," "statement," "assertion," or "utterance") expresses a "proposition" (e.g., Bar-Hillel, 1973) which is subject to truth-value analysis. According to the common conception of truth (Davidson, 1967, 1973; Evans & McDowell, 1976), such a statement s is true if and only if there is a proposition p such that s is the statement that p and p. The truth-functional negation of s contradicts s and says that it is false¹. For example:

- 1) It is snowing outside the window.
(uttered by speaker A)

- 2) No, it is raining outside.
(uttered by speaker B)

Leaving aside pragmatic issues as to why speaker A would see snow where B properly saw rain, we say that speaker B's utterance (2) "truth-functionally negated" speaker A's utterance (1). Speaker B needn't have provided an alternative (rain) but could have simply said "It is not snowing outside". Though the commonsense notion of negation as the absence of something figures in the developmental discussions in succeeding chapters, in addition to the sense outlined here, it will not be addressed in the remainder of Section 2.

2.1 Abstract features of truth-functional negation

Zoosemioticians (animal communication specialists) and communication theorists invested a great deal of effort in the early 1960's in the enterprise of analysing various

¹Philosophical controversies pertaining to the need for many-valued logics, which reject usual logical doctrines such as the law of excluded middle (or bivalence) which says that every proposition is either true or false, are beyond the scope and needs of the current work.

aspects of the structure of communication. These analyses resulted in a new approach to the different types of negation which turns out to be highly relevant to questions about the development of negation in child language and cognition. In these investigations, the communication systems of animals, humans and (later) computer languages were compared and contrasted on what were described as "design features" of those systems. The pioneering work was set out by Hockett (1959, 1960, 1963), who later collaborated with Altmann (Altmann, 1967; Hockett & Altmann, 1968), and related research involved Thomas Sebeok (1962, 1963) and Gregory Bateson and his colleagues (Bateson, 1968; Bateson & Jackson, 1964; Watzlawick, Beavin & Jackson, 1967).

The detail of developments in the organization of this framework for comparing communication systems are unimportant for present purposes, but several of those formulations crucially involved negation. The most central distinction is between negation in "analog" and "digital" communication codes.

Sebeok (1963) was interested in studying speech communication as an information system, with the natural language used constituting the "code" for the system. He dwells on the common distinction made between ANALOG and

DIGITAL coding. Analog devices are control machines (the prototype is a slide rule) for measuring "more-or-less" and representing information iconically, whereas digital devices are for counting (the prototype is an abacus) and hence symbolically representing information in an "all-or-none" fashion (Gregory, 1974). Hockett (1959) had also noticed that the contrast between arbitrary and iconic is exemplified by digital and analog computer codes, but Sebeok noted that this property of arbitrariness is itself a logical consequence of the digital structuring of the code. Since it is well agreed in current theories of signification (Piaget, 1962; Werner & Kaplan, 1963), and has been since the logic of Peirce that the signifier/signified (word/referent) connection is arbitrary, it is clear that the evolution of a digital code is central to the development of an arbitrary code in which words are not iconically represented features, but are symbolic of their referents. It is this development which is so critical in the development of truth-functional negation (Section 2.2).

Sebeok's suggestion that different linguistic channels carry different kinds of information for humans was elaborated upon by Bateson and his colleagues in their analysis of pathogenic interaction patterns in communication. Bateson suggested that such a combination of

"analogic" (roughly the paralanguage of gesture, posture, timing of speech and its intensity between interlocutors) with "digital" messages conveyed in language leaves open the possibility of inconsistency and pathogenesis (Bateson & Jackson, 1964; Watzlawick, Beavin & Jackson, 1967). But he also noted in this context something which Sebeok had not: that whereas "not" and logical negation is possible in a digital code because of the nature of the information, which is discretely boundaried and consists of different "types" or "states" (Wilden, 1972), it cannot occur in a purely analog code. "Not" is a message of a different logical type, as Bateson (1968) and Wilden (1972) explain, because it is a judgement ABOUT another message rather than being part of the message². An analog code has no means for distinguishing "types". Altmann (1967) seems to have independently made the observation that negations involving truth-values are only possible in digital communication, and he concludes that such a communicational mode underlies the finding of Hockett (1963) that only human language has the property of prevarication, which depends for its possibility

² In other words, any "message which 'frames' another message is, synchronically speaking, of a higher logical type than that which it frames" (Wilden, 1972, p. 171).

on intentional message deceit. Altmann, Bateson, Hockett, Sebeok, and Wilden all agree that there is no evidence that any other communication system than man's possesses the capacity to communicate information in both an analog and digital code³, and there is a similar lack of instances of prevarication among non-human species, even where explicit attempts have been made to elicit such behaviour in symbol language using chimpanzees (Premack, 1976b). An analysis of prevarication, which frequently involves the use of false negations, is presented in Chapter IV, Section 5.2.4, where it is argued that prevarication reflects the knowledge of truth-conditions for language use and the child's play with those rules.

Subsequent analyses of the "analog/digital" code distinction have focused on the nature of different types of negation related to logical negation, and made proposals as to what alterations in an analogic code could result in the

³ It is interesting in this context that Bronowski & Bellugi (1970) note that negation was notoriously absent in the dialogues with Washoe the "linguistic chimp". Other claims that chimps have been "taught" the concept of negation, such as in Premack (1976a) are too detailed for analysis here, and subsequent analyses do not depend on negation being species-specific to man.

Sebeok (1976) has reviewed evidence suggesting that some non-human species misuse warning signs for adaptive ends, but we must note that this does not indicate a consciousness of falsity, and particularly not one that involves a communication code with truth-conditions.

syntactic richness of digital expression (Warden, 1972). These depictions of the two systems are highly reminiscent of descriptions of differences in features of the language used by children when early words first appear and later, with the emergence of syntax and (as the research in this thesis documents) logical negation. The remainder of this subsection is devoted to an exposition of Warden's analyses of types of negation in relation to the two types of information code. The theories of signified/ signifier differentiation elaborated by Cassirer (1921/1953) and Piaget (1962) are discussed, and then the formation of abstract categories in cognition and of word meanings is presented as integrally tied to the conception of negation.

For distinctions that Warden (1972) makes in his extensive analysis of analog and digital communication to stand out clearly against the backdrop of negation development in children, brief allusions to the different semantic types of negation which have been differentiated in the speech of young children is necessary (Bloom, 1970; McNeill & McNeill, 1968). According to these accounts, at least three major functions are clearly served by what are at first similarly syntactically expressed negative sentences: REJECTION, which involves an opposition or rejection of some aspect of the child's environment;

NONEEXISTENCE, which involves comments on something recently but no longer present; and DENIAL, which involves a negation of previous statements. As described in Chapter II, most of the controversies surrounding negation development in current theories involve the "order of emergence" for these different semantic functions of negation. I want to suggest that the evolutionary sequence which Warden (and in less detail: Bateson, 1955, 1956; Sebeok, 1963) proposes for the development of communication codes from analog to digital, which involves an intermediary code of transitional logical form, is a heuristic model for negation ontogenesis. The features which figure in the characterization of the power and functions of the different codes also figure in a description of the power and functions which the child's language has at various points and which his negation specifically displays. The working hypothesis then, which is tested in the longitudinal study of negation development (Chapter V), is that the sequence which Warden proposes for the evolution of digital communication codes in human language from animal communication is isomorphic with the sequence for negation development in child language.

Recall that the analog/digital code distinction was initially introduced in the context of machine capabilities.

Both analog and digital computers map continuums: analog codes map them by employing continuous linear quantities to represent other quantities, while digital codes employ discrete elements, resulting in discontinuities marked by boundaries. Digital codes are formed when the continuum is parsed and made discrete by a decision to make some of the infinitude of differences in that continuum into distinctions relevant enough to be distinctly indicated (Altmann, 1967; Wilden, 1972). Digital codes thus introduce arbitrary signifier/signified relationships by denoting these discrete elements with symbols. With such arbitrary representation, and the boundaries which demarcate the discrete elements, it becomes possible to say "not" and make metalinguistic statements about the discrete elements (and hence produce a message about a message). One result of this framework when it is applied to organismic communication is that analog codes are restricted to iconic displays of the "condition" of the organism and its "relation" to the message receiver (Kroeber, 1952, cited in Sebeok, 1962). As indicated, digital codes enable metacommunication about messages and about relationships between message-transmitter and receiver. Following Freud (1925/1961), who distinguishes "refusal" (i.e., rejection) and "negation", Wilden notes that rejection is analogical

negation restricted to the plane of relationship, while digital negation is distinct in signifying the relationship and allowing metacommunication about messages. Now, to review Wilden's distinct contribution, we have to note the problem that the analog and digital codes seem essentially discontinuous from one another, and do not form any clear gradient. Wilden introduces an intermediate level of code digitalization which shares certain features of both an analog and digital code. Whereas the digital code consists of signifiers which are distinct from that which they signify (i.e., arbitrarily denote), this intermediate level code, or "primary digitalization" involves signals or signs which are both arbitrary and fixed in their significance. For example, primate gibbons emit food calls which are arbitrarily related to the presence/absence of food, but all gibbons indicate food with the same set of noises (Hockett & Altmann, 1968). Wilden observes that such a food call is a metacommunication about an analog relationship between the sender of the message and his or her relationship to the message receivers by setting up a boundary between two "states" of food - absence/presence. These "states" are differentially indicated by different calls. But note that there is no possibility of communication about this message at a metalevel. No gibbon can "say" that another gibbon's

food message is not-the-case, or prevaricate in the message by denoting absence of food when food is actually present. This "primary digitalization" is also related to the genesis of the digital language in the ontogeny of human language. Warden suggests in a brief passage that the child's early use of "Fort!" ("Gone! ") with which Freud introduces Beyond the Pleasure Principle (1920/1955) signifies the absence of his recently present but discarded toy, and that this analog difference "paves the way for the arbitrary combination of the discrete element in the syntagma" (Warden, 1972, p. 173). And in the child's world of pretend-play, following Bateson (1955, 1956), Warden sees the bridge toward the digitalization code of logical negation, for such symbolic play emphasizes at the same time what something is and what it is not. Warden's theoretical account of analog and digital codes, and his concept of an intermediary code of "primary digitalization" involving the expression of presence/absence, provides a clear connection between the negation-involving logical features of different information system codes and the ontogeny of negation in the language and cognition of the child. Such information system codes can be viewed as descriptions of stages in the forms of negation available to the child, with the hypothetical sequence of emergence of semantic functions of negation in

the child's language viewed as isomorphic to the sequence from ANALOG to PRIMARY DIGITAL to DIGITAL codes. Warden did not relate his brief account of symbolic play to Piaget's detailed account of the emmergence of play, dreams, and imitation (Piaget, 1962), but in the theory presented there, Piaget argues that symbolic play is but one manifestation of the "semiotic function" (where signifiers become differentiated from that signified) which has further repercussions in the domain of language, where the child begins to use language that refers to objects or events that are displaced in space and time from the utterance.

In the next subsection, I first review some child language research which addresses the emergence of syntax and explicit subject-predicate structures in children's speech. Logical negation is inherently syntactic and relational, as the above analyses indicate, but there is some evidence to suggest that children may be expressing propositions and asserting predicative claims in the period before they begin to use two or more words together in their utterances. The use of negation as a logical operation to judge statements as being true or false is indicated as a central aspect of human communication. Naturalistic observations of the use of negation by children suggest that near the emergence of syntax the child does express

truth-functional negation and manifest language describable by a digital code (Chapter II). But what on the way to that development could have introduced the "distinctions" set out above as necessary for the representation of the world by means of a digital rather than analog code? Piaget's account of the emergence of the semiotic function which makes such a concept of negation possible is first reviewed. I then suggest, in the context of an exposition of Cassirer's theory of category-formation, that there is evidence that some "distinctions" are initially perceptually central for the human organism and later evidenced as universal "natural categories" (Bornstein, 1975; Rosch et al., 1976).

2.2 The development of truth-functional negation

2.2.1 Propositions and true-false judgements

The historically central debate concerning the nature of the early language of the child centred on whether it was "affective" and expressed wants, needs, and basic emotions, or was instead "intellectual" and expressed rudimentary statements or judgements about the world (de Laguna, 1927/1963; Leopold, 1949). This controversy is central to our discussions of the emergence of truth-functional negation because of certain critical features of predication (Strawson, 1959, 1974).

Predication is traditionally construed as a combination of two elements, "subject" and "predicate", which together form a truth-or-falsity yielding "proposition" (Strawson, 1974, p. 21). The subject is seen as identifying some particular, and the predicate specifies a concept. In the propositional combination "the car is red", the general concept is RED, the particular is a specific CAR, and the combination is said to be "true" if the particular exemplifies the concept and "false" if it does not (1974, p. 21). We can thus see that the controversy concerning the emergence of predication is at the same time one involving whether the child is expressing propositions which are

truth-value-yielding. With this connection in mind, we now return to the controversy over "affective/ intellectual" early speech.

This debate has resurfaced in recent years in the extension of J.L. Austin's ordinary language philosophy based on the analysis of language use in its ordinary context of speech acts (Austin, 1971, 1975; also Strawson, 1964, 1970; Searle, 1969, 1974) to language development. Gruber (1975) has reviewed longitudinal data from a child ⁴ 1;2 to 1;4 and argues that a "performative" stage, where words are only used to perform the act of indicating something, precedes a "constative" stage, where words are used to predicate attributes of things in the environment. Bates, Camaioni & Volterra (1975) suggest that an "illocutionary" stage, or period of using non-verbal signals as conventional social acts to convey requests and direct adult attention to objects and events (i.e., to indicate) precedes a "locutionary" stage, where the child uses language "symbolically" to "construct propositions". John Dore's theory of the development of speech acts (1973, 1975)

⁴ Following Stern (1924) and Piaget (1952): years; months (days).

proposes that the child's non-truth-functional performative utterances express illocutionary force via prosodic features of the words before the child expresses propositions with utterances.

Such contributions to our knowledge of language development have not, however, been reconciled with the emphasis placed in philosophical logic (e.g., Dummett, 1973; Evans & McDowell, 1976) on arguments that "propositions", those abstract symbolic entities expressed in the later stage of all the above theories of language development, are the bearers of truth-values, and that the ability to conceive of propositions as true or false is one of the central aspects of actual language comprehension and use. Marshall (1970) pins the problem down as one of deciding what evidence is relevant to the claim that the child has made the transition from the ability to utter appropriate words on stimulus occasions (Quine, 1960, 1973; Skinner, 1957) to creative and propositional language use and the linguistic expression of judgements (Bühler, 1918/1930).

Following Marshall's suggestion, let us consider the use of language-as-judgement. Kant (1787/1963, p. 105) outlined the crucial philosophical concept of judgement when he defined it as:

The mediate knowledge of an object, that is, the representation of a representation of it.

True-false judgements of predicative statements in relation to a context are the prototypes of such metarepresentation, and reflect knowledge of the symbolic, rule-governed tie between word and object. Empirical evidence that a child expresses such true-false judgements in relation to statements about situations would constitute knowledge that the child had made the major transition to truth-functional language which Marshall's neo-Bühlerian suggestion above indicates.

Such accounts as those presented by Gruber, Bates, and Dore, although portraying a certain theoretical elegance in their suggestion that the "illocutionary" (force; performative) and "locutionary" (meaning; propositional content) aspects of speech acts have a predictable sequence in the language acquisition process, do not present evidence based on objective criteria for the emergence of "locutionary" or propositional language use. As we have seen, "propositions" are abstract symbolic entities that are expressed by utterances, and which are subject to truth-value analysis because of their subject-predicate structure. But Bates, for example, considers any single word that refers (rather than being an imitation) to be a proposition which "conveys a locutionary value", and views

"the first referential uses of words" as symbols to be when "language can be said to begin". This view is analogous to Stern's classic theory (Stern, 1924) that language begins with the "realization that everything has a name." Bates presents no evidence that the child is committed to the truth of his utterances with these "referential words", yet the assertion of a proposition (which is what she claims is occurring, the use of "propositional language") is a commitment to its truth (Dummett, 1973 and Searle, 1969, p. 29 - both following Frege). Preyer (1882/1890) also argued that the generalization of names to new objects demonstrates that the child is expressing "judgements", but all of these authors' claims require independent evidence that the child is expressing a judgement, or proposition, with his or her words.

This same difficulty besets theorists who argue that predicative expressions are initially present as single-word "comments" on environmental "topics" that are not expressed in the utterances (de Laguna, 1927/1963; Guillame, 1927; McNeill, 1970a). Such a "holophrastic" or "single-word sentence" view has been repeatedly criticized in recent language development literature, but often for the wrong reasons, or at least inconclusive ones. The usual support for the "holophrase" position comes from arguments (McNeill,

1970a, b) that the child is capable of "conceiving something like full sentences" (1970a, p. 21) but for some reason is limited to uttering single words. Greenfield & Smith (1976) argue that single-words are expressing basic case-grammatical relations prior to the emergence of syntax, and include differential pitch and intonation as a means of assigning some words to grammatical cases. Both Lenneberg (1967, p. 238) and Menyuk & Bernholz (1969) suggest that marked differences in the intonation contours of single words are used by the child to express different primitive syntactic units. The evidence for such a claim is equivocal. Menyuk & Bernholz took five words from the speech of a child 18-20 months old, and found occurrences of each word which were judged by adults to represent declarative, emphatic, and interrogative speech functions. Spectrographic analysis indicated distinctive differences in intonation patterns for the modalities. But many quite different interpretations are possible than the one offered. The child may have used these utterances in inappropriate contexts, or she or he may have imitated the adult's intonation contours, or conceived of each word-intonation coupling as a different word with a different function (Sylva, 1973). Production of different word intonations alone is not sufficient evidence of systematic changes in

structure to express different semantic functions. There are other arguments for predicative structure in the language of the single-word utterance period, but I will not review them here. Bloom (1973) has indicated many problems with such a "relational" account of the "syntactic structure" of single-word utterances which relies heavily on rich context interpretation.

The central point of this discussion on the development of predication is that it is only evidence of the kind Marshall proposes which would indicate that the child is expressing truth-functional judgements about language that would allow us to conclude that the child is using language truth-functionally⁵, and hence conveying propositions which are subject, as are subject-predicate constructions, to truth-value analysis.

To consider both children using single-word utterances and those in the process of acquiring the transformational operations which characterize the adult language (Brown,

⁵ This is consistent with evidence reviewed by Gleitman & Gleitman (1976) that language functions developmentally precede metalanguage functions in other domains, such as syntactic form and phonology.

1973), we will focus on the study of children from approximately 18 to 36 months of age. Most accounts of cognitive development in this period (Bruner et al., 1966; Piaget, 1962; Piaget & Inhelder, 1969; Werner & Kaplan, 1963) stress the emergence near its onset of abstract mental representation and its essential role in allowing language use that transcends the immediate present. It is in the development of this "semiotic function" (Piaget & Inhelder, 1969) that the concept of negation, we will see, becomes possible. In Piaget's writings on child development, we find hypotheses about developments in the knowledge and use of language which Buhler, Dummett, Frege and Marshall deem so crucial to our concept of a language user: the emergence of truth-functions and truth-functional judgements in language.

2.2.2 The semiotic function and truth-functional judgements

The central part of Piaget's theory relevant to the problems of negation outlined above is his account of the transition from sensorimotor intelligence to conceptual thought and the characterizations of those forms of intelligence as they bear on the emergence of logic in language.

The primary achievement of the sensorimotor period also marks its end, sometime between 18 and 24 months of age: the emergence of what Piaget and Inhelder (1969, p. 51) have designated as the "semiotic function". Behaviour patterns which are seen as indicating the semiotic function are deferred imitation, symbolic play, drawing, mental imagery, and the use of language for non-present objects, events, and persons. All of these patterns involve representation (Piaget, 1962), which begins when there is a simultaneous differentiation and coordination between "signifiers" (which serve only a representative function) and the "signified" (objects, events, etc.). Prior to this time, "signifiers" are perceptual and undifferentiated from the "signified" (Piaget & Inhelder, 1969); they act as "indicators" of that signified.

Language at this stage, which is primarily comprised of early words and simple sentences, is characterized as

"preconceptual" and expressive of "complex schemas of action" related to the child (Piaget, 1962, p. 219f). The examples which Piaget draws on for these descriptions are from children one-and-a-half to four years of age. The intelligence underlying the child's language at this point "aims at success and not at truth" (1954, p. 406; 1962, p. 238), and the meanings of the child's words are not fixed, but very personal and mobile in their senses (1962, p. 220).

This "preconceptual" intelligence comes to be supplanted by the "concrete operations" of conceptual thought (Piaget, 1970a; Piaget & Inhelder, 1969) which are characterized by the beginnings of "operational groupings" (Piaget, 1970b, p. 705), operations being interiorized actions (such as addition) that are "reversible" (subtraction is the inverse of addition) and which constitute set-theoretical structures (such as algebraic groups). Such operations are "concrete" in that they are operations applied to things, and not as yet the application of operations to operations themselves, a distinguishing feature of the structures of the period of "formal operations" beginning around age 11 years (Piaget, 1970a, pp. 31f, 67; Piaget, 1970b, p. 711).

The characterization of conceptual thought which Piaget renders is the clearest description in accord with the

components of intelligence which figure in the emergence of truth-functional judgements in the child (1954, p. 405f). Such conceptual thought "leads to knowledge as such and therefore yields to norms of truth", in contrast to the practical adaptation of sensorimotor intelligence, which is limited to "desiring success". The function of verbal or conceptual thought "is to know and state truths", and the child who manifests such a stage of thought can translate his observations "into a system of verbal judgements and reflexive concepts". The intellect of sensorimotor intelligence is an adaptation to social and physical objects as such without socialization, "whereas conceptual thought is collective thought obeying common laws", which is revealed by "the formation of rules". But the most telling characterization of conceptual thought by Piaget is the following:

It is by cooperation with another person that the mind arrives at verifying judgements, verification implying a presentation or an exchange and having in itself no meaning as regards individual activity (1954, p. 407).

We can see by this description that the emergence of truth-functional judgement in the language of children, which is rule-guided, conventional, and intrinsically involving truth-norms, would appear sometime between the

ages of 4 and 7 years, a period which Piaget has recently described as one of "intuitive thought" (Piaget & Inhelder, 1969, pp. 93f) during which the perspectives of others must be coordinated with the child's en route to the objectivity of operatory structures. One can thus observe that Piaget's account of rule-governed judgement verification as involving a higher-order reorganization of thought processing is compatible with the stance of Marshall and others set out above.

It is interesting to point out in this connection that the development of the semiotic function allows for but does not necessitate the concept of negation. In being able to utilize more than immediate sensorimotor activity in thought, the child is representing absent objects (or events, or whatever) in cognition, or in effect, cognizing what-is-not (immediately present). This step which thought has taken away from the concrete reality of the present allows thought of things not possible, and hence thought in a hypothetical mode. Not only can the child imagine what has just recently occurred or appeared, but the combination of such representations in thought in various ways becomes possible. Whereas before relationships between objects had to be elaborated in action⁶, it is now possible for the child to elaborate and explore relationships internally.

Thus, although reflective knowledge of truth-conditions for language-use may need to await, as Piaget claims, adequate socialization, the groundwork for the possibility of negation has been constructed as a consequence of the development of the semiotic function in the sensorimotor period.

2.2.3 Symbolic representation: categories and negation

The notions of "similarity" and "difference" between things are crucial in most theories of concept formation and the development of symbolization. Classical empiricist accounts of the formation of concepts such as those of Locke (1690/1959) and Berkeley (1710/1948-1957) emphasized the abstraction of similarities from different objects which resulted in the classification of objects and hence the

⁶Sugarman (1975) and Forman (1975) provide provocative accounts of the relationship between the discovery of logical relations in overt activities involving object manipulations and later logical development. Such research suggests that the concept of "equivalence", a fundamental construct of logic, is manifest in patterns of activity prior to its expression in language. Similarly, Sugarman's work indicates that children compare classes of things and coordinate similarities and differences between objects in classification behaviour. These findings in general suggest a major shift at 30 months of age toward logical-representational cognition which structures behaviour. The emergence of truth-functional negation involves the coordination of similarities and differences in the domain of language and efforts are now being made to explore the nature of this relationship (Sugarman/Pea).

formation of categories. Coupled with this view has been a referential theory of meaning that associationistic psychology took for granted and which was at the same time a theory of language learning involving the acquisition of words by "ostensive definition", such as pointing at an object and naming it. There are numerous and weighty objections to such an empiricist theory of concept formation and language acquisition, but the most serious centre on the fact that for concept abstraction such an account presupposes an abstraction principle as part of the competence of the supposedly naive "abstracter" (Bennett, 1971, p. 12; Cassirer, 1921/1953, p. 17). Objections to the referential theory of meaning are no less serious and focus on the inadequacy of the empiricist's theory of "inductive abstraction" in explaining how the child ever grasps the linguistic ideas of naming and of reference (Harrison, 1972). No less seriously, Wittgenstein (1958) clearly indicated the inherent ambiguity of the ostensive definition procedure itself: for pointing to a series of red objects (for example) and saying "red" each time still leaves open many possibilites for the intended referent, such as "object", "coloured", "pretty", and so on (Harrison, 1972, p. 26f). And the naming relation itself is assumed by the empiricist: for how does the child ever know that the

vocalization is "naming" some aspect of the object rather than, as just one possibility, expressing an emotion?

Cassirer (1923/1955) presents a very different theory of symbolic forms in which he emphasizes a concept as a system of relations rather than substances (abstractions) with attributes. His account of the formation of concepts has important affinities with the previously discussed shift from analog to digital codes of thought. Recall that Wilden's proposal for the evolution of digital from analog codes consisted in part of a drawing of "distinctions" in the continuum of reality about which the code conveys information. Once these "distinctions" have been denoted or indicated by arbitrary symbols, the representations of the code are of discrete elements, and negation is possible. For Cassirer, the initially amorphous stream of consciousness of the world develops toward a point where:

...within the sequence of these particulars we create definite intervals which provide a characteristic division and articulation. In its unremitting, constant flow certain favored points are gradually singled out and around them the other members group themselves; certain formations arise which are held fast as essential factors and as such endowed with a kind of special accent. Our analysis of linguistic concept formation has shown how language plays a decisive part in this accentuation and articulation. The "first universal" is only guaranteed by the fact that it finds a hold and firm precipitate in language.

(Cassirer, 1929/1957, p. 116)

But how is it that such "favored points are singled out" as the cores of categories? In a series of elegant articles, Eleanor Rosch and colleagues (e.g., Rosch et al., 1976) have addressed problems of ways in which we categorize the world, which are infinite in possibility because of the "virtually infinite number of discriminably different stimuli" some of which we classify as equivalent though non-identical. In a wide-ranging series of experiments, Rosch has ingeniously indicated that for at least some categories, such as colour and form, categories are formed around perceptually-salient points and that such points constitute "prototypes" of the categories in question. The findings in the case of colours indicated that four colour category centres in the colour spectrum (blue, green, red, and yellow) are prototypes for even 3 year-olds as measured by frequency of attention to them, accuracy of matching, and the children's choice of them as exemplary of the colour terms (Heider, 1971). In addition, Bornstein (1975) has found that the centres of colour categories (Rosch's "prototypes", Berlin & Kay's (1969) "foci") were also more salient for 4-5 month old infants. Thus for at least one important cognitive domain, categorization is non-arbitrary and preselectively determined in discrete categories for

humans around salient spectral points. Rosch et. al. (1976) thus suggest that "categories are maintained as discrete by being coded in cognition in terms of prototypes of the most characteristic members of the category". The development of such prototypes in cognition is of fundamental importance for both word-learning and the development, it would seem, of logical negation.

But now to return to Cassirer's theory. According to this view, the world begins to be parsed into discrete categories when "particular, dynamically stressed contents take form and others group around them" (1923/1955, p. 285). But names introduce "the first factor of constancy into the manifold (of perception); identity of name is preliminary to identity of logical concept" (1923/1955, p. 14). It is only after that point when named contents can be categorized under a "generalized and subsuming form of concept" (1923/1955, p. 283), which we would call a superordinate category such as colour. This theory stresses early groupings by "similarity" at first, resulting in the construction of distinct categories, followed by a "denotation" of those categories by names, which allows the comparison of categories by a coordination of the similarities and differences between them. Cassirer's theory is consonant with the analog-digital shift. In terms

of that distinction, the analog code is confined to similarities between points on a continuum, whereas since the digital code deals with discrete elements it can code oppositions. Cassirer is commenting on this same difference when he notes that "representations to be combined must first be made into logical elements" (1923/1955, p. 281). And this is accomplished when names (arbitrary denotations, which also characterize the digital) are introduced. Though Cassirer does not discuss developmental data, his account of symbol formation indicates that the shift from analog to digital codes which results in the structures which enable logical negation to be conceived is the same shift resulting in the development of symbolic representation. Since no developmental theorist I have found discusses the emergence of logical negation in the context of symbol formation, the bridge between communication-theoretic accounts of different information codes and developmental psychological accounts of symbolic representation is an important one. In summary, distinct categories that are named seem essential for the use of logical negation. This is not surprising, since:

Truth...is an agreement which is to be found neither in things nor in ideas, but has reference solely to combinations of signs, and particularly phonetic signs.

(Cassirer, 1923/1955, p. 278)

and logical negation requires truth-conditions. But are there any reasons why we should expect the child to conceive of logical negation (an opposition of an assertion) early in the process of word-learning? One reason would be what would seem to be a necessity of the word-learning process itself. The child must have some conception of logical negation to comprehend naming corrections made by adults when he or she extends a new word to novel exemplars to which it does not apply (Harrison, 1972). This consideration contrasts with recent speculations (Bowerman, 1976; Nelson, 1973) that negative feedback of any kind is detrimental to the word-learning process. Furthermore, one recent theory of lexical development is based on Harrison's (1972) critique of empiricist abstraction accounts of word learning and indicates the necessity in development of negative instances or a contrast set for proper word-referent matching, or the development of a nominal lexicon at all. The considerations above underscore this position.

3. Pragmatic features of negation

3.1 The contexts for ordinary language negation

The primary focus on truth-functional negation up until this point has been on its logical conditions and how such conditions bear on its emergence in cognition and language. Negative statements are justifiably asserted whenever they deny a false statement, if we consider only the logical conditions of truth. This idealized form of logical negation may be utilized in evaluating scientific theories or solving logic problems in textbooks, but it is far removed from normal conversation, even though it illustrates a central feature of human language. This feature is that language is a symbolic system which can be manipulated and transformed as an "object", in addition to its common function as a "tool" for mutual cooperation in communication. One can posit any false statement, such as "Green leaves are brown" and truly deny it, even though no one has any reason to believe it. This distinction between language as a system with truth-conditions such that all false statements can be truly denied and language-use under the conditions of mutual cooperation in communication is also realized in two different sorts of criticisms we make of assertions. One may say that a particular assertion is incorrect (false), or that it is irrelevant (inappropriate). The first criticism relates to the "adherence" to a belief, and the second to the "expression" of the belief (Dummett,

1973, p. 449). For example, One can truly say "It is not the case that I don't exist" without any contestance, but also without a point out-of-context, except to demonstrate something that can be truly asserted with language. Normally, expressive constraints on the application of propositional negation are implicit in our conversations⁷. Almost anyone who has thought about the normal use of negation for some time has observed this fact, from Kant in the 18th century (1787/1963, p. 574) to the present time (e.g., Brown, 1973, pp. 18, 192; Wason, 1965, 1972). These expressive constraints are usually formulated in ways like the following:

Negative speech is tuned to propositions which somebody or other is thought to have grounds for

⁷ One important development in linguistics in recent years has been the attempt to formulate what might be called "contexts for plausible utterances" in general, which are based on some set of conversational maxims (see e.g., Gordon & Lakoff, 1971; Grice, 1975; Labov & Fanshel, 1977) governing cooperation in communication. Though much of this work has focused on conditions for making "requests" of various kinds, the general insight derived has been that all utterances have their contexts of plausibility. The points above and to follow in the text are thus not restricted to negation, though the conditions where negation is concerned may seem much clearer than those underlying requests (Labov & Fanshel, 1977, Chapter 3).

believing to be true.

(Brown, 1973, p. 18)

It has been observed in many contexts that a negative implies the fact that someone would have expected the positive situation that is negated. This is one of the requisites for the conditional relevance of negative statements, without which they are incoherent.

(Labov & Fanshel, 1977, p. 104)

The standard and primary use of 'not' is specifically to contradict or correct; to cancel a suggestion of one's own or another's.

(Strawson, 1952, p. 8)

In assertive discourse the function of such [negative] statements is generally to emphasize that a fact is contrary to an expectation.

(Wason, 1965, p. 7)

It is thus the case that propositions are not usually denied without some form of affirmative context, and that they signal a change of meaning and truth-value from that context. There are thus two important considerations in conceptualizing negation development, reflecting the semantic and pragmatic aspects of negation. There are both logical and social conditions for negation.

3.2 Studies of "plausible denial"

Intuitions about these pragmatic factors influencing negation were confined to the writings of philosophers until the early 1960's, when some pioneering experiments in the psychology of grammar were coordinated with previous studies

of the processing of affirmative and negative sentences. Peter Wason had carried out some ingenious experiments in which he aimed to find out whether the logical equivalence between affirming a negative sentence and denying its affirmative counterpart had a similar psychological equivalence (Wason, 1959, 1961, 1962). In a typical study, Wason (1962) used four different types of sentences, listed below with examples:

- 1) True-Affirmative (TA): "Twenty-four is an even number";
- 2) False-Affirmative (FA): "Thirty-nine is an even number";
- 3) False-Negative (FN): "Ninety-two is not an even number";
- 4) True-Negative (TN): "Fifty-seven is not an even number".

For one such experiment (Wason, 1961), subjects took longer to respond with the words "true" or "false" to the experimental statements which were negative than those which were affirmative. This type of sentence-verification task was elaborated at Harvard's Center for Cognitive Studies in the early 1960's in another context: testing predictions about the psychological reality of particular grammatical transformations in Chomsky's (1957) theory of transformational grammar. This theory regarded such sentences as negatives and passives as generated from basic "kernel" sentences of simple active declarative form by the application of transformational rules. Using a

sentence-matching task, George Miller (1962) found that the time taken to find a basic kernel's (K) passive-negative (PN) transformation in a list (K: "Joe liked the little boy"; PN: "The small boy wasn't liked by Joe") was a summation of the time subjects took to search out the K's negative (N: "Joe didn't like the small boy") and the K's passive transformation (P: "The small boy was liked by Joe"). This finding suggested that complexity of sentence conception was paralleled by sentence grammatical complexity as conceived by the current theory of transformational grammar. Coordinating this research on the psychology of grammar with Wason's earlier findings with affirmative and negative sentences in a verification task, subsequent work at Harvard (McMahon, 1963; Slobin, 1963, 1966b) supported Wason's earlier finding of the general difficulty of negative sentences relative to affirmative ones, but also indicated an important interaction between the truth-value of the sentences used and the variable of affirmative-negative sentence form. True affirmatives were verified more quickly than false affirmatives, with false negatives slower than false affirmatives but faster than true negatives ($TA < FA < FN < TN$). This result has been repeatedly replicated in studies since that time (e.g., see reviews by Carpenter & Just, 1975; Clark, 1974), except in

cases where the sentence predicates are binary (e.g., odd/even). Subjects in experiments with such stimuli often "optionally recode" (Trabasso, Rollins, & Shaughnessy, 1971) or "convert" (Chase & Clark, 1972) negatives such as "not odd" into "even", resulting in a sentence-type difficulty hierarchy of TA<FA<TN<FN .

The interaction between truth/falsity and affirmative/negative sentence form in the Harvard verification studies of the early 1960's was an important finding because it implicated semantic factors in the understanding of negative sentences above and beyond syntactic complexity. Wason anticipated, however, that yet a third factor might have a relevant effect on our conception of negation. This factor, he suspected, was the actual use of negation in its normal context of denying some proposition which the speaker and listener mutually know (Wason, 1962, 1972), or in other words, a "pragmatic" factor in our conception of negative sentences.

Wason initiated an experiment which dramatically demonstrated this pragmatic factor in 1965. He constructed an experimental context in which he could systematically provide what he called "contexts of plausible denial." These contexts, he reasoned, would facilitate the understanding of the negative sentences which were so reliably found to be

more difficult than affirmatives in previous studies. The hypothesis he proposed which is relevant for the current discussion was the "exceptionality hypothesis", which was formulated as follows:

Given a set of similar stimuli, $x_1, x_2 \dots x_n$, and a stimulus, y , which is perceived to differ from these in one important attribute, it is more plausible to assert that y is not x than to assert that x_i is not y .

(Wason, 1965, p. 8)

In the contexts of his experiment, subjects saw a series of cards each of which had eight numbered circles. One of these circles was always a different colour than the other seven circles. Blue and red were the only colours used, and the odd-coloured circle varied for each card the Ss saw. Their task was to complete sentences of the form "Circle No.3 (for example) is..." or "Circle No.3 (for example) is not..." by hitting either a red or blue-coloured key connected to a timer. The hypothesis predicted that the difference between reaction-times (RTs) to negative (N) and affirmative (A) sentences regarding the odd-coloured or dissimilar (D) circle would be less than the difference in RTs to A and N sentences about the similarly-coloured (S) circles: $(DN - DA) < (SN - SA)$. The exceptionality hypothesis was confirmed, and the first experimental verification of the pragmatic contexts of negation thus made. Wason (1972) reviews subsequent studies which provide

additional evidence for the natural use of negation to signal a change in meaning from a contrast class. In sum, philosophers' intuitions about the natural uses of negation were well-founded and supported by experimental investigation.

3.3 Developmental aspects of negation pragmatics

One reliable result in experiments with adults, as we have seen, is that the understanding of negative statements is facilitated by a concurrent situation in which the negative statement signals a contrast from some other positive sentence, assumption, class of objects, or generally speaking "affirmative context". Otherwise, the conversational point of the denial is absent. This might pose an immense problem for the language-acquiring child learning about negation, since this fact about the social conditions for negation involves a considerable degree of non-egocentrism with regard to knowing about the beliefs and presuppositions of others.

At first, as the review of Chapter II indicates, the child seems to negate by rejecting or refusing things that are unwanted. The "rules" regulating this use of negation are internal and not subject to societal conventions or rules of discourse. When the child wishes to reject

something, he or she does. What is important to note about this form of negation, I think, is that it does function in an affirmative context of sorts, for the child is rejecting something mutually understood by his or her listener. There is an object of rejection which is the topic of discussion. But there is little reason to think that the child "presupposes" that his or her listener is aware of their common focus. It is less "mutually understood" than "mutually present" before both speaker and listener. But even the child does not produce negatives without appropriate context, such as going through the verbal and gestural procedures of rejecting without rejecting something. What this suggests is that negatives function in appropriate contexts in the child's use of language from the beginning, even when language-use is confined to immediately-present objects and events. As research reviewed in Chapter II, Section 4.3 indicates, it is only when language is used to discuss topics displaced in time and space from their referents that "pragmatic misfires" occur with negation. These "misfires" are enabled to occur because a child's assumptions or "presuppositions" about a situation differ from the adult's, and propositions may be negated by the child which the adult listener does not actually believe.

One way to systematically investigate the development of knowledge about the pragmatics of negation in young children would be to undertake experiments like Wason's (1965) "plausible contexts of denial" study with children as subjects. We might suppose that if children have some understanding of the social conditions of negation that they would understand "plausible" negatives before "implausible" negatives as defined by Wason's (1965) exceptionality hypothesis (Section 3.2). Experiments carried out by Donaldson (1970) and de Villiers & Flusberg (1975) address this question, and a review of these studies is presented in Chapter III.

4. Summary

In this chapter, a number of distinctions have been introduced which figure in our discussions of the development of negation in the language and thought of the child. These distinctions have emerged from both conceptual and empirical investigations of the ways in which negation is represented in thought, communication systems, and social interaction.

Logical or truth-functional negation was defined and identified as the principal meaning of negation for developmental consideration, and is manifest in the use of

judgements of negation to deny false statements. This type of negation is only possible in language systems which convey the meanings of a digital rather than an analog information code, and at the same time provides evidence for the conceptualization of sentences as true or false which philosophers have considered one of the definitive aspects of language knowledge and use. The emergence of logical negation was thus indicated as the central focus of investigation for the thesis.

In addition to logical conditions specifying when truth-functional negation can be utilized, it was observed that there are also social conditions which regulate the ordinary use of negation in communication. These pragmatic factors can be summarized in the general statement that a proposition is not usually denied (even if it is false) unless someone has either asserted or presupposed it to be the case.

Thus, the enterprise of studying the development of negation in the language of the young child involves attempting to study the emergence of logical negation in its early contexts of use and relating this to the development of knowledge about the social conditions in which the use of logical negation is conventionally acceptable.

Chapter II: Theories of Negation Development

I shall endeavor to show that the opposite gestures of affirmation and negation, namely, vertically nodding and laterally shaking the head, have both probably had a natural beginning.

Charles Darwin (1872, p. 62)

The use of headshaking and headnodding as semantic signals is widespread but not universal. What is universal is the road that leads to their development, even if the gesture which eventually emerges is different. Starting with the inborn motor pattern of rooting in the neonate, who is not conscious and for whom the "No" is nonexistent, this road leads ultimately to the concept of negation and to the conscious use of the semantic "No" for communication.

René Spitz (1957, p. 150)

The study of judgement affords us, perhaps for the first time, an insight into the origin of an intellectual function from the interplay of the primary instinctual impulses. Judging is a continuation, along lines of expedience, of the original process by which the ego took things into itself or expelled them from itself, according to the pleasure principle. The polarity of judgement appears to correspond to the opposition of the two groups of instincts which we have supposed to exist. Affirmation - as a substitute for uniting - belongs to Eros; negation - the successor to expulsion - belongs to the instinct of destruction.

Sigmund Freud (1925, p. 239)

1. Overview

The primary emphasis in this chapter is on the child's development of negation. Negation is broadly construed to include the emergence of the headshake, or negative gesture, and the verbal expression of negation, from its earliest single word forms to syntactic combinations. The central concern is the development of a conception of binary distinction (yes/no) which eventually comes into importance as a contrast between the values of "true" and "false" and judgements about propositions expressed by truth-functional negation. In a review of theories of negation in these various domains, the developmental phenomena which any comprehensive theory of negation development must deal with are presented. Many of these data, whether in English or other languages, have been in the form of parental diaries, which have numerous methodological shortcomings. Nevertheless, such diary data raise important questions and in some cases capture phases of development which a controlled experimental setting could easily miss. In particular, such naturalistic observations have suggested that the child is much more competent in the use and comprehension of negation than would be expected from experimental investigations (Chapter III, Section 3). Such

competence could possibly be illusory and an artifact of anecdotal observations, which are subject to multiple interpretations. But it highlights phenomena that guided observations in the longitudinal study of six children (Chapter V), and the experiment on truth-functional negation reported in Chapter IV. This sentence- verification experiment was aimed at documenting the emergence of truth-functional negation at 24-30 months of age, a period when negation used for logical purposes has been observed in naturalistic studies.

Many of the major developmental issues of negation development are raised in this chapter. The exegesis of these issues is in the main chronological, from primitive physical expressions of displeasure up to gestural, single-word, and ultimately syntactic negation. One primary function of these discussions is to sketch the latticework of social interaction in which negation develops. At the same time, a picture is sketched of the rapid changes which transpire in the forms of negation expression, and special attention is given to the emergence of different semantic functions of negation occurring in various communicative contexts. Truth-functional negation is always the central function of negation to which these developments are related, hence early potential bases of the contrast between

affirmation and negation in the form of judgements are proposed. In particular, the concluding section presents one of the major hypotheses of the thesis, a proposed developmental sequence for the expression of different semantic functions of negation. This suggested sequence stems from the earliest gestural and linguistic REJECTION with negation, to the marking of absence of some kind with negatives commenting on NONEXISTENCE and UNFULFILLED EXPECTATIONS, to TRUTH- FUNCTIONAL negation.

2. Gestural negation and its precursors

2.1 Primitive negation and the development of the headshake

The acceptance or rejection of things is a basic fact of the early activity of the infant, and is most obvious in early nursing situations, where the child searches after the nipple and refuses it when satiated. This early acceptance/rejection led many investigators interested in the gestural origins of negation to postulate that the side-to-side headshake is a "natural sign" of rejection, or negation (Darwin, 1872/1955; Freud, 1925/1961; Spitz, 1957; Wedgwood, 1866). While the psychoanalytic writings of Freud and Spitz have an entire language of their own which is tangential to this work, the central concern with the binary

distinction between "yes" and "no" which they illustrate dictates a brief discussion of their suggestions. The work of Spitz (1957) in particular warrants close attention.

René Spitz (1957), a student of Sigmund Freud and the psychologist Karl Bühler, provided an ambitious genetic account of the development of the headshake as a semantically meaningful gesture. He recognized the importance of verbal negation as a form of language which is "specifically reserved for inter-individual communication" (1957, p. 87), and "algorithmic" rather than representational. This discussion of negation is in accord with earlier discussions (Chapter I) of "not" negation as a digital operator on linguistic propositions, though Spitz mistakenly assimilated every "semantic" (i.e., meaningful) use of "no" or the headshake to have these features. As we found in Chapter I, it is TRUTH-FUNCTIONAL negation which has these digital properties, and not the use of negation in general.

The aim of Spitz's account of the development of the semantic headshake was to demonstrate that the child is not restricted solely to imitation of the adult gesture as an impetus for its development, but that there is a genetic predisposition to the gesture itself, which is based on a preformed motor prototype for the gesture. The genetic

precursor which Spitz discovered (and which Wedgwood and others had speculated about) was the hereditary head-rotating "rooting behaviour" or "sucking reflex" (cf. Piaget, 1952, Chapter I) observable in the newborn who seeks the nipple when placed in a nursing position beside the breasts. A touch of the perioral region of the infant sets off the behaviour, and when the stimulus is the mother's breast, the infant turns his or her head back and forth in rapid movements until the half-open mouth meets the nipple, closes around it, and begins to suck. The function of such rooting is a "turning toward" the nutrient source (1957, p. 35), and in Spitz's terms, by relieving a need, it is "a striving toward tension discharge" (1957, p. 36). But there is no negative counterpart to the rooting behaviour in the first three months of life, since the satiated child merely abandons the nipple instead of actively eluding it (1957, p. 93). At three months, however, Spitz observed the near disappearance of the rooting reflex due to the fact that coordination of tactile and visual perception and muscle movements insure immediate attainment of the nipple. At that time, a morphologically-similar behaviour to the rooting reflex emerges: the infant turns his or her head back and forth energetically to actively avoid the nipple and stop the feeding. Spitz viewed this avoidance behaviour

as the intermediate link between rooting behaviour and the eventual semantic headshake and verbal "no". Rooting is seen as introducing the motor matrix for the semantic headshake, whereas the avoidance movements subsequent to satiation set up the emotional category of refusal which is central to the "no" to emerge later. A continuity between these various phases is provided, according to Spitz's theory, by the "numberless conscious memory traces of the movement's effectiveness (in tension release)" (1957, p. 94).

But what of the transition to the use of the semantic headshake by the child? Spitz proposed a sequence of intermediary developments between the satiation-avoidance movements at 6 months and the meaningful use of the headshake sometime in the second year. Prohibitions from the parent, invariably expressed with "no-no!" and a headshake, are addressed to the child as he or she becomes increasingly ambulatory in the period between 9 and 12 months of age. These speech acts interrupt and constrain the child's actions, and in so doing leave him or her with uncompleted acts. Spitz stressed the importance of this fact by extending the Zeigarnik effect (Zeigarnik, 1927) to account for why the "no" and headshake are so well-remembered by the child. Zeigarnik, a Gestalt

psychologist working within the tradition of Kurt Lewin and the Gestalt theory of personal dynamics, found that uncompleted actions were better recalled than completed ones. Under the assumptions of that theory, the tension state for a particular task continues longer for uncompleted than completed tasks and implements better recall in the first case. Spitz proposed that the large number of prohibitions a child receives leave a large number of uncompleted acts for the child, with the common elements being the inhibiting word "no" and the headshake used. Further, Spitz added a psychoanalytic proposition: that the child's id drives will be frustrated by prohibitions and endow the negative words and gestures of the adult with a "specific affective cathexis" (1957, p. 45) which ensures the permanence of the memory trace for the negative word and gesture. Afterwards, the child moves from passivity to activity and identifies with "the aggressor" (adult prohibitor). The "no" becomes the vehicle for expressing the aggression because it is imbued with aggressive cathexis in the unpleasurable experiences associated with the memory traces. Hence the child now expresses judgements (in Spitz's broad sense) of "no" on the prohibitor, and has begun to utilize negation spontaneously to signify refusal. The significance of this development on the neo-Freudian

account espoused by Spitz, is the inception of the ego's judgement function to affirm or negate the content of thoughts, and can involve two kinds of decision (Freud, 1925/1961, p. 236): "It affirms or disaffirms the possession by a thing of a particular attribute; and it asserts or disputes that a presentation has an existence in reality."

One important feature of the acquisition of the meaningful headshake is its value in communication with the adult. The child now gains the additional autonomy or "personal power" (Shotter, 1975, p. 233) of rejecting the parent's influence by means of an abstract symbol whose meaning is clearly recognized by the adult. George Herbert Mead's remarks on the features of significant symbolization with gestures may be applied to the advent of the semantically meaningful headshake as opposed to the earlier back-and-forth movement of the satiation-avoidance behaviour:

Gestures become significant symbols when they implicitly arouse in an individual making them the same responses which they explicitly arouse, or are supposed to arouse, in other individuals, the individuals to whom they are addressed; and in all conversations of gestures within the social process, whether external (between different individuals) or internal (between a given individual and himself), the individual's consciousness of the content and flow of meaning involved depends on his taking the attitude of the other toward his own gestures. In this way every

gesture comes within a given social group or community to stand for a particular act or response, namely, the act or response which it calls forth explicitly in the individual to whom it is addressed, and implicitly in the individual who makes it; and this particular act or response for which it stands is its meaning as a significant symbol. (In Wundt, 1973, p. 25.)

The child is now aware that the headshake symbol can meaningfully convey an attitude of rejection or refusal, and his or her initial generalizations of the gesture seem to convey a similar semantic function (Section 2.3).

The proposals which Spitz outlines for the acquisition of "no" and the headshake gesture by the child are speculative and couched in the theoretical constructs of Gestalt and psychoanalytic theory. The application of Zeigarnik's findings to infancy, in particular, are rather specious, since the work was carried out with adults and it is unlikely that a straightforward extrapolation of the theory, which deals with the representation of motivation or intention to carry acts through to completion once they are embarked upon, can be justified without being investigated developmentally. Nevertheless, no other account of the early development of the negative gesture discusses possible mechanisms of development, or provides such a thoughtful analysis of the contexts of communication in which prohibition and the early comprehension of negative gestures and words occur.

2.2 The development of prohibition comprehension

The central feature of the effect of the parent's prohibition which Spitz observed was a constraint on the child's intended actions. The child is crawling and exploring the environment and innocently prepares to touch objects or carry out certain acts with objects that, unknown to him or her, are breakable, messy, or could cause physical harm. Parents find a real need to constrain the child at about 8-10 months of age, a time when most children begin to crawl around. In most current accounts of early language comprehension (e.g., Huttenlocher, 1974; Rescorla, 1976), very little of what is said by the parents has been found to be understood at this time unless the verbal aspect of the communicative act is redundant given the situation. Yet parents require understanding and compliance from the child in reaction to their prohibitions. How do they accomplish this?

Most early diarists of child language note early understanding of "no-no" prohibitions by the parent at about 9 or 10 months of age (e.g. Leopold, 1939, p. 112; Lewis, 1963, p. 43). It is usually concluded that the child does not halt prohibited actions so much because of an

understanding of the negative gesture or the word "no", but because of the prosodic and paralinguistic features of the prohibitive utterance, such as the "distinctive intonation" conveyed by such physiologically-grounded parameters of the speech signal as loudness, pitch, duration, and suddenness of onset (Lewis, 1963, p. 43). As the linguist John Lyons (Lyons, 1972) has noted, it is these features of speech which are closely allied with the "attitudinal" or "social" nature of the speech signal and act. And recent work has suggested that prosodic features of the child's early vocalizations carry affect the "speech act" performed (Dore, 1975), in its various modalities, e.g., request, demand, declarative, interrogative. If this research is supported by subsequent investigations, such salient features of prohibition communicative acts by the parent could provide a more substantive ground to Spitz's claim that the negative word and gesture become endowed with a "specific affective cathexis" (1957, p. 45) as a result of the adult's prohibitions.

Lewis (1963) has described a period of prohibition anticipation prior to the use of negation by the child which is the source of many parental anecdotes. After early reactions to parental prohibitions such as crying, the child comes to anticipate prohibition in the context of carrying

out previously- forbidden acts. Lewis (1963, p. 43) noted that at 1;2(3), after a prohibition several minutes before, his child anticipated prohibition in a cautious look to him prior to the execution of the prohibited act, and then halted the act. A related later development which has been frequently described is "self-prohibition," a phenomena where the child approaches a forbidden object and without looking at the previously- prohibiting parent, says "no-no" or shakes his or her head in "self-reprimand" (Section 2.4).

But our question as to how the parent gets the child to comply with and hence understand the prohibition has not been given an answer. Some preliminary aspects of an answer can be given as the result of longitudinal observations of negation development in 4 children from 0;8 to 0;11 who were part of a larger sample discussed in detail in Chapter V. Though not the central topic of this thesis, systematic descriptions of prohibition situations in the 60-90 minute monthly sessions for these 4 children yield a coherent framework for describing the development of prohibition comprehension. I will present the general picture of prohibition reactions during this period, citing examples of observed behaviour where particularly interesting phenomena are involved.

Initially, the parents provide physical constraints in

their prohibitive acts, and by so doing, make the prohibition situation redundant with the additional gestural and linguistic information. Just as in early command situations, where the mother says "Give me the ball" as she gently pries it from the hand of the child and later extends an open palm, the prohibiting mother says "no" and shakes her head as she pulls or lifts the child away from the forbidden situation. The language accompanies the explicit inhibition, and makes the meaning of the prohibition particularly salient. Soon, however, the adult wishes compliance with prohibition at a distance by the use of language alone, though it is often accompanied by extreme headshaking gestures and facial expressions of distress. This and emphatic prosodic and paralinguistic features of the prohibitive speech act must somehow provide the impetus for constraint on the child's part.

Then within the space of a month from the first physical constraints, the children begin to manifest signs of what the parents consider to be an understanding of "no" and the headshake in a prohibition situation. Generally the parents mean one of a number of very different things in their ascription of prohibition comprehension to the child. The child may have withdrawn from the object, or impeded the action on the way to touching it, if only temporarily, and

then renewed progress. The child may have demonstrated various forms of inhibition with regard to the prohibited object/act, or acted intent on disobeying. There are, within the realm of signs of understanding the child displays, a number of clearly distinctive levels of comprehension, reflecting increasing complexity of understanding and approaching what the adult considers understanding of prohibition negation.

At the outset, it is important to note that the child brings to the task of prohibition comprehension and reaction well-developed, even if primitive, means for negation. Displeasure is expressed primarily by physical means: the child rejects objects or actions by turning the head aside, pushing the aversive thing away, flailing his or her arms, or throwing the object aside (cf. Bühler & Hetzer, 1935). The means for communicating rejection here are direct and have no distance from their object, as strikingly direct as were the parent's initial prohibitions of forced compliance by physical means. If these behaviours fail to thwart the offensive stimuli, the child reverts to a cry of displeasure.

Yet the child does not at first use behaviours from his or her physical "rejection repertoire" in response to parental prohibitions and constraints. The child at first

cries, and it is a full month or so until he or she comes to manipulate the inhibitor in such relatively advanced ways as are readily available. The children's prohibition reactions do quickly change form, however. When the parent uses verbal prohibition alone for the first time, the child initially ignores the prohibition, seemingly out of non-understanding. Then if the prohibition is made persistent, if the parent repeats the interdiction, raises the loudness of the voice, or otherwise shows serious intent, it may be heeded by the child and result in a pulling away from the prohibited object/act. Part of this last scenario is the standard look of the child to the prohibiting parent in response to the prohibition, generally with his or her body still aligned in the direction of the prohibited object, or with his or her hand still touching it. In brief, the child looks to the prohibitor, but does not immediately withdraw. Such prohibition sequences involving looks to the parent while the child continues to touch the prohibited object are marked by rapid recurrences of the forbidden act, and numerous replays of touch-prohibition-look "rounds". The child's withdrawals, if they occur at all, are very short-term.

One important phenomenon was displayed by 2 of the 4 children at 0;9 when repeated prohibition-cycles of the type

just described were prevalent. After an initial string of prohibitions and withdrawals, the child begins to approach the forbidden object and spontaneously inhibits a repetition of the prohibited action. The child's gaze goes to the prohibited object, arm aims out towards it, and is self-impeded in midstream, slung back and forth several times in approach-avoidance fashion and then withdrawn (Subject CL was prone to touching a radiator which was sometimes hot, and S had a rubber-tree leaf as his favourite).

Next, for each of the children there occurs what adults often describe (e.g., Lewis, 1963) as guilty, "permission-requesting" looks to the parent, at first immediately after a prohibition the child has complied with in the middle of a renewed approach towards the object. Such looks were used later, by all of the children, in anticipation of prohibition. Looks would be made in the parent's direction before any prohibition had been made in the immediate context, as the child prepared to touch what the parent felt he or she "knew" should not be touched. Concurrent with these anticipatory "permission-requesting" looks are instances for each of the children where, after being prohibited, they react against the prohibition by using primitive physical means of rejection (arm waving,

fretting sounds), which are now at a distance for the first time from their "object" - the parental prohibition. Werner and Kaplan (1963) note that such progressive "distancing" between the child and the object of reference results in a shift from ego-bound things of action to ego-distant objects of contemplation. In this particular case, the primitive physical means for rejection which once directly affected the aversive thing (the child pushed things away) now represents that same "pushing away" or rejecting at-a-distance. One other feature of prohibition reactions in this period is the "sneaky smile", where the child's actions superficially resemble earlier times when the child ignored the prohibition out of non-understanding, except that now the child may smile at the parent in defiance and continue with the forbidden action, after having independently demonstrated prototypic prohibition compliance in these episodes. The children at this point, from 10 to 11 months, have begun to use primitive means of rejection and open defiance to reject their parent's attempts to constrain them with prohibitions.

Aside from the later development of the headshake, which is discussed in Chapter V for these children, this completes the developmental sequence of major changes in the children's prohibition reactions and their growing

comprehension of such commands. One striking feature about this development is the progressive growth of the dyadic nature of prohibition. For the child is learning to react to the prohibition in a way which has two quite divergent components: compliance, a measure of which, from the adult's viewpoint, is nonrebellious withdrawal (passivity), and defiance, where the child comes to display an autonomy from the parent's wishes and exerts a control over his or her own behaviour (activity). In learning the constraining nature of prohibitive acts vis-a-vis the prohibitive communication relationship, the child is learning to inhibit actions in the socially-prescribed way. But he or she is also learning how to inhibit others, to constrain them via negative reactions to prohibitions. Prohibition is hence an arena of early language comprehension where the realization of role-reversibility so central to language becomes naturally emergent as the child attains active agency.

These observations complement those of Lewis (1963) and Spitz (1957) in delineating several intermediate steps of "understanding" the adult's negative prohibitions before the child ever begins to use the semantic headshake. Clearly, no period of straightforward "prohibition-comprehension" can be identified, since there is not a time when the children

observed complied with every prohibition. Instead, there is a balance struck between a development in prohibition compliance as the child recognizes the function of the adult's prohibitive speech act and a development in prohibition defiance as the child, in understanding the prohibitive function, begins to exert autonomy and choose to not obey (cf. Spitz, 1957, p. 57f). In addition, a period was observed to occur before the use of the semantic headshake in which children reject parental prohibitions at a distance by unconventional (i.e., non-symbolic) physical means which were previously utilized to physically (i.e., directly) reject things. In addition, the spontaneous inhibitions of frequently forbidden actions by several children which were observed suggest the advent of an internalization of prohibition constraints, which need not always be current to be effective. This internalization is most striking in the oft-observed phenomenon of "self-prohibition", which is a subsequent development, I shall argue, of great importance for the understanding of truth-functional negation. But first the earliest functions which the headshake serves for the child must be discussed.

2.3 The communicative contexts of gestural negation

Previous studies of the negative gesture have rarely reported on the contexts of its use in any detail, and reports on the development of the word "no" and related negative words have not related this acquisition to the emergence of the negative gesture. So how are the headshake and "no" related in development? One might suspect them to emerge at the same time. However, in the few relevant reports, it has been observed that the headshake emerges prior to the negative word (Carter, 1974; Rūķe-Dravīņa, 1972). Rūķe-Dravīņa, in her study of the acquisition of Latvian by two children, briefly notes that the headshake was used "in protest". Carter, whose study consisted of a detailed analysis of four videotaped play sessions with one infant from 12-16 months learning English, observed numerous examples of REJECTION by means of the headshake, of either another's actions or objects the child did not want. The child also often used what Carter called a "sensorimotor morpheme" when rejecting, consisting of a nasal sound like "ungh" [ə:ŋ], which Carter viewed as a systematic vocalization with non-word status (cf. Dore, Franklin, Miller & Ramer, 1976 on "phonetically-consistent forms").

Wedgwood (1866), Darwin (1872/1955), and Jespersen (1917) have all noted a world-wide tendency for using words with the nasal "n" to signify negation, and suggest that this is a native predisposition.

One other very early use of the headshake, as Spitz (1957) has outlined, is in retort to the parent's prohibitions. Recall that in his account of the acquisition of the negative headshake and the negative word, the child identifies with the aggressor (prohibiting parent) and the aggressive cathexis with which "no" and the headshake have been endowed make them the appropriate symbolic vehicles for expressing counter-aggression. In the words of Freud (1926/1936), cited by Spitz (1957, p. 46):

It is easy to observe how, in every field of psychical experience...an impression passively received evokes in children a tendency to an active response. They try to do themselves what has just been done to them.

Such uses as those described by Carter, where the headshake is used to reject objects and actions, are related to what Spitz views as the original headshake situation for the child of prohibition-refusal. Since Carter's subject had not yet begun to use the word "no", we can make one inference with regard to the uses of gestural negation described thus far. The child can clearly generalize the headshake symbol to situations other than the original use

of the headshake in prohibition refusals, prior to the expression of the concept of rejection in language with the word "no". In addition, there may be alternate "first functions" of gestural negation for the child if he or she has not used the gesture to refuse prohibitions, as illustrated by Carter's subject. Research reported in Chapter V of this thesis supports a theory which holds that the headshake may first be used in contexts other than prohibition refusal, such as food refusal during feeding. In addition, the headshake is used by some children in the longitudinal studies reported in Chapter V to respond to simple ritualistic "yes/no" questions concerning whether the child desires food, drink, or particular activities.

2.4 The phenomenon of self-prohibition

Many careful observers of child development have noted early instances of negation, whether in gestural or verbal form, which occur when the child is about to touch or is touching a "forbidden object" (Bloom, 1973, p. 90; Bruner, Caudill & Ninio, 1976; Edwards, 1976; Escalona & Corman, 1971, p. 5; Greenfield & Smith, 1976, p. 95; Piaget, 1962, p. 97; Spitz, 1957, p. 129f). Shortly after the child has begun to use the headshake or "no" to refuse to obey the

parent's prohibitions, or further, to reject another's actions or an object not wanted, "self-prohibition" seems to briefly appear as a use of negation.

All of the examples of "self-prohibition" cited in this literature involve things which the child has been forbidden to do in the past, and what appears to occur is that the child "tells himself or herself" not to do what he or she is about to do or is already doing. "Self-prohibition" is somewhat of a misnomer for this use of negation, since the child often touches the object anyway. The situation might be more accurately depicted by saying that the child is saying to himself or herself what the parent has said when the same thing has been done in the past. But what is the import of this observation?

Several interpretations of this phenomenon have been offered, both of them psychoanalytic in nature. Escalona and Corman (1971), in a report on ego development, remark that this "self-prohibition" demonstrates that the child has "internalized something like a conscience". Spitz's (1957, pp. 47, 129f) interpretation of this type of negation follows that of Anna Freud (Freud, 1952) in her discussion of preliminary phases of superego development. He suggests that the child has assumed the role of the prohibitor, and is playing a make-believe game of carrying out the forbidden

action:

In these games a cleavage between ego and self is evident. The restructured ego has objectivated the self by taking it as an object. The ego applies here the same device to the self which it had learned to apply against its mother, namely the "No". It had learned to use this device with the help of identification with the aggressor; this led to an increasing objectification of the self. (Spitz, 1957, p. 130)

Spitz views self-prohibition negation by the child as an indicator of the growing awareness of self. But I want to suggest that whether we wish to accept this "conscience" interpretation or the "self-awareness" interpretation, the use of "no-no" or headshake when in the midst of a forbidden action is an important step on the way to the development of truth-functional negation. Whereas before symbolic negation for the child has been a means for rejection and the assertion of autonomy of decision, it has not involved norms of any sort, but only the child's internal decisions of "I want this/I don't want this." By externally rehearsing the two roles of the prohibited, socially-constrained act, the child is in sequence playing out the roles of self-as-action-proposer and other-as-action-constrainer. The awareness of this contrast is most striking when the child actually stops the action as if the parent had been the one to say "no" rather than him or her, as several observers have noted (e.g., Greenfield & Smith, 1976). The

child displays knowledge of the contrast between the affirmative and negative messages: he or she both initiates and negates the initiation. So whereas in the past the affirmative and negative were conveyed in the relationship between parent and child, it has now become transmuted to within the self.

There are several important consequences of this transmutation. One is the internalization of conventional norms for permissible-nonpermissible actions, the other is the fact that this is a contrast of affirmation-negation which is internally represented and which involves the linguistic "no" as the negative form. We might compare this with the classic interpretation of "egocentric speech" on the part of the preschool child by Vygotsky (1934/1962), who argues that such speech serves a planning function which, when the egocentric speech (not directed toward others in conversation) diminishes in frequency and finally disappears, has in fact become internalized and regulates thought processes. The argument here is that "self-prohibition" provides us with an external index that the child has begun to conceptualize an affirmative/negative contrast which incorporates external norms that are extrinsic to the child's immediate need satisfaction. This internal binary contrast, I want to suggest, provides the

semantic basis for later judgements involving contrasts of other centrally-important societal norms: truth-conditions for utterances involving attributes of things and their existence. The child comes to use truth-functional negations to express judgements about properties and the existence of things, as well as judgements on the use of language to make statements by others. Derek Edwards (1976) and Gregory Bateson (1968) have also presented proposals relevant to our considerations of the importance of the phenomenon of "self-prohibition." Edwards (1976) suggests that one important source of early word meanings for the child is the predominance of constraints which the adult imposes on the child's actions by "social prohibition", as well as those imposed by the natural constraints of the physical world. The examples he discusses are all cases where the child comes to use words in contexts which seem to derive from the use of the same words by the adult to impose constraints on the child's freedom of action. Several of these are then extended to situations of constraint imposed by the physical world (e.g., when the child cannot put building blocks together).

Edwards focuses on three realms of meaning: negation, possession, and several words "which in the adult grammar would be classified as Verbs and Adjectives." Evidence is

presented from several English children that there is a close connection between prohibitions by the adult and expressions of rejection-negation and of possession. "No", "no touch", "mummy's", and "don't", among other words and phrases, are all used by one of the children in what appear to be self-prohibitive contexts. The child proceeds to touch objects that have been prohibited by the parent in the past, such as her parents' books, glasses, pencil, and watch. When the child denotes "ownership" of the prohibited objects in her vocalizations, Edwards suggests that this is due to a primitive ownership notion based upon previous impositions that have conveyed the idea of "privileged access" to certain objects by others. One example clearly conveys that these social constraints are basic to his subject's conception of possession at this point (A is the child, S is the mother):

	<u>Language</u>	<u>Context</u>
12.	A: "no touch" (S: "No touch. No. That's correct.")	A looking at E's tape recorder
	A: "mummy's/tape"	A pointing and looking at tape recorder

The tape recorder, A has been told many times before, is not to be touched. Previously, Alice's mother had never been to a recording session and did not own a tape recorder, and the

child assimilated the forbidden object to her general schema of objects her mother possesses which are not to be touched.

Similar constraints are involved in Alice's use of the word "leave" in self-prohibitive contexts, which seems to be derived from her parent's phrase "leave it" or "leave it alone," rather than its being a Verb. In addition, words one might view out-of-context as Adjectives express quite different meanings in context for the children Edwards studied, such as "big" when two objects will not fit together (i.e., one is "too big"), "sharp" for a kitchen knife that is a forbidden object, "heavy" when objects are difficult to lift, and "stuck" when two objects will not go together as the child wishes. Most of these words involve physical constraints imposed on the child's actions.

So from a radically different perspective than that of Spitz (1957), who presents a psychoanalytic account of the early use of "no" based on the child's "identification" with the prohibiting parent, Edwards (1976) draws the similar conclusion that constraints on the child's actions provide an early source of word-meaning and that such a notion of constraint is psychologically real as a part of the child's early word meanings for negation and related words stemming, ultimately, from the communicational contexts of social constraints on the child's actions. These are the very

young child's "plausible contexts" of negation, to relate this work to discussions of the pragmatics of negation presented in Chapter I. Edwards' work highlights one area of early word meaning where the effect of social context and social mores (not all cultural subgroups prohibit children from touching the objects this child was refrained from) is pristine in form.

The second proposal relating to self-prohibition is one elaborated by Gregory Bateson (1968, p. 626) where, in trying to trace a speculative evolution of arbitrary denotative "naming" and "not" negation of digital form from an earlier iconic signal code, he suggests that:

It appears likely that the evolution of the simple negative arose by introjection or imitation of the vis-a-vis, so that "not" was somehow derived from "don't".

Bateson does not mention the phenomenon of self-prohibition in his discussion. But he denotes the negation which is accomplished in interaction patterns (which we might call "dialogue") when one organism proposes a pattern of action which another forbids with "don't" an analog negative confined to commands and hence the level of relationships. In his closing remarks, he proposes that we "look for the evolutionary roots of the negative among the paradigms of interaction" (1968, p. 626). Though this is not the appropriate arena in which to discuss the complex

relationships between phylogeny and ontogeny (but see Gould, 1977), we are clearly dealing with a problem analogous to that envisioned by Bateson to trace the ontogenetic sequence from the early use of "no" which serves the "don't" negation function of prohibiting and rejecting to the use of "no" for expressing the "not" of truth-functional negation. It has been proposed here that the notion of "constraint on actions" which serves as a source of early word meaning for negation becomes internalized (as evidenced in "self-prohibitions") and that the binary contrast marking "no" and imposed constraint provides the cognitive index basic to the comprehension and use of truth-functional negation, the central focus of this thesis. This suggestion can be tested in a preliminary way with longitudinal data on negation development which pay careful attention to contexts of negation use and by observing whether negation development pursues the course predicted here (Chapter V).

3. Negation in the single-word utterance period

One salient feature of early verbal negation is the variety of contexts in which the first negative words appear before they are ever combined with other words to form sentences. One central problem facing the child language

investigator interested in such single-word negation and its contexts of use is in delineating what might be psychologically-real semantic categories for the child producing these negative utterances. Certainly one aid would be provided if the child produced two different negative words, such as "no" and "gone", which each appear only in what would be described as similar situations, perhaps "no" only to reject objects, and "gone" only when people walk out of rooms. But actual negative use is much more complex than this. The child rapidly generalizes negative words to new situations in much the same fashion as object words are generalized to new category exemplars, and the task of the developmental psycholinguist requires detailed descriptions of contexts of negation use and the difficult detective work of trying to detect nuances of meaning that have later consequences in structural differentiation of negation expression. At this time, a complete picture of early negative use is not available, nor is the present research an attempt to present one. It is argued here, however, that certain families of negative meanings can be identified in the uses of single-word negation which can then answer certain specific and preliminary questions about the emergence of different semantic functions for negative use. As a focus for

discussion, a list of negative word-use contexts which we can distinguish as adults is presented below. Actual examples are not cited with their contextual surrounds, since this list is an attempt to specify general features of these word-use contexts for negation, which have either been reported in the child language literature or personally observed in the longitudinal studies reported in Chapter V.

<u>Description</u>	<u>Possible¹ Interpretation</u>	<u>Word (e.g.)</u>	<u>Report(e.g.)²</u>
1) Solitary object rejection	(C is tired of an object and gets rid of it)	away	Bloom(1973)
2) Social object rejection	(C is offered an object and rejects it)	no	Guillame (1927)
3) Action rejection	(C is object of an action and rejects it)	no	Bloom(1973)
4) Person rejection	(C wants a person present to leave)	bye	Carter(1974)
5) Self-prohibition	(C reprimands self in doing something forbidden)	no-no	Escalona & Corman(1971)

¹ Key: "C" = child; "M" = mother.

² Where situations are listed for which I have personal observations in the longitudinal studies reported in Chapter V which are not reported in the literature, I cite "personal observations".

6a) Self-caused disappearance	(C causes something to disappear)	gone	Bloom (1973)
6b) Distal object disappearance	(C notices something disappear from view)	gone	Leopold (1949)
7) Person disappearance	(C notices a person leave)	gone	Leopold (1949)
8a) Self-caused cessation	(C causes an event to cease)	stop	(pers. obs.)
8b) Distal cessation	(C notices a sound stop)	stop	Bloom (1973)
9) Social event cessation	(Someone stops tickling C)	gone	(pers. obs.)
10) Unfulfilled expectation	(C expects an object to be somewhere and does not find it)	gone	Volterra & Antinucci (1977)
11) Unfulfilled action expectation	(C expects something to work and it does not)	no	Bruner et al. (1976)
12) Constrained action	(C tries to do something and is physically stopped)	stuck	Edwards (1976)
13) Prohibition rejection	(C rejects a command to stop some action)	no	Lewis (1963)
14) Command rejection	(C is engaged in one action, told to do something else, and rejects it)	no	(pers. obs.)

- 15) Answer to "yes/no" questions (Various types: actions, desires, play, memory, identity, and attributions) no Greenfield & Smith (1976)
- 16) Correction of misinterpretation of previous utterance (C says something which M repeats incorrectly, and C corrects her) no (pers. obs.)
- 17) Correction of previous statement (C corrects misnamings and false statements made by others: various types) no Leopold (1949)

This may not be a complete list of the early contexts in which negative words occur, but it constitutes a wide range of situations in which such words are used by the young child. There are several things to note about this list. First of all, it is not a typology of the early meanings which "no" and related words have for children, for we have no reason to assume that these "types" are in any sense distinct in the child's conception of his or her use of the words in these situations. Yet one might want to use this classification scheme as an initial guideline for the discovery of negation-types which become psychologically differentiated for the child. There are several reasons why this is not a good first start. One is that there are

certain families-of-contexts listed here which naturally clump together. Although possible, it seems unlikely that these seventeen (and perhaps more) "types" of negation-in-context would emerge in an invariant order (of some kind) across children. For one thing, not all children may express negation in all of these contexts, and even if they did, it is probable that individual differences would result from varying experience in the physical and social worlds of the different children. Nelson (1973, 1975) and others have indicated radical individual differences in early lexical development for object-words and personal-social words, and one aim of current research on mother's speech to infants is to identify early sources of such variation (e.g., Snow & Ferguson, 1977). An additional methodological problem concerns inadequacy of sampling for negative speech, since certain utterance contexts listed above occur only rarely.

Given these considerations, one is faced with two major choices. One could follow a single child in minute detail, preferably with several samplings per week and extensive parental interviews and diaries. This method is unsatisfactory in the present case for several reasons. One is that a more general picture is first required of the general developmental patterns which emerge in the

expression of negation in a number of children, and while the case study might provide detail, it would not suggest general implications of developmental sequence. Secondly, such a case study really requires that one follow one's own child, much as did Leopold (1939, 1949) and Bowerman (1976), just to cite a few salient examples of meticulously detailed studies that required daily observations. Such considerations preclude the case study for the present concerns, and suggest instead the method followed in the empirical observations that are part of the data for this thesis. A number of children were studied longitudinally and the general sequence of development for contexts of early negation leading up to truth-functional negation was traced (Chapter V). The level of description for this general sequence involves the aforementioned notion of "families-of-contexts" for early negative use.

Before expounding this theoretical construct, it is essential to spell out why the contexts listed above are contexts of "negative words". What features of the contexts in which they occur make them negative words? Descriptions 1-4 and 13-14 all involve REJECTION of some kind, and hence constitute the polar opposite, or negation, of acceptance. Descriptions 6-9 are contexts of DISAPPEARANCE, where something which had been present becomes absent, and denote

the negation of absence. Descriptions 10-12 are somehow related to the disappearance contexts except that they involve an expectation of some kind which is not fulfilled, and to that extent encode the negation of constraint on whatever had been planned which involved the fulfillment of expectation.

Descriptions 15-17, at least superficially (see Section 4.3.3 on "yes/no" questions), are of negations relating to previous sentences, including TRUTH-FUNCTIONAL negations. Description 5 stands alone as a context in which a negation, directed to the child by himself or herself, is derived from previous constraints on his or her actions by another's prohibitions.

The general features of these contexts of negation use also allow us to group them into families-of-contexts with the categorizations just specified. Negatives of REJECTION, SELF- PROHIBITION, DISAPPEARANCE, and TRUTH- FUNCTIONALITY are four primary groups which we have mentioned. A possible fifth grouping includes negative use in contexts which involve UNFULFILLED EXPECTATION. So rather than dealing with seventeen-plus potentially distinct semantic functions for negation use in the single-word utterance period, a preliminary categorization is suggested for the purposes of investigating general features of the developmental order of

emergence of different semantic functions of negation. Previous studies of single-word negation are now reviewed with this level of description in mind. A predicted sequence of development for these different semantic functions of negation is later proposed as one of the major hypotheses of negation development in this thesis (Chapter II, Section 4.4).

3.1 Previous studies of negation in the single-word utterance period

The child language literature relating to the emergence of early negation in the single-word utterance period has been solely longitudinal and non-experimental, and previous investigators rarely described this phase of development in any detail. Bloom (1973), Bruner, Caudill & Ninio (1976), Greenfield & Smith (1976), Leopold (1949), Lewis (1963), and Piaget (1962) have all made some allusion to the order of emergence for different types of negation in this single-word utterance period.

Bloom (1973) reports English acquisition data for a girl named Allison who began to express a form of lexical negation at 10 months of age. Allison used "away" for the first time at 0;10 to reject stones or pieces of dirt as she threw them away, in a similar context to when her mother would take a stone or piece of dirt away from her and say

"let's throw it away." Three days later, Allison began to use the word when objects or persons disappeared, such as airplanes in the sky or her father on his way to work. "A'gone" was learned at 1;2 and used in similar contexts as "away" to comment on disappearance of either an object or person after an initial presence before her. Between 0;11 and 1;3 several other negative words developed. From 0;11 to 1;2, Allison used "ne ne ne ne ne" as "an expression of protest or rejection"(1973, p. 90) and first articulated "no" in these same contexts (when another child took her toy, when not wanting to wear a dress she was given, when not wanting to be changed, or take a bath, and so on) at 1;2. At that same time, she looked at or touched objects that had been forbidden to her in the past and said "no" to herself, when she approached electrical wires, plants, adult books and records (1973, p. 90). Just before this last development, at 1;1, she began to say "stop" when an ongoing event ceased, such as phonograph music, the noise of a food blender, or the travel of a car (1973, p. 92). Then at 1;3, Allison began to use "no" in two different kinds of situations: one where she hid pictures, often after naming them, and then said "no" as she made them disappear, and another when she looked into containers that were usually full of something (boxes, shopping bags), and said "no" upon

finding them empty.

In summary, Bloom found for the child Allison a sequence of negative words that began with "away" for rejection and then for the disappearance of things, followed by a vocalization like "no" ("ne ne ne ne ne") for protest and rejection, then by the word "stop" when ongoing events ceased, and finally by two concurrent developments of semantic function for the word "no", one for self-caused disappearance and another for when the child expected to find something and did not.

Bloom (1973) also includes as an appendix to her text the transcripts of utterances plus context from two videotaped play sessions with Allison at 1;4(21) and 1;7(14) when she was still using single words and not yet producing sentences. These data were not discussed in the text, yet they include several other forms of negation which should be noted in a review of the work. We can of course not tell what developments occurred in the gap between 1;3(0), where Bloom's discussion of the data ends, and 1;4(21), where these transcripts begin. But we can note that the appearance of the forms of negation already mentioned occurred earlier than the ones to be described now.

The session at 1;4(21) is referred to here as Session I, and the session at 1;7(14) as Session II. Bloom divides

the transcripts into speech events and numbers them for reference, and these numbers cited as her data are discussed.

Several new uses for "no" emerge in Session I. Allison (A) uses "no" several times (I: 50,54,60) when a stick is stuck inside of a jar. Since she wants the stick, it seems she is constrained in obtaining it. A similar use of the word occurs when her toy animals will not do what she wants them to do and keep falling over (I: 77). Again, A is constrained and frustrated in not being able to carry out a plan as she had anticipated. Finally, "no" is used as the answer to several questions, though Bloom's discussion of earlier "no" use did not mention dialogue-exchanges so we cannot be sure that A was not using "no" in question-response at an earlier time. These examples (I: 27,71) are hard to describe briefly, but one "no" is in response to M's question "Is this for Mommy?" as A offers M a drink and then takes it back, and another "no" is in response to "Do you see anymore?" when A wants more animals after standing all of them up on the chair. A then goes on to ask for more.

The major change at Session II was the large number of frequently correct answers of "no" to complex questions, about NAMES ("Is that a (name)": II: 16,29,31), PRESENCE

("Is (name) here/gone?": II: 20,54,65,67), SIZE ("Is this a small/big (name)": II: 32,57), and POSSESSION ("Mommy (object name)": II: 64). Allison was answering many questions relating to language-situation correspondences that in the adult language we consider to be truth-functional in that answering questions of this kind is like verifying the statements inverted in the questions (e.g., Clark & Clark, 1977, pp. 100-113; cf. Chapter 2, Section 4.3.3). One would like more systematic experimental work of this hypothesis, but it is observations like these, which Bloom does not discuss, that motivate the controlled experimental elicitations of negation reported in Chapter IV. Hence the sequence of negation development which Bloom reports, supplemented by interpretations of the transcripts she provides for later data from the same child, allow an inferred developmental ordering of single-word negation of REJECTION (first use of "away", later, of "no"), DISAPPEARANCE ("away", "a'gone"), SELF- PROHIBITION, UNFULFILLED EXPECTATION, and finally TRUTH- FUNCTIONAL negation relating to previous questions.

Bruner et al. (1976) give a brief analysis of negation development for one English child in which self-prohibition "no-no-no" negation preceded the use of "no" where objects could not be fitted into a container as the child wished.

Thus, just as in Bloom's data, SELF-PROHIBITION negation occurred prior to UNFULFILLED EXPECTATION negation.

In their report on the semantic relations expressed before the emergence of syntax, Greenfield & Smith (1976) also describe aspects of negation development in a child acquiring English. They began observing the child at age 1;6(4), but have diary data kept by the mother from 0;8(19) until 1;9(8) detailing new entries in the child's vocabulary and the use of old words in new ways. Since the child began combining words in sentences after the second observational session at 1;6(27), we are only considering the diary entries they cite prior to that time and observations from Sessions I and II.

The first recorded use of negation by the child Nicky (N) studied by Greenfield and Smith occurred at 0;11(28) as N said "na-na" while touching a forbidden object (1976, p. 95). A similar use of "no" was observed at 1;3(29) when N was "tempted" to touch a forbidden object. Between this time and the first observational session at 1;6(4), the authors found that N used "no" in relation to situational contexts concerning himself, which presumably means to reject things and not another's actions (1976, p. 95). In Session I, the only three occurrences of "no" were in response to questions about N's wants, e.g., "Would you like

some fruit now?" In a diary entry between Sessions I and II, it was observed that N used "no" in relation to others in rejecting other children who wish to touch his toy (1976, p. 95). Finally, in Session II, the authors observed the first "negative indication", when N noted NONEXISTENCE when not finding any milk in his cup by saying "no" (1976, p. 86).

The small number of examples which Greenfield and Smith had available for analysing negation development in the single-word utterance period make one hesitant to posit a developmental sequence from their data, but taking into account the observations and diary entries they utilized, one can obtain the sequence SELF-PROHIBITION, REJECTION, desire-question response, social rejection, and NONEXISTENCE. It is not particularly clear whether these data provide either support or counterexample to a proposed sequence since it is incomplete, but it is cited here as one of the few discussions of single-word negation.

Leopold (1939) studied the language development of his daughter Hildegard (H) in great detail, keeping meticulous records of her concurrent acquisition of German and English, the latter spoken to her by her native English-speaking mother, the former by her father, during her predominantly American childhood. He provides extended analyses of the development of meaning for the negative words which H used.

"Nenene" was a negative used "as an expression of disapproval" (1939, p. 112) as early as 10 months by H. "No" was first used as a ritual response to the question "What did Mama tell you?" after she had been prohibited from doing something in the first half of the 18th month. She then used "no" early in the 18th month only as "an answer to a real or imaginary question for permission" (1939, p. 112). Leopold seems to be referring here to what we have called "self-prohibition" when mentioning the context of "no" use after "an imaginary question for permission." In the second half of that same month, H began using "no" very frequently with the meanings "I do not want to", "I am not allowed to", and "it is not so" (1939, p. 112). Later the use of two different negative words arose. One was "alle", a German word first used by H to mean "gone" or "empty" in relation to objects and persons at 19 months, and then extended to events at 20 months. "Away" was used at 20 months to mean "put it away" or "take it away" when H thought something was not in order (1939, p. 83). Other developments before H began to combine words at 21 months focused on extended uses of the word "no", sometimes as an answer to her own questions³, and at the same time (20 months) as an answer, along with "yes", to "all questions which called for such an answer, but with no concern for the facts involved, as a

semi-mechanical reaction to the suggestion implied in the form and intonation of the question" (1939, p. 113).

At the level of description which interests us in these data, it would seem that Leopold's subject H first spontaneously expressed negative semantic functions in the following order: REJECTION, SELF-PROHIBITION, TRUTH-FUNCTIONAL, DISAPPEARANCE (and perhaps UNFULFILLED EXPECTATION). "Nenene" was first used to express disapproval or rejection, then this was followed by "no" first spontaneously used in self-prohibition, then with the meaning of the logical negative ("it is not so"). "Alle" was then used to denote the disappearance of objects, persons, and events and perhaps (viz., its use to mean "empty") to express unfulfilled expectations. "Away" is used at the end of this sequence with a meaning of "things are in disorder, put them away!" and suggests an internalized contrast between appropriate/ inappropriate places for things.

Note that in the sequence spelled out above, Truth-Functional negatives precede Disappearance negatives for the first time in the literature that has been reviewed.

³For example: "baby / auto? / no!" when "realizing that in Evanston no auto was at her disposal as it had been during a visit in Milwaukee" (1939, pp. 112-113).

We unfortunately cannot assess Leopold's interpretation of H's "no" to mean "it is not so" at that time since he provides no examples (1939, p. 112). H could have been answering "yes/no" questions relating to factual matters (e.g., "Is that your papa's shoe?", when it is in fact hers) or doing one of a number of other things which we cannot evaluate without examples. But Leopold's descriptions provide a counter-example to the sequence proposed in the concluding section of this chapter which must be evaluated with results from the longitudinal studies of negation development reported in Chapter V.

Lewis (1963) also made some observations on the development of the first uses of negation. For the English child he studied the first recorded instance of "no" occurred at 1;7(6) in retort to the mother's prohibition against tearing up a book. Several days later at 1;7(15), the child refused some clotted cream in a spoon, saying "no!" At 1;8(22), he answered "no" to two questions involving his desires: "Come to Daddy?" and "Baby have a drinky?" and, consistent with his answers, dissented from going to his father or having a drink. Lewis does not give any additional observations on negation development, so we cannot assume that he has provided a complete account of early negative usage. The interesting observation concerns

the first use of "no" being in response to a prohibition, as Spitz (1957) proposed (see Section 2.1).

Piaget (1962, pp. 97, 217) in his discussion of changes in language use after the development of the semiotic function (Chapter I, Section 2.2.2) recorded a sequence of negation development for L, one of his subjects. L first used negation for refusal prior to 1;3(6), then shook her head for "what she knows she is not supposed to do (put a ring in her mouth)" at 1;3(6). This was followed by the first use of negation when failing to find something she was feeling for at 1;3(14), at which time she was also using "avoua" ("a corrupted version of 'au revoir'") to refer to people going away, and when she left the room herself. Again, we are faced with incidental observations without the focus of a central interest in negation, but the observations made point toward the emergence of REJECTION prior to SELF-PROHIBITION, which is followed by UNFULFILLED EXPECTATION (L had expected to find the thing she was feeling for).

What conclusions can be made from these series of brief observations by different investigators who did not have a primary interest in negation development? Only Bloom's data (1973) provide sufficient detail for a specification of a full developmental sequence for the emergence of negative

semantic functions at even the general level of semantic category specification proposed earlier. The supporting aspects of the other observations derive not from their completeness, but in the sequence-ordering they provide. For example, Piaget's three examples do not include DISAPPEARANCE negations, nor negations of TRUTH-FUNCTIONALITY, but the order of emergence for the three semantic functions he does note corresponds to that which we inferred from Bloom's data: REJECTION, DISAPPEARANCE, SELF-PROHIBITION, UNFULFILLED EXPECTATION, and TRUTH-FUNCTIONAL NEGATION. Given the entirely different interests of these investigators, it is important that a striking concurrence between emergence-orders does in fact occur. We did find two potential counter-examples to this sequence in Greenfield and Smith's finding of SELF-PROHIBITION prior to REJECTION negation, and Leopold's remark which suggested that H expressed TRUTH-FUNCTIONAL negation (with the meaning "it is not so") earlier than DISAPPEARANCE negation. But these were both based on weak claims. The data presented here are evaluated in relation to the developmental sequence predicted in Section 4.4 and then tested with the longitudinal studies reported in Chapter V.

4. Negation in sentences

4.1 Bellugi: A syntactic account of negation development

The first systematic investigation of the acquisition of negation in children was one undertaken by Bellugi (1964, 1967; Klima & Bellugi, 1966) as part of Roger Brown's (1973) project on first language acquisition. Like others in that enterprise, she was primarily concerned with the development of lower-level syntactic phenomena like the position of the negative in the sentences of the children she studied. Her account consisted of a sequence of structural stages, each characterized by transformational rules with which she tried to capture the syntactic regularities of the children's speech. She found a striking concurrence of the sequence of developmental stages (though not their age of occurrence) across the three children that were studied. At the first structural stage (Stage A), when the children's utterances had a mean length of 2.0 morphemes, the first syntactic negative utterances were negatives attached to primitive sentence nuclei, such as:

No the sun shining.
No sit there.
Not a teddy bear.
No write this book.

(Bellugi, 1967, pp. 37-39)

The structural characterization given of negative sentence constructions at this point was Neg + S (and far more rarely, S + Neg), where S was a rudimentary sentence or nounphrase. There were no negatives internal to sentences at this time, and Bellugi concluded from an investigation of the children's responses to their mother's internal sentence negations that there was no evidence that the child understood internal negatives at this stage either. The negative evidence was indirect, and the children's responses were to either persist with their previous statements, repeat part of the mother's utterance, question ("huh?") what the mother said, or provide an alternative:

Child: "Daddy suitcase"
Mother: "That's not Daddy suitcase"
Child: "Cromer suitcase"
(Bellugi, 1967, p. 48)

Bellugi was not convinced that the child was negating the mother's utterance with a substituted constituent because such substitutions were very productive at that stage even when the mother agreed with the child's previous utterance:

Adam: "Adam pillow"
Mother: "Oh, they're Adam's pillows"
Adam: "Daddy pillow"
(Bellugi, 1967, p. 48)

However, in the interim between Stages A and B, evidence for the denial of prior propositions occurred in

all three children's speech, as evidenced in discourse pairs such as the following:

Mother: "Is that Snoopy?"
Eve: "No, that puppy"

Father: "Daddy's getting old, huh?"
Sarah: "No, I get old"
(Bellugi, 1967, p. 74)

Bellugi noted that at the point when these discourse pairs emerged, many examples occurred which could be paraphrased as "It is not the case that X" where X is a previous proposition (1967, p. 74). The age of the three children at this point was 21, 29, and 34 months, and their M.L.U.s were all between 2.0-2.6 morphemes. Since this is the "denial" function of negation of central concern for this chapter, Stages B, C and D will not be reviewed here. Other studies at the same time described the same initial stage of negative plus sentence nucleus, in English (Menyuk, 1969), French (Grégoire, 1937/1971, cited in McNeill, 1970b), and Russian (Slobin, 1966a, 1968).

4.2 Semantic/functional accounts of negation development

Lois Bloom (1970) was also interested in negation development and provided semantic interpretations of the syntactic negations of three English-speaking children. In

a detailed analysis of not only the syntactic form of their negative utterances but their discourse and situational contexts, she found agreement between data for the three children for order of emergence of the syntactic expression of three distinct semantic categories of negation: NONEXISTENCE, REJECTION, and DENIAL, as defined below (1973, p. 173):

- 1) NONEXISTENCE: where the referent was not manifest in the context, where there was an expectation of its existence, and it was correspondingly negated in the linguistic expression.
- 2) REJECTION: where the referent actually existed or was imminent within the contextual space of the speech event and was rejected or opposed by the child.
- 3) DENIAL: where the negative utterance asserted that an actual (or supposed) predication was not the case.

One virtue of Bloom's semantic interpretations of the child's early negations as serving different functions is that, unlike the transformational account Bellugi provides, they do not obscure the underlying differences in use of negations and make the data appear more homogeneous than they in fact are. This difficulty with the Neg + S schema for early negation had been pointed out as early as 1966 (Huxley, 1966, p. 210).

McNeill & McNeill (1968), working at about the same time as Bloom, also examined the insights which a

concentration on the semantics of negation could provide into the processes of negation development. Their paper also dealt with first language acquisition. Bloom's study followed three children learning English - two from 19 months and another from 21 months of age. The McNeills studied Japanese negation development and reported on one child from the age of 27 months. Each of these studies proposed a tripartite distinction for negation functions: Bloom set out the three categories of REJECTION, NONEXISTENCE, and DENIAL, whereas the McNeills presented a system of three binary feature-contrasts, which were Existence-Truth, External-Internal, and Entailment-Nonentailment. Though the findings of the two studies are often taken as both supporting the emergence of semantic functions of negation in the order: NONEXISTENCE, REJECTION, DENIAL (Bloom, 1970, p. 173; Cromer, 1974; de Villiers & Flusberg, 1975), there are crucial discrepancies between them which have even been acknowledged by McNeill (1970a, p. 96).

In brief, the McNeills thought that their task of searching out semantic development for negation would be considerably simplified by observing the acquisition of Japanese, since the four common forms of simple negation in Japanese have different semantic functions and (+) or (-)

feature markers on each of the binary dimensions mentioned above:

- 1) Nai (aux) is a denial of a previous predication, which I will call "non-entailing denial";
- 2) Nai (adj) is an assertion of nonexistence of X given an expectation, by the speaker or listener, that X was previously present (where X is an object or event);
- 3) Iya is a straightforward rejection (gloss: "I do not want");
- 4) Iiya is a denial of a previous predication plus the implication that something else is true: this may be called "entailing denial".

The process of negation acquisition was seen by the McNeills as the acquisition of dimensions which are marked (+) or (-) in a semantic feature analysis⁴. Although few examples are given in the report, the McNeills conclude that the

⁴One of the problems with the McNeills' dimensions is the extreme oddity of the dimension entitled "Existence-Truth", which is not really an opposition at all. This dimension, they suggest, concerns the "condition" of negation: the existence or lack of either some thing or the truth of some sentence. Yet only sentences have truth-values (in relation to world-states), so the existence of things and the truth of sentences are not diametrically opposed as are the dimensions "External-Internal" or "Entailment-Nonentailment". Since truth-values involve arbitrary and rule-governed correspondences between world-states and sentences, the "truth" aspect of the McNeills' dimension is of a HIGHER ORDER than the "Existence" aspect, with the consequence that any "+/-" feature analysis of these two "conditions" is artificially-contrived.

negative linguistic forms emerged in the speech of the Japanese child in the following order: Nonexistence, Non-entailing denial, Rejection, and Entailing denial. Recall that Bloom found the order: NONEXISTENCE, REJECTION, and DENIAL. The difference between the two accounts consists in the fact that the Japanese child purportedly "had the idea of linguistically registering the truth of statements before she had the idea of linguistically registering her inner states in relation to outer ones" (1968, p. 61), whereas all of Bloom's subjects expressed DENIAL after REJECTION.

Semantic accounts of negation development addressing themselves to the order of emergence proposed in Bloom's framework have yielded quite different orders. Greenfield & Smith (1976) studied two American children learning English and were primarily concerned with the development of semantic relations from the first use of words to the emergence of syntax. They found that the first syntactic negations expressed REJECTIONS of objects (1976, p. 166), which were followed by syntactic negatives expressing DENIAL and NONEXISTENCE, occurring for the first time in the same observational session. To complicate matters further, Bowerman (1973) found that the negative sentences of the two Finnish children she studied (from 22 and 24 months) were

almost exclusively DENIALS. If these investigators have consistently applied Bloom's categorization criteria for assigning negative utterances to semantic categories, the developmental validity of this scheme is clearly questionable. One problem may be that the semantic category definitions (see page 101) for REJECTION, NONEXISTENCE, and DENIAL blur the often heterogeneous nature of the data. The NONEXISTENCE category is especially misleading, for many different types of things may figure as the "referent". Such a category can be broken up into a number of divisions, at least three in number:

- 1) negative utterances which comment on the DISAPPEARANCE of objects (e.g., "no more choochoo" uttered as a train disappears around a corner);
- 2) negative utterances which note the CESSATION of an event (e.g., "no more noise" as a vacuum cleaner stops);
- 3) negative utterances concerning CONSTRAINTS on the child's intended actions (e.g., "no fit" when one block did not fit into another).

All of these subdivisions of the NONEXISTENCE category express nonexistence of some sort of a recently present object, or recently occurring event expected to reappear or recur, or the expected consequence of an action. But the notion of "nonexistence" so broadly construed could include the "nonexistence" of a correspondence between a previous utterance and its truth (DENIAL) and the "nonexistence" of a

desire for an object, event, or action (REJECTION), resulting in the collapse of all the semantic categories into one. Similar problems abound with the REJECTION category, which is divisible at least into:

- 1) rejection of other-initiated actions (e.g., "no put in there", Bloom, 1970, p. 191);
- 2) rejection of other-proferred objects (e.g., "no dirty soap", Bloom, 1970, p. 172);
- 3) self-prohibition for forbidden objects (e.g., "no" on approach to forbidden object, Bloom, 1973, p. 90).

And DENIAL includes both the non-entailing and entailing denial forms which are treated separately in the account by the McNeills of negation development above, as well as answers to "yes/no" questions which "denied" the propositions contained in the questions (e.g., Bloom, 1970, p. 183).

I make these distinctions, some of which Bloom is clearly aware (for nonexistence subcategories: Bloom, 1973, p. 22n; Bloom & Lahey, 1978), not to reject the central feature of her approach emphasizing the necessity of considering the function of the child's negation in its communicative contexts, but to hold in question her conclusion that the emergence-order for the syntactic expression of semantic functions of negation in child language is, plainly and simply stated, "nonexistence,

rejection, and denial" (1970, p. 218). The data subsumed under these three categories are not homogeneous. I want to suggest that this overgenerality of semantic categories contributes to the lack of consensus among investigators of negation development working within Bloom's framework. The importance of Bloom's account of negation development lies in the attempt at defining a general level of sequence description, which is a necessary first step. But to be successful at the enterprise of constructing a general level of description for the emergence-order of semantic functions of negation, one has to be more precise in setting out the general-level category-characterizations. And Bloom's scheme, as we have seen, leads to equivocal negation-characterizations.

The above criticisms centre on the equivocal applicability of Bloom's framework for semantic categories of negation, and assume the validity of the scheme as applied to the data described by Bloom. But more critically, there are good reasons to question the emergence order for syntactic expressions of the different semantic categories even with the data taken to provide evidence for it.

Bloom's arguments on which the emergence order are based concern the "relative frequency" of syntactic forms

which express different negative semantic functions as well as the "structural complexity" which they display. The first measure must assume, to be valid as an order-determiner, that situations in which negative sentences are possible are equi-probable for each of the three semantic categories. But it is highly unlikely that such constancy can justifiably be assumed. The contexts in which the negative utterances occur vary considerably for the different categories: DENIALS depend on "yes/no" questions being asked or incorrect names or descriptions of events being used (at least from the child's perspective), REJECTIONS rely on things/events being offered to be rejected, and NONEXISTENCE negatives require disappearing objects, ceasing events, or unexpected failures. These have no intuitively valid equiprobability of occurrence, and Bloom's finding that at a certain point in a child's development the syntactic expression of negative utterances of a certain semantic category are more frequent than those of the other semantic categories thus makes no contribution to a claim about the order of emergence for different semantic functions of negation in syntactic expression.

There are also problems with the interpretation of changes in "structural complexity" of expressions of different semantic functions of negation. What is at issue

is the temporal priority of one semantic function being expressed syntactically when compared with other semantic functions. Bloom notes that whereas "nonexistence" is for the most part the first semantic negation function to be expressed syntactically, when "rejection" and "denial" (which seem to be initially expressed by the single-word "no") become expressed syntactically, they take the same structure, and progressive increments in structural complexity first occur for the semantic function "nonexistence", which is first in order of emergence. But there are many reasons why "nonexistence" might become structurally complex earlier than expressions of the other negative semantic functions. There are no a priori reasons which yield "first in structural complexity" as a measure of "first in temporal priority" of syntactic expression. And as Bloom notes (1970, p. 219), the single word alone may be quite adequate for expressing the negation functions of "rejection" and "denial" at a point when negatives involving "nonexistence", to be understood by the listener, must include the specification of a referent. This point results in the most serious non-sequitur of Bloom's account of negation development: what does order of syntactic expression of semantic function of negation have to do with the emergence of semantic functions of negation at all? No

claims can be made about the "cognitive complexity" of different forms of negation, because order of syntactic expression has no necessary correspondence to a cognitive difficulty metric, since the demands of discourse and communication requirements could differentially affect the different semantic functions of negation, as Bloom herself observes. In the end, for the present purposes of constructing a theory of negation development which aims to be cognitively-based, the sequence Bloom proposes is a red herring.

The utility of Bloom's data lies primarily in examples of what she calls the "denial" function of negation, which relate to our emphasis on truth-functional negation, since the eventual emergence of this use of negation (rather than its place in a developmental sequence of syntactic expression) is not at issue. Her data for the emergence of "denial" negation cluster at the end of the second year for her three subjects, when the children had a mean utterance length in the range of 1.3-1.8 morphemes. There are many possible reasons for the difference in degree of linguistic sophistication at the time of emergence for the "denial" function of negation in the speech of Bloom's subjects as compared with Bellugi's subjects, whose M.L.U's at this point were between 2.0 and 2.6 morphemes. One possibility

is that in Bloom's calculation of M.L.U., she did not count exact repetitions of utterances, which could have boosted Bellugi's figures in relation. A more likely interpretation is that Bellugi does not note this semantic function of negation until it is very productive, while Bloom's data mark the first occurrences of what she interprets as "denial" negatives. The age norms are several months later and the M.L.U. nearly one morpheme more when Bellugi's subjects begin to productively use negatives to deny propositions. But given these minor differences, there are still unequivocally-interpretable "denial" negatives:

E: "Daddy" (about a boy figure)
L: "Is this Daddy?" (E pointing to Daddy figure)
Child: "No this Daddy"
(Bloom, 1970, p. 161: the child is 2;1)

There are other examples for all three children at this time of what Bloom calls "anaphoric" negatives, where the "no" at the beginning of the sentence does not apply to the remainder of the sentence, but instead to a previous statement. The remainder of the negative utterance is an affirmative statement which is often presented as an alternative to the previous utterance, now negated. It is important to note that not all such "anaphoric" negatives are truth-functional. There are many cases which involve alternatives that are not dictated by the

externally-motivated true predication, as in the example above. Many of the alternatives involve the child's choice of one alternative among many that are possible given the form of the adult's query:

(Gia has completed a puzzle)

Adult: Now can I do it?

Gia: No now I do θ/dIt/

(Gia does the puzzle again, refusing
to let the adult construct it)

(Bloom, 1970, p. 161)

In a literal sense here, Gia has negated the proposition contained in the question "Can I do it?" (i.e., "I can do it"), but the truth-value of the adult's statement is not contingent on the world's inherent properties, but subject to change depending on the child's motivation or inclination in the situation. Contrast this previous case with this example:

Adult: Doesn't that look like scrambled egg?

(adult referring to yellow wheel
on a plate)

Child: That's not scramble.

(Bloom, 1970, p. 200: the child is 2;0)

It is clear that the "scrambled egg" interchange we are focusing on here is but one member of a subset of the larger class of utterances which Bloom designates as "denial" negations, and these are cases where the child is negating prior propositions which mistakenly violate truth-conditions for predication of properties, names, actions, and the

like.

One additional feature of Bloom's discussions of negation development is central to our account of the development of truth-functional negation and will be a central issue of concern in the next section, where theories of negation development in discourse are reviewed. This feature has already been alluded to in her distinction between two types of sentence negation - "anaphoric" negation in which the negative morpheme applies to a previous statement, and "non-anaphoric" negation in which the negative morpheme directly negates the remainder of the sentence. In the initial stage of syntactic negation development when the children's M.L.U. in morphemes was below 2.0, Bellugi (1967) found no evidence of sentence-internal negation. However, when Bloom analysed negative utterances for her subjects in this same period, she found that contexts of occurrence disambiguated a set of superficially-similar negative sentences and enabled her to separate them into two quite distinct classes (Bloom, 1970, p. 156f). These two classes were distinguished by the relationship between the negative and the remaining constituents of expressed surface structure with the assistance of nonlinguistic cues and previous utterances. These differences motivated Bloom to separate "anaphoric"

negative utterances, where the negative morpheme did not negate the remainder of the sentence, and "non-anaphoric" negative utterances, where the negative morpheme preceded elements it clearly negated. The utterance "no outside" is an example of "anaphoric" negation, used when K was protesting the suggestion of taking a bath, wanting to go outside instead (Bloom, 1970, p. 149). A typical example of "non-anaphoric" negation is the utterance "no pocket", uttered when K was unable to find a pocket in her mother's shirt (Bloom, 1970, p. 149).

In an analysis of these two classes of negative sentences, Bloom found that the structure of the affirmative sentences following the negative morpheme for "anaphoric" negative sentences was more structurally "complete" than that of the non-negative constituent structure of "non-anaphoric" negative sentences. Since in a way the negative morpheme of the "anaphoric" negative sentence is "appended" to an affirmative sentence it does not directly negate, she reasoned that the negation in that case did not affect the sentence's internal structure. However, it was her contention that the inclusion of negation within sentences, which occurred with the non-anaphoric negative sentences where the negation directly affected the sentence, operated to replace or delete forms in the sentence's

underlying structure, and hence reduce⁵ their structural complexity (1970, p. 162). Bloom concludes that such internal negation appears to increase the "cognitive weight" of the sentence for the child (1970, p. 169). But just what this "cognitive weight" consists in is never specified. One goal of the research reported in this thesis is to begin to explore this enigma of negation.

In addition, we will find the importance of Bloom's distinction between "anaphoric/non-anaphoric" types of negation evidenced in current accounts of the role of negation in discourse, and it also proves to be central to analyses of truth-functional negation (though we will find it necessary to develop new terminology for Bloom's "anaphoric/ nonanaphoric" categories), which could be manifested in both forms:

1) "ANAPHORIC" TRUTH-FUNCTIONAL NEGATION

Adult: That's a car. (indicating a ball)
Child: No ball. (child looking at the ball)

⁵Bloom was arguing for a reduction transformation which deletes underlying elements, in this case sentence-subject and often verb + complement, from the postulated deep structure of meaning characterizing the child's semantic intentions. Such a proposal that the child's utterances possess a richer deep than surface structure has been a recent focus of controversy (Braine, 1974, 1976). The reality of such reduction transformations is thus currently a matter of dispute, but the resolution of this controversy does not influence the proposed account of negation development.

2) "NON-ANAPHORIC" TRUTH-FUNCTIONAL NEGATION

Adult: That's a ball. (indicating a car)
Child: No ball. (child looking at the car)

Just as in the case of Bloom's analysis of her subjects' negative utterances, it is necessary to specify not only the utterances, but the focus of the speaker's attention and other situational context in order to disambiguate potential meanings for the child's negations.

4.3 Analyses of the development of negation in discourse

Since negation is fundamentally a discourse relation involving the utterances, beliefs, and intentions of others, it is surprising that so little attention has been given to the elaboration of the negations of children in relation to prior adult utterances. Several recent papers from quite different theoretical perspectives have begun to address this problem, touched on in a preliminary way by the distinction between "anaphoric" and "non-anaphoric" negation made by Bloom (1970).

Volterra and Antinucci (1977) analyse speech acts of negation in the context of a theory of pragmatics in language acquisition. Recall the point made by Wason and echoed throughout the history of philosophy that negatives in ordinary language function in affirmative contexts. This

is essentially the pragmatic analysis of negation offered by the above authors, which begins with the argument that in the adult language the speaker denies, with a negative sentence, a "corresponding positive presupposition attributed to the hearer." "Presupposition" is itself a technical term from philosophical logic requiring explanation, but the rudiments of Volterra and Antinucci's model can be set out first.

Negation in Volterra and Antinucci's theory of early negation is analysed in accord with the generative semantic model of language set out by Parisi and Antinucci (1976). In this theory, sentence-meaning representations consist of pairs of semantic predicates consisting of a "performative" configuration which represents the "force" of the speech act (e.g., whether the sentence is intended as a command, question, promise, etc.), and a "propositional" configuration which represents the "content" of the linguistic act. The authors extend this schema to analyse single-word utterances. They propose that negation is a part of the speaker's reaction to a sentence, and hence must be assigned to the performative component of a negative sentence representational schema. (Although the authors do not discuss previous analyses of negation that share many features in common with their own, it is clear that Frege

(1919/1952) among others presents a similar model for negative sentences, involving an affirmative sentence plus a "negative word".) They then present four types of negation which they feel exhaust their child language data covering the period from 15-35 months, each type possessing a different relationship between the performative (negation) and presupposed information of the proposition it dominates.

The relationship between "propositions" and "presuppositions", however, must be made clear. In Volterra and Antinucci's analysis, which Bates (1976, pp. 96f) expands, there is a vague specification of psychological presupposition, which we assume figures in their model of negation, which is attributed to the listener, such that the listener is held to "believe" that X, where X is the presupposition negated by the child with the negative utterance. The four types of negation involve negating different presuppositions that the child is said to think that the speaker believes. For many of their examples, this is by virtue of the utterance made by the previous speaker. Volterra and Antinucci claim to find all four types of negation in their earliest transcripts, though there are certain developmental trends in the relative abstraction of the presuppositions from the context.

For each type of negation they propose, I will first

list the "presupposition", and then what the child is taken to negate by his or her command or assertion. An example of each type will then be provided from the authors' appendices.

TYPE A

PRESUPPOSITION: "The speaker believes that the listener is doing or about to do p"

COMMAND: the child doesn't want the listener to do p.

EXAMPLE: (The child's mother is singing "Soldier, Soldier") Child: "No mommy 'Soldier, Soldier'."

TYPE B

PRESUPPOSITION: "The speaker believes that the listener believes p."

ASSERTION: the child doesn't want the listener to believe p.

EXAMPLE: (The child is putting all the cars in a glass) Child: "See, cars allgone now."

TYPE C

PRESUPPOSITION: "The speaker believes that the listener wants the speaker to do p."

ASSERTION: the child doesn't want the listener to believe that he or she will do p.

EXAMPLE: Adult: "Evie, put the cows in the box"; Child: "I don't want to."

TYPE D

PRESUPPOSITION: "The speaker believes that the listener wants him or her to confirm or disconfirm a statement."

ASSERTION: the child asserts a confirmation or disconfirmation of the speaker's question.

EXAMPLES:

- 1) Mother: Do you want to play with the doll?
- 2) Child: No.

- 1) Mother: Is this chocolate big?
- 2) Child: No, it is very very little.

The examples of TYPE A negatives often involve negations which reject ongoing or proposed behaviours on the part of another, as in the example where the child is telling her mother that she doesn't want her to sing the song she is singing. TYPE B negatives are primarily cases where "from the adult sentence the child infers a certain listener belief or expectation" which is negated or those in which "the child seems to negate his own expectations". TYPE C negations are refusals. TYPE D negations are primarily answers to "yes/no" questions, involving the identity of objects ("Is this the baby bed?"), states of objects ("Is the doll broken?"), desire for objects ("Do you want an orange?"), possession of objects ("Is it yours?"), presence of objects/persons ("Is your grandmother there?") and an assortment of many other kinds of statements that one could confirm or disconfirm. Both categories B and D in their classification scheme could be said to fit our construal of "truth-functional negations", depending on the

explicitness of the speaker's want to have the child confirm or disconfirm the speaker's statement. In Volterra and Antinucci's model, this is most explicit when the statement to be evaluated in this confirmation process is a "yes/no" question.

The finding by these authors that each of these types of negation occurs in the earliest transcripts for their study of two Italian children (followed from 15-24 months and 16-28 months) and two American children (followed from 21-28 months and 31-35 months) leads to the central problems in their account. Examples of these types of negations in the early transcripts are expressed by single-word utterances yet their complex presuppositional structures are assumed to be part of the child's cognitive representation of the speech act context. Such a claim is clearly an overattribution of linguistic and social cognition to the child of the single-word stage 6 (Bates, 1976, p. 100; Campbell, 1976), for whom we have no evidence of the ability, as these authors presume, to "infer" the complex structure of another's beliefs from their utterances (TYPE B

⁶Robin Campbell (1976, p. 247), in discussing previous tree-structure presuppositional analyses of single-word utterances by Ingram (1971) and Antinucci & Parisi (1975) summarizes this point succinctly: "Such large trees -- such tiny fruits!"

negations) or their "wants" to have him or her disconfirm a statement (TYPE D negations). There is clearly some sort of combination of linguistic/contextual knowledge that we can attribute to the child at this point (Section 4.3.3), but epistemological claims like those of Volterra and Antinucci need much more systematic investigation than their naturalistic observations provide. An attempt to remedy this deficiency in the context of statements and verification is presented in the experiment on negation use and comprehension reported in Chapter IV.

There are, however, certain trends in the emergence of negation in discourse which Volterra and Antinucci discern that delineate a developmental sequence which has been described in other domains of language development such as early word use (Piaget, 1962; Werner & Kaplan, 1963). In that domain, words are first used only in a context of currently present objects and ongoing events, and then later become displaced in space and time (cf. the discussion of the emergence of the semiotic function, Chapter I, Section 2.2.2). Volterra and Antinucci divide their data into a sequence of four periods. Initially, there is considerable "support" in the immediate context of the child's negation for the task of keeping the presupposition in mind. The information presupposed for the first negations is external

and hence available in the ongoing event or in an utterance by the adult. The remaining developments consist of different levels of complexity in the internalization of the presupposition construction process. At the first level, the child no longer has the presupposition present in the ongoing event but must either: (1) observe a change of state between an immediately preceding situation and the ongoing one (e.g., "gone" when an object disappears); or (2) anticipate a forthcoming event from the situational evidence (e.g., refusal of an action which the child expects, such as nappy-changing, by "no").

A further step occurs when the child begins to negate presuppositions that are less "local" and more normative in that they relate to the child's norms concerning typical contexts. Examples they provide involve either associations the child has established concerning habitual locations of certain objects:

- 1) "no c'e caccinvite qui dento"

(In Italian = "there is no screwdriver in here")

(Child looking in pantry for screwdriver)

or usual functions of objects⁷:

- 2) "no sona"

(In Italian = "(it) doesn't ring")

(The telephone doesn't ring)

The final step in their developmental sequence is indicated when the child negates presuppositions derived from what the authors call "true concepts":

- 3) "Hai itto io ado giu, cappe nove...no anno male"

(In Italian = "Look, I am coming down. New shoes...don't hurt")

No adult sentence preceded this negation, which negates the child's "precise norm" that new shoes do not usually fit well.

The information from which the child "constructs" the presupposition negated by his or her utterance thus continues to become farther away from the immediate context shared with the listener. With this increase in distance, Volterra and Antinucci posit, "pragmatic misfires" become more likely in which a mismatch occurs between the child's and adult's presuppositions. They thus stress that the task for the child in the development of negation is to bring his or her presuppositions into accord with the listener's. The importance of this development of societal norms and conventions which render appropriate contexts for the use of particular utterances was highlighted in the earlier

⁷Their depiction isn't quite correct, for the ringing of a telephone isn't really its function, but a typical "index" (Peirce, 1867/1931; Sebeok, 1976, p. 131) immediately preceding one of its functions: to be talked on with a person who has called that is not physically present.

discussion of pragmatic features of negation in adult language (Chapter I, Section 3), and is a major emphasis in the empirical studies reported in this thesis.

It is interesting to note that negatives occurring as early as the single-word utterance period (see Sections 3 & 3.1) seem to involve a type of presupposition at the level of the child's expectations with regard to the outcome of his actions. Single-word negatives were observed to occur in various situations when expectations which the child might have were UNFULFILLED: with regard to search for an object (expecting that he or she will find it), an attempt to put two objects together (anticipating that they will fit), or the task of arranging toy animals (expecting them to stand up as they should). These utterances seem to provide evidence for a sensorimotor basis to the concept of "plausible contexts of denial" that Wason (1965) made explicit in his work on negation comprehension in adults (Chapter I, Section 3.2).

A radically different model of discourse negation has been proposed by Keller-Cohen and her colleagues (Keller-Cohen, Chalmer & Remler, 1977; Keller-Cohen & Gracey, 1977), in which discourse negation was defined as the denial or rejection of a prior proposition expressed by another speaker. Working within a framework provided by

Keenan, Schieffelin, and Platt (1976), in which observations are presented suggesting that complex propositions in children's speech develop out of discourse frames in which such propositions are earlier created jointly across speakers, they suggest a similar process for the development of discourse negation. Negation in discourse here includes, in addition to morphologically-defined negatives such as "no" and "not", utterances which "function to negate", such as the word "yes" provided in opposition to a prior negative utterance, and predicates which "negate propositional content" by being "alternatives" (e.g., "blue" when a previous utterance called an object "red"). Discourse negation is further divided into "simple" discourse negation, which is non-elaborative in not providing any new information. "Elaborated" discourse negation provides new information by either going on to give reasons or alternatives which motivated that negation.

The data provided are from a Finnish child from 4;3 to 4;11 learning English as a second language. From this longitudinal data, they conclude that the emergence of syntactic complexity in discourse negation for second language learning follows the same course reported by Bloom (1970) for the native acquisition of English. Recall that Bloom found that the children she studied produced less

complex negative sentences than other utterances from the same time period, when a particular subset of negations were considered in which the negative element had "immediate effect" (1970, p. 152) on the remainder of the sentence. Such negative utterances were described as "non-anaphoric" in that they directly negated subsequent constituents of the sentence rather than utterances expressed in prior discourse. For current purposes of exposition, I will call these "non-anaphoric" negative sentences "NO + X" and the "anaphoric" negative sentences "NO + AFF S" (for "affirmative sentence"). The structural features which distinguish these two types of negation for Bloom's subjects have been described earlier.

Bloom argued that negatives in "NO + X" sentences acted to reduce the surface structural manifestation of a more complex underlying structure, specifically, the inclusion of either sentence-subject or verb + complement, which were expressed at the same time in "NO + AFF S" sentences (Bloom, 1970, p. 152f). Keller-Cohen's data for her second language learner, in her interpretation, follow the "developmental pattern" for structural complexity of negation development proposed by Bloom (1970). Keller-Cohen finds that initially structure-reduced negatives in discourse are followed by discourse negation elaborated by reasons or alternatives and

thus more "complex" negation. She then proposes that such similarities between first and second language acquisition of negation cannot be explained by cognitive problems or memory limitations involved in negation for the first language learner, but must be due to "more general properties of negation" since the same problems arose in the elaboration of negation for a four and a half year-old child.

Unfortunately, there are serious flaws in the data from which Keller-Cohen derives her position, as well as the non-sequitur that her "developmental sequence" mirrors that which Bloom described for first language learners. First of all, Bloom's observation of structural reduction was limited to "NO + X" sentences and she specifically did not find that "NO + AFF S" sentences were reduced in structural complexity relative to other sentences produced at the same time. But this is just the claim that Keller-Cohen makes: that "anaphoric" ("NO + AFF S") negative utterances are structurally-reduced and later become more elaborated. So there is no accord with Bloom's data on negation reduction. The data for Keller-Cohen's claim of "reduced structural complexity" are also not presented in a way that their validity can be evaluated. She suggests that the claim about the reduced structural complexity of negative

utterances is not so interesting if such utterances are short because they are elliptical responses to "yes/no" questions or imperatives. So to support the interpretation that negative utterances are less structurally complex than utterances that are non-negative occurring at the same time, she distinguishes those discourse negations which are "simple" (i.e., do not include elaborations such as "no, it's red" following the false statement made by another than the object is blue) which appeared after questions and imperatives from those occurring after nonquestions and nonimperatives. She finds that from the eight-month sample (the longitudinal data are pooled in an aggregate score), of the 93 simple discourse negations following non-questions and non-imperatives, only 6 were expressed syntactically. But the proportion of syntactic simple discourse negations following questions and imperatives, as well as other elaborated (i.e., more complex) discourse negations occurring at the same time (up to 50% in the final months) are not presented for comparison. So what are these discourse negations less-structurally-complex than? There is no way to answer this question from the data as presented in either report from Keller-Cohen and colleagues. And since only "simple" and not the concurrently present "elaborated" discourse negations figured in the calculation

of "structural complexity", the claim that negatives were "structurally reduced" amounts to the non-controversial and far less mystifying result that discourse negation becomes more elaborate over time.

It has been important to evaluate Keller-Cohen's claim that "general properties of negations" rather than cognitive constraints figure in her results, since the current account of negation development makes strong claims about the interaction between the emergence of cognitive representation and the type of elaborations present in the child's logical negations in discourse.

4.4 "Yes/No" questions and the development of discourse negation

Verbal expression of negative reactions...and of positive reactions of wanting something...quickly come to represent attitudes with respect to a verbal suggestion - assent or dissent - to an awaited event, observation of the absence or presence of an object or fact. The language of "wanting" thus takes on an intellectual value.

(Guillame 1927/1973, p. 533)

Traditionally in the child language literature, responses by the child of "yes" or "no", with or without elaboration, to "yes/no" questions by the adult are treated as if they are confirmations or disconfirmations of the declarative statement framed in the interrogative mode

(e.g., Greenfield & Smith, 1976; Volterra & Antinucci, 1977).

The usual format for creating a "yes/no" question from a declarative sentence is to prepose the auxiliary verb before the subject and predication, and give the sentence a terminal rising intonation (Quirk & Greenbaum, 1973). Thus, the declarative sentence "The boy is walking." becomes the interrogative "Is the boy walking?" If there is no auxiliary to prepose, DO is introduced in initial position. For example, the declarative sentence "John enjoys artichokes" becomes the interrogative "Does John enjoy artichokes?"

The treatment of "yes/no" question responses as confirmations or disconfirmations is perhaps justifiable for adults (Clark & Clark, 1977, pp. 100-113; Johnson-Laird, 1974), whom we can assume recognize the explicitly marked request for affirmation or denial. But can we justifiably assume that very young children also recognize the relationship between declarative sentences and their interrogative counterparts? For it could easily be the case that the child learns about the common features of what I will call the "yes/no" question "format" before understanding that he or she is assenting or dissenting, confirming or disconfirming, the statement "contained" in the question. One piece of evidence which supports this

hesitation in jumping to the usual interpretation of the child's "yes/no" responses is that very young children answer "yes/no" questions before they actually produce them (e.g., Halliday, 1975; Leopold, 1949, p. 69)⁸. I want to suggest that certain acoustic features of "yes/no" questions and their early situational and non-verbal contexts of occurrence in the speech to the child are extremely salient and thus are demarcated very early from other types of question (Wh-) and statements. "Yes/no" questions are usually redundantly identified for the child as well, both with terminal rising intonation and many situational prompts. The mother may hold a glass of juice in the child's sight, pushing it forward, as she asks, "Do you want some juice?" In addition, Bloom (1970, p. 183) reports observations of one subject who initially responded "yes" to all "yes/no" questions as well as repetitions of her own utterances which were marked by a terminal rising tone. There are some preliminary data concerning the early types of "yes/no" questions which children answer. Specifically,

⁸ Although there are quite possibly certain linguistic domains in which comprehension lags behind production for the child, it is now clear that such asymmetries in speech production and comprehension systems cannot be assumed, as has often been the case, but must be demonstrated for the language phenomenon in question (Blank, 1975; Blank & Allen, 1975; Chapman & Miller, 1973; Clark, 1974).

early "yes/no" questions to the child (see Chapter V) are generally concerned with what Halliday (1975, pp. 19, 25, 48) has called the INSTRUMENTAL and REGULATORY functions of language. The INSTRUMENTAL function is that which language serves for the child in satisfying material needs, and the REGULATORY function of language serves to control or regulate the behaviour of others. Examples of questions relating to the INSTRUMENTAL function are generally, but not invariably, of the form "Do you want---?" and for the REGULATORY function "Would you like to---?"

In Halliday's data for his child Nigel from 9 to 22 months, there was an initial period in which the only types of questions of "yes/no" form responded to were ones in which the answer served these two particular language functions, which were already represented in his linguistic system for speech production. Only later, after 18 months, did Nigel begin to answer "yes/no" questions seeking information like "Is there a---?" or "Have you got---?" And only still later does he begin to use "yes/no" interrogatives himself (1975, p. 56). Halliday notes that at the earliest period mentioned here there would be little point in denoting the child's utterance to a "yes/no" as an "answer", since nothing in the child's linguistic system at that point corresponded to a general discourse idea of

"question and answer", which depends on a concept of dialogue and hence roles defined by the communication process (1975, p. 25). We might take issue with Halliday on his depiction of the early language "functions", but the general point to be made from this exposition is that the early "no" (or "yes") in response to a "yes/no" question is not to be cavalierly interpreted as a "disconfirmation" of the statement which has been expressed in the interrogative mode.

One other widely observed phenomenon might also perhaps be explained by this suggestion that an early "dialogue format" is provided by (at least some varieties of) "yes/no" questions. This is the appearance of a "stage" in which "no" (or "yes") is purportedly used to mean either "yes" or "no" (Greenfield & Smith, 1976, p. 164; Leopold, 1949, p. 26; Nelson, 1973, p. 111; Spitz, 1957, p. 140n). The evidence consists, for example (Greenfield & Smith, 1976), of several cases where a child (at 18 months of age) answered "no" to a "yes/no" question and then happily carried out the action he had "rejected" with his negation⁹. The child was not using "yes" at that time. Greenfield & Smith interpret these data as supporting a

⁹ Leopold (1949, p. 26) observed the same phenomenon in his child Hildegarde at 20 months of age.

theory of semantic development (Clark, 1973) in which a lexical entry representing one pole of a dimension joining polar opposites (yes-no) is initially used to represent both poles¹⁰. But the considerations above suggest that we can more easily interpret these data, as well as the "yes" phenomenon described by Bloom above, as initially representing set responses slotted into dialogue "formats". This is a far cry from the rich interpretation that the child extends "no" to mean both "no" and "yes" at first. Generally, it has been suggested that such dialogue "formats" or "frames" provide a means for constructing propositions across speakers in that the child can comment on topics raised in the adult's "frames" (Bates, 1976; Bruner, 1975b; Halliday, 1975; Keenan, Schieffelin & Platt, 1976). This suggestion is supported by longitudinal data from a number of children in a study of negation development (Chapter V).

¹⁰What this means is that for two different questions, one which adults would answer "yes" and another "no," when the child says "no" to both questions, he or she means "yes" in one case (as the adult does) and "no" in the other (as the adult does).

5. Toward a general theory of negation development

Wode (1977) presents a theory for the acquisition of negation which is the most general presented thus far, in that data from a large number of languages are summarized and the evidence involves syntactic, semantic, and pragmatic aspects of the acquisition process. It is claimed that a first stage consists of one-word negation. Two or more word negative sentences mark the second stage (IIa), of ANAPHORIC negation, and third stage (IIb) of NON-ANAPHORIC negation. In most studies cited, both "anaphoric" negatives relating to previous propositions and "non-anaphoric" negatives appear in sentence-initial position. The argument this summary generates is that the child "overgeneralizes" the morpho-syntactic devices of IIa (for a sentence schema of Neg + S) to express negation which, by the adult model, should be internal. In the fourth stage (III) of "intra-sentential" negation, the child begins to position "non-anaphoric" negative morphemes internally, as in the adult language, and language-specific peculiarities of negative placement in sentences emerge.

Although this theory is comprehensive in considering a wide variety of languages for acquisition data, the central

argument for the first type of negation being "anaphoric" is inadequate in detail, and erroneous on one important count. It is based on two examples given in the presentation of German acquisition data (1977, p. 92), brief mention of an agreement with Swedish acquisition data by Lange & Larson (1973), English acquisition data (Bloom, 1970), and data from many other languages. Since the German data are not presented, we have no way of assessing the claim of temporal priority for "anaphoric" negation in the first syntactic constructions. The Swedish data also cannot be evaluated. Wode (1977, p. 96) presents examples of both "anaphoric" and "non-anaphoric" negative sentences by the Swedish child, but they are from the transcripts of the same testing session, and no additional data are provided from the transcript appendices of this unpublished technical report. Bloom (1970), however, does provide detailed discussions of "anaphoric" and "non-anaphoric" negation in one of the American children she studied. But given Bloom's data (1970, p. 148f), one reaches the opposite temporal sequence that Wode reports in her citation of Bloom. As Bloom notes (1970, p. 151), only 2 of the 14 syntactic constructions with "no" from the Kathryn I text were "anaphoric" negations of the sentence type "NO + AFFIRMATIVE SENTENCE". And since relative frequency of occurrence of the two types is one of

her criteria for ontogenetic priority of occurrence (see Section 4.2, this chapter), if she had chosen to order these two types of negation in terms of syntactic expression, she would have derived a developmental sequence from "non-anaphoric" to "anaphoric" negation. So unfortunately, the one major contention of Wode's theory of negation development, that "anaphoric" negation precedes "non-anaphoric" universally in acquisition, is not supported by the English acquisition data "supporting" the theory. And we are given only assurance (no examples) that Bulgarian, Dutch, Egyptian Arabic, Finnish, French, Italian, Japanese, Russian, and Swedish acquisition data support this developmental sequence.

What can be concluded from the many theories of negation development reviewed in this section? Unfortunately, the best we can hope to do is piece together the beginnings of a theory based on some important theoretical distinctions and a number of pieces of suggestive evidence. Clearly, a general picture of the child's first period of syntactic negations in terms of a "pivot grammar" (Slobin, 1968)¹¹, or the transformational schema {no/not} - S (Bellugi, 1967; Klma & Bellugi, 1966) covers up some important distinctions in the child's productions of negative sentences, particularly between what

has been designated as "anaphoric" negation, which does not directly negate the remainder of the sentence but a previous utterance, and "non-anaphoric" negation, which directly affects the post-negative sentence constituents (Bloom, 1970).

An analysis of what might be involved in early responses to "yes/no" questions suggested that an extension of "anaphora" interpretations of early negation too far back in development may be only metaphorical, since the child might initially be responding "no" (or "yes") on the basis of cues from non-verbal context and "yes/no" question intonation.

We also found that distinctions of the semantic function of the child's negatives are necessary for establishing an ontogenetic sequence of negation development, although Bloom's (1970) categories of NONEXISTENCE, REJECTION, and DENIAL lump together negations

¹¹As suggested by Braine (1963), where by distributional measures applied to a child language corpus, one was said to be able to distinguish two classes of words present in the child's two-word utterances: a small "pivot class" of words to which many "open class" words are attached. Slobin (1968) suggested that data from Russian, German, French, Italian, Polish, Bulgarian, and Japanese supported a "pivot" interpretation of "no", and fit the initial sentence schema for negation which Bellugi had proposed (Bellugi, 1967) for English of {no/not} - S, with "S" being the class of open words.

of quite heterogeneous function. It also became clear that a reliable emergence sequence of semantic functions of negation as realized in syntactic negations has not been advanced, nor is it relevant for the cognitive questions we wish to raise about the development of truth-functional negation.

Similar problems of "categorization" emerge in the analysis of the pragmatics of early negatives provided by Volterra & Antinucci (1977). Their formal depiction of complex presupposition/negation relationships, resulting in four distinct types of negation which "exhaust" their early language data, may provide comfort for the adult psycholinguist, but have no clear relation to the child's conception of the negation he or she produced and do not mesh with what we know about early linguistic and social cognition at the one-word stage. This point was set in bold relief by their finding that all four types of negation occurred in the earliest one-word uses of "no". A much more sensitive developmental analysis which they provided indicated that the critical problem in the development of pragmatics for negation involves the synchronization of the child's presuppositions and those of the adult.

Finally, with regard to the single-word utterance stage of negation, the few observations presented in Section 3.1

yield a rather fragmented picture. All of the investigations cited had only a peripheral interest in negation development, and it was not clear whether seeming counterexamples to the development order observed by Bloom (1973) for the emergence of different semantic functions of negation were a result of real variation among the children of the various studies or an artifact of critically incomplete observations. This problem is reconciled in the longitudinal studies of Chapter V.

These theoretical lacunae suggest several critical areas of developmental investigation which are pursued in the empirical studies reported in Chapters 4 and 5. In brief, two central enterprises are undertaken: to document the early use of truth-functional negation in a controlled experimental setting, and to chart the developmental sequence for the expression of semantic functions of negation prior to such logical negation.

Two central considerations lead to predictions for a developmental sequence of semantic functions of negation. Theoretical accounts of the logical features of different communication codes (Bateson & Jackson, 1964; Sebeok, 1962; Wilden, 1972) in Chapter I lead to the prediction that REJECTION will emerge as the first semantic function of negation, followed by DISAPPEARANCE negatives that denote

absence, and finally, TRUTH-FUNCTIONAL negation. Independent conceptions of the development of the first symbolic negation (Freud, 1925/1961; Spitz, 1957) also predict REJECTION negation as the first emergent function. Further, it was suggested in Section 2.4 that the child's use of negation in "self- prohibitions" provides evidence that the child has internalized a binary contrast (for permissible/prohibited acts) involving the word "no" which provides a semantic basis for later judgements also involving binary contrasts for affirmation/negation: the absence/presence encoded in DISAPPEARANCE negatives and the truth/falsity distinction involved in TRUTH-FUNCTIONAL negatives. This suggestion results in an additional prediction about semantic function emergence order: that SELF-PROHIBITION negatives will occur prior to DISAPPEARANCE negatives. The sequence of development observed by Bloom (1973), however, is just the reverse of this (Section 3.1). It may prove to be the case that DISAPPEARANCE negatives (and the related negatives of UNFULFILLED EXPECTATION) occur prior to SELF- PROHIBITION negatives in some children, and if so, this would suggest a re-evaluation of the proposed function which they serve. The longitudinal studies reported in Chapter V consider this problem in relation to negation emergence sequences for 6 children.

The experiment reported in Chapter IV was designed to elicit truth-functional negation and statement corrections in a controlled experimental setting, and to chart the emergence of different types of negation used for such logical purposes. In this context, the previous distinction between "anaphoric" and "non-anaphoric" sentence negations is redefined in terms of earlier semantic functions of negation and thus set in a cognitive context for the first time. What have been designated as "anaphoric" negative sentences involve rejecting a prior proposition with a negative, while "non-anaphoric" negative sentences directly negate the predicate expressed in the negative sentence. Both forms of negation are in fact "anaphoric" since they relate back to a previous proposition: the difference is in the function of the negative. What have beeen called "anaphoric" negative sentences are denoted as REJECTIVE ANAPHORIC negatives and what have previosuly been called "non-anaphoric" negative sentences are denoted as PREDICATIVE ANAPHORIC negatives. The former should appear prior to the latter in the emergence of types of sentence negations (as Wode, 1977, assumed for different reasons) because of the cognitive primacy of REJECTION, as set out in the predictions for the emergence of semantic functions of negation in Chapter I, relative to the greater complexity of

predicative anaphoric negative sentences. This is to say that the predictions of the longitudinal scheme for early negation semantic functions, which is itself based on cognitive complexity notions, apply once again at the level of sentence negations. In Chapter IV, Section 5.2.2, evidence is presented that REJECTIVE ANAPHORIC negative sentences develop prior to PREDICATIVE ANAPHORIC negative sentences, as predicted.

Chapter III: Experimental studies of negation development

1. Overview

In Chapter I, it was observed that developments in abstract representation which characterize the emergence of the "semiotic function" in the middle of the child's second year make the concept of negation possible by enabling thought of things which are not-the-case in that they are not immediately perceptually-present. In Chapter II, longitudinal observations of children's spontaneous use of negatives were seen as suggesting that one important function negation serves for the two-year old child is to deny propositions which have been previously expressed. It was indicated that these observations require systematic investigation, the results of which are presented in Chapter IV. Previous experimental studies of the child's early conception of negation reviewed in the present chapter, however, have either ignored very young children (2-3 years old) or provided only suggestive evidence that they utilize negation for logical purposes. Reasons for these general failures are suggested in the conclusions of this chapter.

Studies which focus on the child's knowledge of the social conditions of negation are first discussed, followed by a review of studies of the child's knowledge of the

logical conditions of negation. This distinction was first introduced in Chapter I, Section 3. Several studies with only a peripheral relevance to logical negation (Beilin, 1975; Feldman, 1972; Inhelder & Piaget, 1964) are not discussed. These investigations were concerned with the comprehension of negative sentences involving complementary classes and class-inclusion relations. As such, they focus on the understanding of set-theoretic negation, a relatively advanced form of cognition characteristic of much older subjects.

2. Studies of the child's knowledge of social conditions for negation

In Chapter I, experiments with adults were discussed which demonstrated that certain contexts facilitate the understanding of negative sentences, and that this is due to implicit social conventions underlying the ordinary use of negation. One does not usually deny propositions without an affirmative context in which the proposition denied has been either asserted or somehow assumed. In a sentence-verification experiment in which 6-20 year-old subjects were asked to judge whether simple sentences of either affirmative or negative form were true or false, Slobin (1966b) found that several of his youngest subjects

refused to accept any of his negative experimental statements as true. These statements negated propositions without any affirmative context, it seems, and Slobin's observation seems to indicate that 6 year-olds are sensitive to the social conditions of negation. But have there been more systematic tests of this speculation? There have been several attempts, with varying degrees of success.

Margaret Donaldson (1970) presented 5 to 6 year-old children with a similar task to that which Wason (1965) had used with adults (Chapter I, Section 3) in testing his "exceptionality hypothesis". This hypothesis had predicted that it would be easier to complete negative sentences which are "plausible" than those which are "implausible". The experimental conditions introduced two contexts for sentence-completion, one in which a negative description of a situation was facilitated by the provision of a contrast set (the "plausible" context) and another, "implausible" context where a negative description would be relatively uninformative. For Wason's task, a typical stimulus-card consisted of eight numbered circles, seven of which were one colour (e.g., red), with the odd circle a different colour (e.g., blue). Imagine that, for example, Circle #3 is red and Circle #4 is the blue one. The exceptionality hypothesis predicted that it would be easier to complete the

sentence "Circle #4 is not..." (with the correct response being "red", the majority colour) than to complete the sentence "Circle #3 is not..." (with the correct response being "blue", the colour of the odd circle). Donaldson (1970) used 6 rather than 8 circles and was also interested in testing Wason's exceptionality hypothesis. However, her 5-6 year-olds did not display any difference in sentence completions for the two negative contexts. Both contexts were equally difficult, with subjects incorrectly completing the negative sentences 65% of the time.

One should not conclude from this study, however, that 5-6 year-olds are not aware of the pragmatic conditions for negation. Using a clever variation in method, de Villiers & Flusberg (1975) at Harvard University have experimentally demonstrated that two-and-a-half to four year-old children are aware of the pragmatic conditions for negation. These investigators tested Wason's exceptionality hypothesis by varying their stimuli along easily-nameable class dimensions, with typical stimulus sets being made up of seven cats and one duck, or seven cars and one baby's bottle. Consider the stimulus set of seven cats and one duck. The exceptionality hypothesis predicts that it would be easier to complete the statement "This is not a...?" when the duck (odd item) is indicated than the statement "This is

not a...?" when one of the cats (majority, or rule item) is indicated. Like Wason's adults, the three-and-a-half and four-and-a-half year-old subjects took significantly longer to complete the implausible (latter) negative statements than the plausible (former) negative statements. Implausible negative statements were also the source of more errors than the plausible negatives. Of the 13 two-and-a-half year-olds tested, however, only eight completed negative sentences at all. The responses of those who did carry out the task yielded differences between the two types of negatives which were similar to those of the older children but nonsignificant. Error data for the two-and-a-half year-olds, however, indicated that plausible negatives are understood before implausible negatives, with 36% errors for implausible negatives compared with only 8% for plausible ones. We can conclude from this study that apparently even two-and-a-half year-olds are aware of the social, pragmatic conditions of negation in a simplified task environment.

It can be said that an awareness of the social conditions presupposes an awareness of the logical conditions of negation, because pragmatically-justified negative statements of this sort are a proper subset of logically-justified negative statements. This of course is

based on the assumption that when we speak we usually speak the truth (Grice, 1975). Results of this sentence-completion experiment, however, cannot be used as evidence for young children's knowledge of the logical conditions of negation because a sentence-completion task does not directly tap children's use of negatives to correct false statements. Instead, it only involves true descriptions utilizing negative statements.

3. Studies of the child's knowledge of logical conditions of negation

The first attempt at having children judge the truth or falsity of sentences was carried out by Dan Slobin in the early 1960's (Slobin, 1963, 1966b). Six to twenty year-old subjects verified simple passive and active sentences with subject-object sequences which were either reversible (as in "the dog is chasing the cat," which has a possible reversal in "the cat is chasing the dog") or irreversible (as in "the girl is watering the flowers", which does not have the possible reversal of "the flowers are watering the girl" in any literal sense). Such sentences also varied in truth-value, being either true or false, and were either affirmative or negative in form. These two variables resulted in four types of sentences, true-affirmatives

(e.g., "the girl is watering the flowers" with a picture depicting this event), false-affirmatives (e.g., "the girl is watering the flowers" when a picture does not depict this event), false-negatives (e.g., "the girl is not watering the flowers" when a picture depicts her doing so), and true-negatives (e.g., "the girl is not watering the flowers" when the picture does not depict her watering the flowers).

Slobin's experiment elaborated upon a paradigm established by Wason (1961) in which the difficulty of sentence comprehension was operationalized by the measures of reaction-time and number of errors made in the experimental tasks. Subjects had to judge whether exemplars of a given statement-type were true or false with reference to a presented picture. Just as in similar research with adults (cf. Chapter I, Section 3), Slobin (1966b) found that on average the affirmative sentences were verified more quickly and with fewer errors than the negative sentences. He also found that the false-negative statements were better comprehended than the true-negatives. Nonreversibility of sentences was found to facilitate verification of both affirmative and negative sentences in the passive voice. The important finding for the present purposes, however, is that Slobin found significant agreement in the ranking of sentence-types for performance difficulty across the entire

age range of 6 to 20 year-olds studied. True-affirmatives were simpler than false-affirmatives, and false-affirmatives were easier than false-negatives. True-negatives were the hardest of all. Slobin's study was the first direct test of the comprehension of logical negation in a verification task with children. Since the 6 year-olds revealed a comprehension-difficulty hierarchy that matched the adults, the ontogenesis of this ability was left as an open question.

There have been more recent experiments directly assessing the logical aspect of negation performance, most of them by Margaret Donaldson and her colleagues at Edinburgh (Donaldson, 1972; Donaldson & Lloyd, 1974; Lloyd & Donaldson, 1976). The feature of these studies which concerns us here is the development of a technique for eliciting judgements from preschool children as to whether statements are true or false with respect to situations. She introduced the children to a "talking" panda-bear and they were told that this panda could learn to talk if they would only help him get better. An assistant actually did the talking and the voice appeared to emanate from the panda, whose head contained a small loudspeaker. This talking panda-bear made many mistakes in describing situations the child could also see. Donaldson then trained

the children to press a bell when the panda said something "correct" and to press a buzzer when he said something "wrong". With this method, she was able to establish that children as young as three-and-a-half years old could signal the truth or falsity of positive statements by noting a mismatch between a statement and the situation it describes.

Children as old as three-and-a-half years old, however, are somewhat advanced from the population of two year-olds who appeared to be utilizing logical negation in their spontaneous language use to deny statements in observational studies (Chapter II). Only one previous study, an unpublished experiment by de Villiers (1975), addresses these problems with younger subjects. De Villiers used subjects 2-5 years of age and also implemented the study with a talking-doll technique. Just as in the adult sentence-verification studies, stimuli were simple declarative statements like "This is a spoon" which were varied for truth (true/false) and assertive form (affirmative/negative). Examples of the four sentence-types are presented below:

True-Affirmative: "This is a spoon" (about a spoon)

False-Affirmative: "This is a shoe" (about a spoon)

False-Negative: "This is not a spoon" (about a spoon)

True-Negative: "This is not a shoe" (about a spoon)

The details of the results are not discussed, but she notes that two year-olds, when asked "Is it wrong or right?" could "accurately judge" the affirmatives as right or wrong, and that three year-olds could "accurately label" false-negatives as wrong, but did not correctly respond to the true-negative statements. Reaction-time and error data for the 4 and 5 year-old subjects were pooled because there were no differences displayed, and they revealed the same ordering of statement type difficulty which Slobin found with older subjects. False-affirmatives took significantly longer to judge than true-affirmatives (1.60 versus 1.16 seconds), and true-negatives took significantly longer to judge than false-negatives (1.88 versus 1.55 seconds). As one would expect, the greatest number of errors by far occurred in response to true-negative statements (21, compared to 8 for false-negatives, 1 for false-affirmatives, and 0 for true-affirmatives).

The study by de Villiers suggests that 2-3 year-olds can note that false statements are "wrong", but the results are only given in summary form. In particular, it was observed that two year-olds would only note the incorrectness of false-affirmatives when asked "Is it right or wrong?" and could easily have been imitating the final word of the question, a possibility which was not

eliminated. Because of the importance of such evidence, a detailed sentence-verification study was designed and carried out with very young children aged 18-36 months, as reported in Chapter IV.

Roger Brown (pers. comm.) has indicated that the results of the experiments by de Villiers (1975) and de Villiers & Flusberg (1975) have markedly influenced the treatment of negatives which he plans to give in a future book discussing language acquisition. Recall that the true-negative (TN) sentence-type was the most difficult in both the adult sentence-verification studies and in the studies with children. In particular, the children 4-5 years-old in de Villiers' (1975) experiment made 21 errors for TNs which consisted of saying that such sentences were "wrong" and not "right". Given that the investigators were interested in "right" and "wrong" as judgements of truth, "wrong" was an incorrect answer in response to TNs. Brown, however, gives a conceptual analysis of the TN which he feels explains this high degree of "mistakenness".

Brown's framework is based on a consideration of two correspondences. The first is between the FACT or objective situation to which the statement refers and the utterance ($-p^1$, i.e., the TN which negates an affirmative proposition p) which speaker r makes to listener o. FACT

and UTTERANCE must correspond for the utterance to be true. The other correspondence to be checked for is the one between the UTTERANCE ($-p$) and its PRESUPPOSITION (q). The presupposition in the case of the true-negative statement is that listener o believes that p , which is the proposition the TN statement then denies. On Brown's account, for there to be "reason to communicate", and hence for the negative to be "plausible", the UTTERANCE and the PRESUPPOSITION must not correspond. It is in this second correspondence, between UTTERANCE and PRESUPPOSITION, rather than the first, between FACT and UTTERANCE, where the TN statement "fails", because listener o does not believe that p is the case, and r 's TN statement presupposes that o does believe this. The presupposition q (that o believes that p) matches r 's TN, which results in the TN being "wrong" in the sense that "there was no disagreement between presupposition and fact and so no occasion to talk [negate] at all" (Brown, pers. comm.). This analysis is clearer in the context of an example from de Villiers' study, which Brown provides:

¹Brown (pers. comm.) actually represents the two interlocutors as " p " and " o ", but since in propositional logic " p " usually represents "proposition", I denote the speakers as " r " and " o " to avoid confusion.

"Utterance r→o:	"This is not a shoe"	(TN, but as a communicative act)
Fact as seen by r:	This is not a shoe	(It is in fact a spoon)
Presupposition of o as imagined by r:	This is a shoe.	(For purposes of illustration, actually impossible as a spoon cannot be mistaken for a shoe)
For communication to occur, should have:		
	(1) Agreement: Utterance-Fact	(It is the truth, unless you mean to lie)
	(2) Disagreement: presupposition-fact	(o is mistaken, so there is reason to communicate)"

But in the case of TNs where there is an agreement between the presupposition and the fact, such as in this example, the TN is inappropriate because it has no communicative point, signalling no change in meaning from the presupposition it purports to deny. Brown thus interprets the 4-5 year-olds' replies to TNs of "wrong" as comments on the appropriateness rather than the truth of the TN statements. He concludes by stating that his view is that children have two very general lessons to learn about language and about negation: "when there is any reason to speak at all and to speak the truth."

4. Conclusions

Experiments reviewed in this chapter suggest that when simple task environments are available in experimental situations, children aged three years or older indicate an understanding of the logical and social conditions for negation. Naturalistic observations presented in Chapter II, however, pointed to a much earlier competence in logical negation. One early function of negation utilized by children two years-old seems to be that of denying propositions expressed by another speaker. This finding

requires experimental support, but to date research efforts have been conducted with only older children. Certainly many of the task requirements would be inappropriate with younger subjects, such as learning to press a bell when a statement is "right" and a buzzer when a statement is "wrong". This is a highly artificial task environment for the very young child, whose usual language experience consists largely of extended dialogues (e.g., Keenan & Schieffelin, 1976). Two year-olds did not spontaneously offer judgements of "right" or "wrong", which were the experimenter's desired judgement-values. But two year-olds appear to succeed when allowed to spontaneously negate statements in natural dialogue. These problems make it especially important to look at the emergence of logical negation by approximating the child's normal language experience of dialogue. Such an attempt is provided in the experiment described in the following chapter.

Chapter IV: The Sentence-Verification Experiment

1. Introduction

Naturalistic observations of the semantic functions which negation serves in the speech of the two-year old, as we have seen in Chapter II, highlight the occurrence of negatives used by the child to deny the statements of others. These findings suggest that the groundwork for an important aspect of semantic development throughout language acquisition, the specification of the conditions under which statements are true or false, is being laid at the same time that the first sentence structures are being elaborated. In contrast to these accounts which suggest that early logical negations are part of the language competence of such young children, experimental attempts at investigating early negation comprehension and use have, as reviewed in Chapter III, by and large failed to produce evidence for these early skills. In addition to the failure of demonstrating judgements involving negation for young children, previous experiments also pointed to a certain pragmatic incompetence, such that the plausible contexts of denial which had been shown to facilitate adult comprehension of negative statements (Wason, 1965) did not seem to aid children in comprehension (Donaldson, 1970). A later

experiment with a modified design had greater success (de Villiers & Flusberg, 1975).

The experiment reported in this chapter results from an attempt to reconcile the naturalistic and experimental findings concerning early linguistic competence with negation, and specifically, to provide an experimental paradigm simple enough for such young children that task difficulty would not be confounded with manifestations of the children's abilities. This attempt resulted in the experimental design described below, which primarily utilizes the child's spontaneous use of negatives and affirmatives, especially, in a simplified version of the traditional sentence-verification paradigm presented to children 18 to 36 months of age. This paradigm involves simple statements of variable truth-value (true or false) and assertive form (affirmative or negative) set in dialogues about objects, properties, and actions familiar to the child.

The primary aim of the experiment was to test several of the major hypotheses of the thesis. In the theoretical overview of the importance of negation in Chapter I, propositional or truth-functional negation (which judges propositions to be false) was pinpointed as the developmental focus of the empirical investigations of the

thesis. This function of negation is the developmental endpoint of the proposed ontogenetic sequence originating with rejection negation. No previous controlled studies have been directed at documenting the early use of negation for logical purposes, for noting whether statements made by others conform to the reality of experience. One of the experimental hypotheses thus predicts, based on naturalistic studies of the early functions of negation, that truth-functional negation will be manifested in the speech of two year-olds. This prediction, if supported, would have profound psychological implications for theories of early cognitive development, since it indicates a knowledge of rules which regulate early logical judgements. This principal aim, of establishing the early manifestation of operations of cognition in language judgements, may now be made explicit:

Hypothesis 1: Logical negation is a basic semantic function expressed in the language of two-to-three-year old children.

From a logical point-of-view, evidence for such an ability would derive from the appearance of judgements of false statements as "false" by negating them, and we might expect correlative judgements of true statements as "true" by affirming them. But we have already observed how certain salient PRAGMATIC features of negation in the ordinary use

of language complicate this claim. This is because negation in ordinary language normally functions to deny statements that someone has reason to believe are true, thus normally occurring in what have been called "affirmative contexts" (Wason, 1972). So there are important interactions between semantic, or truth-functional, and pragmatic, or use features of negation which any developmental theory must take into account.

The consonance or match between judgements of "falsity" (with negation) and judgements of "truth" (with affirmation) was alluded to above. As we saw in Chapter I, negative sentences may be created which violate the pragmatic conditions for negation, but which nonetheless result in true sentences. Such "true negatives", to be judged as true, require a transcendence of communicative constraints and an explicit focus on the LOGICAL structure of the statement. Furthermore, there is a mismatch between the logical form of the statement (i.e., negative) and the judgement of "true" required by its truth-value (i.e., the affirmative). This predicted difficulty of the "true negative" statement type results in the following hypothesis:

Hypothesis 2: The ability to judge negative statements as true will be a later development than the abilities of judging misnamings (false affirmative statements) or another's denials (false negative statements) to be false.

We can investigate the development of this coordination of pragmatic and semantic features of negation by studying children's response patterns to "true negative" statements in the different age groups.

The third developmental hypothesis of the thesis, which is set out in detail in Chapter V, has already been described to some extent and predicts a developmental sequence for the emergence of different semantic functions of negation, from REJECTION negation, to negations of DISAPPEARANCE and UNFULFILLED EXPECTATION, and then TRUTH-FUNCTIONAL negation. Thus, there is a fundamental relation between Hypotheses 1 and 3. Hypothesis 3 predicts a sequence for the precursors of TRUTH-FUNCTIONAL negation and Hypothesis 1 aims to document the early occurrence of TRUTH-FUNCTIONAL negation. Both Hypothesis 2 and many of the results discussed in Section 5.2 relate to more subsidiary issues in the development of negation (and correction in general) for logical purposes. One basic tie between the experimental results of Chapter IV and the longitudinal data of Chapter V is the experimental finding (Section 5.2.2) that "anaphoric" sentence negations (which

reject a previous proposition and assert an alternative proposition) appear as corrections of false statements prior to "non-anaphoric" sentence negations (which directly negate the previous proposition by an internal sentence negation which negates the previous predicate). This developmental sequence has the same COGNITIVE basis as Hypothesis 3 in Chapter V that REJECTION negation will appear prior to TRUTH-FUNCTIONAL negation; since the predictions for the longitudinal study were based on cognitive complexity notions (Chapter I), with "rejection" as the primitive negation function. These predictions are applicable once again at the level of sentence negations. Thus, for the first time, the developmental relation between "anaphoric" and "non-anaphoric" negation is embedded in a cognitive context, which also applies to the emergence of the earliest semantic functions of negation in single-word speech.

2. Methodological background

Previous experiments designed to test young children's knowledge of negation, as we have noted, have not supported naturalistic observations that suggest that a central function of early negation is to deny propositions previously expressed by others. Task difficulty may have

resulted in a lack of competent performance for these young children, whose usual language environment involves extended DIALOGUES with other individuals (e.g., Keenan & Schieffelin, 1976). Because of this problem, conditions of experimentation were designed to approximate the naturalistic language experience of the child to as great an extent as possible given the confines of experimental design. Several considerations were central to this end.

First of all, the experimental stimuli had to be presented in such a way that they might naturally elicit negative and affirmative judgements from very young children, 18 to 36 months of age. Previous studies, such as those of de Villiers (1975) and Donaldson and her colleagues (Donaldson, 1972; Donaldson & Lloyd, 1974; Lloyd & Donaldson, 1976) had little luck (Chapter III: Section 3) in eliciting true/false judgements from two and three-year olds when they were instructed in some way to give responses of "right" or "wrong" to statements that were presented by a talking doll. Yet pilot observations, as well as the naturalistic studies of negation reported in Chapter II, had suggested that children as young as two years of age would spontaneously negate false statements of simple form, and often provide affirmative alternatives. It thus seemed as if requiring the child to use the experimenter's indices of

true/false was an inadequate technique for very young children, whether the indices were the verbal forms "right" and "wrong" (de Villiers, 1975) or a bell/buzzer system for judgements of "correct"/"wrong" (Lloyd & Donaldson, 1976).

An additional consideration for providing a more ecologically valid experimental setting concerns stimulus-statement presentation. Rather than presenting a series of statements the child is expected to just respond to, one after one, pilot studies indicated the value of a DIALOGUE FORMAT to the experimental sessions in which the experimenter's stimulus sentences could be construed by the child as comments on an action which the child was asked to perform by the experimenter. These dialogue formats are described in greater detail in the Method section.

3. Method

3.1 Subjects

There were 40 subjects in the study, 5 males and 5 females at each of the following ages: 18, 24, 30, and 36 months (mean ages: 1;6(5), 2;0(5), 2;6(5), and 3;0(5)). The subjects were selected, with age and sex as the sole constraints, from the Language Acquisition Group subject files, which is composed of cards which mothers visiting the

John Radcliffe Maternity Hospital in Oxford are given and send in to the Department of Experimental Psychology if they are interested in "participating in studies of normal child development." These same 40 individuals also served as subjects in a coordinate study on the development of classification and organizational flexibility by Susan Sugarman from the University of California, Berkeley.

3.2 Design and materials

There were two major variables in the stimulus statements: statement-type and word-type. The word-type variable concerned the type of word utilized in the word-use pretest, the word-comprehension phase of the sentence-verification tasks, and in the statements being presented: either noun, verb, or adjective. The word-type was varied so that developmental data could be obtained on the verification of statements involving three major types of predication (Werner & Kaplan, 1963, pp. 160f). Werner & Kaplan found that the earliest kind of predicative judgements are "identifying predication", which correspond to our NOUN stimuli, of the form "This is a __". "Predication of action", corresponding to our VERB stimuli, are next articulated, followed by "predication of

attributes", corresponding to our ADJECTIVE stimuli¹.

The statement-type variable focuses on two polar dimensions: true-false (T-F) and affirmative-negative (A-N), which respectively correspond to the truth-value of the stimulus statement in relation to the referent Object² depicted, and the assertive form of the stimulus statement. There are thus four statement-types: TA, FA, FN, and TN.

There were 16 referent Objects used as stimuli for the word-use pretest: 8 objects of various classes (body parts, food, animals, toys), 4 actions (transitive, intransitive),

¹The results of this experiment do not include breakdowns of response-patterns for these 3 types of word-stimuli for several reasons. First of all, few of the 18-24 month olds either produced or comprehended the verbs or adjectives, and so test-statements for these words were rarely presented to these age-groups. Secondly, there were no interesting differences between noun, verb, and adjective response-patterns or response-type frequencies in the 30-36 month old groups. The data presented are thus collapsed across these word-categories.

²"Object" with capital "O" is used throughout this discussion to refer to the referents of statements concerning names, actions, and properties of objects, to distinguish the general term from the descriptive word "object".

and 4 attributes (colour, size). The referent stimuli were chosen on the basis of their salience in the perceptual/action world of children (Anglin, 1977), and the relatively high frequency with which the words appear in early vocabularies (Anglin, 1976; Nelson, 1973; Rescorla, 1976), with the intention of maximizing word-comprehension and production success among even the youngest children. Exemplars of the referent-types were chosen to be highly discriminable, the object attributes were accentuated and unique features of particular objects in the object set, and the actions were such that they could be illustrated by either a doll or the child.

The 16 words, or names, for the referent Objects, and their respective word-stimuli "statement-sets" (composed of 4 statements: TA, FA, FN, and TN) were embedded in the two-phase word- comprehension/sentence-verification tasks (see Table 1).

Table 1

The 16 Stimulus Words and Their Respective Word-Stimuli Statement-Sets (TA, FA, FN, TN for each word)

NOUNS

1) DOG

TA: That's the dog.
 FA: That's the cat.
 FN: That's not the dog.
 TN: That's not the cat.

5) CAT

TA: That's the cat.
 FA: That's the dog.
 FN: That's not the cat.
 TN: That's not the dog.

2) CAR

TA: That's the car.
 FA: That's the ball.
 FN: That's not the car.
 TN: That's not the ball.

6) BALL

TA: That's the ball.
 FA: That's the car.
 FN: That's not the ball.
 TN: That's not the car.

3) HAIR

TA: That's her hair.
 FA: That's her mouth.
 FN: That's not her hair.
 TN: That's not her mouth.

7) MOUTH

TA: That's her mouth.
 FA: That's her hair.
 FN: That's not her mouth.
 TN: That's not her hair.

4) APPLE

TA: That's the apple.
 FA: That's the biscuit.
 FN: That's not the apple.
 TN: That's not the biscuit.

8) BISCUIT

TA: That's the biscuit.
 FA: That's the apple.
 FN: That's not the biscuit.
 TN: That's not the apple.

VERBS

1) JUMPING

TA: She's jumping.
 FA: She's sitting.
 FN: She's not jumping.
 TN: She's not sitting.

3) SITTING

TA: She's sitting.
 FA: She's jumping.
 FN: She's not sitting.
 TN: She's not jumping.

2) EATING

TA: He's eating.
 FA: He's drinking.
 FN: He's not eating.
 TN: He's not drinking.

4) DRINKING

TA: He's drinking.
 FA: He's eating.
 FN: He's not drinking.
 TN: He's not eating.

ADJECTIVES

1) YELLOW

TA: That's the yellow one.
 FA: That's the red one.
 FN: That's not the yellow one.
 TN: That's not the red one.

3) RED

TA: That's the red one.
 FA: That's the yellow one.
 FN: That's not the red one.
 TN: That's not the yellow one.

2) BIG

TA: That's the big one.
 FA: That's the little one.
 FN: That's not the big one.
 TN: That's not the little one.

4) LITTLE

TA: That's the little one.
 FA: That's the big one.
 FN: That's not the little one.
 TN: That's not the big one.

During the experimental session, there were a maximum of 48 (rather than 64) two-phase sequences presented, consisting of a comprehension statement or question containing the test word (see Table 2), and then

Table 2

 Commands and Questions Used by the Experimenter in the Word Comprehension Tasks for the Different Stimulus Word Types

<u>STIMULUS WORD-TYPE</u>	<u>EXPERIMENTAL COMMAND OR QUESTION</u>
NOUN	"Show me the _" or "Can you show me the _?"
VERB	"Make the doll _" or "Can you make the doll _?"
ADJECTIVE	"Show me the _ one?" or "Can you show me the _ one?"

a statement from the test word's stimulus statement-set.

There were four experimental groups: IA, IB, IIA, and IIB. The 48 stimulus statements for each group were counterbalanced for order to eliminate the possibility of order effects, with the constraints that:

- 1) The same TRUTH-VALUE did not occur more than twice in succession.
- 2) The same ASSERTIVE FORM did not occur more than twice in succession.
- 3) The same ASSERTIVE FORM and TRUTH-VALUE statement type was never repeated in successive statements.
- 4) The same WORD-TYPE did not occur more than twice in succession.
- 5) The same WORD was never repeated in successive statement presentations.

The primary motivation for grouping the subjects was to get as many data as possible for the total statement-sets for each stimulus word, since some subjects (it was expected) would not receive all 48 statements. The difference between groups (I & II)A and (I & II)B is thus in the order of the statements presented: IA is the reverse of IB, IIA is the reverse of IIB.

Groups IA and IIA (and similarly, IB and IIB) differ in the actual test statements included in the session. Two word-types, verbs and adjectives, do not have their full stimulus statement-sets represented in the set of 48

statements for any group. That is, for a particular contrast-set (for the cases of true-negative and false-affirmative statements), such as DRINK/EAT, one group "A" and one group "B" received both negative statements for one stimulus word ("drink") and both affirmative statements for the contrast stimulus word ("eat"), while the other "A" and the other "B" group received both affirmative statements for "drink" and both negative statements for "eat". Hence, the design for verbs and adjectives is balanced for groups rather than individuals, as it is in the case of nouns. Without such a split, the experimental sessions would have consisted of 64 statements, which pilot testing revealed to be more than most children would contend with. It also would have made the session well over an hour in length.

3.3 Procedure

For the word-use pretest and the word-comprehension/sentence- verification tasks the mother, child, and one experimenter were seated together at a table (approximately 5' x 3' in area, 3' in height) in the testing room, with the child either sitting in a highchair next to the mother, or on her lap (see Figure 1). After completing

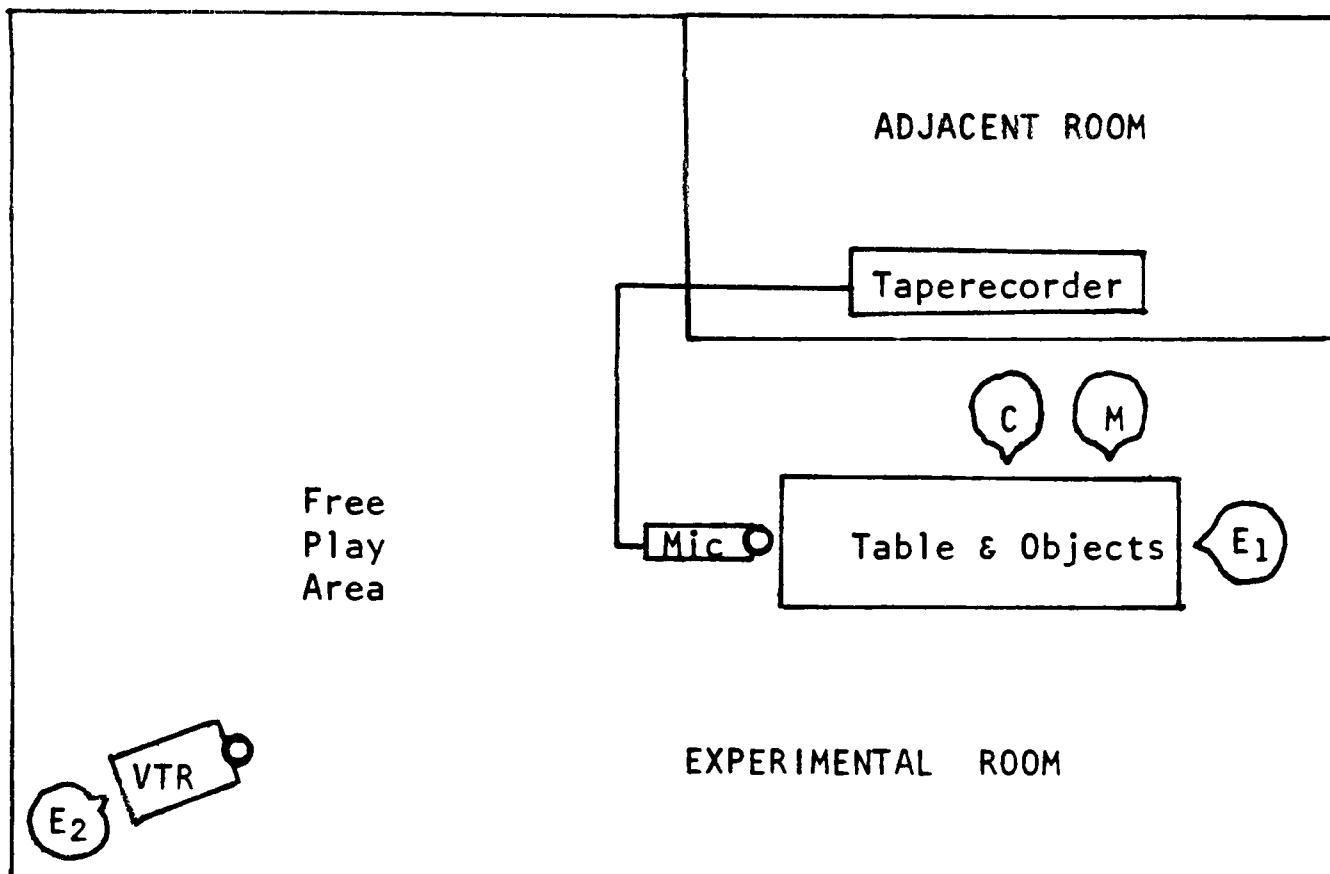
(Insert Figure 1 here)

the experimental session, the child, mother, and experimenter moved to the carpeted floor for the collection of the free-language sample. The experimental period, from beginning to end, took from 20 to 60 minutes, and breaks were taken as needed. Susan Sugarman also saw each child within a week of testing for nonverbal probing of the logic of classification activity.

At the beginning of the test period, the structure and purposes of this study and the coordinate study were explained. No instructions were presented to the child, such as "Tell me when I'm right or wrong" for the sentence-verification task, so any responses the children made were spontaneous reactions to the stimuli in their context.

Apart from the free language sample, the experimental period included two different sorts of specific tasks: the word-use pretest, and the two-stage word comprehension, sentence-verification tasks. In the word-use pretest, which always proceeded the other tasks, the child was asked a comprehension-question, which varied in form according to word-type (see Table 3), allowing the child to manifest use

FIGURE 1. Experimental Setting



Symbols: E1, E2 = experimenters

C = child

M = mother

VTR = video taperecorder

MIC = microphone

of the

Table 3

Word Production Elicitation Questions Used by Experimenter
For the Different Word Types in the Word Use Pretest

<u>WORD TYPE</u>	<u>COMPREHENSION QUESTION (CONTEXT)</u>
1) NOUN	"What's this?" (experimenter either points at or holds referent)
2) VERB	"What is the doll doing?" (experimenter engages doll in action)
3) ADJECTIVE	"What colour is this?" (experimenter points at or holds coloured ball), or "What size is this?" (experimenter holds a big and little ball and points at one of them, holding it nearer the child; "Is this big or little?" was used if the child did not understand the size question)

word concerned for the object, action, or attribute indicated by the experimenter. The question was repeated several times if the child did not respond, and was repeated again later in the session if there was no initial response. The mother was also asked if the child used the word concerned.

After the completion of the word-use pretest in its entirety, the experimenter then began to present the set of 48 two-stage word-comprehension, sentence-verification tasks. The structure of these tasks was an initial command

or question, again depending on word-type (see Table 2), with the aim of eliciting the child's comprehension of the word, followed by the stimulus statement. This second stage was not initiated until the child either demonstrated word-comprehension (sometimes after repeated questioning), or failing that (and particularly if earlier in the session the subject had shown such comprehension) was shown the referent Object by the experimenter.

The presentation of the stimulus statement after the word-comprehension test stage was accompanied by explicit gestural reference to the referent Object. Either the experimenter touched the object, demonstrated the action, or held the object with the referent attribute within the space between the child and the experimenter. In the event of the child shifting attention from the referent Object in-between the word-comprehension and the sentence-verification task, the experimenter either reinstated the word-comprehension stage or moved the referent Object around until the child attended to it once again, and then re-presented the stimulus statement.

After the stimulus statement had been presented for the first time, the child sometimes was not listening due to an engagement in some sort of play, and the statement was repeated, sometimes several times in succession. After

15-30 seconds from the final presentation of the stimulus statement, the next two-stage comprehension and verification task was begun. This sequence of events was repeated until either the 48 statements had been presented³ or the child's patience with the experiment wore thin, and the session was terminated.

When the two-stage tasks had all been completed, the experimenter asked the child a number of "yes/no" questions concerning the names of the referent Objects, their presence/absence, and one simple question about a non-present state-of-affairs (see Table 4)⁴. Many of

³One exception to the described experimental design was a fairly regular occurrence for the 18-24 month-olds: if a child neither produced a test word nor comprehended it, the statements belonging to the statement-set for that stimulus word were not presented.

⁴The results of this pilot experiment with questions are not discussed in the thesis.

Table 4

"Yes/No" questions asked during the QUESTION task

<u>Question</u>	<u>Stimulus Condition</u>
1) Is this a dog?	DOG toy present
2) Is this a red ball?	YELLOW BALL present
3) Is the doll jumping?	JUMPING DOLL present
4) Is the ball allgone?	HIDDEN BALL
5) Is this a dog?	CAT toy present
6) Is this a red ball?	RED BALL present
7) Is the doll jumping?	SITTING DOLL present
8) Is it raining outside?	(current weather; non-visible window)
9) Is the ball allgone?	VISIBLE BALL

the younger subjects never received these questions because they had lost patience with the experiment sometime during the two-stage tasks.

The child then moved to a free play area on the carpeted floor, and the experimenter gave the subject a series of object sets in succession that had proven to be effective in eliciting a speech sample from children in this age range. The three sets of objects were:

1) Fischer-Price miniature family and furniture set

Description: small plastic father, mother, girl, baby, pram, table, playpen, rocking horse, cradle, spoon.

Note: This object set generally stimulated the children to combine the objects in ways that they commented on, particularly about actions (e.g., "fall"), states (e.g., "down") and spatial relations (such as "in", "on"), and allowed the experimenter or the mother to ask them questions about what they were doing. The children also often responded to

inappropriate actions the experimenter carried out, such as the father being placed into the crib.

2) Plastic dish set

Description: several plastic cups, spoons, forks, bowls; cups with missing bottoms, the bottom pieces, cellotape.

Note: many children would set up make-believe "tea" sequences with this set of objects, and often talked about the broken cups as they tried to repair them.

3) Mixed box of toys

Description: large wooden box with fire engine, doll with missing leg, the leg, envelopes, cars, blocks, wooden animals, a windup hopping frog, a plastic car with a silly man at the wheel, a plastic pencase with styrofoam encasing inside.

Note: subjects often made comments about similar objects they had at home, gave them to the adults present, asked questions about what the objects were or did, and generally chatted about them.

These object sets were presented to the children for up to five minutes apiece, or until they lost interest. The free language sample was collected either after this experiment, at the end of the experimental period, or at the end of the coordinate study with Susan Sugarman, if the child had terminated the session early due to fussing. Free language sessions lasted from 10 to 15 minutes.

3.4 Recording data

All experimental tasks, with the exception of the word-production pretest, were videotaped from a sheltered corner of the testing room (see Figure 1), where a second experimenter (Susan Sugarman) operated the camera and transcribed the child's utterances and relevant non-verbal behaviours in sequence as they were occurring. In addition, both the experimental tasks and the free language play task were recorded on a portable Uher audio taperecorder. The word-production pretest results were recorded on paper by either the first or second experimenter.

3.5 Transcribing data

The word-use pretest

The first or second experimenter noted the use of the Object names, and also made a written transcription of idiosyncratic names, if any, that the child used for the referent Objects.

The word-comprehension task

The second experimenter, on a set of coding sheets with slots for all 48 two-phase tasks, transcribed the child's reactions to the comprehension probes. The units of transcription were both verbal and gestural, and were transcribed in sequence, and repetition of the comprehension probe by the first experimenter was noted if it occurred. Gestures which were transcribed were points to, reaches towards, touches, and takings of the referent or attribute object, as well as demonstrations of the actions under study. Namings of the Object were also transcribed. If, for reasons described in Section 3.3, the experimenter had to show the Object to the child, this was also marked. The first experimenter then viewed the videotape of the experimental sessions to verify the transcription of the second experimenter, and annotated and supplemented the descriptions wherever there were omissions. In cases of auditory failure or inaudibility of the videorecording, there was reference to the supplementary audiotape.

The sentence-verification task

Transcription of the child's responses to the sentence-verification tasks was carried out by the second experimenter during the experimental session, and this transcription was then supplemented and annotated by the first experimenter with the use of videotape and audiotape recordings. All utterances were transcribed, in addition to a good deal of nonverbal behaviour which was required for the coding procedures, as described below.

The transcription was sequential, and time relations between utterances and context were marked. A period "." was used for conjunction (as a marker of simultaneity) and a comma "," was used to mark succession.

In addition to the linguistic data, a number of the following concomitant situational features were transcribed. These included a notation of the Objects involved, which were arbitrarily numbered when necessary; a general description of the actions involving the Objects (especially: "holds," "takes," "points (to)," "offers (to)," and "looks (at)"); nonverbal affirmation and negation gestures (headshaking and headnodding: see Appendix B) and other utterance features (especially question intonation, loud voice, and laughing). The speaker was always

identified, and repetitions of the stimulus statement were noted. A sample transcription appears as Appendix A.

The free language sample

The language corpus was transcribed in its entirety from the audiorecording, and supplemented by context notes where these had been taken by the experimenters.

4. Data analysis

4.1 The response protocol

After the child focused on the referent in the comprehension-phase of the two-stage sentence verification tasks, the statement was presented at least once, and usually several times, with a pause each time to allow the child to respond. The set of responses to each statement is called its response protocol.

4.2 Categorizing responses

There were several major dimensions relevant to the parsing of responses into categories. These involve the

focus of the child's attention after the statement presentation, the syntactic complexity of the response, logical complexity in sentence conjunction, and illocutionary variation (a variation in what statements are meant AS rather than in what is meant BY them; hence differences in "illocutionary force", cf. Austin, 1975).

The child's attentional focus

After the statement presentation, the child may have continued to attend to the referent Object, shifted attention to the mentioned Object, or not attended to either of these two Objects. The child's responses may thus be directed with regard to his or her attentional focus (foci), and not necessarily those of the experimenter. The truth-value of the statement from the child's viewpoint may thus change as a function of the child's attentional focus. Responses made where the child is still attending to the referent Object are coded as "primary" (abbreviated as Scheme I or just I), and responses where the child is attending to the mentioned Object are coded as "secondary" (and abbreviated as Scheme II or just II). This division is only applicable to responses to statements of false affirmative (FA) or true negative (TN) form, since for other

cases (i.e., the true affirmatives and false negatives) the referent Object and mentioned Object are co-extensive. When the child was not attending to either the referent or the mentioned Object, the task began again with the comprehension phase until the child attended.

Syntactic complexity

There are primarily three major divisions in the response typology involving varying degrees of syntactic complexity:

- 1) Single words: "no," "yes," Object words.
- 2) Operator plus name: "no" or "yes" plus referent name or mentioned name.
- 3) Copula addition: either copula (i.e., "is" or "'s") plus name, or copula with operator plus name.

The complexity involved in (2) may have both linguistic and cognitive consequences, e.g., the juxtaposition of negating and alternatively asserting "No, (it's a) ball" suggests a realization of the logical connections between assertion and denial that a single word utterance could not. Similarly, the copula (3) is relevant as evidence for the child asserting and not merely naming (cf. p. 205).

Logical complexity in sentence conjunction

For some cases, it is clear that the level at which responses are coded must be multisentential. There are numerous response protocols that include responses where the child conjoins two statements that together express a logical relationship between the statement which the child interprets the experimenter to have made and one or more statements the child makes about the referent and/or mentioned Object. Coding these separately would result in the loss of the information that the two or more statements were combined. Such conjoined statements are here called "explicit oppositions".

Illocutionary variation

Austin (1975), in focusing on the occasion of an utterance rather than its "timeless" meaning, made a distinction between the meaning of an utterance and its "force". Certain statements could, on occasion, be used as either statements or warnings, as one example. There are important distinctions in the function of some of the children's utterances which result in the following

categories, which may suffice as a rough approximation:

- 1) Comments: the child is making remarks about the statements in accord with normal conventions of correction, agreement and truth - at least insofar as the child understands the statements.
- 2) Questions: the child's responses are marked by terminal rising intonation, and ask a question about what has been said or about the referent or mentioned Object.
- 3) False responses: the child is transforming ordinary conventions of correction, agreement and truth (insofar as the child understands the experimental statements, as assessed in the word-production and word-comprehension tasks) to yield statements that do not correspond with truth conditions for the use of the words concerned.

4.3 The formation of the BASIC Coding System categories

Given the four dimensions of importance set out in Sections 4.2.1-4.2.4, and the fact that the data for the primary analyses would centre on negation, affirmation, the use of the referent name(s) or mentioned name(s), and the child's attentional foci, a number of response categories were initially formed. Both the "explicit opposition" and "false response" categories were more complex and are discussed in Sections 4.3.2 and 4.3.3 respectively.

The initial categories

The initial categories formed on the basis of these considerations are presented below in title form (see Appendix B for detailed specifications of the criteria). The initials "I" and "II" refer to the attentional focus of the child as described in Section 4.2.1.

Affirmation

Solitary YES: Primary (I)
Solitary YES: Secondary (II)
YES + Referent Name: I
YES + Referent Name + Copula: I
YES + Referent Name + Copula: II

Negation

Solitary NEG: Primary (I)
Solitary NEG: Secondary (II)
NEG + Referent Name: I
NEG + Referent Name: II
NEG + Referent Name + Copula: I
NEG + Referent Name + Copula: II
NEG + Mentioned Name
NEG + Mentioned Name + Copula

Names

Solitary Referent Name: I
Solitary Referent Name: II
Referent Name + Copula: I
Referent Name + Copula: II
Solitary Mentioned Name
Mentioned Name + Copula
Other: Elaboration (some other name)

Questions

Referent Name Questions
Mentioned Name Questions
Other questions

Nonverbal: child's referent

Child indicates Referent Object
Child indicates Mentioned Object

"Explicit opposition" responses

For sentence conjunctions involving explicit oppositions, four major categories resulted from an initial survey of the protocols:

1) Explicit Opposition Type A1:

The child negates the experimenter's FA or TN statement, shifts attention to the mentioned Object, and names it.

2) Explicit Opposition Type A2:

The child negates the experimenter's FA or TN statement, maintains attention to the referent Object and names it.

3) Explicit Opposition Type A3:

The child in one statement negates the experimental FA or TN statement and asserts the referent Object name, and then shifts attention to the mentioned Object and names it.

4) Explicit Opposition Type B:

The child either names the referent Object and then shifts attention to the mentioned Object and names it, or names both Objects in the reverse order.

But is this an exhaustive set? Could there be additional two-part oppositions which might have but did not occur? This possibility was explored by generating the 8 cases which are possible in permutations of the 3 dichotomous variables that distinguish the cases (1)-(4) above:

A)OPPOSITION: either the signs of the two conjuncts are:

- 1) opposed: (+) and (-), or
- 2) same: (+) and (+), or (-) and (-).

B) NUMBER OF NAMES: either

- 1) one, or
- 2) two

names are used in the set of conjuncts.

C) NUMBER OF REFERENTS: either

- 1) one, or
- 2) two

referents become the focus of comment within the conjunction.

Four of the 8 possible combinations are described above as Explicit Opposition Types A1, A2, A3, and B , which may each be denoted by triplets expressing permutations of the 3 dichotomous variables that jointly define them: (A1B1C2) , (A1B2C1) , (A1B2C2) , and (A2B2C2) .

The other four possibilities yield the following conjoined statement forms, which are either improbable as conjuncts, or which for obvious reasons are coded in the False Response category:

- 5) (A1B1C1): The child negates the experimenter's true statement, maintains attention to the referent Object, then names it.
- 6) (A2B1C1): The child names the referent Object twice.
- 7) (A2B1C2): The child names the referent Object, then uses the referent Object name for some other object. (Note: This is False Response Type 2).
- 8) (A2B2C1): The child names the referent Object, then uses another Object name for the referent Object. (Note: This is False Response Type 1).

Hence, the four cases of "explicit opposition" for which categories are formed in the BASIC coding scheme exhaust the set of conjoined statements varying in the dimensions (A)-(C) above. The only occurring cases of explicit opposition were thus truthful and oppositional: (5), (7), and (8) involve False Responses, and (6) is non-oppositional.

"False Responses"

For "false responses", a great number of categories could have potentially been formed, mirroring the subdivisions found in Section 4.3.1 above, but since this type of response was relatively infrequent, subcategorization was restricted to the types set out below.

For specific coding details for each type, see Sections 1.36-1.42 of Appendix B.

Type 1: Child misnames the referent Object.

Type 2: Child applies the referent name to another Object.

Type 3: Child applies the mentioned name to another Object.

Type 4: Child misnames the referent Object and then misnames another another Object.

Type 5: Child negates the experimenter's true affirmative statement.

Type 6: Child denies the experimenter's true negative statement.

Type 7: Child repeats the experimenter's false affirmative statement.

Additional categories

In the course of coding some of the response protocols with the response categories listed in Sections 4.3.1-4.3.3, it became evident that several new categories were required for two types of responses to the experimenter's negative statements. The child would sometime repeat the false-negative or true-negative statements verbatim or minimally alter the words, but not semantic structure, of the statements by dropping an article or substituting a different pronoun, for example. Thus the following categories were added:

NEGATION

NEG-phrase, consensual: repetition
NEG-phrase, consensual: different

4.4 Decision-criteria: BASIC and COMPILED coding systems

The details of the decision-criteria for the coding categories are presented in Appendix B. There are in fact two coding systems which figure in the presentation of the results. The most detailed system consists of 43 basic and mutually exclusive categories, and is denoted as the BASIC coding category system. However, broader analyses of the subjects' protocols were required which did not lose sight of general trends in, for example, "yes" and "no" use (irregardless of complexity) to the different statement-types, as the BASIC categorization clearly does. For this purpose, a COMPILED coding system of 13 categories was elaborated. The basic principle underlying this compilation was the classification of responses which had common features, such as the occurrence of a "yes", "no", or referent name. For results presented in the text, I always cite the coding system constituting the data base.

5. Results and discussion

This experimental paradigm compares children's spontaneous responses to each of the different types of statements rather than taking an experimenter's indices of judgement values, such as "right" or "wrong". And since only minimal differences demarcate the different statement types, e.g., the false-negative statement only differs from the true-affirmative in the occurrence of a negative morpheme after the copula "be", differences in response-patterns to the different statement types provide evidence of ways in which they are differently interpreted by the children. To that extent, our primary form of data presentation consists of comparisons between different statement types involving the response-categories defined in Appendix B.

Two factors make data presentation complicated. First of all, the actual number of statements presented overall (including all statement types) differed according to the age of the subject group (see Table 5).

Table 5

Number of Statements Presented to
Each Age-Group by Statement Type*

<u>Age (months)</u>	<u>TA</u>	<u>FA</u>	<u>FN</u>	<u>TN</u>
18	41	66	52	41
24	77	92	84	81
30	111	115	117	115
36	120	120	120	119

(*n = 10 for each age-group)

This was due to variation in attention and interest in the experimental task, and the younger subjects' sessions terminated earlier. Secondly, for all the age groups but particularly for the 18 and 24 month-old subjects, the number of statements presented of the different types varied. Such differences make frequency statistics an inappropriate way of presenting the results, particularly for the younger subjects. So the primary statistic utilized in describing the results is the proportion of total statements presented which had specific types of responses made to them. In addition, base frequency data from which the proportions were derived are presented in a table juxtaposed with each graph. The categories of response serving as the basis for comparison are also listed with

each table or graph.

For purposes of general reference, the primary data are presented in Appendix C. The youngest subject group (18 month-olds) made few responses to any of the statements presented, so the generally low proportions are due to an overall lack of response.

Since the detailed exegesis of the experimental findings tends to obscure the general results, it will be useful to briefly summarize them here. Support was found for the hypothesis predicting that false statements will be corrected by 2 to 3 year-old children (Section 5.1). False-affirmative statements (i.e., misnamings) were corrected with logical negations of increasing complexity with age, and false-negatives were also frequently corrected, by complex "yes" responses of oppositional function. Due to the inherent problems of interpreting the single-word responses of the younger groups to true-negative statements, the hypothesis that agreement with such statements is a later development than false statement corrections could not be evaluated. There was clear evidence, however, that by 30-36 months of age such agreements with true-negatives were prevalent.

Other findings of central interest are the appearance of false statement dissent prior to true statement assent

(Section 5.2.1), the use of "anaphoric" negations prior to "non-anaphoric" negations for false statement corrections (Section 5.2.2), the appearance of logical oppositional responses which conjoin propositional denial and alternative assertion (Section 5.2.3), and false responses in which children clearly play with truth-conventions and produce insincere predication (Section 5.2.4). A number of interesting sex differences in response patterns were also discerned, and an analysis of response-patterns by sex revealed that almost all of the false statement corrections of the 18 and 24 month-old groups were contributed by females (Section 5.2.5).

The general organization of the results and discussion is in two parts. In the first part (Section 5.1), evidence is considered for the two hypotheses which are outlined in Section 1 of this chapter. In the second part (Section 5.2) a number of other centrally interesting aspects of the children's judgements and response-patterns are discussed and related to basic questions about the development of negation and the child's growing conception of language.

5.1 Evidence for two hypotheses

5.1.1 Emergence of logical denial: Negating false statements

One of the fundamental hypotheses of the thesis tested in this experiment concerned the emergence of truth-functionally defined negation (Chapter I) as a basic semantic function expressed in the linguistic judgements of very young children around the age of two. From a purely logical standpoint, as we have mentioned before (Chapter IV, Section 1), evidence for an ability to truth-functionally deny false statements would consist of the use of negation in response to false statements. However, from a discourse perspective, this may be accomplished in several ways, depending on the form of the false statement. False-affirmatives (FAs), which have been called "misnamings", may be explicitly negated with a negative morpheme. Such corrections are very frequent in the negations of children in this study, and evidence for these truth-functional negatives is outlined in Section 5.1.1.1.

Another type of false statements, False-negatives (FNs), have been called "incorrect denials" because they negate true statements of affirmative form. Again, considering just the logical form of FNs, this type of statement is false and to be corrected ought to be negated

with a negative morpheme. Unlike FAs, however, there are several forms of correction-response which can be utilized to accomplish such a negation. Recall that the form of a FN is "That is not _". To negate this statement, one may use a negative morpheme and negate the truth-value of the statement, or one may use the affirmative morpheme ("yes") and negate the negative component of the surface form of the sentence. The result of using this affirmative morpheme is to negate the FN by opposing the negative morpheme of its surface form with the conversational counterpart of negation - the "oppositional affirmative". This form of negation, as well as referent name assertions with the copula "be", is a prevalent one in response to FNs for the children of this study, and its various aspects are detailed in Section 5.1.1.2.

Both types of false statements may ordinarily be corrected in conversation by offering the correct name, omitting any explicit negative or affirmative morpheme. But such a form of conversational negation, from a developmental viewpoint, although highly suggestive and deserving further study, does not result in unequivocal evidence for truth-functional denial. The use of such naming for what seem to be corrective purposes is discussed in Section 5.1.1.3.

5.1.1.1 Negation of False-Affirmatives with "no"

One central hypothesis of the thesis concerns truth-functional negation. The reviews of longitudinal and experimental research on early negation in this thesis (Chapters II and III) revealed that no experimental account had systematically probed for the use of early negation as a logical operator to deny false statements. One contrast in particular between the different statement types enables one test of the hypothesis that children in the age period between 18 and 36 months use negation with the logical function of truth-functional denial. The TA and FA statement types only differ in that the latter type misname, and hence set out a false statement by providing an identifying predication for a referent which is not true. If negation is being utilized to deny the False-Affirmative statement exemplars, the hypothesis would make several specific predictions:

PREDICTION 1: Negation will be a more frequent response to False Affirmatives than to True Affirmatives.

PREDICTION 2: Negation will be a more frequent response to False Affirmatives than affirmation.

These initial predictions concern the use of "no" and "yes" responses in general, regardless of additional

elaborations which may occur in the responses at later ages, so COMPILED categories A and B (cf. Appendix B, Section 2) provide the data for testing the predictions, which is presented in Figures 2 and 3.

(Insert Figures 2 and 3 here)

In Figure 2, the proportion of statements presented which were responded to by "no" responses of some kind (COMPILED category B) is compared for TA and FA statement types. The difference between the frequency of negative responses to the two statement types is significant for the 30 and 36 month-old groups ($\alpha = .005$, Wilcoxon matched-pairs signed-ranks test⁵, one-tailed, $n = 10$), supporting Prediction 1. Four of the 24 month-olds did not use negatives in response to either statement type, and two of the remaining six subjects (both female) contributed most (17/21) of that age-group's FA negation responses. This variation in performance for the 24 month-old group resulted in a nonsignificant group difference between FA and TA

⁵Hereafter, "Wilcoxon MPSR test".

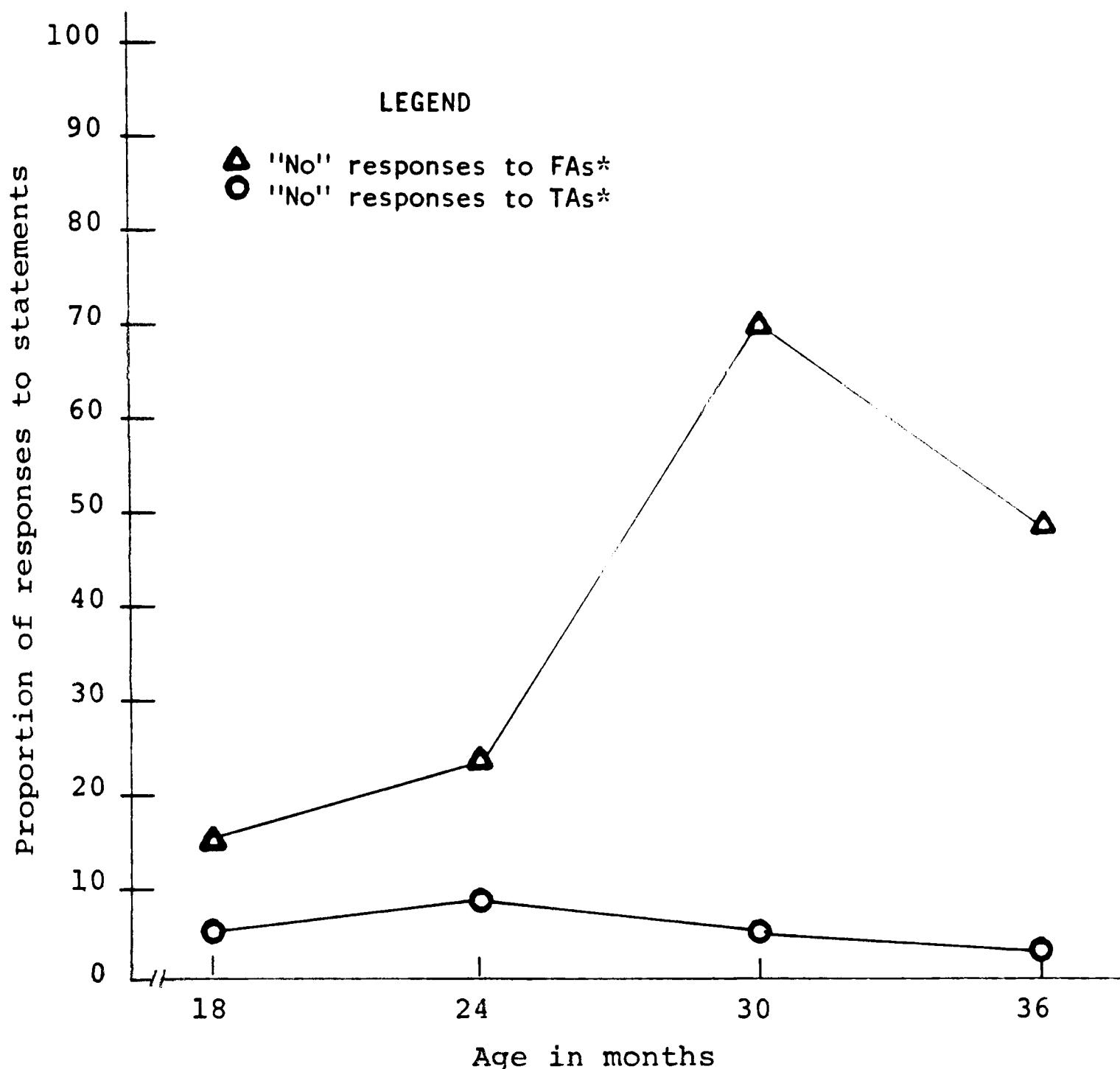


FIGURE 2 Proportion of "No" Responses for FAs and TAs
(*COMPILED Category B)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
"No"	FA	$\frac{10}{66}$	$\frac{21}{92}$	$\frac{81}{115}$	$\frac{59}{120}$
	TA	$\frac{2}{41}$	$\frac{6}{77}$	$\frac{6}{111}$	$\frac{3}{120}$

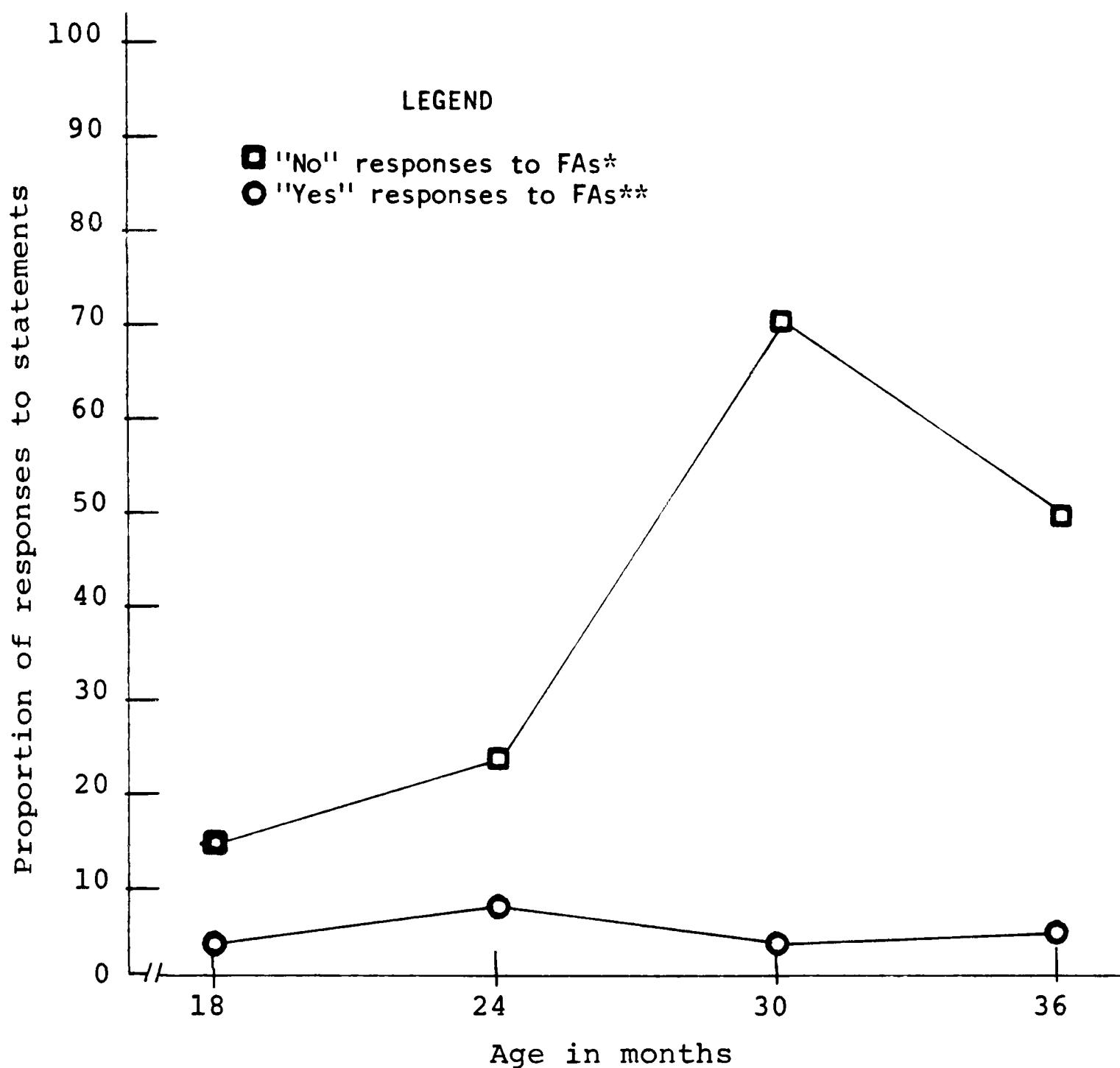


FIGURE 3 Proportions of "No" and "Yes" Responses to FAs
 (*COMPILED Category B
 **COMPILED Category A)

<u>Base Frequencies</u>				
Age in months				
	18	24	30	36
"No"	$\frac{10}{66}$	$\frac{21}{92}$	$\frac{81}{115}$	$\frac{59}{120}$
"Yes"	$\frac{2}{66}$	$\frac{6}{92}$	$\frac{4}{115}$	$\frac{5}{120}$

negation responses. The 18 month-old group difference between TA/FA negations is also not significant. But when the protocols of the 18 month old females are analysed as a group, the FAs are responded to with negatives significantly more frequently than TAs ($\alpha = .05$, paired-difference t-test, one-tailed, $df = 4$).

Figure 3 compares the prevalence of "no" responses (COMPILED category B) to that of "yes" responses (COMPILED category A) for FAs. Negatives are the significantly predominant response to FAs in this comparison for both the 30 ($\alpha = .005$, Wilcoxon MPSR, one-tailed test, $n = 10$) and 36 month-old groups ($\alpha = .005$, Wilcoxon MPSR, one-tailed test, $n = 8$). Neither the 18 nor 24 month-old group differences are significant, but the tendency to negate rather than affirm FAs is reflected in the number of subjects negating rather than affirming these statements at all (18 months: 4/10 S's negated, 2/10 S's affirmed; 24 months: 6/10 S's negated, 3/10 S's affirmed). The results of the two older groups substantiate Prediction 2, and although generally less responsive, the 18 and 24 month-olds display similar tendencies.

Furthermore, the complexity of the "no" response to the FA changes radically within the age range studied, as illustrated in Figure 4.

(Insert Figure 4 here)

Whereas at 18 months almost all of the negatives of FAs are solitary "no" responses, many of the negatives produced by the 24-36 month-old subjects consist of "no" plus some form of elaboration. Though not a comparison relevant to the hypothesis of current concern, the development of two of these forms of elaboration, "no" plus the mentioned name (of logical form NOT-X) and "no" plus the referent name (of form "no" plus affirmative proposition) is considered in Section 5.2 where the development of these "non-anaphoric" and "anaphoric" negatives is discussed. This distinction was first introduced in Chapter II, Section 4.2.

5.1.1.2 Negating False-Negative statements

In the previous section, predictions concerning evidence for the truth-functional denial of false-affirmative statements were rather straightforwardly constructed, due to the interaction of the FA statement type and the affirmation-negation response systems. "Yes" responses, it was predicted, would be rare to FAs, relative

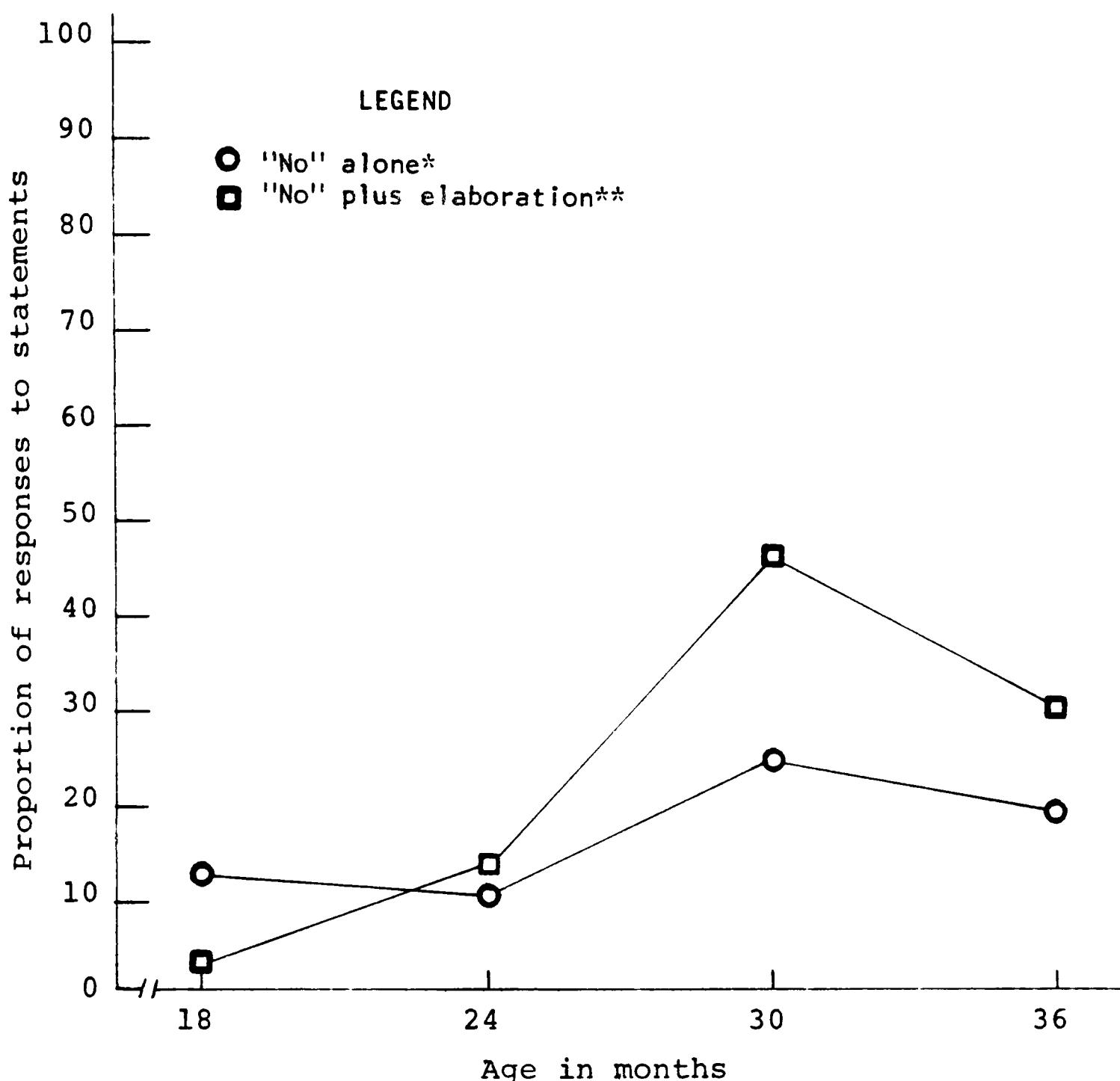


FIGURE 4 Complexity of "No" Responses to FAs: Proportions of Solitary "No" and "No" Plus Elaboration
 (*BASIC Category 7;
 **BASIC Categories 9-14, 32-34)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
"No" alone	8 66	9 92	28 115	23 120
Complex "No"	2 66	12 92	53 115	36 120

to "no" responses, because such affirmations would falsely agree with the misnaming, whereas a negative morpheme would correctly deny it. But the FN statement type poses a more complicated case for our consideration, for there are two quite different ways of truth-functionally denying FNs, one which negates the sentence-as-a-unit with a negative morpheme, and another which negates the negative "not" within the FN statement by an affirmative morpheme. The latter form of FN truth-functional denial focuses on the logical opposition of "yes" and "no" and makes the binary contrast between affirmation and negation as a truth-functional response SYSTEM strikingly clear. But given these two options for truth-functionally denying the FN statement, any simple comparison of the relative frequency of affirmative and negative statements is inadequate. In particular, if the child provides only a solitary "yes" in response to a false-negative statement, one should be hesitant about inferring that the child had truth-functionally denied the FN with an oppositional affirmative. For might he or she not be mistakenly agreeing with it instead? Similar problems abound with interpretations of a solitary "no" in response to the FN. One might feel that the child could be imitating the negative component of the sentence, an objection which could

not be pressed against the same response to the FA statement. These sorts of objections make analyses of FN responses as truth-functional denials (of either affirmative or negative form) a delicate affair. Nonetheless, several predictions can be fruitfully proposed which are consonant with the major hypothesis that children in the period from 18 to 36 months develop the ability to truth-functionally deny false statements. Both of these predictions involve predicative elaborations of some kind of basic response, whether it is affirmation, negation, or referent naming.

Though much of our previous discussion about the assertion and denial of statements has focused on "yes" and "no" responses, the copula "be" also plays a major role in these expressions of judgements. "It is" and "It is not" are the prototypical forms of assertion and denial (Dummett, 1973; Strawson, 1974), and are logical counterparts in predicative function. The relevance of this point to our investigation of truth-functional assent and dissent is immediate. Whereas the solitary "yes", for example, may be ambiguous with respect to logical function, the response "yes, it is" makes the logical opposition of its assertion with the false-negative statement explicit with the copula "be". This becomes important when we consider the TA statement type which differs from the FN only in the

occurrence of the word "no" after the copula "be" (in the form "is"). If the child is using the word "yes" oppositionally to deny the FN rather than to mistakenly agree with it, the elaboration of such a "yes" response with the copula "be" should be more frequent when the child is denying FN statements than when the child is agreeing with TA statements. We can now state the first prediction regarding truth-functional denials of FNs:

PREDICTION 3: Elaborated "yes" responses will be more frequent to False Negatives than to True Affirmatives.

The BASIC coding category 5 (Appendix B, Section 1.5) provides the data for testing this prediction, which are presented in Figure 5.

(Insert Figure 5 here)

It is clear from the figure that elaborated "yes" responses, consisting of "yes" and a predicative statement with the copula "is", are more frequently utilized as responses to FNs than to TAs at both 30 and 36 months of age ($\alpha = .01$, Wilcoxon MPSR, one-tailed, $n=7$). Elaborated "yes" responses to any statement type are rare before this time, and the strict criteria set on the form of "yes" responses which are counted as oppositional affirmatives still yields

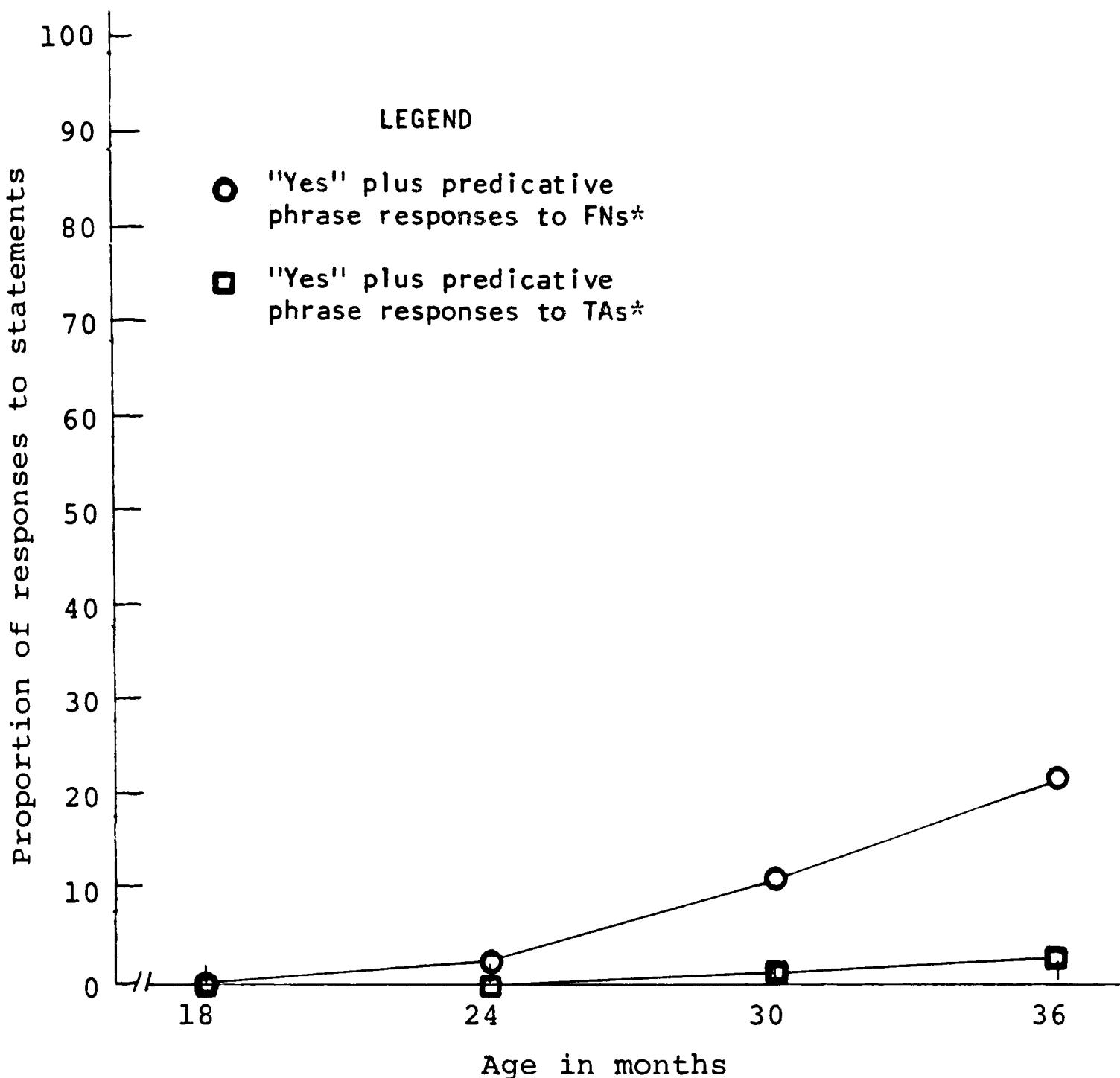


FIGURE 5 Proportions of "Yes" Plus Predicative-Phrase Responses for FNs and TAs (*BASIC Category 5)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
FN	0	$\frac{0}{52}$	$\frac{2}{84}$	$\frac{14}{117}$	$\frac{28}{120}$
	TA	$\frac{0}{41}$	$\frac{0}{77}$	$\frac{1}{111}$	$\frac{4}{120}$

the result that "yes" is used in this way at an early age. Since this response is rare before 30 months of age, is there any other evidence which bears on the question as to whether younger children deny FNs in some other way? Again, a prediction may be made involving the elaboration of a response, this time with the copula "be":

PREDICTION 4: Elaborated referent naming responses with the copula "be" will be more frequent to False Negatives than to True Affirmatives.

This prediction is similar to Prediction 3 in that it is predicted that if referent namings are in fact being used to correct the FN statement by oppositionally asserting the referent name, the child will more clearly mark assertion by the inclusion of the copula "is". And since FNs only differ from TAs in the appearance of "not" in the former type, the comparison of the relative frequency of the referent naming predicative phrase response for the true (TA) and the false (FN) statement types would provide evidence of the use of such a response as a correction of the FN by oppositional assertion. The evidence for testing this claim is presented in Figure 6 from BASIC coding categories 5, 11, and 21, which are all responses with referent naming predicative phrases as components (Appendix B, Section 1).

(Insert Figure 6 here)

As Figure 6 illustrates, this type of response is more frequently given to FN statements than to TAs from 24 to 36 months of age. This difference is only significant at 30 ($\alpha=.005$, Wilcoxon MPSR, one-tailed, $n = 9$) and 36 months ($\alpha = .01$, Wilcoxon MPSR, one-tailed, $n=8$). Three female subjects provided all the responses of this type for the 24 month-old group. Subject B used referent naming predicative phrases in response to 7/12 FNs, but only 1/12 TAs; subject E made such responses to 7/12 FNs and 0/11 TAs; and subject F to 1/12 FNs and to 0/11 TAs. These results provide another piece of evidence in support of the hypothesis that language is used for the purpose of truth-functional denial by two and three year-olds.

"No" responses to FNs, on the other hand, are in general more difficult to interpret. One problem already alluded to is the ambiguity of the solitary "no" response. What is being negated? This problem is heightened by the result presented in Figure 7 that the elaboration of "no" responses to FN statements is very rare.

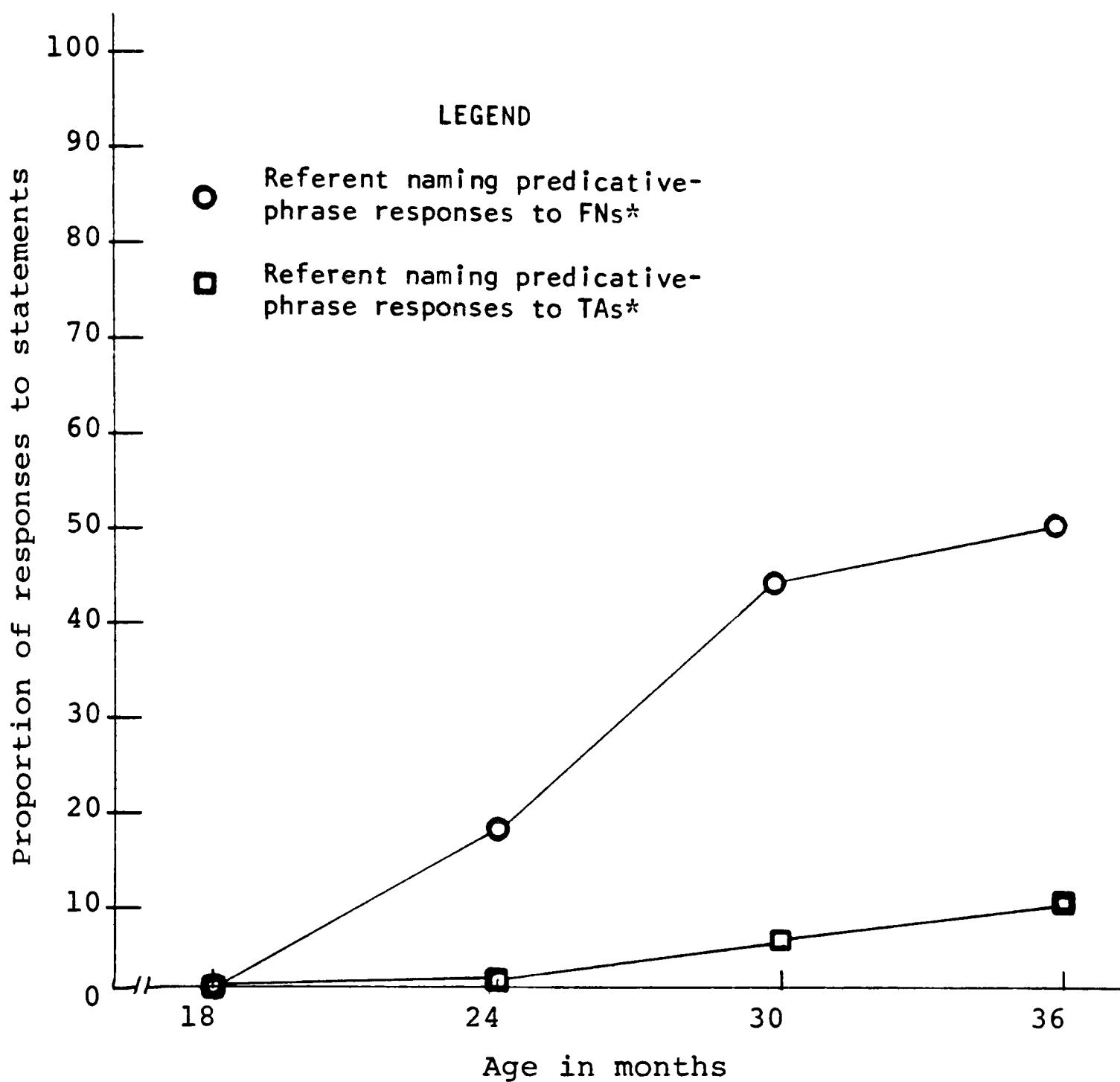


FIGURE 6 Proportions of Referent Naming Predicative-Phrase Responses for FNs and TAs
(*BASIC Categories 5,11,21)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
FN	0 52	15 84	52 117	60 120
	0 41	1 77	5 111	12 120

(Insert Figure 7 here)

In particular, this figure illustrates that the 36 month-old group responded to 14% of the FA statements with "no" plus referent naming elaboration of some kind, while NO FN statements had such elaborated forms of negation response. This may not be surprising because the referent of the FA statement has not been named by the experimenter, so the child may both negate the FA with "no" and then also correctly name the referent. And the FN statement has already named the referent, but negated this name by incorrectly denying it. So there may, this proposal goes, be no point in the child providing a referent name elaboration in addition to "no" as a response to FNs. But this still leaves the quandary of the ambiguity of the solitary "no", which is the primary type of "no" response to FNs, as shown in Figure 8. This difference is significant at 24 months ($\alpha = .01$, Wilcoxon MPSR, one-tailed test, $n = 7$) and 36 months ($\alpha = .025$, Wilcoxon MPSR, one-tailed test, $n = 6$).

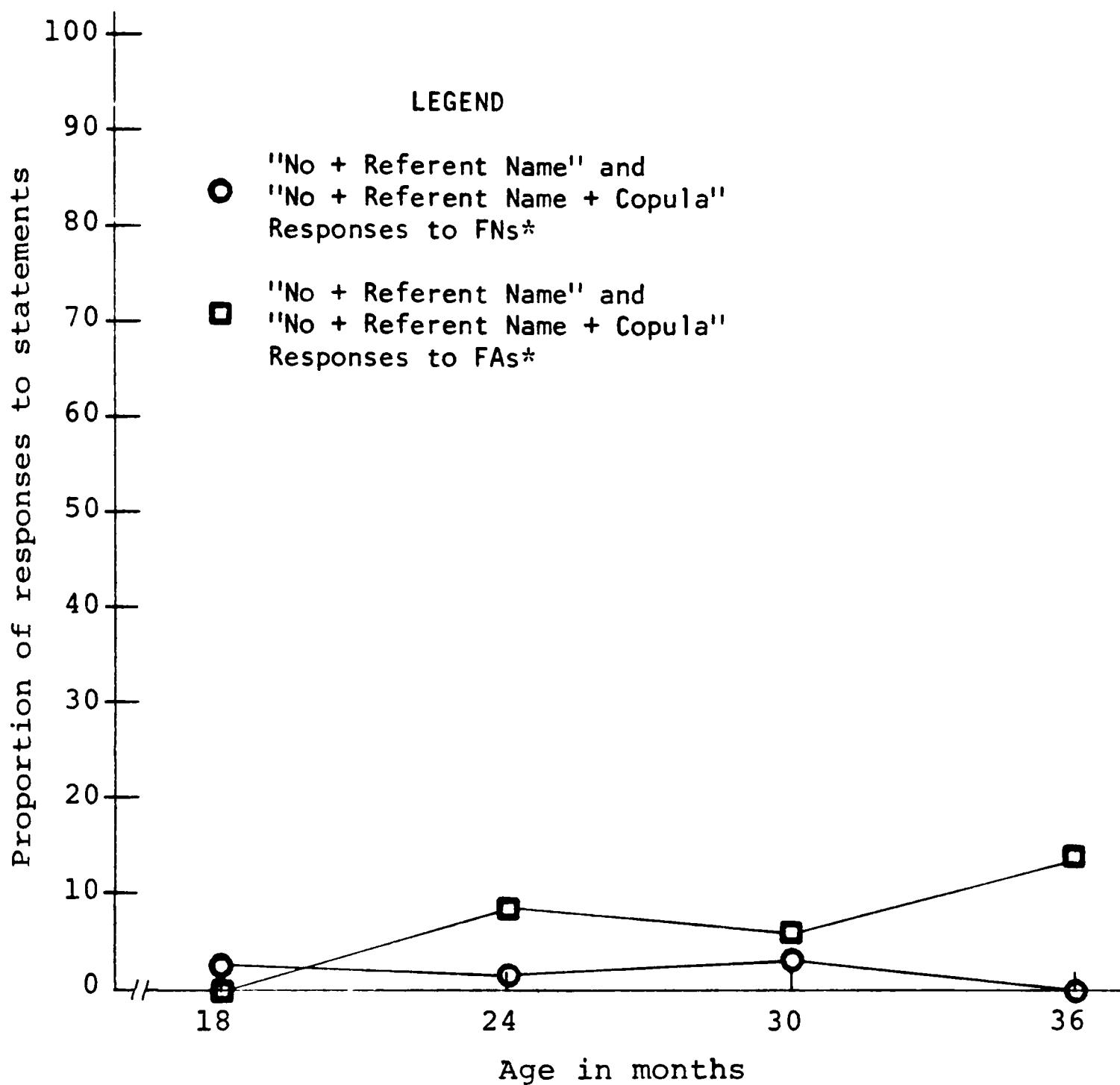


FIGURE 7 Proportions of "No" Responses with Referent Naming Elaborations for FNs and FAs (*BASIC Categories 9,11)

<u>Base Frequencies</u>				
		Age in months		
		18	24	30
FN	18	$\frac{1}{52}$	$\frac{1}{84}$	$\frac{4}{117}$
	36	0	0	0
FA	18	$\frac{0}{66}$	$\frac{7}{92}$	$\frac{7}{115}$
	36	0	0	0

(Insert Figure 8 here)

One important thing to make clear is that every one of the "no" responses to FNs which does have a referent naming elaboration of some kind is unambiguous with regard to function, unlike the solitary "no". For example:

E: That's not the apple. (E points at apple)
I30: No, that's a apple. (C shakes her head)

So it is the case that some of the "no" responses to FNs negate the falsity of the FN statements. But the predominance of the solitary "no" response to FNs means that "no" responses to FNs in general cannot strictly be interpreted as logical negations of false statements. The strongest evidence for truth-functional negation of the FN statement type derives from the previous discussion of the use of oppositional "yes" plus predicative-phrase responses.

Several analyses of tendencies for certain children in the study to be either "yes" or "no" responders point to a developmental trend toward the later use of the oppositional affirmation response. First of all, as indicated in Figure 9, the predominance of "yes" relative to "no" responses to FNs changes drastically for the 30 and 36 month old groups.

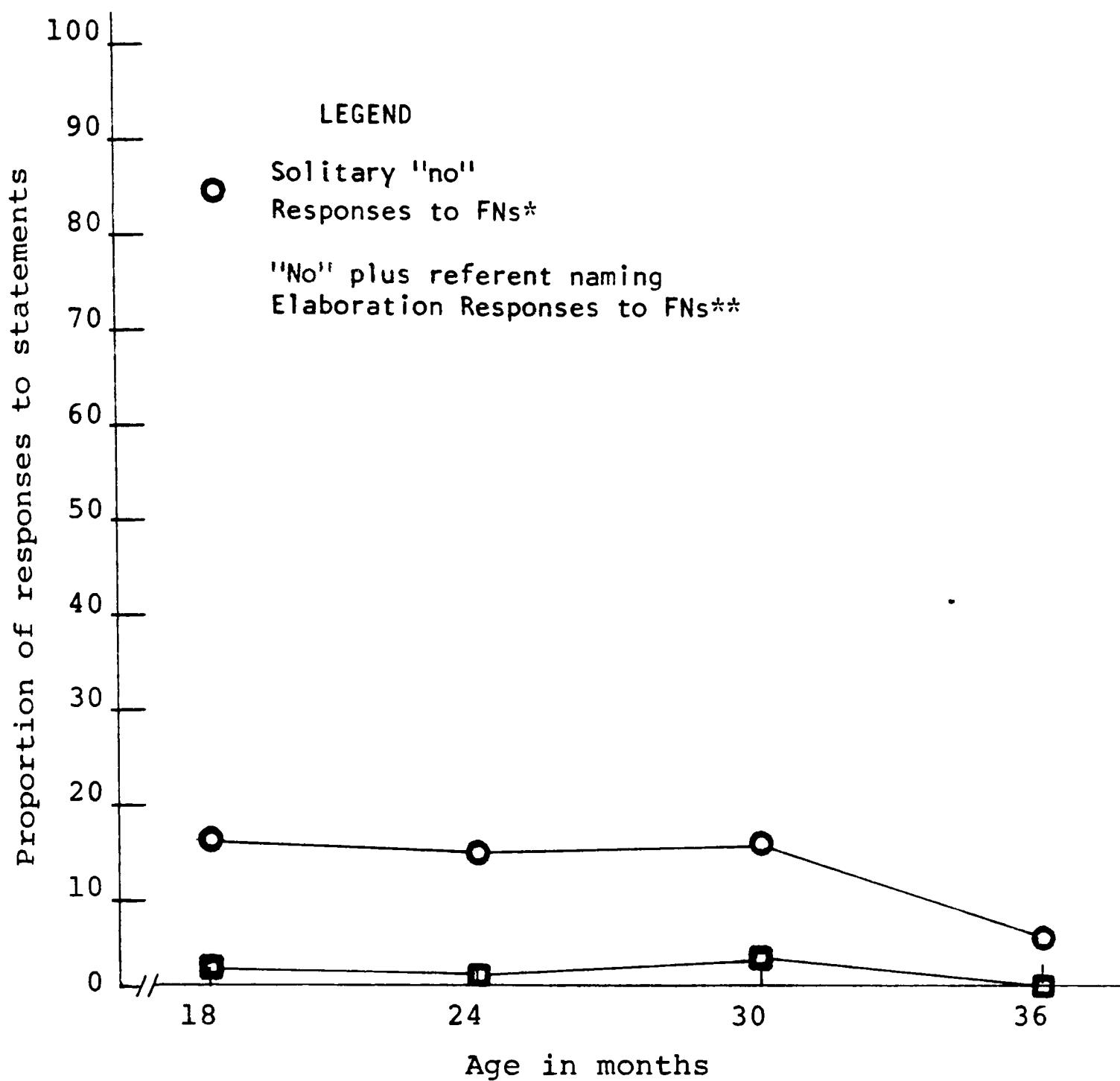


FIGURE 8 Proportions of Solitary "No" Responses and
"No" with Referent Naming Elaboration Responses to FNs
(*BASIC Category 7;
**BASIC Categories 9,11)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
"No" alone	9 52	13 84	19 117	7 120
Complex "No"	1 52	1 84	4 117	0 120

(Insert Figure 9 here)

At 30 months, the "yes" response to FNs becomes more frequent than the "no" FN response, and this "yes" advantage becomes radical at 36 months (as well as statistically significant: $\alpha = .01$, Wilcoxon MPSR, one-tailed test, $n = 9$). At this age "yes" responses were made to 49% of the FNs and "no" responses to only 6% of them. This developmental pattern is also clearly discernible in an analysis of individual response patterns. A histogram is depicted in Figure 10 representing the number of subjects in the four age groups who were predominantly "yes" or "no" responders, or who had responded equally with both of these response types to FN statements.

(Insert Figure 10 here)

As the figure indicates, 8 of the 10 36-month-old subjects predominantly responded with "yes" responses of some kind to FNs, and whereas 3 of the 10 18-month-old subjects were using "no" responses for the FNs, no subjects of that age used "yes" responses to them predominantly. It thus appears as if the oppositional affirmative response to

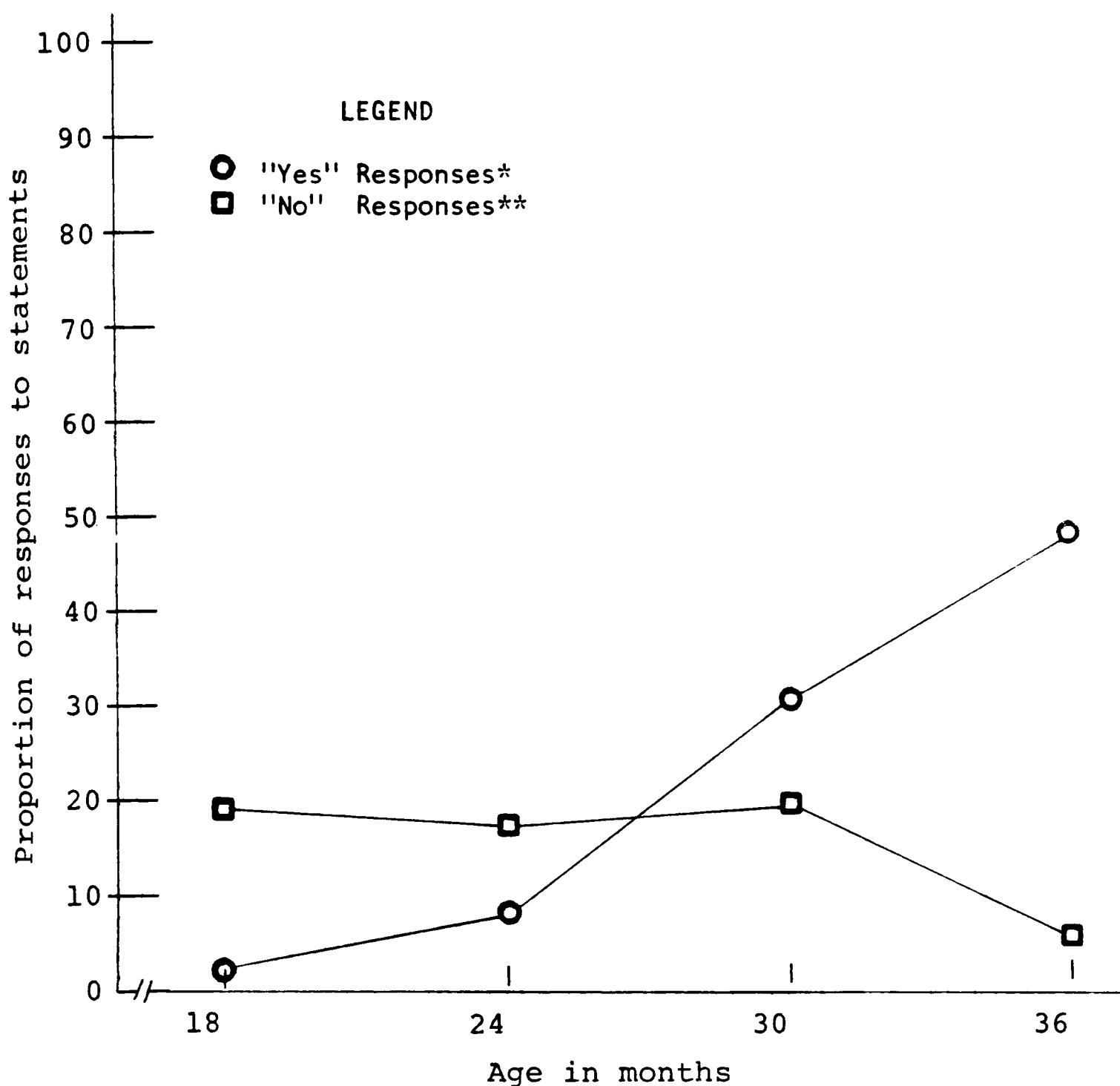


FIGURE 9 Proportions of "Yes" and "No" Responses to FNs
 (*COMPILED Category A;
 **COMPILED Category B)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
"Yes"	18	$\frac{1}{52}$	$\frac{7}{84}$	$\frac{36}{117}$	$\frac{59}{120}$
	24				
"No"	18	$\frac{10}{52}$	$\frac{14}{84}$	$\frac{23}{117}$	$\frac{7}{120}$
	24				

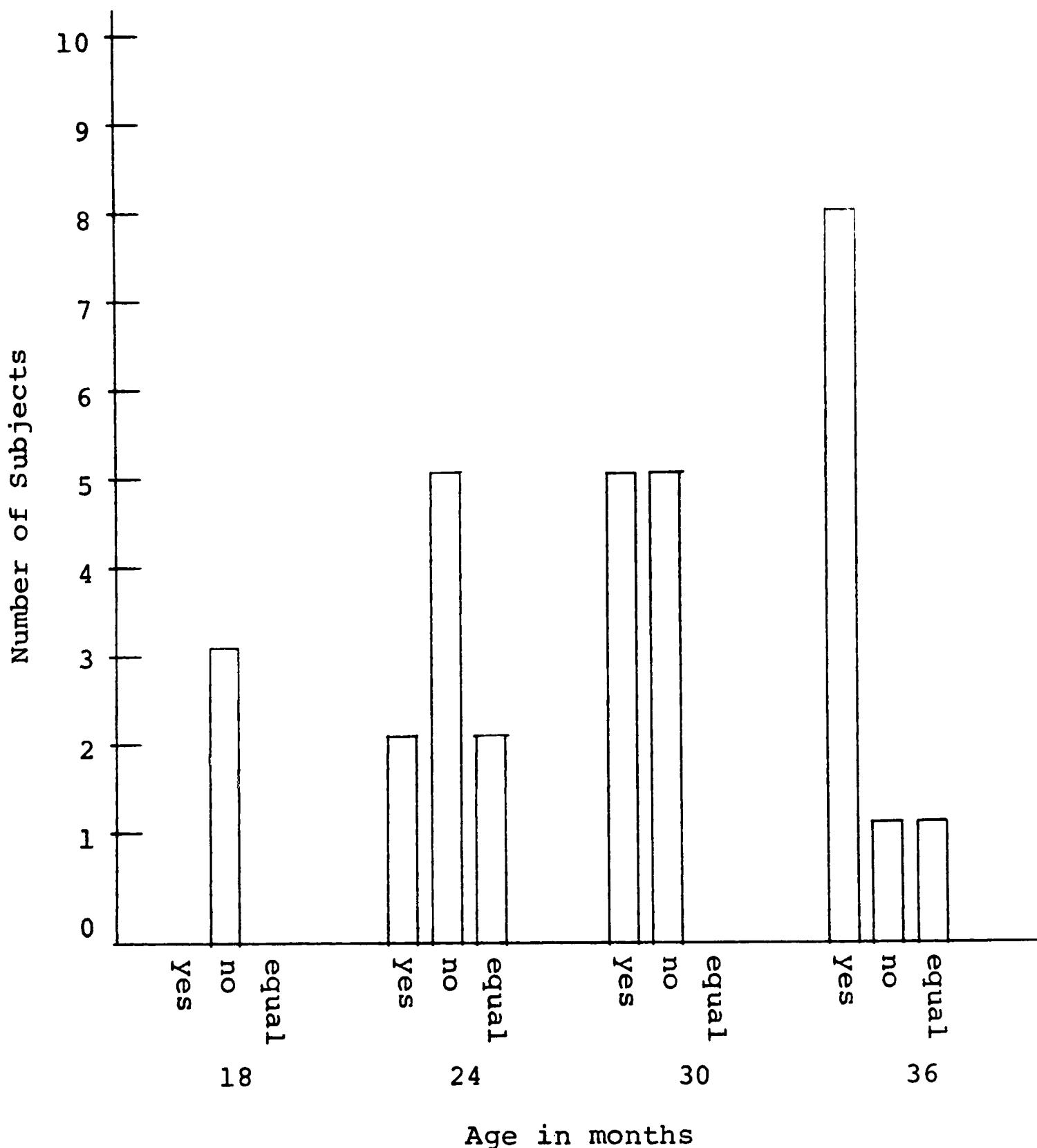


FIGURE 10 Histogram Representing the Number of Subjects Per Age Group Who Responded to FNs Predominantly with Either "Yes" or "No" or with "Yes" and "No" Equally

(Note: Subjects not represented ($n = 10$ for each age group) did not respond with either "yes" or "no" at all to FNs.)

FNs is a later development than the "no" response. This developmental pattern is also evidenced in children who seem to be at an intermediate stage between "no" and "yes" responding to FNs, resulting in responses like the following one:

E: She's not sitting. (E points to a sitting doll)

F36: No, yes she is sitting down.

Evidence from several fronts has been assembled in this analysis of responses to false statements in support of the hypothesis predicting the use of language, and especially negation, to logically deny false statements within the age period of 18 to 36 months. There are a number of spontaneous corrections which children make of the false statements presented to them, and these were seen to vary as a function of the form of the stimulus statement. False-Affirmative (FA) statements were frequently corrected by the young children, and such logical negations occurred in response to 60% of the FA statements by the 30 month-old subjects (see Figure 2). False-Negative (FN) statements were corrected in a several different ways, all of which demonstrated a truth-functional denial of the falsity of FNs. Subjects provided oppositional affirmations to the FNs by using statements like "yes it is!" to the FN statements

of "That is not _" form. Elaborated referent naming predicative phrases of the form "that is a _" were also used to correct FNs, as were such phrases with initial "no". The importance of FN truth-functional denials is that they clearly demonstrate initial comprehension of sentence-internal negation by age two (Figure 6), when subjects are asserting referent naming predicate phrases far more frequently to correct FNs than in assenting to TAs. Internal negation comprehension is even more marked in the 30 month-old group, who correct FNs with oppositional affirmatives plus referent naming predicate-phrases (Figure 5). These two results contradict Bellugi's (1967) preliminary suggestions that children at age two do not understand sentence-internal negation (Chapter II), and provide the first systematic evidence that they do.

5.1.1.3 Referent naming corrections of false statements

In ordinary conversation if someone mistakenly names something, a single word such as the object's name suffices as a correction which at the same time serves as a denial of the false statement which the other person had made. But when considering the use of referent names by very young children in response to such false statements,

such an interpretation may not be as warranted. This point has already been raised in Chapter I in a discussion of the structure of single-word speech in the 18 month-old child. Is the child predication with the single referent word? The use of language to predicate and assert is highly related to an understanding of negation and of truth and falsity, and one type of evidence that a child is asserting a proposition whose truth-value he is committed to would derive from the differential use of such referent naming in contexts where that name has been denied, or where another name has been given to the referent Object whose name the child knows. The possibility of assessing whether very young children do use single words to correct false statements is provided by the statement type contrasts of the sentence-verification task. Several predictions follow from the hypothesis that the very young child is asserting propositions with his or her single words:

PREDICTION 5: The name for the referent indicated will be used more frequently if that name is denied with a FN than if it is asserted with a TA.

PREDICTION 6: The name for the referent indicated will be used more frequently if that name is implicitly denied with a FA than if it is asserted with a TA.

These predictions may be evaluated by comparing the use of referent names, whatever the complexity of their expression, to the three statement types TA, FA and FN

across the different age groups, as presented in Table 6.

Table 6

Frequencies and proportions of referent naming responses* to True Affirmative(TA), False Affirmative(FA), and False Negative(FN) statements

	<u>TA</u>	<u>FA</u>	<u>FN</u>
18	.07(3/41)	.20(13/66)	.17(9/52)
Age 24 in months	.12(9/77)	.38(35/92)	.39(33/84)
30	.15(17/111)	.17(20/115)	.57(67/117)
36	.14(17/120)	.56(67/120)	.56(67/120)

(*COMPILED category D)

Prediction 5 is supported by significantly more referent names to FN than TA statements by the 24 ($\alpha=.025$), 30 ($\alpha = .005$), and 36 ($\alpha = .005$) month-olds (all Wilcoxon MPSR, one-tailed), while the 18 month-old group data yield no significant difference.

With regard to Prediction 6, significantly more referent names to FAs than TAs were provided by the 24 ($\alpha=.025$) and 36 ($\alpha= .005$) month-old groups (all Wilcoxon MPSR, one-tailed tests). The 18 month-old group data did not display a significant difference in this comparison, but of the 4 subjects who used referent names as responses at all, all 4 displayed differences in referent naming responses in the direction predicted. And as Figure 2 illustrates, the

lack of a difference at 30 months may be due to the fact that 60% of all FAs presented were met with negatives from the children, and so few actual alternatives to the FA (such as referent names) were stated in addition to the negative.

Although not involving negative or affirmative words, these referent naming corrections of false statements concur with evidence presented in Sections 5.1.1.1 and 5.1.1.2 that very young children spontaneously correct false statements with the language they use. Two pieces of evidence also provide preliminary findings on the truth-functional abilities of 18 month-olds. In Section 5.1.1.1, 18 month-old females (but not the males and females together as a group) were found to correct FAs with the word "no". There is also some indication here that some 18 month-olds provide referent names more often for FAs than TAs. These two groups of data together provide support for the suggestion in Chapter I that the child producing only single words may yet be asserting propositions whose truth he or she is committed to. In addition, the 24 month-olds' preferential use of referent names in response to FNs to a greater extent than TAs indicates that the child is not merely imitating the referent name in the statement he or she hears, but is comprehending the sentence-internal negation of the FN statement. It may thus be the case that

children at this early stage of lexical development are aware of the negative morpheme in sentences in which their parents are correcting their early misuse of words.

5.1.2 Responses to true negative statements

The results reviewed in this section centre on the children's responses to the True-Negative statement forms. This type of sentence, although true in terms of the state-of-affairs it describes, violates an important pragmatic condition on the ordinary use of negative statements. In Chapter I, many different accounts of the comprehension of negative sentences were reviewed, and a special focus was placed on the importance of the ordinary contexts of negative use. These contexts are generally those where one negates a proposition only if someone believes it to be true. In producing negative sentences, one is thus denying a corresponding affirmative proposition that has somehow been proposed or assumed in the conversational context in which the negative sentence occurs. But negative sentences can be created which are conversationally inappropriate in negating affirmative propositions which, given the conversational context, no one can reasonably be construed as believing. For want of a better term, this type of negative sentence has normally

been called a True-Negative sentence. This is not to say that when we usually use negative sentences they are not true. It is just that such conversationally inappropriate negative sentences are true, but not set in a proper context. For these reasons, as set out in Chapter I, numerous experiments have resulted in the conclusion that true-negative sentences (TNs) take longer to comprehend than other types of negatives when sentence-verification experiments provide the data.

To judge a negative sentence to be true when an appropriate affirmative context is not provided requires that the logical structure of the statement in relation to the state-of-affairs it describes be the correspondence upon which the judgement is based, rather than a consideration of its pragmatic felicity. Hypothesis 2 predicted that for young children, judging such negative sentences to be true would be a later development than the truth-functional denial of FAs and FNs. The responses which children made to TN sentences are thus the focus of one of the more difficult analyses of data from this experiment. The reasons for this difficulty stem from problems of interpreting responses which children spontaneously make to TNs, and a brief outline of these problems is prerequisite for discussing any results.

In Chapter III, Roger Brown's three-fold conceptual analysis of the true-negative statement type was explained. In his framework, two correspondences are considered. One of these is between FACT or objective situation the statement refers to and the UTTERANCE (-p, or the TN which negates an affirmative proposition p) which speaker r makes to listener o. FACT and UTTERANCE must agree for the UTTERANCE to be true. The other correspondence to be checked for is that between the UTTERANCE and its PRESUPPOSITION (y). The presupposition in this case is that listener o believes that p is the case. UTTERANCE and PRESUPPOSITION must not correspond for there to be "reason to communicate" on Brown's account. And this is where the TN fails, because listener o does not believe that p is the case. The presupposition, or what the speaker believes to be true (the FACT) does not mismatch with the speaker's utterance.

Brown then goes on to suggest (pers. comm.) that children have two very general lessons to learn concerning utterances - "when to speak at all and to speak the truth". This conclusion results from the work of his colleagues Jill de Villiers and Helen Tager- Flusberg (de Villiers, 1975; de Villiers & Flusberg, 1975) on negation comprehension. Recall from Chapter III that these studies found many errors made by 4 to 5 year-olds who were asked

whether TN statements were "wrong" or "right". These were coded as "errors" since the experimental intent was to have "right" and "wrong" serve as judgements of true and false, and TNs are true, and hence not "wrong". Brown's interpretation of the meaning which such responses of "wrong" to the TNs have for these children is that they are rejecting the presupposition p of utterance $-p$ because no one could believe p given the fact x . Hence, rather than agreeing with the truth of the TN, these children disagree with its presupposition. One thus might predict that in the current experiment, spontaneous negatives would be common responses to the TN statements. This is indeed the case, as illustrated in Figure 11.

(Insert Figure 11 here)

But how are we to interpret these "no" responses to the TN? The data here clearly demonstrate that there are a number of different types of "no" response which children from 18 to 36 months spontaneously make to the TN, and that the general point which Brown makes is not applicable to many of these "no" responses. Of course de Villiers' (1975) research utilized the child's instructed response of "wrong" rather than spontaneous responses of "no", but this point still

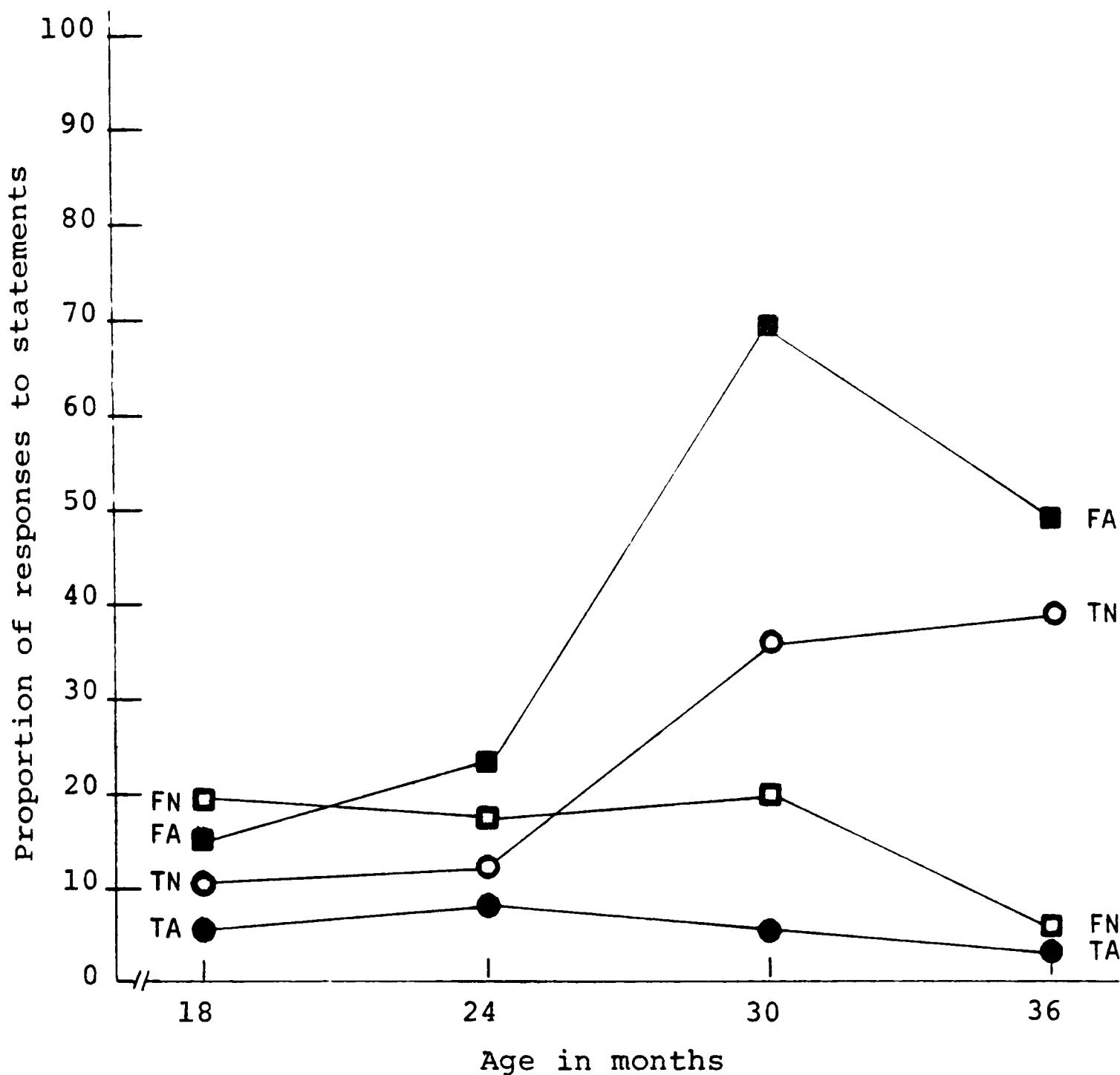


FIGURE 11 Proportions of "No" Responses to TAs, FAs, FNs and TNs
(*COMPILED Category B)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
TA	2 41	6 77	6 111	3 120
FA	10 66	21 92	81 115	59 120
FN	10 52	14 84	23 117	7 120
TN	4 41	10 81	41 115	47 119

holds because, as we have argued for "no" responses to the FA, the child is negating some aspect of the statements with the negative morpheme; in that case the "no" serves to correct a statement incorrect with regard to TRUTH. So if the child does wish to negate the presupposition of the TN, as Brown suggests occurs with "wrong" in de Villiers' experiment, it is to be expected that "no" responses of some type will be the vehicle for such negations. But now to return to the different kinds of "no" responses which were actually made to the TN statements.

Imagine a particular TN statement, such as "That is not a car" said by the experimenter in reference to a ball. There is an important advantage in having the child spontaneously respond to the TN statement rather than using the experimenter's words of "wrong" or "right", for by careful analyses different uses of "no" responses which are elaborated in some way can be distinguished, some which agree with TNs, others which disagree for some reason. To see why this might be the case, imagine an adult's possible responses to the true-negative statement above. In English, we have a positive-negative answering system for "yes/no" questions which is extended to responses made to statements when assent or dissent seem to be called for. This answering system has the feature that an English person

normally responds "yes" for positive answers, whether the question asked is of positive (e.g., "Is it hot today?") or negative form (e.g., "It's hot today, isn't it?"), and "no" for negative questions of both forms (Pope, 1973). This stands in contrast to the Japanese system of agreement-disagreement in which one word "hai" is used for both positive answers to positive questions and negative answers to negative questions, and another word "iie" which occurs as a positive answer to negative questions and as a negative answer to positive questions (Pope, 1973). The importance of the English system for our purposes is that the same word can be used to agree or disagree depending on the preceding sentence. This has already been brought out in one context in Section 5.1.1.2, where children were seen to use "yes" as an oppositional affirmative to False-Negative sentences. Thus, two and three year-olds both use "yes" for positive-disagreement of FNs, and for positive-agreement with TAs, as illustrated in Figure 12. The FA/TA contrast

(Insert Figure 12 here)

presented in the figure demonstrates the fact that the children are not just agreeing with affirmative statements

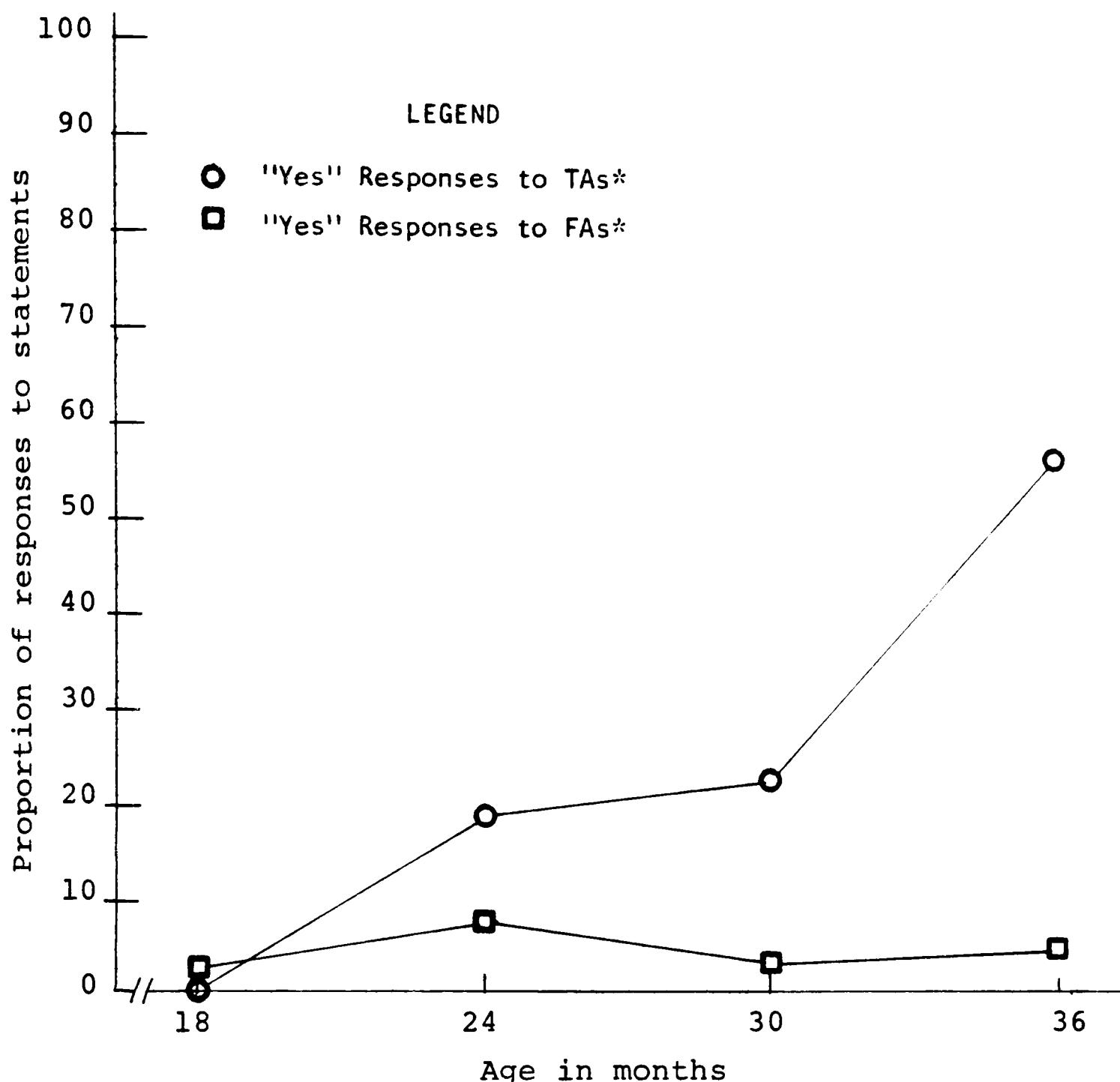


FIGURE 12 Proportions of "Yes" Responses to TAs and FAs
(*COMPILED Category A)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
TA	18	0 41	14 77	24 111	67 120
	24				
FA	18	2 66	6 92	4 115	5 120
	24				

in general, but only true ones (30 months: significant at $\alpha = .01$, Wilcoxon MPSR, one-tailed; 36 months: $\alpha = .005$, same test).

"No" responses may also be used for negative disagreement, especially to FAs (Section 5.1.1.1), and, we might expect, for negative-agreement with TN statements. These two uses of "no" responses are illustrated in the following hypothetical examples:

- 1) Speaker: That is not an artichoke.
(Speaker is holding a large sunflower)
Listener: No, it's not one. It's a sunflower.

- 2) Speaker: That is not an artichoke.
(Speaker is holding a large sunflower)
Listener: Yes, you're right, it's not.

In the first case (1), the listener responds with negative-agreement, in the second (2) with positive agreement. But a speaker-listener exchange illustrating Brown's point about negative use to note presupposition-fact mismatch might be one like the following:

- 3) Speaker: That is not an artichoke.
(Speaker is holding a large sunflower)
Listener: No! Why should I think it is?

This is then a case of negative-disagreement, but one where conversational rule-violations involving appropriate presuppositional contexts for negation is at issue rather than violations of truth-conditions.

The primary analysis indicating that some of the

children's "no" responses to the TNs function as negative-agreements derives from a consideration of cases where the negative-phrase is repeated, as presented in Figure 13. As the figure shows, the 30 and 36 month-old

(Insert Figure 13 here)

subject groups made this negative-phrase repetition response more frequently for TNs, where the negative-phrase was true, than for FNs, where it was false. This difference is statistically significant for the 36 month-old group ($\alpha = .025$, Wilcoxon MPSR, one-tailed test, $n = 6$), and the four 30 month-olds using this response at all displayed the difference in the predicted direction. The significance of these negative statements lies in what is their most plausible interpretation - that at least the older children are, just as in Example (1) on page 223, agreeing with the TN statements. Another type of TN agreement supporting this hypothesis was quite rare, but also important. One 30 month-old subject responded to two different TN statements with "yes, it's not", where positive and negative agreement are used in concordance.

But where does this leave the hypothesis predicting children's judgements of negative statements as true as a

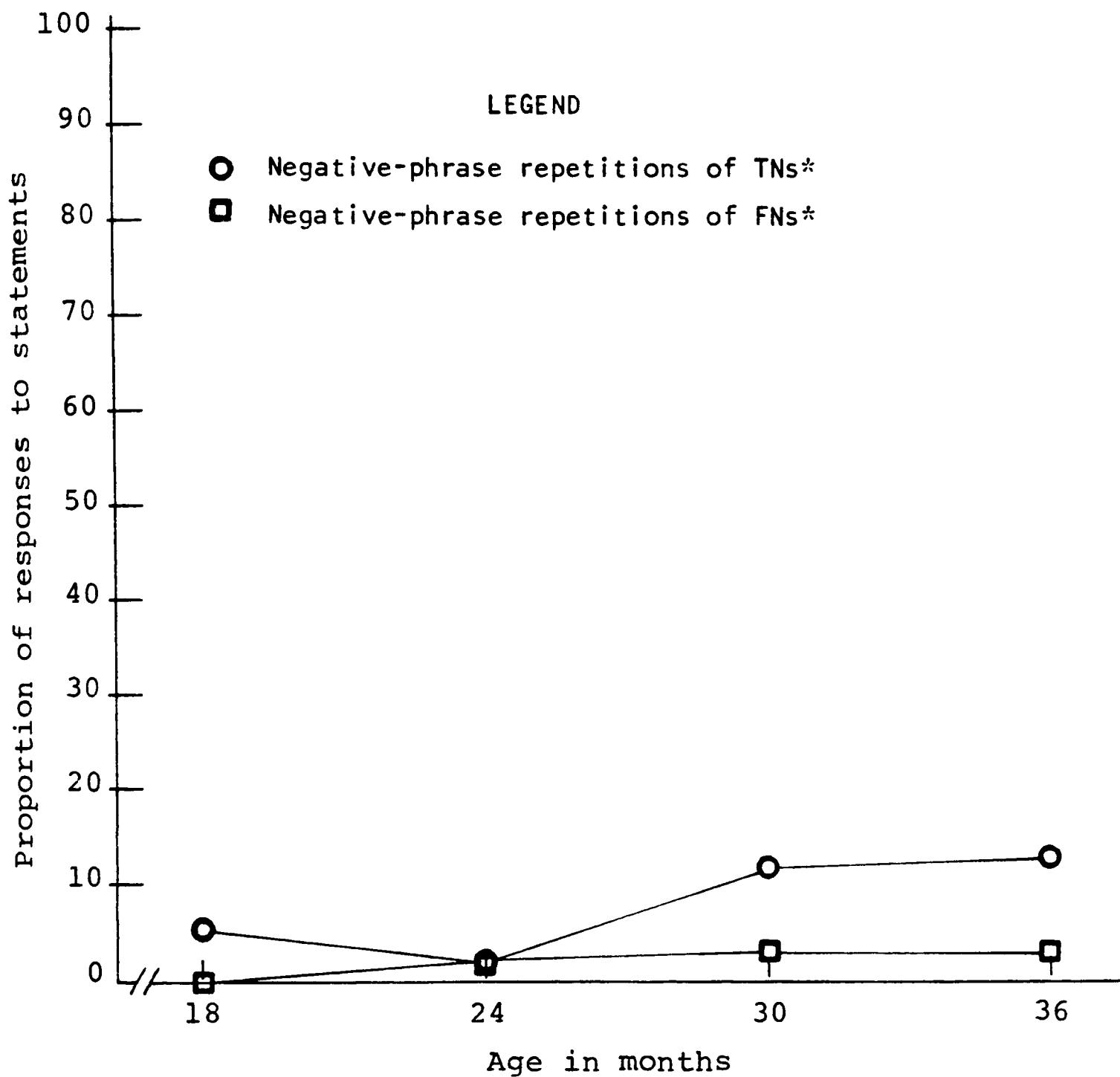


FIGURE 13 Proportions of Negative-Phrase Repetition Responses
to TNs and FNs
(*BASIC Categories 15-18)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
TN	2	$\frac{2}{41}$	$\frac{2}{81}$	$\frac{14}{115}$	$\frac{15}{119}$
	FN	$\frac{0}{52}$	$\frac{2}{84}$	$\frac{3}{117}$	$\frac{3}{120}$

later emergent than judgements of FAs and FNs? Unfortunately the data obtained do not enable a clear answer to this question. First, agreement with TNs must be established. Then, strict criteria for temporal priority of judgement types must be established and data evaluated given such criteria. But as already observed, it can only be clearly established that TNs are agreed with by some 30 month-olds and by the 36 month-old group, though many simple "no" responses which might have been intended as agreements with TNs occur earlier than this. This leads to problems for a temporal-priority of judgement-type evaluation. If one cannot establish when a particular judgement type first emerges, then ordering it relative to other judgement types for order-of-emergence becomes an impossible enterprise. This is not, however, a general problem with developmental-order predictions, since other orderings can be clearly established. For example, in Section 5.2.1, results are reported which demonstrate that judgements of True-Affirmatives as true do not occur before judgements of False-Affirmatives as false. The particular problem here results from the difficulty of interpreting many of the types of "no" response to the TN statements. It was suggested earlier that some types of "no" responses, those involving repetitions of the negative-phrase of the TN,

demonstrate agreement with statements of this type. One interesting phenomenon indicates that TNs are also being disagreed with at this time.

A prevalent response pattern to TNs, especially at 30 months of age, was to oppose the statement by its affirmative counterpart, most frequently with an emphatic "is" as in "yes, it is!" Since the end result of such a response is the negating of a TN, by a FA statement, such responses have been relegated to BASIC category 41 as "False Response Type 6 (Appendix B, Section 1.41). Such a response to TN statements at 30 months was quite common, occurring in response to 15% (17/115) of the TN statements (in contrast to 7%(6/81) at 24 months, and 5%(6/119) at 36 months).

The ubiquity of this response at 30 months (dropping for some unknown reason at 36 months) suggests confusion rather than an attempt to "play" the same game as the experimenter by providing false statements, as most responses of the False Response categories seem to indicate (Section 5.2.4). The children are more engaged in disagreeing with some aspect of the TN with their response, as if something is wrong with it. But while this response pattern does demonstrate that SOME ASPECT of the TN statement is being opposed by affirmative-disagreement, it does not indicate what that aspect is, and no children

offered reasons such as "that's a funny thing to say" which might support Brown's proposal that TN negative responses are comments on violated presuppositional conditions for the utterance of the true-negative statement.

The most serious barrier to finding out more about the children's conception of TN statements is the prevalence, particularly in the 18 and 24 month-old groups, of the single-word "no" response. Figure 14 depicts the relative proportions of (1) solitary "no", and (2) "no" responses which are either negative-phrase repetitions or elaborations of "no" responses involving naming the referent that is the focus of the TN statement (designated as "complex no responses").

(Insert Figure 14 here)

How are such single-word "no" responses to be interpreted? This problem has already arisen with respect to the same kind of response to FNs (Section 5.1.1.2). Again, one suspects there must be some point to the frequency with which this response is made, relative to the True-Affirmative statements, for example. This contrast is depicted in Figure 15. TNs were more often negated than TAS at 30 ($\alpha = .025$) and 36 ($\alpha = .005$) months (all Wilcoxon

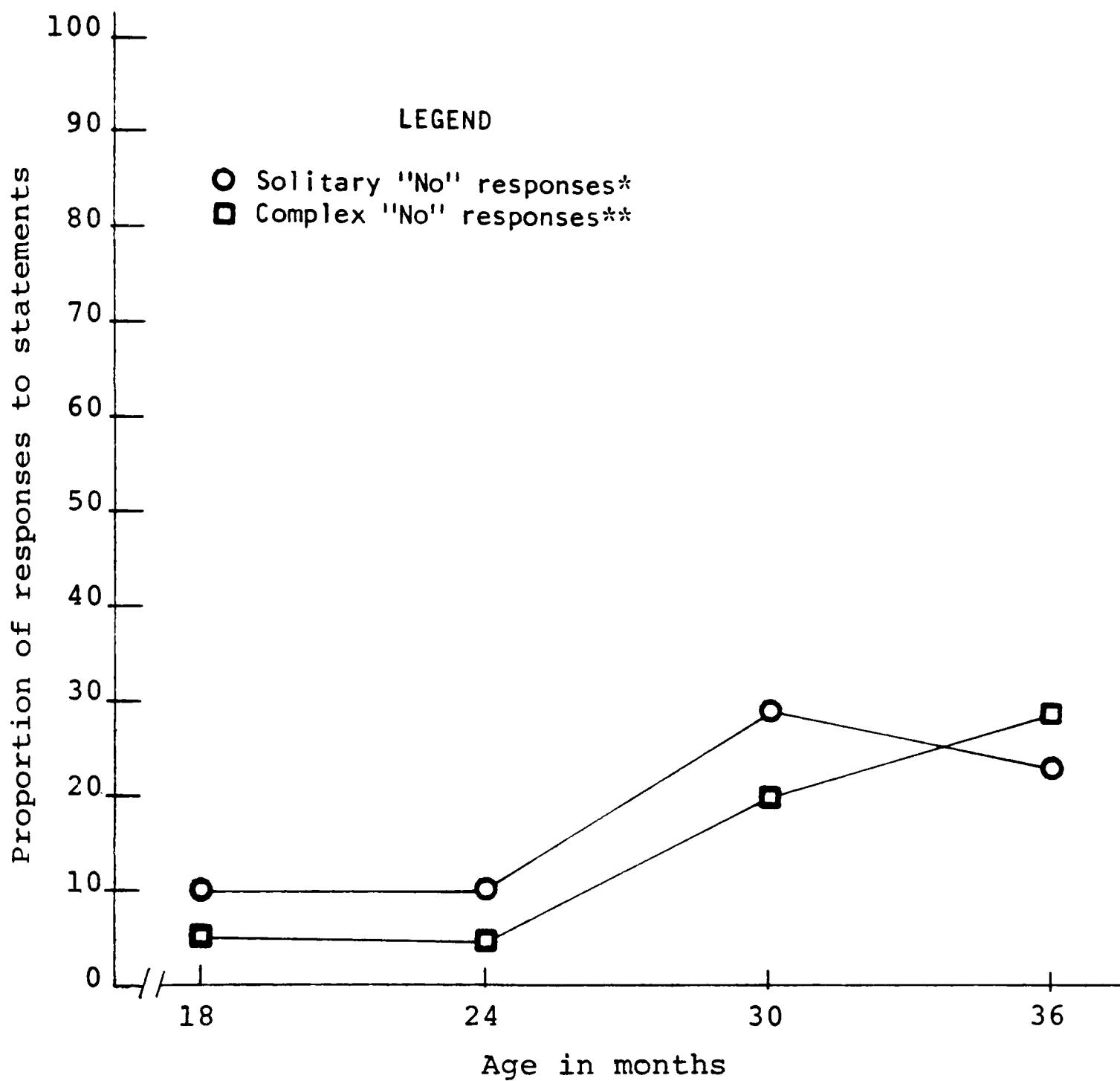


FIGURE 14 Proportions of Solitary "No" Responses and Complex "No" Responses Including Either Referent Naming Elaborations or Negative-Phrase Repetitions to TNs
(*BASIC Category 7;
**BASIC Categories 9-12,15-18)

		<u>Base Frequencies</u>			
		Age in months			
		18	24	30	36
"No" alone	4	4	8	33	27
	41	41	81	115	119
Complex "No"	2	2	3	23	34
	41	41	81	115	119

MPSR, one-tailed tests). But the ambiguity

(Insert Figure 15 here)

of such single-word "no" responses remains, for given the above analyses, they may be either in agreement or disagreement. Hence there is no clearly defined beginning point for evidence of negative-agreement, and the hypothesis concerning temporal sequencing of this judgement form cannot be evaluated. Furthermore, in response to the TNs, even elaborated "no" responses where the referent is named leave the function of the "no" which begins the sentence ambiguous. The TN statement about a ball, "that is not a car", for example, is often responded to with statements like "no, that's a ball". But here too the "no" may serve to either agree or disagree with some aspect of the TN statement, and there is no clue in the children's response patterns as to which of these functions of the "no" is intended.

5.2 Affirmation and negation development in other aspects of the children's judgements

Though the sentence-verification experiment was specifically designed to test the two hypotheses described

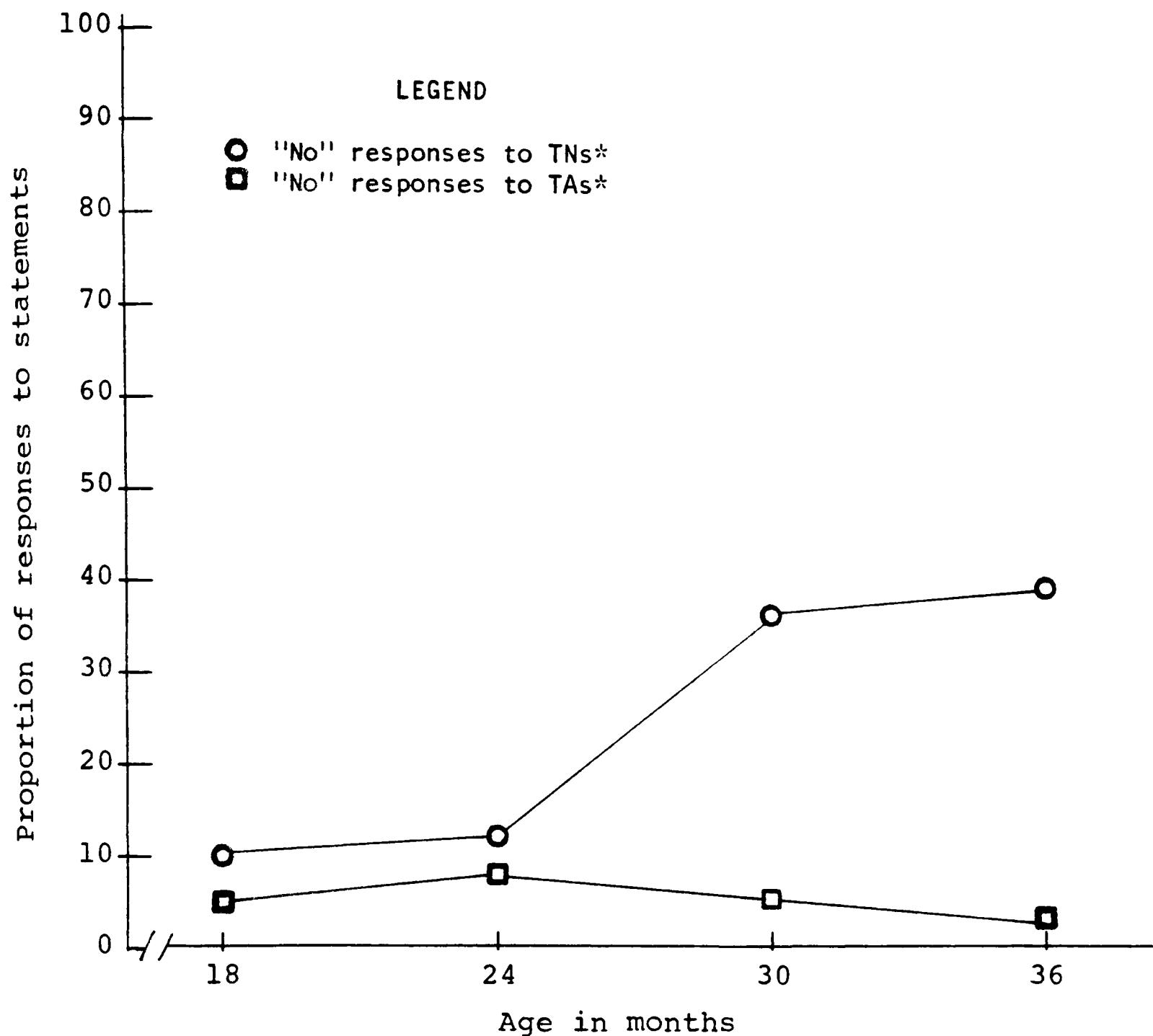


FIGURE 15 Proportions of "No" Responses to TNs and TAs
 (*COMPILED Category B: This does
 not include negative-phrase
 repetitions for the TNs)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
TN	$\frac{4}{41}$	$\frac{10}{81}$	$\frac{41}{115}$	$\frac{47}{119}$
	$\frac{2}{41}$	$\frac{6}{77}$	$\frac{6}{111}$	$\frac{3}{120}$

in the previous section, a number of subsidiary questions relating to negation development can be given preliminary answers on the basis of the data collected in the experiment. Several of these questions relate to variables in the experimental design, as in the case of sex-differences in response patterns. But certain types of responses were unexpected prior to experimentation, and yield important insights into the children's knowledge of negation and truth-conditional rules of language. Children made "explicit opposition" responses in their conjoining of affirmative and negative propositions which made the logical relationship between assertion and denial explicit. They also made their own "false responses" to some of the statements, where they themselves would produce FA and FN statements after manifesting understanding and production of the words they misuse. Results are discussed pertaining to these questions and others in the sections to follow.

5.2.1 The developmental relation between assent and dissent

Does the affirmation of true statements precede or follow the negation of false statements? As we found in Section 5.1.1.1, children negated more FAs than TAs with "no" responses, even at 18 months of age (Figure 2; i.e.,

the female subjects). The primary evidence bearing on the developmental ordering of TA assent relative to FA dissent results from a comparison of "yes" responses to TAs and "no" responses to FAs, as presented in Figure 16.

(Insert Figure 16 here)

At 18 months, there was not a single "yes" response made to TA statements, whereas FAs were frequently corrected with "no" responses. This appearance of false-statement dissent with "no" prior to true-statement assent with "yes" displays the same order as that usually reported for the first use of "no" and "yes" in children's speech productions, with "no" generally occurring before "yes" (e.g., Greenfield & Smith, 1976; Jespersen, 1917; Leopold, 1939).

5.2.2 The emergence of rejective anaphoric and predicative anaphoric sentence negation

In Chapter II, a current distinction between two types of sentential negation was reviewed. These two types were "anaphoric negation", which negates a prior utterance with the morpheme "no" and then asserts an affirmative sentence, and "non-anaphoric negation" which directly negates the prior utterance with a sentence of -p form, where "-" is

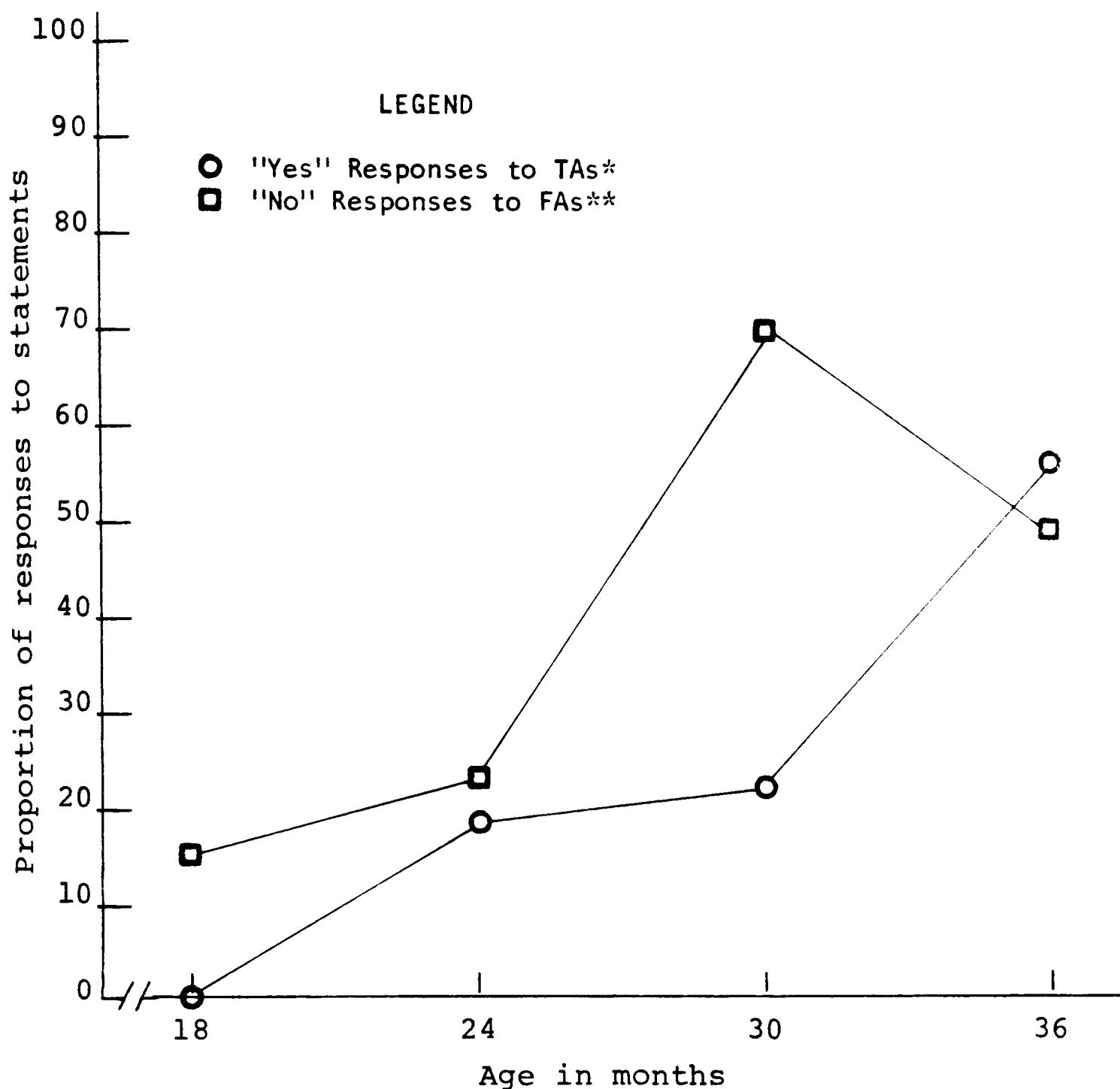


FIGURE 16 Proportions of "Yes" Responses to TAs and "No" Responses to FAs

(*COMPILED Category A;
**COMPILED Category B)

Base Frequencies

Age in months

	18	24	30	36
"Yes" (TAs)	0 41	14 77	24 111	67 120
"No" (FAs)	10 66	21 92	81 115	59 120

usually the negative morpheme "not" and p is the previous utterance being negated. Bloom (1970) seems to have used the term "anaphoric negation" for NO + AFFIRMATIVE SENTENCE negatives because such sentences each had an initial "no" morpheme that did not negate the remainder of the sentence, but instead referred back to the previous utterance. But strictly speaking, both of these types of negation can be discourse negations which are "anaphoric" in that they relate back to a previously expressed proposition and negate it. The two types only differ in the function of the negative. This previous terminology is hence misleading, and an additional motivation dictates a redesignation of these two important forms of sentential negation. This motivation concerns a predicted vertical décalage⁶ between negation development at the single-word stage and at the sentence level. According to Piaget's theory of cognitive development, structures of a rudimentary level are

⁶The term "vertical décalage" was used by Piaget (1926), where the term "vertical" refers to ascending age, and "décalage" to the gap between the successive developments under consideration.

reconstructed at a higher stage of symbolic representation. According to this prediction, the sequence of stages for the functions of single-word negation will be recapitulated in the emerging functions of sentential negation. Specifically, what have been called "anaphoric" negative sentences are denoted here as REJECTIVE ANAPHORIC negatives, and what have previously been called "non-anaphoric" negative sentences are denoted as PREDICATIVE ANAPHORIC negatives. The former, we are predicting, should appear prior to the latter in sentence negation development (as Wode, 1977 has assumed, but for different reasons - Chapter II, Section 5) because of the cognitive primacy of REJECTION. The predictions of the longitudinal scheme for early semantic functions of negation, which are based on the notion of cognitive complexity (Chapter I), apply once again at the higher level of sentence negations.

This distinction was central in Wode's (1977) general theory of negation development, which claims that "anaphoric" negation precedes "non-anaphoric" negation in language development. This prediction may be tested with a consideration of the negative responses to statements by children of different ages in the study. Specifically, the occurrence of NOT-p, or PREDICATIVE ANAPHORIC negation can be compared to NO, q, or REJECTIVE ANAPHORIC negation. This

breakdown of "no" responses is presented in Figure 17. Although rarely occurring, both types of negatives

(Insert Figure 17 here)

appeared at 18 months, with several instances of headshake plus name⁷. At 24 months, REJECTIVE ANAPHORIC negation was more frequent than PREDICATIVE ANAPHORIC negation, providing evidence for its temporal priority. This argument is based on several premises. The first is that an equal opportunity for denial with negations exists for these two types. This may be illustrated, for example, with the FA statement "that is a p" when the referent is in fact q. To correct this with negation, the child can either say "no, q" (REJECTIVE ANAPHORIC negation) or "not-p" (PREDICATIVE ANAPHORIC negation). The other premise concerns a method of establishing the temporal priority of linguistic forms, and

⁷Such utterances which combine a word with a headshake to express a negative meaning, given the context, have also been observed in previous studies (Carter, 1974; Halliday, 1975, p. 45).

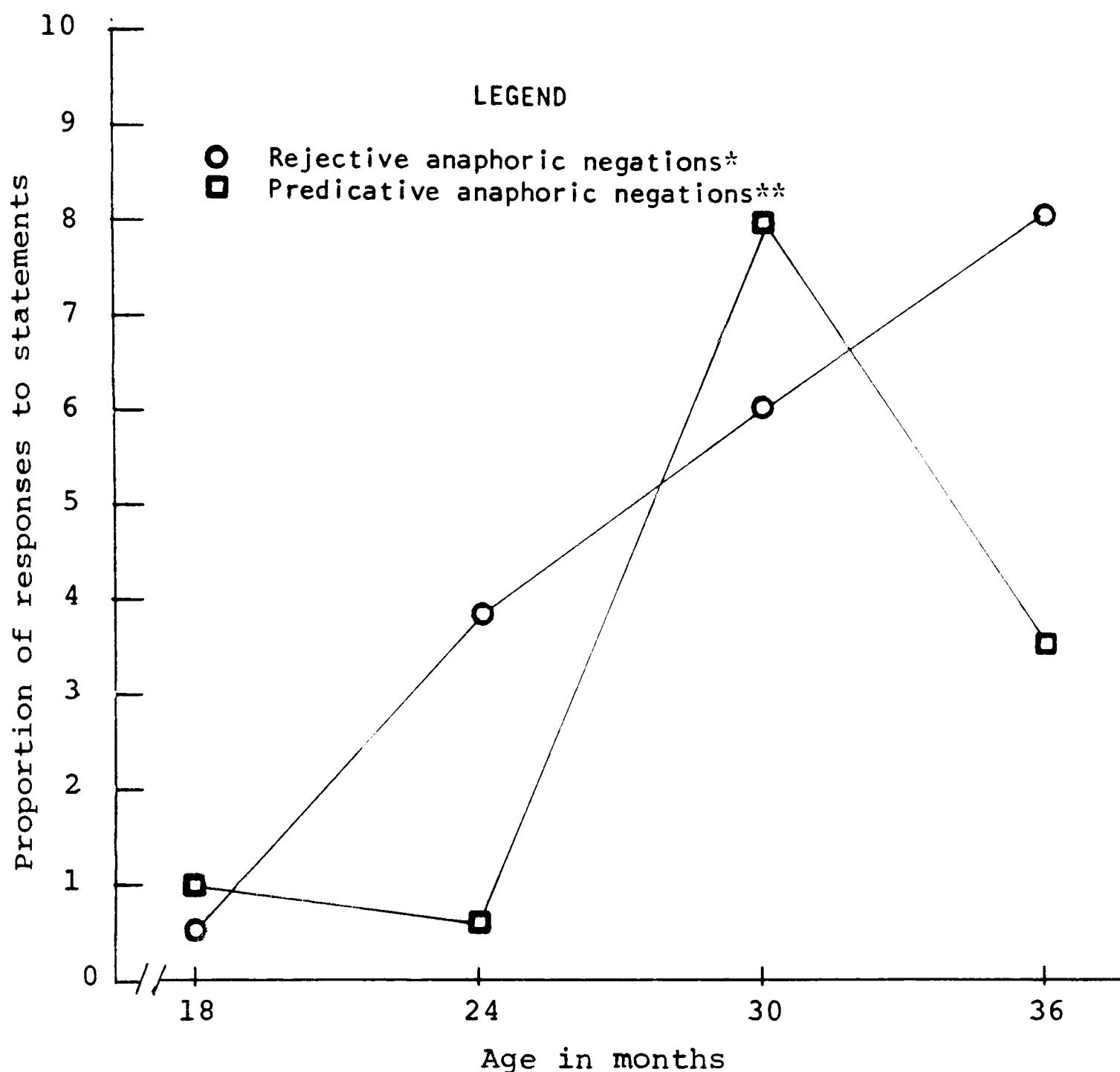


FIGURE 17 Overall Proportions of Rejective Anaphoric Negative Sentences and Predicative Anaphoric Negative Sentences^a
(*BASIC Categories 9-12,34;
**BASIC Categories 13,14,32,33)

	<u>Base Frequencies</u>			
	Age in months			
	18	24	30	36
Rejective Anaphoric	$\frac{1}{200}$	$\frac{13}{334}$	$\frac{28}{458}$	$\frac{39}{479}$
Predicative Anaphoric	$\frac{2}{200}$	$\frac{2}{334}$	$\frac{37}{458}$	$\frac{17}{479}$

^aNote reduced scale of graph.

elaborates a suggestion by Brown (1973) that a linguistic form cannot be clearly considered part of a child's linguistic competence until it begins to appear frequently in obligatory contexts. Brown was specifically concerned with the use of morphological inflections such as the plural "s", but the point is a general one. Since the denial of statements may be accomplished with either REJECTIVE or PREDICATIVE ANAPHORIC negation, the strength of response as determined by its frequency is a measure of its developmental stability as a form of denial. The prediction of REJECTIVE ANAPHORIC negation appearing prior to PREDICATIVE ANAPHORIC negation is thus supported, and provides the previous "anaphoric/ non-anaphoric" sentence negation distinction with a cognitive basis.

5.2.3 The conjunction of assertion and denial: "explicit oppositions"

One particularly important response type was unanticipated prior to the execution of the sentence-verification experiment. This kind of response was one in which a child conjoins two sentences in succession with one another which make explicit the logical relationship between DENIAL, where the child is correcting a mistaken statement, and ASSERTION, where the child is

correctly naming either the referent or the thing referred to in the false statement. These conjunctions have been designated as "explicit oppositions".

One statement type to which this complex response was often made was the False-Affirmative (FA) which incorrectly names the referent, and in so doing, names some other referent, which will be denoted here as the "mentioned referent". Such FAs can be corrected in several ways by "explicit opposition" (E.O.) responses. Three of these four types (A1-A3) all utilize negative morphemes, while a fourth, Type B, does not. The four types are summarized below with a False-Affirmative statement example.

FA: "That is a ball" (experimenter indicates a car)

E.O. Type A1: "that's not a ball" (child looking at car),
"that's a ball" (child looking at ball).

E.O. Type A2: "that's not a ball" (child looking at car),
"that's a car" (child still looking at car).

E.O. Type A3: "no, it's a car" (child looking at car),
"that's the ball" (child looking at ball).

or

"no, that's the ball" (child looking at ball),
"that's the car" (child looking at car).

E.O. Type B: "that's the car" (child looking at car),
"that's the ball" (child looking at ball).

Both Types A1 and A2 are partially comprised of a PREDICATIVE ANAPHORIC negation (Section 5.2.2) which directly negates the remainder of the sentence, while the negation of Type A3 is REJECTIVE ANAPHORIC, denying the previous statement and making an alternative assertion. Type B involves a correction of the FA by the assertion of the correct name of the referent, coupled with the indication and naming of the mentioned referent.

Whereas at 18 months "explicit oppositions" of any type are rare, by 36 months they are very frequently used to correct FA statements, functioning to deny and then assert something concerning 21% of the FA statements, as shown in Figure 18. In addition to being a generally

(Insert Figure 18 here)

more frequent form of logical denial with the increasing age of the subject population, there was also a differentiation of E.O. type whereby certain types were predominant for the different age groups. At 18 months, the only type of E.O. response expressed at all was Type B (and even then only once), which does not utilize a negative morpheme. The Type

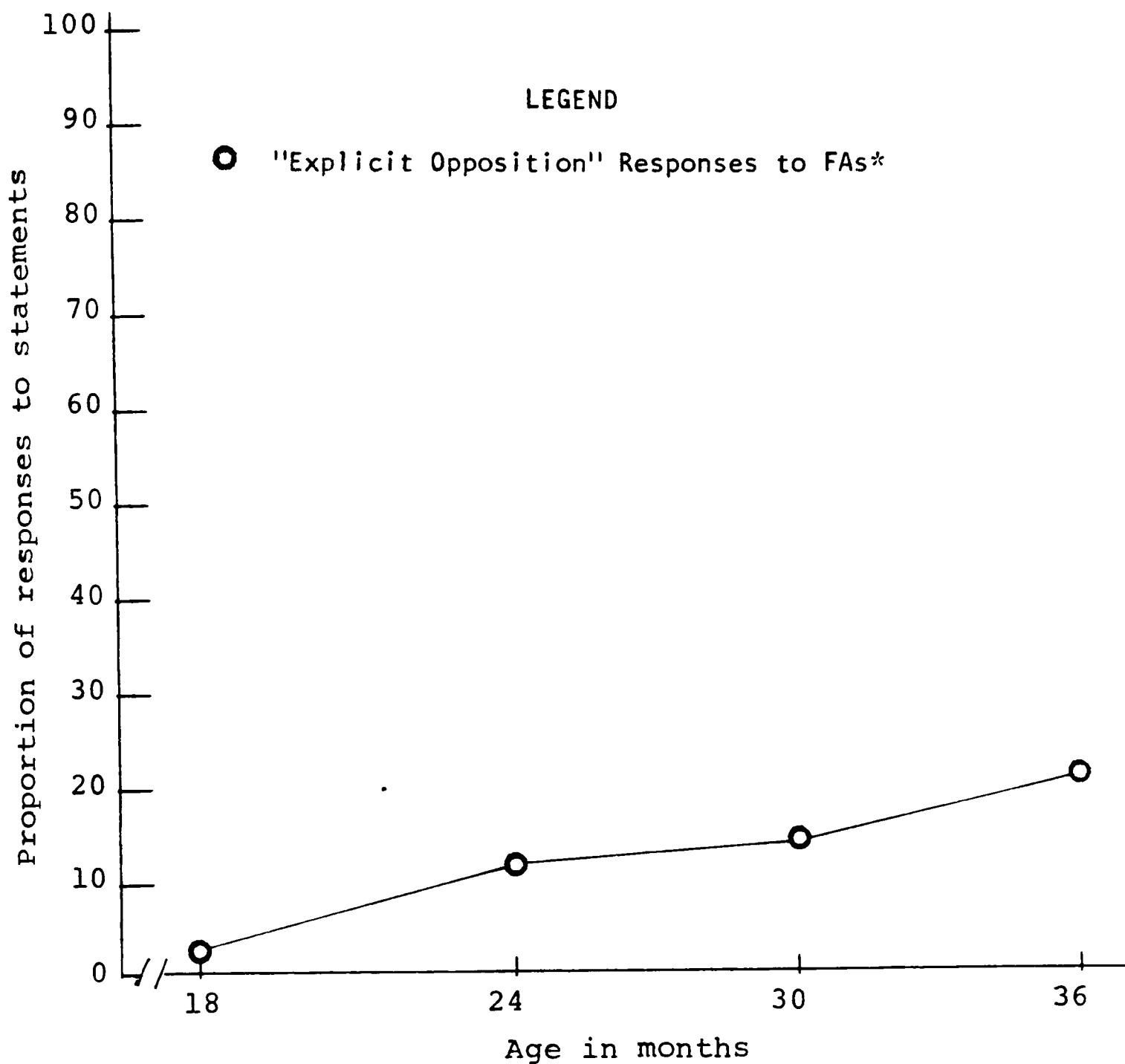


FIGURE 18 Proportion of "Explicit Opposition" Responses to FAs
(*COMPILED Category K)

<u>Base Frequencies</u>			
Age in months			
18	24	30	36
1 66	10 92	16 115	25 120

B response was also the most frequent at 24 months (in response to 5%, or 5/92 FAs), with the next most frequent type (in response to 3%, or 3/92 FAs) being A3, which incorporates the REJECTIVE ANAPHORIC form of negation that was found to emerge before PREDICATIVE ANAPHORIC negation in sentences used for truth-functional negation (Section 5.2.1). The other interesting difference concerns E.O. Types A1 and A2, for which data are presented in Table 7.

At 30 months, Type A1

Table 7

Proportion and frequency of Explicit Opposition Response Types A1, A2, and A3 to False Affirmative (FA) statements

	<u>Age in months</u>	<u>18</u>	<u>24</u>	<u>30</u>	<u>36</u>
E.O. A1 ^a	0/66	1/92 (.01)	11/115 (.10)	1/120 (.01)	
Type A2 ^b	0/66	1/92 (.01)	3/115 (.03)	10/120 (.08)	
A3 ^c	0/66	3/92 (.03)	2/115 (.02)	2/120 (.02)	

^a BASIC category 32.

^b BASIC category 33.

^c BASIC category 34.

predominates as the preferred form of E.O. type logical correction utilizing negative morphemes (67% of the Type A E.O.s), while at 36 months, E.O. Type A2 is used more frequently (72% of the Type A E.O.s). What this means in concrete terms is that where 30 month-olds are most often

correcting FAs by focusing on the mentioned name, first denying that it is correctly applied to the referent and then asserting it with the correct referent (Scheme II response), 36 month-olds are most often correcting the FAs by focusing on the referent object, first denying the name asserted of it, and then correctly naming it. The significance of this shift seems to be that 36 month-olds find it easier to note that a single referent can be both NOT-X and Y at the same time, where X is the mentioned name and Y the correct name for the referent. The 30 month-olds seem to find it easier to note that the referent is NOT-X and to then go and find something which is X. These are important differences which deserve further study and replication with a larger sample, but which transcend the scope of the thesis.

5.2.4 False responses

The ability to say that which may not be so (lies, fictions, errors, superstitions, religions, hypotheses, science, delusions and ambitions) lays the foundations for some of man's greatest achievements, as well as for some of his basest acts, and much of his mental illness.
Altmann (1967, p. 353)

An extremely important type of response occurred in the 24 to 36 month-old groups which provides new insights into

the knowledge of language possessed by children of this age-range. As described in the categorization criteria specifications (Appendix B, Sections 1.36-1.42), these false responses are utterances which either spontaneously express false statements or mark a consensus with false statements. There were seven different types of False Response which were observed to occur. One prerequisite to the categorization of a response as a False Response of any type was that the child had to have produced both the name of the referent and the mentioned name (if one is involved) in the word-production pretest (Section 3.3). Otherwise, it might have been the case that children who seemed to be producing False Responses were, for example, just imitating mentioned words they did not know rather than knowingly misnaming things. The implications of the production of these False Responses are far-reaching, and to anticipate the discussion at the end of this section, provide an additional form of evidence that young children are aware of truth-conditions for at least certain simple sentences, and furthermore, that they have reflective knowledge of such truth-conditions which enables them to systematically manipulate the rules of the "predication game" basic to the logical operations of assertion and denial.

There are four fundamental groups of False Response

types derivable from the original group of False Responses Types 1-7 in the BASIC coding system (see Appendix B). Three of these are False Responses relating to the False-Affirmative statement type, while another concerns the False-Negative statement type.

One of these fundamental groups centres on MISNAMINGS of various kinds, where a different name than the correct one is applied to a referent. This group subsumes False Response Types 1-4, which were either (1) misnamings of the referent indicated by the experimenter, (2) applications of the referent name to an incorrect referent, (3) applications of the mentioned name to an incorrect referent, and (4) multiple misnamings where both False Response Types (1) and either (2) or (3) were used. While one might have expected certain of these types of misnamings to predominate in different age-groups, such differences were not evidenced so the various misnamings represented by False Response Types 1-4 are grouped together. Such False Responses involving misnamings began to occur at 24 months, and the overall proportion of total statements to which such responses were utilized did not change markedly for the 30 and 36 month-old groups (near .03 for all groups from 24-36 months). The number of subjects per age group contributing the False Responses involving misnamings did change with

age, however. No 18 month-old subjects produced such responses, and this figure increased from 3/10 at 24 months, to 7/10 at 30 months, and then 5/10 at 36 months. Furthermore, when we break down the False Responses involving misnamings of some kind which were made to the different statement types, one developmental pattern in particular emerges. This pattern involves misnamings by the child after the experimenter has presented either a FA or FN statement, as shown in Table 8. Whereas misnamings in response to FAs are generally equally

Table 8
Proportion of statements with False Responses
involving misnamings*

	<u>Age in months</u>	<u>18</u>	<u>24</u>	<u>30</u>	<u>36</u>
TA	0/41	2/77(.02)	4/111(.04)	1/120(.01)	
FA	0/66	4/92(.04)	3/115(.03)	3/120(.03)	
FN	0/52	1/84(.01)	9/117(.08)	8/120(.07)	
TN	0/41	1/81(.01)	1/115(.01)	3/119(.03)	

(*sum of proportions for BASIC categories 36-39)

present from 24-36 months, misnamings following FNs only become frequent for the 30 and 36 month-old groups. This

point does not deserve elaborating, since there were so few responses overall on which it was based, but it seems to suggest that while 24 month-olds focus on the falsity of FA statements and provide like misnamings, it is not until 30 months when the falsity of both affirmative and negative statements spurs the production of False Responses involving misnamings. Interestingly, a second and related fundamental group of False Responses (Type 5), which involve the negating of the experimenter's TA statement and hence the spontaneous production of a FN statement, also do not occur until 30 months of age, when 5 of the 10 subjects that age contributed false responses of this type (to a total of 6%, or 7/111 of the TAs).

False Responses Types 6 and 7 both involve a consensus of some form with a False Affirmative statement (FA). False Response Type 7 consists of an agreement with the FA produced by the experimenter, and was most frequent as a response at 24 to 30 months of age. This was also the only type of False Response to be produced by the 18 month-old group. Subjects could also have agreed with the FA by shifting attention to the mentioned name, making the FA a TA in effect, but this was rare. The data for both FA agreement with the referent as focus and with the referent of the mentioned name as focus are presented in Table 9.

Table 9

Proportion of statements with False Responses of Type 7 involving agreement with FA statements compared to "Yes II" responses involving agreement with FA statements where the referent of the mentioned name is the focus of attention

	<u>Age in months</u>			
	<u>18</u>	<u>24</u>	<u>30</u>	<u>36</u>
FR Type 7 ^a	2/66 (.03)	6/92 (.07)	8/115 (.07)	4/120 (.03)
"YesII" ^b	0/66 (0)	2/92 (.02)	4/115 (.03)	0/120 (0)

(^aBASIC category 42; ^bCOMPILED category F.)

False Response Type 6 is unique in that it concerns a response to the TN statement type discussed in Section 5.1.2. The TN statement is particularly difficult since it violates the normal presuppositional conditions for the production of negative sentences in denying something that no one has reason to believe. The interpretation of this False Response type, which consists of a denial of a TN statement, is not that the child is intentionally transforming a true statement into a false one by opposing it, but that such responses are evidence of a confusion the child experiences with the TN statements. Something is wrong with the TN statement, and our analysis of other types

of responses to this statement type indicated that there are many disagreements with the TN, one of which is the False Response Type 6. Emphatic oppositions to TNs of "yes it is!" similar in form to FN oppositional affirmatives (Section 5.1.1.2), are the prototypic Type 6 False Responses. Thus although the end result of such responses is to assert the opposite of the TN (the FA), they are not seen as a False Response type which is related to False Response Types 1-5 and 7 as yet another form of intentional misuse or play with the conventional rules for producing true utterances. Throughout the remainder of the discussion of false responses, therefore, the False Response Types 1-5 and 7 will remain our focus.

In summary, children aged 24 to 36 months of age were found to spontaneously produce different kinds of False Responses to stimulus sentences involving words they both understood and produced. This finding leads to several new conclusions about children's conception of language and of negation in this age range. Earlier (Section 5.1.1) it was demonstrated that children recognize the correspondence rules for truth which regulate language-use in statements about the world via evidence of their denials of false statements, which were frequently carried out with the use of negative morphemes. Such denials of truth-functional

negation express judgements concerning the language use of another person and demonstrate an implicit awareness of truth-conditions much as our use of language demonstrates implicit awareness of the rules of grammar (Chomsky, 1972). But when these children also systematically break the correspondence rules of truth in their production of False Responses, they reveal a REFLECTIVE knowledge of truth-conditions.

This new form of knowledge is an important development in the child's linguistic knowledge for many reasons. It allows a transcendence of language use and language reflection from the plane of interaction and immediate means-end satisfaction (Bates, 1976; Bruner, 1975a) to language in the hypothetical mode and the use of the counterfactual conditional (Marshall, 1970, p. 44; Morton, 1970, p. 94). It is primarily for these reasons that language theorists have dwelt upon the importance of lying (Janet, cited in Piaget, 1962, p. 233; Sturtevant, 1947, cited in Sebeok, 1976). Lying is a type of distortion of reality by means of language which is linked to both the language of hypothesizing and the False Responses above. Lying was also a previous topic of great interest in child development (Stern & Stern, 1910; Stern, 1924) because it presupposed a stage of "psychic development" involving three

components: "(1) a consciousness of falsity, (2) intentional deception, and (3) a distinct purpose in view" (Stern, 1924, p. 539). The False Responses which children made in this sentence- verification study share only the first of these components of lies, in demonstrating the children's consciousness of the contrast between truth and falsity in their intentional production of false statements. The children did not intend to deceive the experimenter, since the objects concerned were in clear view and not displaced, a feature of lying which Hockett (1963) and Altmann (1967) both consider as criterial, and also because such False Responses were frequently accompanied by laughter, very loud voice, accentuated intonation, and looks to the mother. No one was being fooled. It seems more likely, as Davison (1974), one observer of early insincere activity, has also noted, that these falsehoods have the purpose of conveying humour. The children also had no distinct purpose in view or vested interest in having their False Responses believed by their interlocutor, unlike the lying child who has broken a glass and disclaims himself as agent.

Now as we found in the data analyses above, children from 24 to 36 months of age expressed such false statements. Can any developmental patterns be discerned in their use of False Responses? Table 10 provides an important clue to

untangling this puzzle. The simplest form of False

Table 10

Proportion and Frequency of False Response Types 1-5 & 7^a
to the Four Statement Types (TA, FA, FN, TN)

	<u>Age in months</u>			
	<u>18</u>	<u>24</u>	<u>30</u>	<u>36</u>
TA	0/41(0)	2/77(.03)	11/111(.10)	3/120(.03)
FA	2/66(.03)	10/92(.11)	11/115(.10)	7/120(.06)
FN	0/52(0)	1/84(.01)	9/117(.08)	8/120(.07)
TN	0/41(0)	1/81(.01)	1/115(.01)	3/119(.03)

(a Total of BASIC categories 36-40, 42)

Response is a statement of False-Affirmative form, assuming that producing a false statement of negative form (to TAs, see discussion of False Response Type 5, p. 242) is more difficult than one of affirmative form. As Table 10 indicates, it is in response to the experimental False-Affirmative statements when the only False Response are produced at 18 months, and when most (71%) of the False Responses are produced at 24 months. This same context for False Responses does not show a selective facilitative effect at 30 and 36 months, from which it is tentatively concluded on the basis of these data that the youngest groups, at 18 and 24 months, generally first required a simple to understand false statement (the FA) themselves to

spur the production of a False Response on their own.

5.2.5 Sex differences in response patterns

The central question to be addressed in an analysis of the data for the male versus the female subjects is whether particular response patterns which provided evidence for the major hypothesis concerning the occurrence of truth-functional denial (Section 5.1) were contributed primarily by the responses of one sex. One might expect this to be the case because of ample documentation that females talk earlier and more than males do in the preschool years (e.g., Harris, 1977). Just to note two examples, girls generally attain a vocabulary of 50 words several months before boys (girls: 18 months, boys: 22.1 months; Nelson, 1973), and produce many more complex syntactic constructions such as passives, reflexives, subordinate clauses, and conjunctions from 24 to 50 months (Horgan, 1976). The loquaciousness of the females relative to males is indicated by the data presented in Table 11. Girls

Table 11

Mean-Length of Utterance and Total Number of Utterances
Produced in the Free Language Session by Boys and Girls

		<u>MLU</u>	<u>Total utterances</u>
18 months	MALE (N=5)	0.82 ^a	71
	FEMALE (N=5)	1.20	181
24 months	MALE (N=5)	1.56	291
	FEMALE (N=5)	2.92	542
30 months	MALE (N=5)	2.96	549
	FEMALE (N=5)	2.93	488
36 months	MALE (N=5)	4.29	483
	FEMALE (N=5)	3.77	436

(^aThis figure is below 1.0 because one subject had not begun to produce any words. Excluding that subject, the 4 remaining males had a mean MLU of 1.03.)

produced many more utterances and had a longer average utterance-length as measured in morphemes⁸ than did boys at both 18 and 24 months of age, although the difference marginally reversed direction for the 30 and 36 month-old groups.

Several response domains are dominated almost entirely by the females of the 18 and 24 month-old groups. The 18 month-old girls are producing almost all of the corrections of FAs for that age-group (Sections 5.1.1.1 & 5.1.1.3) by

⁸Calculated according to the criteria introduced by Roger Brown (1973, p. 54).

either using the word "no" or naming the referent most often for this statement type. This is shown in Table 12. In addition, the

Table 12

Frequencies and Proportions of "No" Responses^a and Referent Naming Responses^b Compared for TAs and FAs as a Function of Sex of Subject at 18 Months

	<u>"No"</u>		<u>Referent Names</u>	
	<u>TA</u>	<u>FA</u>	<u>TA</u>	<u>FA</u>
18 month-old males(N = 5)	0/16(0)	1/28(.04)	1/16(.06)	2/28(.07)
18 month-old females(N = 5)	2/25(.08)	9/38(.24)	2/25(.08)	11/38(.29)

^a COMPILED category B.

^b COMPILED category D.

females of the 24 month-old group are responsible for producing 42/51 or 82% of the total number of "no" responses, and as depicted in Table 13, this means that they were the subjects of that age-group who were primarily negating false statements. The 24 month-old females negated

Table 13

Frequencies and Proportions of "No" Responses^a to TAs, FAs, FNs, and TNs for Male and Female 24 Month-olds

	<u>Statement-Type</u>	<u>TA</u>	<u>FA</u>	<u>FN</u>	<u>TN</u>
MALE		0/33(0)	2/40(.05)	3/37(.08)	4/34(.12)
FEMALE		6/44(.14)	19/52(.37)	11/47(.23)	6/47(.13)

^a COMPILED category B.

significantly more FAs than TAs ($\alpha = .05$, paired difference t-test, one-tailed, $df = 4$). Also, when one considers referent naming corrections of FNs by 24 month-olds which consist of predicate-phrase elaborations, such as "it is a ball" (BASIC category 21), the females once again were doing the correcting, producing 13 of these corrections (contributed by 3 of the 5 female subjects) compared to none for the males. The pattern seems to be that for the 18 and 24 month-old groups studied here, females are the primary contributors to the group data demonstrating truth-functional denial with "no" responses and false statement correction with referent naming.

Since the primary basis for our ascription of truth-functional abilities to the children consists of the expression of linguistic judgements, and 18 to 24 month-old boys were less verbal than girls in the same age groups (cf.

Table 11), we were left with the conclusion, given the paucity of data for the boys, that such ascriptions are only warranted for the female subjects of these age-groups. But what about the 30 and 36 month-old boys? At 30 months of age, the male and female subjects are nearly matched on linguistic maturity, at least as measured by mean length of utterance (males: 2.96 morphemes; females: 2.93 morphemes), so that any differences attributable to the linguistic precocity of the females should disappear. Remaining differences would indicate different approaches or styles of the two sexes for comprehending and correcting sentences.

There are three primary differences of interest between the response patterns of the male and female 30 month-olds. One of these consists of different ways of correcting the FN statement. As pointed out in Section 5.1.1.2, one can either negate the FN by using an oppositional affirmative morpheme (and often a referent name predicate phrase) or with a negative morpheme. Whereas 30 month-old males are more inclined to provide oppositional "yes" responses to FNs than "no" responses, females in that age-group use these two types of response with near equal frequency. This is shown in Table 14.

Table 14

Frequencies and Proportions of "Yes" Responses^a Compared to "No" Responses^b to FNs for Male and Female 30 Month-olds

	<u>"Yes"</u>	<u>"No"</u>
30 month-old males (N = 5)	16/60(.27)	6/60(.10)
30 month-old females (N = 5)	20/57(.35)	17/57(.30)

^a COMPILED category A.
^b COMPILED category B.

Males also provide significantly more (Pearson $\chi^2 = 10.38$; df = 1; $p \leq .01$) referent naming corrections in response to FNs (to 72% of them, contributed by all 5 males) than do females (51%, contributed by 4 of 5 females) at 30 months of age (COMPILED category D).

A second difference between the sexes at 30 months also involves false statement correction. There is very nearly a bimodal distribution for the type of syntactic "no" response used by males and females to correct FAs, as illustrated in Table 15. Whereas females are primarily correcting FAs

Table 15

Frequencies and Proportions of Rejective Anaphoric^a and Predicative Anaphoric^b Sentence Negations to FAs Compared for 30 Month-old Males and Females

	<u>Males</u>	<u>Females</u>
Rejective anaphoric	2/59(.03)	14/56(.25)
Predicative anaphoric	32/59(.54)	5/56(.09)

^a BASIC categories 9-12 and 34.

^b BASIC categories 13, 14, 32 and 33.

with responses which contain rejective anaphoric negative sentences (of the form "NO + AFFIRMATIVE SENTENCE"), males are predominantly correcting FAs with responses containing predicative anaphoric negative sentences (of the form "NOT-X", where X represents a previous proposition). This difference in FA negation style between 30 month-old males and females is highly significant (Pearson's $\chi^2 = 26.87$; df = 1; $p \leq .001$). Considering that in Section 5.2.2 it was found that rejective anaphoric negation develops prior to predicative anaphoric negation, and that earlier (at 18 and 24 months) males were behind females in linguistic maturity, this result is somewhat unexpected. It seems to be linked to the preference for using oppositional affirmatives rather than "no" responses to correct FNs by males of this age, since predicative anaphoric sentences also directly negate

the previous proposition (rather than saying "no" and then asserting an alternative name). But the result is still difficult to explain, particularly because the difference disappears entirely in a consideration of these same responses in a comparison of males and females at 36 months of age. Instead of a bimodal split in FA negation strategy between the sexes as at 30 months, 36 month-old females use both forms of correction more frequently than the same age male group, and for neither sex is there a preference for one of the two types of FA correction, as shown in Table 16.

Table 16

Frequencies and Proportions of Rejective Anaphoric^a and Predicative Anaphoric^b Sentence Negations to FAs Compared for 36 Month-old Males and Females

	<u>Male</u>	<u>Female</u>
Rejective anaphoric	4/59(.07)	13/61(.21)
Predicative anaphoric	4/59(.07)	13/61(.21)

^a BASIC categories 9-12 and 34.

^b BASIC categories 13, 14, 32, and 33.

These 36 month-old females use both forms equally often, in response to 21% of the FAs, as do the males far less frequently, to only 7% of the FAs. Why 30 month-old males should be so proficient at using predicative anaphoric sentence negations to correct FAs and yet a group of 36

month-old males rarely use such a form of truth-functional denial is a puzzle that merits further study.

The third primary sex difference is unfortunately no less of an enigma, again concerning a pattern prevalent at 30 months which is not really present in the 36 month-old group. Males and females respond very differently to TN statements at 30 months. The females respond primarily with single word "no" responses (significantly different from males: Pearson's $\chi^2 = 6.88$; df = 1; $p \leq .01$) and the males with negative-phrase repetitions (BASIC categories 15-16; significantly more than females, Pearson's $\chi^2 = 4.89$; df = 1; $p \leq .05$) and emphatic denials which are categorized as False Response Type 6 (see Section 5.2.4; again significantly more than females, Pearson's $\chi^2 = 8.66$; df = 1; $p \leq .01$). These differences are captured in Table 17.

Table 17

Frequencies and Proportions of Single-word "No" Responses^a Negative Phrase Repetitions^b and Denials of TN Statements^c for 30 Month-old Males and Females

	<u>single-word "no"</u>	<u>neg-phrase repetition</u>	<u>denial of TNs</u>
30 month-old males(N = 5)	10/57(.18)	12/57(.21)	14/57(.25)
30 month-old females(N = 5)	23/58(.40)	4/58(.07)	3/58(.05)

^aBASIC category 7.

^bBASIC categories 15-18.

^cBASIC category 41.

The difficulty with TN statements is well-documented (Section 5.1.2), and the ambiguity of the single-word "no" response to such sentences has been underscored. Does it function to agree with the TN statement, or to reject it for some reason relating to its conversational unacceptability? This problem is endemic to these analyses as well. The negative-phrase repetition was earlier interpreted as an agreement response to TNs, and from this evidence it seems that males come to agree with TNs prior to females. Again, this is counterintuitive if one holds that females are generally advanced in not only the pace of language development and relative talkativeness, for the 30 month-old males are matched on the currently-best measure of linguistic maturity (i.e., Roger Brown's MLU measure, Brown, 1973) with the females, while agreeing with the truth of the TN and transcending its inappropriate conversational context is a mature linguistic ability. One speculative interpretation of this difference in TN responding between 30 month-old males and females is that girls are more attuned to conversational presuppositions than boys and comment on "pragmatic misfires" such as the TN, while the boys attend more to the TN's truth-conditions. Although there is no evidence that males focus on logical aspects of

language to a greater extent than females, there are several studies indicating sex differences in what preschool children talk about, with girls talking more about people and using personal-social words and boys talking more about objects (Dore, 1975; Nelson, 1973; Smith & Connolly, 1972). This focus on personal-social aspects of language could then predispose the female to focus on conversational conventions to a greater degree than males. The difference obtained in this study for types of verbal response to True Negative statements, even when the different-sex groups are matched for linguistic maturity, point to an interesting area for subsequent research.

Chapter V: Six Case Studies of Negation Development

1. Purpose

One important form of linguistic evidence of early logical abilities, as indicated in Chapter I, is the use of negation to express judgements about the truth-value of statements made by others. The use of negation with this function was the focus of the experimental investigation of Chapter IV, and false statement corrections, many utilizing negations, were frequently made by children from 18 to 36 months of age. The purpose of these longitudinal studies of negation development was to outline the course of negation development prior to the expression of negation which serves such logical purposes in judgements. In particular, reviews of previous studies of negation development had indicated the occurrence of negation use by very young children to serve a number of quite different functions (Chapter II). These functions were outlined, and a general level of description for certain FAMILIES of negation functions was defined as a preliminary heuristic for the study of negation function development. Finally, a hypothesized universal emergence sequence for the development of negation functions which was based upon cognitive and communication-theoretic

foundations predicted that the developmental course of the functions which negation serves would progress from the expression of internal states (REJECTION), to comments on external states (DISAPPEARANCE), to comments on correspondences between external states and language use (TRUTH-FUNCTIONAL negation). A longitudinal study was designed to assess this hypothesis about negation function development by intensively studying six children covering an age range of development from 8 to 24 months of age.

In addition, two other interesting functions of early negation had been implicated in Chapter II as important precursors of truth-functional negation. One of these is SELF-PROHIBITION negation, in which the child seems to engage in self-reprimand by saying "no-no" while approaching objects which have been forbidden in the past (Chapter II, Section 2.4). This use of negation, it was suggested, provides clues to the child's internalization of a binary contrast which utilizes the word "no" (for permissible/prohibited acts), and thus provides a semantic basis for later language-use also based upon binary contrasts of affirmation/ negation: the absence/presence encoded in DISAPPEARANCE negatives, and the truth/falsity distinction of TRUTH-FUNCTIONAL negation. It was tentatively proposed in that context that SELF-PROHIBITION

negation would precede DISAPPEARANCE negatives in the course of ontogeny, and this proposal is evaluated in these longitudinal case studies of negation development. The other general function of negation of interest in this study is the negative of UNFULFILLED EXPECTATION, expressed in such contexts as when a child expects a toy to work and it does not, when a child expects an object to be in a habitual place and fails to find it, or when a child expects to be able to ride his bicycle and becomes impeded (see p.81). In Chapter II, reviews of previous studies of single-word negation seemed to suggest that DISAPPEARANCE negatives were used prior to negatives of UNFULFILLED EXPECTATION, as if the child first has to use negation to note immediate disappearance before using negatives as comments upon unrealized anticipations of future states. This form of negation is thus also a focus of the developmental investigations of these longitudinal case studies.

2. Method

2.1 Subjects

The subjects for the longitudinal studies were six children living in the immediate vicinity of Oxford. Two male and two female subjects (H, S; CL, J) were studied during the period from 8-20 months of age; one male and one female subject (R, CA) were studied during the period from 12-24 months of age. This overlapping longitudinal design (designated "quasilongitudinal" in Slobin et al., 1967) enabled the collection of data within the period of primary interest (8-24 months) without necessitating 16 consecutive months of observations.

None of the subjects were first born due to the unavailability of first borns in the Language Acquisition Group File which constituted the set of prospective subjects. This file was composed of cards which mothers visiting the John Radcliffe Maternity Hospital in Oxford were given by their pediatricians and told to return if they were interested in participating with their child in "studies of normal child development". H had a three year-old brother, S a ten year-old brother, CL a two year-old sister, J a nine and a ten year-old brother, R a

seven and eleven year-old brother, and CA had a four year-old brother.

2.2 Procedure

Each subject was visited individually in their home each month, with their siblings either at school or with a babysitter. Visits were generally of 90- 120 minutes duration. One half-hour of the child interacting with his or her mother (and more rarely, with the father) in natural play settings, and everyday activities such as feeding and nappy-changing was filmed by the experimenter (RP) with a portable Sony videocamera. The remaining hour or so of each visit was comprised of observations of the child and mother during additional play, and the child's negative gestures or utterances during this period were transcribed with additional contextual notes. During this additional hour, the mother was asked a number of questions in an informal interview about the child's language and particularly negation. Videotapes were later transcribed. These transcriptions from the video records included all speech produced by the child and the adults present, with additionally relevant non-linguistic behaviour (such as pointing) and context (such as actions, gaze, and objects)

also noted according to the conventions described in the following section. The children's ages at the 12 visits are listed in Table 18. R was visited an additional time.

Table 18

Ages of Children for the Home Visits

SUBJECT CL	SUBJECT H	SUBJECT J	
<u>Session</u>	<u>Age</u>	<u>Session</u>	<u>Age</u>
1	0;8(17)	1	0;8(9)
2	0;9(30)	2	0;9(18)
3	0;10(29)	3	0;10(12)
4	0;11(26)	4	0;11(15)
5	1;0(30)	5	1;0(12)
6	1;2(4)	6	1;1(16)
7	1;3(1)	7	1;2(20)
8	1;3(25)	8	1;4(3)
9	1;5(9)	9	1;4(29)
10	1;6(15)	10	1;5(28)
11	1;7(13)	11	1;6(24)
12	1;8(22)	12	1;8(13)

Table 18 (continued)

SUBJECT S	SUBJECT CA	SUBJECT R	
<u>Session</u>	<u>Age</u>	<u>Session</u>	<u>Age</u>
1	0;7(29)	1	1;0(24)
2	0;8(26)	2	1;1(24)
3	0;9(26)	3	1;2(28)
4	0;10(29)	4	1;3(25)
5	0;11(27)	5	1;5(6)
6	1;1(3)	6	1;6(4)
7	1;2(6)	7	1;6(27)
8	1;3(5)	8	1;8(0)
9	1;4(13)	9	1;9(10)
10	1;5(17)	10	1;10(13)
11	1;6(22)	11	1;11(7)
12	1;7(29)	12	2;0(24)
		13	2;0(13)

2.3 Data transcription

The data collected for each child consisted of twelve one-half-hour videotape records, an additional transcribed sample from approximately twelve hours of play and activity

where negative gestures and utterances had been recorded with non-linguistic context as pertinent, and interviews with the child's mother from each visit. Transcripts were made from the videotapes by writing out both the child's and adults' speech in English orthography wherever possible. The speech of the children in the early visits was rendered as nearly as possible in phonetic transcriptions using the symbols of the International Phonetic Alphabet. Suprasegmental features of the children's speech such as intonation and loudness were often noted. Relevant details of the non-linguistic interaction between parent and child were recorded in the immediate context of the child's utterances. A notational system was elaborated¹ for transcribing the videotapes which allowed time relationships between aspects of linguistic behaviour and non-linguistic context to be noted, capturing at a general level the interactional context in which the child's utterances occurred. Utterances were transcribed in the left column of a notebook while non-linguistic context, such as the general direction of the infant's gaze, objects being acted upon, and particular actions carried out by child or adult could

¹Renira Huxley provided valuable comments and assistance with her help on various modifications in the development of this system.

be slotted into their place of occurrence in linguistic interactions. An arrow was used between utterance and context to indicate direction of sequentiality, and simultaneity between behaviour/context and utterances was denoted by a dot ("."). Such common actions as "gives," "takes," "reaches," "touches," and "points," etc., were abbreviated as upper-case letters which enabled a more rapid transcription of the videotapes (cf. Sugarman, 1976). Each 30 minute tape took approximately 6 to 8 hours of attentive notation nonetheless, involving numerous replays of sequences of behaviour and talk, to result in a transcription complete enough for the purposes of the study and future analyses of data on other aspects of early language development.

2.4 Data selection criteria

Transcripts from the videotaped portions of the visits with the children and from notations of observations during the remainder of the visits were then examined for utterances and gestures relevant to the empirical questions posed prior to the studies concerning the development of negation. The data culled from these session samples included all explicit negative utterances and negative

gestures (headshakes). Other relevant utterances and gestures were affirmatives and affirmative gestures (headnods). Formal criteria for the data chosen for analysis are outlined below for both negation and affirmation:

1. NEGATION: utterances were chosen that included at least one negative word. Such cases were those with the morphemes "no", "not", "n't", approximations of "no" such as [na] or [nə]. Other negatives were "allgone", "gone", "away", and "stop". Utterances were also chosen if they co-occurred with a headshake by the child, and headshakes alone were also included for analysis.
2. AFFIRMATION: utterances were chosen that included "yes" or one of its colloquial variants, such as "yeh", "yep", "uh-huh". Utterances were also selected if they co-occurred with headnodding on the part of the child, and headnods alone were included for analysis².

The gestures and utterances meeting these criteria were then separated into those which followed questions, such as "Do you want a sweet?", those which were in imitation of the adult, and spontaneous productions.

Children's utterances and negative/affirmative gestures which comprised the data selected were coded as

²The data on affirmation development will not be discussed in this thesis. In this study, two children expressed affirmation first at the same time as negation, the other four children after negation (compare to the variation described by Rüke-Dravića, 1972, p. 235n).

question-responses if they immediately followed a question by the adult, without the intermediary of another utterance. Only one utterance or gesture immediately following the adult question is considered a question-response. Others are classified as spontaneous productions.

Children's gestures or utterances making up the data selected were classified as "imitations" if the word (or gesture, phrase, or sentence) occurred in the immediately prior context and was produced by someone other than the child. One exception to this rule is that if the child also displayed nonverbal evidence of defiance to the adult negation, as in hitting the adult or pushing something away, the child's utterance/ gesture was not classified as an imitation, but as a negative reaction to the adult's negative comment with the function of rejection.

2.5 Coding

There are two predictions which were posed in relation to the emergence of different semantic functions of negation in the speech of children prior to the expression of truth-functional negation (Chapter II). One of these is that REJECTION will emerge as the first semantic function of negation, followed by DISAPPEARANCE negatives that denote

absence, with TRUTH-FUNCTIONAL negation occurring only after these first two types of negation have been expressed. The second prediction is more tentative (cf. Chapter II, Section 2.4) and proposes that negations of SELF-PROHIBITION are an intermediary development between negations of REJECTION and those of DISAPPEARANCE. Such "self-prohibitions", where a child repeats a prohibition in a situation similar to a previous prohibition-context, but without immediately prior adult prohibition directed to the child, were suggested as important evidence that the child had internalized a binary contrast involving the word "no" (for permissible/prohibited acts). This semantic contrast provides a cognitive basis for later judgements also dependent upon binary contrasts of affirmation/negation - the absence/presence of something encoded in DISAPPEARANCE negatives, and the truth/falsity distinction basic to TRUTH-FUNCTIONAL negatives. These two predictions both depend on the identification of instances of negation in the corpus of utterances and gestures collected in the longitudinal studies of young children, and hence the specification of the functions of the children's negatives.

It is only in language acquisition studies of the past five to ten years that the CONTEXT of children's utterances has played a critical role in the interpretation of language

functions. Three different perspectives toward the language of children have been taken in this period, and these different approaches have focused on syntax, semantics, and pragmatics. Reviews of the strengths and weaknesses of these various approaches are presented in Bates (1976), Bloom & Lahey (1978), Bowerman (1976), and de Villiers & de Villiers (1976). One theory emphasizes the importance of each of these factors in the development of language, and centres on the child's "speech acts" as the central units of analysis (Bruner, 1975a, b; Dore, 1973, 1975, 1976). Bruner's research has focused more upon the transition from prelinguistic to linguistic communication from a detailed analysis of mother-infant interaction than on a consideration of synthesizing previous language acquisition approaches, so this discussion centres primarily on Dore's theory of the development of speech acts.

Dore (1975) emphasizes the integration of three types of skills in the development of speech acts. In considering the child's use of language in communicational episodes, Dore noted the importance of a coordination between linguistic skills (lexical, phonological, and grammatical development), the child's cognitive-pragmatic intentions in communicating (what the child wants to accomplish with the speech act, such as describing objects, attaining food, or

indicating an event), and the child's conceptual representation of the world (which comes to be expressed in language with a particular purpose). This cognitively-based theory of language acquisition is currently a topic of great interest, and will require further substantiation, but at the current time it is the most applicable theory to the early use of language by the child (Bates, 1976; Pea, in preparation). For these reasons, the analysis of the negative utterances of the children in this study will be based upon such a speech act approach rather than a purely semantically-based theory dependent on some version of current grammar, such as Fillmore's case grammar (Greenfield & Smith, 1976). The speech-act model treats the child's intention in producing a particular utterance as a cognitive-pragmatic structure which is distinct from the grammatical category serving to express this intention (Dore, 1975, p. 36). Such intentions are the FUNCTIONS of the utterances, and are specified in this theory by a consideration of the contextual features of the utterance.

The functions of the children's negations are thus the central focus of the longitudinal studies of negation development, rather than syntactic aspects of these negations such as in Bellugi (1967), or the syntactic expression of different semantic functions of negation, as

studied by Bloom (1970). The limitations of both of these approaches from the standpoint of coordinating cognitive and linguistic aspects of negation development have been detailed in Chapter II. Criteria for selecting negative utterances and gestures expressing the different functions of central interest for this investigation are specified in Table 19.

(Insert Table 19 here)

3. Results: The developmental relationship between different functions of negation

In Chapter II, the hypothesis was offered that negation development progresses from REJECTION negation to DISAPPEARANCE negation and at last to TRUTH-FUNCTIONAL negation. The only account of negation which presented detailed enough observations of children's negations so that single-word utterances could be considered at this level was Bloom (1973). She found an emergence-sequence which may be described as REJECTION, DISAPPEARANCE, SELF-PROHIBITION, UNFULFILLED EXPECTATION, and TRUTH-FUNCTIONAL negation. These additional two functions of negation are not critical to the current hypothesis, but analyses of

TABLE 19

Classification Criteria for Different Functions of Negation*

<u>Primitive Negation Speech Acts</u>	<u>Child's Utterance</u>	<u>Non- linguistic behaviour</u>	<u>Adult Response</u>	<u>Relevant Contextual Features of Utterance</u>
REJECTION(R)	word or headshake or word & headshake	C attends to object, action or utterance (where truth-value depends on the child's motivations); C does not necessarily address adult; does not seek assistance from adult.	If adult had prohibited or commanded C, A may persist with command or prohibition.	Something which was the focus of the child's attention is rejected.
DISAPPEARANCE (D)	word or headshake & word	C attends to object, person or event disappearance or question about presence/absence; often points at locus of vanishing; C does not necessarily address adult.	May agree or expand child's utterance.	Something which had been present just prior to utterance becomes absent(unless C is responding to question about presence/absence; it(object, person) disappears, or (event) stops, and the utterance focuses on this fact.
TRUTH- FUNCTIONAL (TF)	word or headshake or word & headshake	C attends to adult utterance (statement or question) which is true or false given situation and not C's own motivations; no nonverbal indication of rejection (e.g., pushing or turning away); C addresses adult.	May acknowledge child's correction.	Child is attending to adult utterance.

(*The form of this table is based on Dore, 1975.)

TABLE 19 (continued)

<u>Primitive Negation Speech Acts</u>	<u>Child's Utterance</u>	<u>Non- Linguistic Behaviour</u>	<u>Adult Response</u>	<u>Relevant Contextual Features of Utterance</u>
SELF- PROHIBITION (SP)	Word or headshake or word & headshake	C attends to forbidden object; may stop ongoing prohibited act; not addressed to adult.		Something which has been an object of prohibition in the past is approached by the child.
UNFULFILLED EXPECTATION (UE)	Word or headshake or word & headshake	C notices some kind of constraint or absence other than immediately prior disapp- earance; may seek adult assistance in having expectation of lack of constraint fulfilled.	May ask question concerning constraint on child's activity, make suggest- ion to help C resolve difficulty, or ask quest- ion about current location of thing which C notices is absent.	Something which is part of the child's continuing line of activity does not occur; or something which was previously present and then disappeared is focused on some time after its disappearance.

"self-prohibition" negation indicated that it may serve an important intermediary purpose in the development of a linguistic conception of negation applicable to external states from negative expressions of internal states (Chapter II, Section 2.4). The results for testing this prediction derive from the classifications of negatives the children produced in this study according to the specifications of negative functions in Table 19. Results are discussed individually for each child.

3.1 Analysis of R's data

R, the oldest male of the study, was using 5-10 object words when he was first observed at 1;0(3). He produced only one negative at the first observational session, a headshake plus the word "no" in imitation of his mother. R had begun to use the headshake two weeks earlier at the dinner table in imitation of his two older brothers who would say "Don't want that, do you?" and shake their heads when R would refuse to eat something on his plate. R's mother reported that he began to immediately use the negative gesture to refuse drinks offered to him, but I did not observe any spontaneous use of negation until Session 2 (1;1(8)). During that session, R shook his head on five

different occasions with the function of REJECTION. Three of these were in response to questions of "Do you want _?" form where the referent of the statement was visible to R, one was in rejection of a prohibition by his mother, and one a rejection of bicycle trouserclips offered to him by his brother. No utterances expressing DISAPPEARANCE were seen to occur, and R's mother had never heard R say anything such as "gone" or seen him shake his head when he watched something disappear.

Two new functions of negation were observed in Session 3 (1;2(8)) in R's productions. Four different negative utterances were used to express SELF-PROHIBITION, when R was tempted to touch the experimenter's papers, the power transformer, to bang his bike, and as he put a set of keys in his mouth. Two negatives of UNFULFILLED EXPECTATION were also used, one when R was trapped between two settee cushions and couldn't move, and one when looking at his dart gun which he couldn't get to work.

No negatives of DISAPPEARANCE occurred until Session 5 (1;4(6)), three months after R had begun to use REJECTION negatives. All four DISAPPEARANCE negatives that occurred in this session were in reference to an empty cup which R had been drinking out of just before his utterances. R expressed this negative function with the word "gone", and

his mother had observed his first uses of this word sometime between Sessions 4 and 5. R used "gone" when something dropped from his hands but was still in his sight as well as for when things disappeared.

No substantive changes occurred in R's use of negatives until Session 7 (1;6(11)), when R was observed to produce what was in effect a negative utterance by combining a word with a headshake. A cat disappeared from the television screen and R said "pussy" five times while shaking his head, noting its DISAPPEARANCE. R's mother observed at the same time that this combination was frequently used, not just for this function, but to express REJECTION. R would use the name for something he didn't want and shake his head simultaneously. This same use of negation was present even in the 11th session (1;10(1)), several months after R had been combining words in sentences.

R began combining words in simple sentences in a productive way in Session 9 (1;8(5)), with utterances such as "horse there" and "it fall down". Prior to this session, R was producing primarily single words and successive single words which seemed to comment on a single topic (cf. Bloom, 1973, p. 39f; Branigan, 1976, 1977; Leopold, 1949, p. 45n), in addition to several unoriginal set-phrases which were learned as wholes, such as "fall down". No negative words

are used in these first syntactic constructions, but in Session 10 (1;9(7)), R began to note the SUBJECT which had disappeared in his DISAPPEARANCE negatives, such as in "book gone", "Roy gone balloons" (to call my attention to this fact as he turned the page on a picture of them), "flowers gone", and "eyes gone" (as he shut his eyes). R's mother up until this time had not observed R using the word "no" or any other negative to respond to questions about the correctness of statements, such as "Is this a dog?" (about a CAT, for example). After R and his mother had been talking about all the people they knew who were gone that day (Session 10), I made the false statement to R that "Mummy is gone" and R said "no". This was the sole occasion in Session 10 of what was classified as TRUTH-FUNCTIONAL negation, which became increasingly frequent in R's final three sessions.

In Session 11, when R was 22 months old, he began to correctly answer numerous "yes/no" questions with TRUTH-FUNCTIONAL negations of sentence complexity. Several examples below indicate R's negative false statement corrections:

UtterancesContext

R(11(0).7)

E: Is that warm?

(R sits his bare bottom
on a cold bicycle seat)

R: No, cold.

R(11.21.2)

M: Is that a helicopter?

(R points at plane picture)

R: No.

(R shakes his head)

M: Is it not?

What is it then?

R: It's a plane.

R(11.18.2)

(R has been saying "upside-down"
lately when he sees objects in
their reverse orientations, such
as books, cars, and toy planes.)M: Is that the right way? (M shows R a car oriented
upside-down)

R: No, der. (R puts the car right-side up)

Such truth-functional negatives were frequently used by R in Sessions 12 (1;11(2)) and 13 (2;0(13)), including several false statement corrections which would have been classified as "explicit oppositions" had they occurred in response to similar statements made in the experiment described in Chapter IV.

<u>Utterance</u>	<u>Context</u>
R(13(0).26)	
E: Where's the ball?	
E: That's a car.	(R finds ball, gives to E)
R: It's not car. It's not the car, it's the ball.	

R thus came to express negatives about internal states through negations which coded REJECTION several months before using negatives of DISAPPEARANCE which commented on the external state of absence where something had been immediately present before. TRUTH-FUNCTIONAL negatives were used for the first time several months after DISAPPEARANCE negatives, and this sequence of negation function emergence in R's speech acts of negation supports the hypothesis proposed earlier. In addition, R used negatives of SELF-PROHIBITION and UNFULFILLED EXPECTATION earlier than the negative function of DISAPPEARANCE but after REJECTION negation was observed to occur.

A summary of the frequencies with which R expressed different functions of negation in Sessions 1-13 is presented in Table 20.

(Insert Table 20 here)

The negatives in the different categories are broken down into spontaneous (S) utterances, imitations (I), and question-responses (Q). In addition to the five categories mentioned above to be of central interest, additional negatives were relegated to one of two additional categories. Either such utterances were uninterpretable, or interpretable, but in some different category than the five central categories. For example, certain responses by R of "no" to statements made by the adult serve a "denial" function, where the child is denying the previous utterance of the adult, but where neither the situation itself as retrievable from the transcripts nor R's internal motivations dictated the truth or falsity of the parental statement (cf. Chapter II on Bloom's "denial" category including more than strictly truth-functional negatives). For example, R had not been able to find the last piece to complete a jigsaw puzzle (Session 13, 2;0(13)):

TABLE 20

Frequencies of Different Negation Function Expressions:
Longitudinal Data for R

Session Number	R		D		TF		SP		UE		Echo	Total	
	q	s	i	q	s	q	s	s	q	s	UI	NC	
(1)											1		1
(2)	3	2								1			6
(3)	2						4		2				8
(4)	1												1
(5)	1	1	1	2						1			6
(6)	7			3					2	1	2		15
(7)				1									1
(8)	1		2						2		3		8
(9)		1	1								1		3
(10)		2	3	10			1		3	30	2	2	53
(11)	2	8	1	1	4	9 (2)	1			6	5	4	43
(12)	6	2	3	9	7 (1)	4 (1)				1	1	2	1
(13)	2	3		7	8	24 (2)	4	1	4	39	2	13	110

sum total = 293

KEY

Negative Function Abbreviations:

R = Rejection

D = Disappearance

TF = Truth-functional

SP = Self-prohibition

UE = Unfulfilled Expectation

Other:

UI = Uninterpretable

NC = No category, but interpretable

Conversational Role Subdivisions:

q = question-following negatives

i = imitations of negatives

s = spontaneous negatives

Note: The top number in the TF column
represents correct responses; the
parenthetical number represents
incorrect responses.

<u>Utterance</u>	<u>Context</u>
R(13.13.3)	
M: Can you see a piece of clock over near the mouse?	(R is searching for the clock piece to complete his jigsaw puzzle)
R: No.	(R looking near mouse)

In this example, we do not know whether R could see the puzzle piece, but he did deny his mother's statement.

3.2 Analysis of CA's data

CA, the oldest female of the study, was using only three words at the time of the first session (1;0(24)): "bye-bye" as a farewell, and two different words or word-like forms, "der"(there) and "eya"(here you are) when giving objects to others. She had begun to shake her head in response to "yes/no" questions about her wants (e.g., "Do you want some milk?") when not desiring the specified food/action/drink, and nodding her head and body together enthusiastically when wanting the thing mentioned. The only negatives produced at Session 1 were four headshakes with the function of REJECTION in response to different questions of "Do you want_?" form. No occurrences of DISAPPEARANCE negatives were observed, and CA's mother had only noticed CA imitating the word "allgone" when she said it after hiding

an object, and had observed no spontaneous use of the word.

No negatives of REJECTION or DISAPPEARANCE were observed at Session 2 (1;1(24)) though CA's mother noted that CA had generalized her headshake to spontaneously reject objects, food, and being put to bed without being asked a "yes/no" question first. The only negative of this session expressed the function of UNFULFILLED EXPECTATION, when CA shook her head while giving me a toy which did not work.

CA's mother did not notice CA using any DISAPPEARANCE negatives until much later (Session 6: 1;6(4)), and the first DISAPPEARANCE negatives used by CA in the visits were at Session 7 (1;6(27)), when her mother left the room, and when holding an empty cup. In the previous session (1;6(4)), CA had used the word "gone" in a way related to disappearance, but which had the contextual features of loss-of-possession: an object would fall, CA would keep it in her sight, but then say "gone". The object had not disappeared, but only "gone" out of her immediate possession.

The next function to emerge in CA's use of negation was SELF- PROHIBITION in Session 9 (1;9(10)). CA was often prone to tear pages, pull wheels off cars, take glued pictures out of books, and to jerk legs off of her dolls,

saying "off" as she separated what had been one object into at least two parts. She was often told "no-no" in these situations by her mother, and would usually acquiesce. CA had torn off a leg from my toy dog earlier in the session, and the following sequence occurred twenty minutes later:

Utterances

CA(9.17.1)

Context

(CA touches dog's broken foot, puts the dog down, and picks up a teddy who has only one leg left, the other torn off by CA in the distant past)

CA: No-no, mummy.

M: Hmm?

CA: No mummy.

(CA points to teddy's remaining leg)

M: No, I don't think that one will come off.

CA: Off.

(CA tugs at teddy's leg)

CA had also said "no-no" as she went to shake a bell which had been forbidden to her in the past, because of its loud noise.

An important development reported by CA's mother as an occasional occurrence at the time of Session 9 was frequently observed during Session 10 (1;10(13)): the use of syntactic negation. Fifteen of the 39 negatives produced by CA in this session were combinations of a negative word with

at least one other word, such as "no doll, mummy" as I put my doll in the toybag as I readied to leave. All the different functions of negation expressed in this session were expressed syntactically some of the time (DISAPPEARANCE: 7/7, REJECTION: 2/7, UNFULFILLED EXPECTATION: 3/17).

In Sessions 11 (1;11(7) and 12 (2;0(24)), several interesting and correct uses of TRUTH-FUNCTIONAL negation were observed. In one example, CA is being exposed to the word "holly" in the context of a picture of a holly wreath, but her previous experience with this word has been as a proper name for a dog who comes to visit with her mother's friend.

Utterances

Context

CA(11.10)

M: For Christmas,
that's holly.

(M points to a picture of
a holly wreath)

CA: No.

(CA points to holly picture)

M: No?

(CA points to holly picture)
a second time)

CA: Dat.

M: Not the "Holly"
you know.

CA thus corrects her mother's use of the word "holly", which is incorrect given her previous experience with it as a proper name of a dog. Several other examples from Session

12 also illustrate CAA's use of TRUTH-FUNCTIONAL negation. In one case, CA's mother named a pear picture correctly as she pointed to it, and CA said "no mummy" while pointing to a picture of an apple. This correction resulted from a misinterpretation of the referent of the mother's sentential subject. In another case which was not a reply to her mother's previous utterance but her own, CA noted the negation of the negative state of its being "lost":

<u>Utterances</u>	<u>Context</u>
CA(12(0).1)	(CA is looking for a doll but cannot find it)
CA: Lost dolly.	(CA finds the doll)
M: You found the baby.	
CA: No lost. M: It's found.	

Thus, CA came to express negatives denoting REJECTION several months before using negatives which were observations of DISAPPEARANCE, and TRUTH-FUNCTIONAL negatives were first used sometime later. This negation-function emergence sequence coincides with R's and also supports the hypothesis which predicted this particular emergence- sequence. Like R, CA used negatives of

UNFULFILLED EXPECTATION after those of REJECTION and before those of DISAPPEARANCE, but SELF- PROHIBITION was first observed after DISAPPEARANCE negatives for CA, rather than before them as in R's negation development.

The frequencies with which CA expressed different functions of negation at the various sessions are summarized in Table 21. CA was not untalkative,

(Insert Table 21 here)

but produced less than half as many negatives as R during the same twelve-month period of observations (126 to R's 293).

One very interesting feature of CA's negations at Session 11 (1;11(7)), when truth-functional negation first began to be used, is the general theme of her use of negative utterances. CA's mother noted that CA was using negatives very frequently to note that things were in some way out-of-character, out-of-place, incomplete, or not right. Some examples that CA's mother had noted in a diary are negatives that are used when:

- 1) only half of an apple, or part of a button is shown in a picture (incomplete);
- 2) her coat, pot, toys, and so on are not in their proper places (not in habitual location);

TABLE 21

Frequencies of Different Negation Function Expressions:
Longitudinal Data for CA

Session Number	R		D		TF		SP		UE		Echo	Total	
	q	s	i	q	s	q	s	s	q	s	UI	NC	
(1)	4												4
(2)			1							1			2
(3)		2									2	1	5
(4)	3								1	1			5
(5)	1								1	2			4
(6)	1									1			2
(7)		2		2	(1)							2	7
(8)	1												1
(9)				1	(1)		3			2			7
(10)	2	5		7	(2)				17	2	3	1	39
(11)	3	15		1	1	1			1	4	7		34
(12)	1	2	1	2		3			5		2		16

sum total = 126

KEY

Negative Function Abbreviations:

R = Rejection

D = Disappearance

TF = Truth-functional

SP = Selfprohibition

UE = Unfulfilled Expectation

Other:

UI = Uninterpretable

NC = No category, but interpretable

Conversational Role Subdivisions:

q = question-following negatives

i = imitations of negatives

s = spontaneous negatives

Note: The top number in the TF column
represents correct responses; the
parenthetical number represents
incorrect responses.

- 3) objects are used unconventionally, such as when her mother cut a string with a kitchen knife; and
- 4) a puzzle piece is placed in the wrong hole.

These cases suggest an important connection between the conceptualization of the APPROPRIACY of object-place, wholeness, object-use and the like which, when a discrepancy occurs, is observed with the correction of a negative. Truth-conditions for the use of language are also based on conventions (Lewis, 1969), ones with a far more general level of agreement than conventions concerning the habitual places of objects. But in the emergence of different functions of negation in CA's language development, these two forms of negation seemed to be simultaneously emergent. It may take the child some time to realize the generality of truth-conditions, and this general problem arises in the "pragmatic misfires" described by Volterra & Antinucci (1977) in the negations of young children where knowledge presupposed to be shared between the child and his or her listener is in fact idiosyncratic to the child. A similar problem would arise if CA took the resting location of her coat to be as immutable as the truth-conditions for the statement "this is a coat".

3.3 Analysis of J's data

J was observed for the first time at 0;8(7) and did not use any conventional form of negation until Session 6 (1;1(25)), when she had 5 object words in her vocabulary. During that session J shook her head just once, as she and her mother prepared to walk out into the garden and she was asked, while holding her doll Kim, "Are you taking Kim to the garden?" J had started to shake her head two weeks earlier in imitation of her mother, and quickly came to use the gesture to refuse feeding, objects and actions she did not like, such as cuddles given her by her aunt. Thus the first function of negation expressed by J was REJECTION. J's mother never observed J to say "gone" or "no" or shake her head when something or someone disappeared, so DISAPPEARANCE negatives had not yet been used.

J's mother noted a veritable eruption of uses of negation by the time of Session 7 (1;3(0)). J frequently used "no" as well as the headshake to reject things she did not want, primarily food and ritual behaviours such as nappy-changing and being taken to bed. The only other function of negation observed during this session was SELF-PROHIBITION, and J's mother mentioned seeing this

frequently in the two weeks previous to the session. J would frequently shake her head, say "no", and generally reprimand herself as she was about to touch or had touched objects forbidden to her in the past. A related use of negatives occurred, also in self-prohibition and was restricted to one forbidden action - eating soap. J had been told "don't eat it" repeatedly in being washed-up by her mother as she would go to bite the soap, and her mother had observed her use of an abbreviated version of this phrase ("doweetih") as she went to bite soap BEFORE her mother told her "don't eat it". J also, according to her mother's report, named possessors (e.g., mumma, dada) of objects (such as books, pens, and records) she wasn't supposed to touch and would shake her head as she approached them. The report from J's mother coincided with my observations at Session 7, when J used negatives of SELF-PROHIBITION over a dozen times. A typical sequence centred around J's temptation to touch some glass ducks on a shelf, which were forbidden to her:

<u>Utterances</u>	<u>Context</u>
J(7.12.3)	
J: No.	(J near forbidden glass ducks) (J reaches for a duck, then stops) (J approaches and withdraws from duck several times)
J: Duck.	(J reaches for duck again)

	(J pulls her hand back again)
	(J touches duck for the first time)
J: No.	(J shakes her head)
J: Stroke.	(J touches duck, "strokes" it as she does her other pet animals)
J: Yes.	(J picks up shell, another fragile and previously-forbidden object)
J: No.	(J sets shell back down)
J: Bad.	

The self-prohibition apparent in this sequence is remarkable, and includes J calling herself "bad" (as her mother often did) after she had picked up a forbidden shell and placed it down again. Her mother's interpretation of the "yes" in the sequence concerned a common event in their interactions. If J wanted something which she had not had before, she would often look to her mother, who would say "yes" if granting her permission, and "no" otherwise. Such a use of "yes" to grant oneself permission has also been observed by Leopold (1939, p. 94).

In Session 7, J had still not expressed any negatives with the function of DISAPPEARANCE observations, but one utterance she used was related to this function. One ritual which J and her mother engaged in involved dropping objects. After J or her mother had dropped an object, the mother would rapidly say "Where's it gone?" The object in these contexts would rarely disappear but would remain in plain sight, however out-of-possession it had become. One time during this session, J dropped her ball and said this phrase

very rapidly, [wəsIg>], and then bent over and picked the ball up. The object had not disappeared, but had just been lost from her possession (cf. similar uses of "gone" by R and CA). Whatever the restraints on the use of DISAPPEARANCE expressions in Session 7, by Session 8 (1;4(1)), J was expressing DISAPPEARANCE negatives with great frequency, with over thirty examples in ninety minutes. These negative speech acts were primarily either the single words of "gone" or "stop". "Gone" was used when such things as her ball, her doll, and her mother disappeared from sight, and "stop" was used for event cessation, such as when my noisy rewinding videorecorder stopped, or when her mother ceased twirling her around in a swivel-chair.

Another function of negation also appeared for the first time in Session 8 (1;4(1)): UNFULFILLED EXPECTATION. J had been playing with an inflatable duck earlier in the visit, but had left it and crawled into a chair to play with a toy cat. With the duck nowhere in sight, J said "duck/gone". Interestingly, J never expressed this function of negation when her toys did not work for her or when she could not make puzzle pieces fit properly, and her mother also never observed this use of negation, which had been rather frequent in the speech of both R and CA. J did,

however, come to use UNFULFILLED EXPECTATION negatives in contexts where the presence of something was expected in a particular location, as R and CA had done:

<u>Utterance</u>	<u>Context</u>
J(10(0).2)	(J pulls down trousers of G.I. Joe doll, who has on no underpants)
J: No/pants.	

J had traditionally observed her doll to have undergarments beneath his khaki trousers, and was quite surprised to find the contrary.

J's language seemed to develop in great leaps. Just as her negative utterances had jumped from one example in Session 6 to eighteen negatives at Session 7, so her language complexity developed from entirely single-word utterances at Session 8 (1;4(1)), with 180 examples, to 37% utterances of sentence complexity (two or more words: 38/104 utterances) at Session 9 (1;5(0)). These developments in syntax occurred prior to the expression of TRUTH-FUNCTIONAL negatives such as the following:

UtterancesContext

J(11.4.1)

(J hears a car outside, her head turns that direction)

E: Is that Daddy in
the car? Is Daddy here?J: Daddy gone/
Daddy da car.

M: Where's Daddy, J?

J: Gone/work.

J(12.9.3)

(J shows E his car)

J: There/there/
it's a car.

E: Is it Nicky's car?

J: No, J.

(J shakes her head)

J(12(O).13)

J: Bus.

(J holding a toy bus)

E: Is this a bus?

(E points to toy car)

J: No/car.

Just as in the cases of R and CA, J expressed different functions of negation in the developmental order of REJECTION, DISAPPEARANCE, and TRUTH-FUNCTIONAL negation. This emergence order again supports one of the major hypotheses of the thesis. Like R but unlike CA, J expressed SELF-PROHIBITION negation prior to DISAPPEARANCE negation. And J expressed UNFULFILLED EXPECTATION negatives after

DISAPPEARANCE negatives but before TRUTH-FUNCTIONAL negatives, a developmental pattern different than either R or CA, who used UNFULFILLED EXPECTATION negatives prior to DISAPPEARANCE negatives. The frequencies with which the various functions of negation were expressed at the various sessions with J are presented in Table 22.

(Insert Table 22 here)

3.4 Analysis of CL's data

CL was 0;8(17) at the first observational session, and used her first headshake in Session 2 (0;9(30)), as her two year-old sister approached her and started making faces at her. CL's mother had not observed CL shaking her head at this time, but noticed shortly afterwards that CL was imitating her when she shook her head at CL in prohibition situations. In Session 3 (0;10(29)) CL used a headshake in imitation of her mother's playful headshake on three occasions. Though there was only one recorded instance of spontaneous headshaking at this point, it was with the function of REJECTION. During Session 3 CL also used her headshake one time in SELF-PROHIBITION, as she approached my

TABLE 22

Frequencies of Different Negation Function Expressions:
Longitudinal Data for J

Session Number	R	D	TF	SP	UE	UI	NC	Echo	Total
	q s	i q s	q s	s	q s				
(1)									0
(2)									0
(3)									0
(4)									0
(5)									0
(6)	1								1
(7)	2 1			14		1			18
(8)		2 2 28			1	1	5	1	40
(9)	1	1 1 13			1	2	6	1	26
(10)	2 1	2 13	(1)			1	1		21
(11)	1	2 8	1 (2)	1 3		3		1	22
(12)	1 1	14	2				2		20

sum total = 148

KEY

Negative Function Abbreviations:

R = Rejection

D = Disappearance

TF = Truth-functional

SP = Self-prohibition

UE = Unfulfilled Expectation

Other:

UI = Uninterpretable

NC = No category, but interpretable

Conversational Role Subdivisions:

q = question-following negatives

i = imitations of negatives

s = spontaneous negatives

Note: The top number in the TF column
represents correct responses; the
parenthetical number represents
incorrect responses.

videorecorder which her mother had cautioned her against numerous times in the past.

In Session 4 (0;11(26)) only one negative was used, as CL told her mother "bye-bye" after being told not to touch the phonograph records she was handling. CL's mother often told CL "bye-bye" when not wanting to be bothered by her as she approached to play, and CL was using this word with a similar function of REJECTION here, as she continued to touch the records. CL was also rather precocious in locomotion, walking quite adeptly at 11 months and frequently touching the many prohibited objects in her small home, which was shared by her grandparents, making it a very congested place. She was frequently constrained by her mother from touching things, and verbal "no" battles became very frequent in the later months of the study.

In Session 5 (1;0(30)), CL expressed DISAPPEARANCE negatives for the first time in combination with REJECTION negation. Four different times during the session, CL used "gone" to respond (correctly) to "Where's _?" questions. "No" was used to reject her mother's offer of a game of "clap hands", and a headshake accompanied her annoyed riddance of a toybag. The use of DISAPPEARANCE negatives, her mother observed, was a new development. In Sessions 6-8, negatives of disappearance were the most common form of

negation, accounting for 27/40 negatives at Session 8 (1;3(25)).

Session 9 (1;5(9)) was the beginning of what might have been called a period of "negativism" for CL in the older developmental literature (e.g., Bühler, 1935), though the developmental implications of this phenomenon are unclear. Constant streams of "no" were very common, and many of the mother's commands were met with rebellion. The following sustained sequence was typical:

UtterancesContext

CL(9.5.2)

CL: Get down. (CL tries to tug M off chair)
 M: No, I'm not getting down.
 CL: No.
 M: No. (M shakes head)
 CL: No num. (CL points to candy,
 i.e., "num" on near shelf)
 M: No, you're not
 getting up there.
 CL: Yeh. (CL tries to get to shelf)
 M: No.
 CL: Yeh!!
 M: No.
 CL: No.
 M: "No," that's what I said.
 CL: No.
 M: No. (CL swings her arms at M)
 M: No. (CL pulling on M's sweater)
 CL: No.
 M: You're not getting to
 the unit.
 CL: No!
 M: No.
 CL: No-o-o-o!!! (CL shouts loudly)
 M: No! (M shouts, shakes her head)
 (CL hits M with her fist)
 M: No, no, no, no. (M pushes CL away)
 CL: No-no/no!!! (CL sits down)
 M: "No", that's what
 mum said.

In Session 10 (1;6(15)), CL first used negatives with an UNFULFILLED EXPECTATION function. She used "stuck" a number of times when she was wedged between two settee cushions and later when trapped between a chair and an end table, unable to move. In similar contexts of Session 12

(1;8(22)) she used the negative word "can't" when unable to do something she planned to do.

Though not always correct from an adult perspective in her use of "no" in response to "yes/no" questions whose answers depend on external truth-conditions rather than CL's internal motivations and wants, CL used TRUTH-FUNCTIONAL negation correctly in numerous contexts in Sessions 11 (1;7(13)) and 12 (1;8(22)). The contexts of particular interest concern possession, absence/presence, and corrections of another's misinterpretations of her previous utterances.

POSSESSION

<u>Utterances</u>	<u>Context</u>
CL(11(0).9)	
E: Is that C's?	(E points to sister S's doll)
CL: No.	
E: Is that S's?	(E points to sister S's doll)
CL: Yeh.	
E: Is that S's?	(E points to C's doll)
CL: No.	
E: Is that C's?	(E points to C's doll)
CL: My.	(CL points to herself)

CL(11(0).21)

CL: Big. (CL points to big pair of shoes next to small pair that are hers. The large pair belong to Ned.)
E: Is this big? (E points to CL's small shoe)
CL: No/mine.
CL: Ned/big. (CL points to Ned's big shoes)

ABSENCE/PRESENCE

CL(11(0).8)

E: Is the ball gone? (E shows CL the ball)
CL: No.

CL(11.8.1)

E: Is CL's shoe in
the bag? (shoe on her foot near toybag)
CL: No.
E: Where is it?
CL: Look. (CL holds up her foot
with the shoe on it)

CL(11(0).14)

E: Is Mummy in there? (CL's mother has left the room)
CL: No/away.

MISINTERPRETATION
CORRECTIONS

CL(11.15.3)

E: Is it nice?	(CL is eating a sweet)
CL: Daddy.	(CL looks at sweet, which Daddy buys)
E: Teddy?	(E intentionally misinterprets CL's clearly spoken utterance)
CL: No.	
E: Daddy?	
CL: Uh-huh. (= yes)	

CL(12(0).9)

CL: Womble.	(CL searches for Womble doll)
E: Ball?	(E intentionally misunderstands)
CL: No.	
E: Womble?	
CL: Yeh.	(CL looks for and finds him)

CL's negation development displayed the predicted sequence of emergence of negation function which was observed for R, CA and J. Negation first served the function of REJECTION and only later DISAPPEARANCE, followed by the beginnings of TRUTH-FUNCTIONAL negation. For CL, UNFULFILLED EXPECTATION negation only appeared after DISAPPEARANCE negatives, as in the case of J, but unlike either R or CA, who used them before DISAPPEARANCE negatives. SELF-PROHIBITION was the second function of negation expressed in this general scheme of five negation

functions for CL, occurring after REJECTION but before DISAPPEARANCE, just as in the transcripts for R and J, but not CA, who used SELF- PROHIBITION negatives initially after DISAPPEARANCE negation. Though 4 months younger than R at the close of the study (i.e., 20 months old), CL was the second most prolific producer of negatives behind R, with 302 negatives. These were primarily used in sequences of "no" interchanges in battle with her mother over object-possession. The frequencies with which CL expressed the different negative functions from 8 to 20 months of age are listed in Table 23.

(Insert Table 23 here)

3.5 Summary of S's data

S, a male, was only using five words when he was last observed at 20 months of age (Session 12: 1;7(29)), and none of these were words serving negative functions. There was a brief history, however, to his use of the headshake which can be described. S's mother noted at Session 6 (1;1(3)) that S had begun to imitate her headshake, and sometimes used it to reject things, such as when his grandmother

TABLE 23

Frequencies of Different Negation Function Expressions:
Longitudinal Data for CL

Session Number	R		D			TF		SP		UE				Total
	q	s	i	q	s	q	s	s	q	s	UI	NC	Echo	
(1)														0
(2)		1												1
(3)								1				3		4
(4)		1												1
(5)	1	1		4						1				7
(6)	1		1	1	1			1						5
(7)		2	1	2	2									7
(8)	2	3	5	14	8			1			4	3		40
(9)	3	30	7	7	7	(1)		3			2	3	7	70
(10)	2	18		7	2			1		2	2	1	1	36
(11)	6	16	1	1	1	22 (14)		2		2	3	7		75
(12)	16	10	1		5	5 (1)		2		9	4	3		56

sum total = 302

KEY

Negative Function Abbreviations:

R = Rejection

D = Disappearance

TF = Truth-functional

SP = Self-prohibition

UE = Unfulfilled Expectation

Other:

UI = Uninterpretable

NC = No category, but interpretable

Conversational Role Subdivisions:

q = question-following negatives

i = imitations of negatives

s = spontaneous negatives

Note: The top number in the TF column
represents correct responses; the
parenthetical number represents
incorrect responses.

offered him a grapefruit and he shook his head rapidly from side to side. He also was reported to use the headshake when his brother tickled him, which made him upset. One time during the observations at Session 6, S's mother wiped his face with a rag and he shook his head, disliking the act and pushing his mother away. In Sessions 7-10 there were no headshakes, and his mother reported that he had stopped using it altogether. In Session 11 (1;6(22)), S said [na] when getting upset at his mother taking away his cup, but never used a similar sound or the word "no" during the observational sessions, or according to his mother's recollections. At Session 12, S's mother reported that S had begun to respond appropriately to ritual questions like "Do you need the pot?" and "Do you want a kiss?" with a headshake when he did not want the thing mentioned, and just do it if he did want to, but no headshakes were observed during that session.

The only headshakes S was observed to use had the function of REJECTION, and no other negative functions emerged during the period of study from 8-20 months. DISAPPEARANCE negatives such as "gone" were never used from 8-20 months of age by S, though his mother noticed that he was interested in object disappearance and would sometimes point to the locus of an object's or a person's

disappearance.

3.6 Summary of H's data

H, another male, was first observed at 0;8(9) and last visited at 1;8(13). On the last visit, H had a vocabulary of only three words, and none of these were negatives. Like S, however, H did have a history to the use of the headshake which also involved an initial appearance of use to reject things, a period of time when it was not used, and another period when it re-emerged.

At Session 3 (0;10(29)), H's mother reported that he had just begun to refuse food at the table with a headshake, but no instances of the gesture were observed during this session. H's mother noted several of H's uses of headshakes at Session 4 (0;11(26)) which she had written into her diary during the previous month. H had shook his head when his mother washed his face many times, when his eyes were being bathed, as he was being put to bed, and when he was being offered some distasteful medicine. During this session, H was observed to use a headshake to reject something on two different occasions, when his mother was trying to pry a toy from his hand, and when I put a hat on his head. H's mother also observed that H often used a nasal grunt like [nə] when

he was disgruntled, which previous writers have speculated is the "natural sound" of rejection (e.g., Jespersen, 1917). This nasal sound was used several times during this session when H's mother took his toy away, but did not have an immediate developmental consequent in the word "no", which was still not being used nine months later.

H stopped using the headshake shortly after Session 4, however, and his mother did not observe him to ever shake his head in the following three months. It was not until Session 7 (1;2(20)) that H had begun shaking his head again, still to reject food which he is offered, but now in retort to his parents's prohibitions to not touch the television and curtains as well.

A new function of the headshake was manifested in Session 8 (1;4(3)), when H had started to shake his head in self-prohibition when he either approached or sat in a forbidden nook in which a coil-heater used to sit. H sat in the nook "with an awful look of devilment" on his face, shaking his head, but sometimes only approached the nook and shook his head as he went to crawl into it.

H used headshakes infrequently in the remainder of the sessions, but always in contexts of REJECTION, and never in response to "yes/no" questions of even simple form, such as "Do you want a biscuit?" H's mother would just offer H food,

actions and other things rather than asking him if he "wanted" it. No use of DISAPPEARANCE negatives by H was ever observed by either H's mother or me, though the phonetically-consistent form (Dore et al., 1976) [ga] occurred in contexts related to disappearance. H used the morpheme just before throwing objects and just before towers or blocks would fall, and in months prior to his use of this sound, his mother had often said "gone!" when he either threw his ball and bricks, or knocked over towers of bricks.

4. Summary of longitudinal data on negation function development

In a detailed consideration of the use of negation by six children studied longitudinally over a year-long period, a consistent sequence of emergence for different functions of negation in the course of development was found. All of the four children who during the course of the study expressed the three central functions of negation involved in the hypothesized emergence-sequence (Chapter II) of negation functions supported the prediction. Children first expressed negation with the function of REJECTION, and only later denoted absence and the negation of external states with negatives of DISAPPEARANCE. And both of these negative functions emerged prior to the expression of TRUTH-

FUNCTIONAL negation, which is the use of negation for the logical purpose of commenting on the correspondence between the language-use of another in relation to the world, and hence the use of negative judgement (Chapter I).

Interestingly, the other two general functions of negation considered in terms of developmental emergence did not display this same invariance of sequence. SELF-PROHIBITION negatives did occur, as hypothesized, prior to the expression of negatives commenting on absence in four of the five children expressing SELF-PROHIBITION negation at all, but a fifth child (CA) did not use negatives in this way until after DISAPPEARANCE negation. This variation does not diminish the proposed importance of the phenomenon of negatives in self-prohibition, for such cases still provide dramatic evidence of the internalization of constraints imposed by the adult on the child's conceptualization of the world, in this case the binary division between permissible/prohibited acts and objects. This contrast is important because in the phenomena of self-prohibition it is evidence for the child's developing conception of what conventions are involved in the use of the word "no". The fact that CA did not express this function of negation prior to comments on DISAPPEARANCE as the other children did is interesting but unexplainable at the present time. The

child Bloom (1973) describes also displays this developmental sequence (cf. p. 90).

The other general function of negation considered in the analysis of the data was that of UNFULFILLED EXPECTATION (UE). In this respect as well there were differences between the children in the emergence point in negation development for this function relative to that of DISAPPEARANCE negatives: two subjects (R and CA) used UE negatives earlier than disappearance negatives, and two subjects (J and CL) only used them after disappearance negations had appeared. Two subjects did not use them at all (S and H), but had only used negatives of REJECTION and SELF-PROHIBITION (H). This variation suggests that the use of UNFULFILLED EXPECTATION negatives does not in any way require the prior elaboration of the linguistic encoding of absence in negations of DISAPPEARANCE. In fact, such variation may be critically related to similarities in the contextual features of negations of DISAPPEARANCE and UNFULFILLED EXPECTATION. Both types of negatives encode ABSENCES of some sort, the primary difference being that disappearance negatives are used in the context of the disappearance of an immediately-prior object/event/person, and unfulfilled expectation negatives are used in contexts where there is an expectation of current presence or task

completion which experience defies. The latter negatives, it was posited, should be later developing than the former due to their apparently greater developmental complexity. Talking about disappearance is in some sense more like an orienting to a change in the here-and-now, while talking about an unfulfilled expectation seems based more on presupposed and habitual knowledge than the immediate sensorimotor sensory field. These distinctions, though perhaps persuasive or appealing from a theoretical standpoint, do not bear the weight of empirical evidence, in which the predicted invariance of developmental sequence is not found. For the child, we may tentatively conclude that DISAPPEARANCE and UNFULFILLED EXPECTATION negation are not distinct negative functions during this period of development. Another possibility is that the individual variation in the occurrence of such negatives in the speech of the children of this study is in part a result of differences in parental speech to the children, but there is no evidence in this corpus to support such a claim.

The developmental sequence of negation functions for the six children is summarized in Table 24 on the following page.

TABLE 24

Developmental Sequences of Negation Function Emergence for Six Children

<u>Child</u>	<u>Developmental Sequence of negation functions</u>
R	R, SP/UE, D, TF
CA	R, UE, D, SP, TF
J	R, SP, D, UE, TF
CL	R, SP, D, UE, TF
H	R, SP
S	R

Abbreviations:

R = Rejection

D = Disappearance

SP = Self-prohibition

TF = Truth-functional

UE = Unfulfilled expectation

Chapter VI: New Perspectives on Childhood Negation

1. Research summary

At the outset of Chapter IV, we presented two central hypotheses, and the results of an intensive study of the responses of 18 to 36 month-old children to different types of sentences in a sentence-verification task were used to assess them. The use of truth-functional negation in linguistic judgements to deny false statements made by others was demonstrated by children only two to three years of age. These results supported the first hypothesis, that children of this age could be shown to both comprehend internal sentence negation, in their correction of false-negative statements, and to use negatives to correctly deny false statements.

A second hypothesis proposed in Chapter IV stated that the ability to judge negative statements as true would be a later emergent than either judging misnamings or another's incorrect denials to be false. This prediction was based on preliminary evidence from other sources that there is an interaction between PRAGMATIC factors (where the judged utterance is appropriate, given prior discourse or assumptions) and SEMANTIC factors (where the judged

utterance is correct, given conventional truth-conditions), with an early overemphasis of pragmatic factors such that true-negative statements would be difficult to understand without appropriate context (Chapter I) and hence hard to affirm at an early age. Unexpectedly, this hypothesis could not be evaluated given the patterns of the children's responses to true-negative statements. This was due to the fact that unlike the case of false statement corrections, a point of developmental emergence for true-negative sentence agreement could not be established due to the ubiquitous but ambiguous single-word "no" response to this statement type. It was clear that 30 and 36 month-olds were using negative sentences to agree with true-negatives, but the function of the early predominance of single-word "no" responses to TN statements could not be determined. The end result of this ambiguity was that the origins of spontaneous agreement with TN statements were left obscure and could not be placed in developmental perspective with false statement correction. It was clear, as previous studies had suggested, that true-negative statements were difficult for the young children to understand, which does support the contention that pragmatic factors are crucial to the child's normal understanding of negative sentences.

At the conclusion of Chapter II, a sequence of

development was predicted for the emergence of different functions of negation in the child's language growth. This hypothesis was evaluated in longitudinal studies of six different children in a critical period of negation development, spanning the age range from 8 to 24 months. Results supported the hypothesis, and an invariant sequence of negation function development was demonstrated. Negation first serves to express internal states of REJECTION, followed by negation which comments on external states, denoting absence with DISAPPEARANCE negation, to the important development of negative judgements on correspondences between external states and language use and hence TRUTH- FUNCTIONAL or propositional negation. In contrast to this uniformly expressed sequence, the negative functions of UNFULFILLED EXPECTATION and SELF-PROHIBITION were subject to some variation in their place of sequence emergence relative to the three central functions above for the different children studied. Given that these different functions of negation can be expressed with the same conventional vehicle, the gestural or verbal "no", the emergence sequence implies that early conceptions of negation, by prefiguring later affirmation/negation contrasts, exert important influences on later negation development, and in particular the use of negation in

truth-functional judgements.

In the remainder of this chapter, we will summarize the implications of this body of research and synthesis of previous findings, and suggest several ways in which the present research program can be extended.

2. Further research

One of the basic findings of this research program was that the format of the dialogue-like sentence-verification paradigm was an excellent technique for eliciting linguistic judgements and verbalizations from very young children. As such, the paradigm is a method with general applications. Previous investigators have often commented upon the difficulty of eliciting different types of language productions from children, such as complete subject-verb-object constructions, and this technique would seem to be ideally suited to eliciting productions from the child as to what is occurring in a production task if the experimenter instead produces a statement which falsely says what is occurring (the false-affirmative statement type). The results of the current study show that children two to three years of age are highly motivated to correct false statements by providing alternative statements correctly

describing the current experimental situations. This paradigm could also be fruitfully applied to other domains of predication in which complex sentences, such as comparatives, could be used as stimuli, and children's knowledge for the conditions under which comparative statements (e.g., A is bigger than B) are true could be assessed. The general importance of the current method is that it does not require the child to comprehend task instructions, and the child's performance would presumably be more closely related to his actual competence than in conventional language assessment methods (e.g., Schiefelbusch & Lloyd, 1974). Results of this experimental study are in keeping with the recent general finding that varying traditional task demands on child subjects reveals abilities that had previously been thought to be lacking in the child, such as classification and conservation skills, spatial, social, and conversational perspective-taking, and causal reasoning (Case, 1978; Gelman, 1978; Shatz & Gelman, 1973; Shatz, 1978). The current research indicates that two to three year-olds can demonstrate rudimentary logical abilities in their language use in a simple sentence-verification task. This line of research could be extended to other aspects of early logical competence, such as the solution of simple syllogisms in natural task

environments (Pea & Jewson, in progress).

Another arena of investigation that would be particularly interesting given the findings of these studies would be a detailed analysis of the effect of negative corrections and feedback during the child's word-learning process. Recently, some authors (Bowerman, 1976; Bruner, 1975a) have speculated on the basis of some indirect evidence described by Nelson (1973, pp. 101f) that if the mother's use of language "conflicts" with the child's preverbal cognitive organization, such as in the mother's corrections of the child's early overgeneralizations (Clark, 1973) of words to new objects there is an INHIBITION of the learning process. Nelson (1973, p. 113) suggests that "correcting early errors is unproductive" and "slows the child's learning". But it is certainly the case that rejecting the child's attempts at naming is a different enterprise than correcting the child and providing a correct alternative. These two different methods of early word-use "error" negation, which Nelson does not distinguish, may have radically different consequences for the word-learning process, and require systematic study in a circumscribed word acquisition experiment, similar to that reported by K.E. Nelson & Bonvillian (1973). Katherine Nelson's result that children whose attempts at using early words are often

"rejected" or corrected by their mothers acquire new words more slowly than children whose attempts are "accepted" (1973, p. 115) by their mothers, could be as much due to the mother's attitudes about correction and feedback as conveyed in "authoritarian" suprasegmental features of the correction events (loud, derisively-intoned negatives) than in the corrections themselves, or in the non-elaboration of negative feedback (e.g., "No" rather than "No, that's a DOGGY, not a pussy."). In addition, the less-advanced children may have been that way irrespective of their mother's attitude to their use of words.

Indeed, Harrison (1972) suggests that the understanding of negative rules of when NOT to use words (i.e., when a referent is not an exemplar of a class named by the word) is an essential part of the word-learning process. This suggestion has just recently been elaborated as a new theory of semantic development (Barrett, 1978). This point is particularly important since the 18 month-old child, who is in the midst of word-learning, seems to understand simple negation, as suggested by the results of the sentence-verification experiment reported in Chapter IV. Nelson (1973) wishes to suggest that ANY form of correction is detrimental to word-learning, but her findings remain tentative and require extensions in the way suggested above

before we suggest as Bowerman (1976) does, that the use of negative feedback in language-intervention programs with the mentally-retarded be reconsidered. The use of negation in corrections may be crucial to the learning process in these cases, as well as in the course of normal language development. This is not to suggest a crude empiricistic account of the word-learning process (Harrison, 1972). Negation may play an instrumental role in lexical development, unlike the language development covered by the well-cited adage that corrections do not provide any aid to the process of syntactic development (Brown, Cazden & Bellugi, 1968). Even in that seminal study, parents corrected for "the truth of the proposition the child intended to express" even if not the syntactic ill-formedness of the statement used by the child to express the proposition.

3. Implications of the current research

There are a number of important implications which can be drawn from the results of the research presented and critically reviewed in this investigation of negation development.

The notion of the "cognitive complexity" of negation

Numerous developmental psycholinguists have expressed the notion that negation displays a certain "cognitive complexity" which seems to have some reducing effect on sentence-complexity in particular types of negation (Chapter II: Bloom, Keller-Cohen). The analyses of negation presented in Chapter I of the "denial" function usually referred to in these studies makes this vague notion of "complexity" clearer by substantiating the difficulty which children have with negation in terms of critical notions in cognitive development (the emergence of the semiotic function; the role of "horizontal decalage" in the development of NOT-X negation) and communication theory (the distinction between "analog" or iconic and "digital" or abstract communication codes). Since truth-functional negation is a sine qua non of the logical functions of language, it is to be expected that it will exert some effect on the production of negative sentences serving these functions. The well-documented difficulty adults have with negation e.g., Wason & Johnson-Laird, 1972) and with negative information in problem-solving tasks (Bruner, Goodnow & Austin, 1956) testifies to the general difficulty

of negation in human cognition. What has yet to be investigated are the mental operations which underlie the child's use of negation for logical purposes, which we are currently unequipped to study. One cannot assume that the information-processing models of adults's understanding of negative sentences (e.g., Clark, 1972; Carpenter & Just, 1975) in terms of component processing stages are applicable to the cognitive underpinnings of logical judgement in children.

The cognitive bases of negation development

The current account of negation development, unlike prior studies which focused on linguistic analyses of negative expressions, is based on cognitive principles that predict the relative difficulty of different functions of negation (Chapters I,II). Given this orientation, and the results of the longitudinal studies of negation development in six children, we can tentatively propose that this emergence sequence is generally applicable and that detailed studies of negation development in other languages would reveal the same sequence of development for the emergence of different functions of negation, from negative expressions of internal, affective states with REJECTION negation,

outward toward DISAPPEARANCE negatives which denote the absence of something present immediately prior to the negative utterance, and ultimately to the expression of negative judgements of non-correspondence between external states and the language used to describe them. The specification of negative functions outlined in Table 20 should provide the necessary detail for cross-language comparisons.

Negation as a source of early autonomy for the child

The developments in negation-comprehension for prohibition described in Chapter II and the brief descriptions of the emergence of REJECTION negation in the language of the six longitudinal subjects suggest the importance of early affective negation for the child's establishment of agency and interactional control. As Shotter (1975) has suggested, the ability to deny another control is an important component of the early establishment of the child's "personal power" and his conception of himself or herself as an agent who has CHOICE and can exert a will independent of the caretaker. Conventional negation provides the vehicle with which the child conveys this developing autonomy to the adult.

Levels of knowledge about negation

At the outset of the thesis we identified truth-functional negation, which provides evidence of the child's conception of propositions in terms of their truth or falsity, as a topic of central developmental importance from both a cognitive and linguistic perspective. There are a number of different levels of knowledge about negation in general which are critical in this development as discernible from the reviews and research of this thesis.

At first, the child conceives of negation in only a DEONTIC sense, where negation concerns conditions of control or constraint on agency. Initially negation is known as a constraint on self rather than other, as we saw from analyses of childrens' early responses to adult prohibition negation. The child first ignores the adult's prohibitions or only orients in the direction of the loud voice, and only later, sometime at the end of the first year, begins to retract from the forbidden place or object upon hearing the prohibition. Soon after, however, the child comes to express constraints on others, retorting to the parental prohibitions with non-compliance at first and then

conventional negation (of headshake or negative word).

A distinct development occurs with the onset of what might be designated as EPISTEMIC negation, as the child begins to mark the unexpected, the absent, and unfulfilled expectations with negative utterances. Such early negations provide language-marked oppositions by denoting disappearances, cessations, and violated expectations. A related development at the same time consists of the phenomenon of self-prohibition negation, which is an important intermediary form of negation between the child's knowledge of negation as a tool of rejection and agency control, and the child's knowledge of negation as a linguistic device for logical judgement in propositional denials. Such negatives, as suggested in Chapter II, represent a new level of knowledge about negation which reflects the child's awareness of negation as a socially-reciprocal constraint. The contrast between affirmation (approach) and negation (withdrawal) has been internalized by the child with the conventional negative word acting to represent the contrast. This new knowledge about negation indicates the emergence of an internal register or notation for that which is conventionally prohibited and that which is allowed, i.e., for "no" and that which is permissible.

Such knowledge about negation is superseded by a higher-order level of negation when the child comes to use truth-functional negation for logical purposes. Again the negations are dictated by a conventional code, the arbitrary truth conditions we have tacitly agreed upon as speakers of a common language. In the use of truth-functional negation, the child is demonstrating an understanding of rules for truth which regulate language use in our statements about the world. But initially this is only an implicit awareness of truth conditions, much like our implicit awareness of the rules of grammar in Chomsky's account (1972) of linguistic knowledge. It is in this context that the children's false responses in the sentence verification experiment (Chapter IV) emerge as important. Recall that children in that study who did produce false responses were producing their own false statements, which were not merely imitations of earlier false statements, but spontaneous and systematic "corruptions" indicating play with the correspondence rules of truth. As both Collins (1968) and Premack (1976b) have indicated, being able to systematically BREAK a rule, in this case the rules of correspondence between language and reality, in addition to being able to say when a rule has been broken (shown by the children's corrections of false statements), constitutes evidence for reflective knowledge

of that rule. What this means is that the children's false responses to sentences illustrate a new level of linguistic knowledge which involves a reflective consciousness of the possibility for language to be false. The truth-rules for language use become symbolic objects. This new level of knowledge about negation and language constitutes an important acquisition for the child. The current results reveal that the very young child, as developing epistemologist, is acquiring important information about the structure of language itself, as a system relating to the world with logical structure.

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APPENDICES

APPENDIX A

SAMPLE EXPERIMENTAL TRANSCRIPT

APPENDIX A

Sample Experimental Transcript*

Comprehension

<u>Word</u>	<u>Stimulus Statement (Type)</u>
JUMP	HE'S JUMPING. (TA)
(C makes doll jump)	"Oh, jumping"
BIG	THAT'S NOT THE BIG ONE. (FN)
(C takes big ball)	"No" • (C shakes head), "that's big" • (C hits big ball)
MOUTH	THAT'S YOUR HAIR. (FA)
(C points to it) • "right there"	"No" • (C shakes head), "That's my hair" • (C points to hair), "Mummy part it there," "Mummy comb it"
APPLE	THAT'S NOT THE BISCUIT. (TN)
(C points to it)	"No" • (C shakes head), "it's a --- and that's biscuit right there" • (C points to biscuit)

*Note: An experimental transcript consisted of 8 pages with 6 stimulus statements and response boxes as above appearing on each page. This particular sequence of 4 statements appeared consecutively in the transcript of one 30 month-old female, whose responsiveness was typical of this age-group. Since the primary point here is to illustrate the transcript format, the fuller transcript is not included.

APPENDIX B

DECISION CRITERIA FOR CODING CATEGORIES

APPENDIX B

ANALYSIS OF DATA: DECISION-CRITERIA FOR CODING CATEGORIES

1. The BASIC Coding Categories

Summary of contents

- 1.1 Solitary YES: Primary (I)
- 1.2 Solitary YES: Secondary (II)
- 1.3 YES + Referent Name: I
- 1.4 YES + Referent Name: II
- 1.5 YES + Referent Name + Copula: I
- 1.6 YES + Referent Name + Copula: II
- 1.7 Solitary NEG: Primary (I)
- 1.8 Solitary NEG: Secondary (II)
- 1.9 NEG + Referent Name: I
- 1.10 NEG + Referent Name: II
- 1.11 NEG + Referent Name + Copula: I
- 1.12 NEG + Referent Name + Copula: II
- 1.13 NEG + Mentioned Name
- 1.14 NEG + Mentioned Name + Copula
- 1.15 NEG-phrase: repetition (duplicate)
- 1.16 NEG-phrase: repetition (different)
- 1.17 YES + NEG-phrase: repetition (duplicate)
- 1.18 YES + NEG-phrase: repetition (different)
- 1.19 Solitary Referent Name: I
- 1.20 Solitary Referent Name: II
- 1.21 Referent Name + Copula: I
- 1.22 Referent Name + Copula: II
- 1.23 Mentioned Name
- 1.24 Mentioned Name + Copula
- 1.25 Other name: Elaboration
- 1.26 Other name: Generalization
- 1.27 Referent Word Questions
- 1.28 Mentioned Word Questions
- 1.29 Other Word Questions
- 1.30 Child indicates referent Object
- 1.31 Child indicates mentioned Object
- 1.32 Explicit Opposition: Type A1
- 1.33 Explicit Opposition: Type A2
- 1.34 Explicit Opposition: Type A3
- 1.35 Explicit Opposition: Type B
- 1.36 False Response: Type 1
- 1.37 False Response: Type 2
- 1.38 False Response: Type 3
- 1.39 False Response: Type 4
- 1.40 False Response: Type 5
- 1.41 False Response: Type 6
- 1.42 False Response: Type 7
- 1.43 Non-Relevant Response

1. The BASIC coding categories

In the discussion of criteria for the forty-three BASIC categories, redundancy is avoided wherever possible. One distinction which demarcates a large number of categories is the PRIMARY/SECONDARY, or I/II scheme division, which will be presented here rather than throughout sections 1.1-1.43. The criteria for scheme-assignment of particular responses concern the child's attentional focus after the statement is presented. The response is a PRIMARY (I) scheme response unless the child shifts attention to the mentioned Object (in the case of FAs and TNs), in which case the response is one to be classed in a SECONDARY (II) scheme category. Schemes I and II will only be noted in section headings, and not made explicit in the decision-criteria discussions.

Definitions of technical terms, such as "head-nodding", are given only once, and the terms are subsequently only mentioned in the decision-criteria.

There is also a hierarchical principle utilized throughout the decision-criteria formulations, where responses are categorized at the level of greatest complexity whenever they could potentially be decomposed and categorized "in pieces". For example, "yes, it's a ball" could be dissected and analyzed as YES: Primary (I), together with Referent + copula (I), but is instead coded as the more complex YES + Referent Name + Copula (I).

1.1 Solitary YES: Primary (I)

For a response to be included in this category, it must be either:

- (1) the word "yes" or "yeh" alone,
- (2) the idiom "uh-huh" with fall-rise intonation,
- (3) the gesture of head-nodding, consisting of at least two rapid, distinct contradirectional head movements in the vertical plane.

In addition, to avoid "eh"-like grunts from being counted as "yeh", the paternal interview must note the use of the type of affirmation in question.

1.2 Solitary YES: Secondary (II)

Criteria are as in 1.1, with the exception of scheme (II).

1.3 YES + Referent Name: I

The response must be either a combination of (1) and (2) in a sentence (i.e., within sentential intonation boundaries and not with separate intonation contours):

- (1) "yes", "yeh", or "uh-huh", or headnodding,
- (2) the referent name.

1.4 YES + Referent Name: II

Criteria are as in 1.3, with the exception of scheme (II).

1.5 YES + Referent Name + Copula: I

The response must be a combination of (1), (2a) or (2b), and (3) in a sentence:

- (1) "yes", "yeh", "uh-huh", or headnodding,
- (2) (a) the referent name,
(b) the pronoun "it" or some other pronoun referring to the referent Object.
- (3) the copula "is", or its contracted form "'s".

1.6 YES + Referent Name + Copula: II

Criteria are as in 1.5, with the exception of scheme (II).

1.7 Solitary NEG: Primary (I)

For a response to be included in this category, it must be either:

- (1) the word "no" or "not" alone,
- (2) the idiom "uh-uh" with rise-fall intonation,
- (3) the gesture of headshaking, consisting (roughly) of at least three rapid, distinct contradirectional head movements in the horizontal plane.

There are cases where the child uses negatives for pragmatic ends, such as to accompany pushing something, to disagree about an Object's place or manner, or to protest. Such cases are not coded as negatives for the purposes of the categorization.

In addition, to avoid "ne" or other nasal grunts from being counted as "no" or "not", the paternal interview must note the use of the negative in question.

1.8 Solitary NEG: Secondary (II)

Criteria are as in 1.7, with the exception of scheme (II).

1.9 NEG + Referent Name: I

The response must be a combination of (1) and (2) in a sentence (cf. 1.3):

- (1) "no", "uh-uh", or headshaking,
- (2) the referent name.

1.10 NEG + Referent Name: II

Criteria are as in 1.9, except for scheme (II).

1.11 NEG + Referent Name + Copula: I

The response must be a combination of (1), (2a) or (2b), and (3) in a sentence:

- (1) "no", "uh-uh", or headshaking,
- (2) (a) the referent name,
(b) the pronoun "it" or some other pronoun referring to the referent Object.
- (3) the copula "is" or its contracted form "'s".

For example: "No, it's the ball".

1.12 NEG + Referent Name + Copula: II

Criteria are as in 1.11, except for scheme (II).

1.13 NEG + Mentioned Name

The response must be a combination of (1) and (2a) or (2b) in a sentence:

- (1) "no", "not", "uh-uh", or headshaking,
- (2) (a) the name mentioned, when it differs from the referent name (FAs; not TNs, since this is categorized as 1.16 below),
(b) the pronoun "it" or some other pronoun referring to the referent Object.

For example: "not the car".

1.14 NEG + Mentioned Name + Copula

The response must be a combination of (1), (2a) or (2b), and (3) in a sentence:

- (1) "no", or "not", or "uh-uh", or headshaking,
- (2) (a) the name mentioned, when it differs from the referent name (FAs; not TNs, since this is categorized as either 1.15 or 1.16 below),
 (b) the pronoun "it" or some other pronoun referring to the referent Object.
- (3) the copula "is" or its contracted form "'s".

For example: "no, it isn't", "isn't ball", "isn't it", "it isn't the ball".

1.15 NEG- phrase: repetition (duplicate)

This response must be a near or exact duplicate of the negative statement presented as the stimulus, where the following sequence is present in a sentence: an initial pronoun (e.g. "it" or "that"), "is" or the contracted form "'s", "not" or the contracted form "n't", and the mentioned name.

For example: "that isn't the car".

1.16 NEG-phrase: repetition (different)

This response may be either the combination of (1) and (2), or (2) alone in a sentence:

- (1) an initial "no", or headshake,
- (2) a phrase which preserves the FN or TN statement's semantic structure, but not its lexical items:
 typical examples are "it isn't" or "it's not" or "isn't a ____" or "that's not a ____".

1.17 YES + NEG-phrase: repetition (duplicate)

This response must be the combination of "yes" or "yeh" with the response-type defined by 1.15.

1.18 YES + NEG-phrase: repetition (different)

This response may be either the combination of (1) and (2), or (2) alone in a sentence:

- (1) an initial "yes" or "yeh",
- (2) a phrase which preserves the FN or TN statement's semantic structure, but not its lexical items:
 typical examples are as in 1.16 (2) above.

1.19 Solitary Referent Name: I

The response must be the use of the referent name alone.

1.20 Solitary Referent Name: II

The response must be the use of the referent name alone, in accord with the secondary scheme (II), and hence focusing on the mentioned Object (where it differs from the referent Object).

1.21 Referent Name + Copula: I

The response must be either (3), or a combination of

(1) and (2) in a sentence:

- (1) the referent name,
- (2) the copula "is" or its contracted form "'s" (usually) in combination with the pronoun "it" or "that", or another pronoun referring to the referent Object.
- (3) "it is", or "tis".

1.22 Referent Name + Copula: II

Criteria are as in 1.21, except for scheme (II).

1.23 Mentioned Name

The response must be the name mentioned, where it differs from the referent name (FAs and TNs), and where there is not a shift to scheme (II). If the child has demonstrated a comprehension and production of the words, this is one of 1.36-1.42, unless it is part of a "response-change", such as "car...ball" (without shift of scheme), in which case it is not listed in any category, but is discussed separately in the text.

1.24 Mentioned Name + Copula

The response must be the combination of the response-type defined by 1.23, the copula "is" or its contracted form "'s", (usually) in combination with the pronoun "it" or "that", or another referring to the referent Object.

1.25 Other Name: Elaboration

The response is the correct name of an Object other than the referent Object, or (if they are non-coextensive) the mentioned Object. This response-type is not restricted to names in the referent set: other cases are "claws", "eyes", "laying down".

The response is also not an exemplar of either the referent Object or mentioned Object types. This response-type includes cases where the response made (a name) is applicable to the referent (or mentioned) Object itself, but which actually concern a different feature than the one focused on by the referent (or mentioned) Object name presented (e.g. "ball" as a response when the referent Object was "a red one", but also a ball).

This response-type does not include names which are used to explicitly request objects, as sometimes happened with the food-item exemplars, marked by extended open palm and demanding voice.

1.26 Other name: Generalization

The name of the referent Object (or the mentioned Object if they are non-coextensive) is applied correctly to an exemplar of that Object type different from the referent Object (or, again, the mentioned Object if they are non-coextensive). This category does not discriminate between schemes I and II.

1.27 Referent word questions

The response is a question, marked by terminal rising intonation, that contains the referent word.

1.28 Mentioned word questions

The response is a question, marked by terminal rising intonation, that contains the mentioned word, when it is different than the referent word (i.e. for FAs and TNs).

1.29 Other questions

The response is a question, again marked by terminal rising intonation, which contains neither the referent word nor the mentioned word (e.g. "Hey?", "Say?", "Eh?").

1.30 Child indicates referent Object

The response consists of a point to, a taking of, or in general, an indication of the referent Object, which was initiated after the statement was presented. The child may have indicated the Object for the comprehension-phase of the experimental task, but must have withdrawn it before the statement was presented for this response to have occurred.

1.31 Child indicates mentioned Object

Criteria are as in 1.30, except for scheme (II).

1.32 Explicit Opposition: Type A1

This response must be a conjunction formed by two sentences, one of type (1) and one of type (2). It is assumed that the mentioned name is different than the referent name.

- (1) "not (mentioned name)", or "it('s) not": where the referent Object is the focus of attention,
- (2) either mentioned name + copula, mentioned name + pronoun, or mentioned name + pronoun + copula; where the mentioned Object is the focus of attention.

The order of (1) and (2) is not considered for coding purposes. If this response-type occurs to a TN, (1) is classified as either 1.15 or 1.16, and whichever category of 1.20 or 1.22 is applicable for (2).

Example: "not a dog", where the child is looking at the CAT, followed by "that's dog" where the child is looking at the mentioned Object, DOG.

1.33 Explicit Opposition: Type A2

This response must be a conjunction formed by two sentences, one of type (1) and one of type (2). It is assumed that the mentioned name is different than the referent name.

- (1) "not (mentioned name)" or "it('s) not" (scheme I),
- (2) either referent name + copula, referent name alone, referent name + pronoun, or referent name + pronoun + copula; where the focus of attention has not shifted from the referent Object to the mentioned Object.

The order of (1) and (2) is not considered for coding purposes. If this response-type occurs to a TN, it is classified as either 1.15 or 1.16 (for part (1)), and in whichever category of 1.19 or 1.21 is applicable for (2).

Example: "not a dog", where the child is looking at the referent CAT, followed by "it's cat", with the same focus.

1.34 Explicit Opposition: Type A3

This response must be a conjunction formed by a negation (1), and two sentences, one of type (2) and one of type (3). The negation must be the initial part of one of the two sentences. It is assumed that the mentioned name is different than the referent name.

- (1) "no",
- (2) either referent name + copula, referent name alone, referent name + pronoun, or referent name + pronoun + copula; where the referent Object is the focus of attention,

- (3) either mentioned name + copula, mentioned name alone, mentioned name + pronoun, or mentioned name + pronoun + copula; where the mentioned Object is the focus of attention.

The order of (1) + (2) and (3), or (1) + (3) and (2), is not considered for coding purposes.

Example: "no, that's ball", where the child is looking at the referent BALL, followed by "that's car", where the child is looking at the mentioned Object, CAR.

1.35 Explicit Opposition: Type B

This response must be a conjunction formed by two sentences, one of type (1) and one of type (2). It is assumed that the mentioned name is different than the referent name.

- (1) either referent name alone, referent name + pronoun, referent name + copula, or referent name + pronoun + copula; where the referent Object is the focus of attention,
- (2) either mentioned name alone, mentioned name + pronoun, mentioned name + copula, or mentioned name + pronoun + copula; where the mentioned Object is the focus of attention.

The order of (1) and (2) is not considered for coding purposes.

1.36 False Response: Type 1

One criterion to be satisfied before a response is coded as any type of False Response (thus for all of 1.36-1.42) is that the child must manifest production and comprehension of the words involved.

This response is a misnaming of the referent alone, and not merely an imitation of (or agreement with) the misnaming rendered by a FA statement (1.42) or a TN (1.41).

Example: Referent Object: DOG

Stimulus: "that is a dog"

Child's response: "that's a cat" (about a DOG)

1.37 False Response: Type 2

This response is an application of the referent Object name to an Object other than the referent which itself is not a different exemplar of that Object-type.

Example: Referent Object: DOG

Stimulus: "that is a dog"

Child's response: "that is a dog" (about ball)

1.38 False Response: Type 3

This response is an application of the mentioned Object name to an Object which is neither the referent Object, the mentioned Object, or another exemplar of those two Object-types.

Example: Referent Object: DOG

Stimulus: "that is a cat"

Child's response: "that is a cat" (about CAR)

1.39 False Response: Type 4

This response is the conjunction of two sentences: one which is a False Response Type 1, and another which is either:

- (1) a False Response Type 2,
- (2) a False Response Type 3,
- (3) an incorrect application of some other stimulus word which is neither the referent name nor the mentioned name to an Object other than the referent Object.

Example: Referent Object: DOG

Stimulus: "that is a cat"

Child's response: "that's a ball" (about DOG),
"that's a dog" (about CAT)

1.40 False Response: Type 5

This response is a negation of the true-affirmative (TA) stimulus statement either by:

- (1) "no", "not", "uh-uh", headshaking, or
- (2) the combination of (1) with the copula "is" and a pronoun referring to the referent Object (e.g. "it's not") or the referent name (e.g. "that's not a ball").

Example: Referent Object: BALL

Stimulus: "that is a ball"

Child's response: "that's not a ball"

1.41 False Response: Type 6

This response is a denial of a true-negative statement (TN) by a false-affirmative statement by the child. It is a misnaming just as exemplars of False Response Type 1 (1.36) are, but of interest as a separate category due to the difficulty of the TN stimulus statements. The child's FA may take the following forms:

- (1) the mentioned word alone,
- (2) the copula "is" alone,
- (3) a pronoun referring to the referent Object in combination with (2): "it is",

- (4) the mentioned word conjoined with (2) and (3):
e.g. "it is a ball",
- (5) "yes" (or other affirmatives) in combination with
any of (1)-(4).

The child's attention must not have shifted to the mentioned Object (scheme II).

Example: Referent Object: BISCUIT

Stimulus: "that's not an apple"

Child's response: "it is!"

1.42 False Response: Type 7

This response is basically an agreement with the false-affirmative (FA) stimulus statement, and consists of either:

- (1) the mentioned word alone,
- (2) "yes", "yeh", "uh-huh", or head-nodding,
- (3) the copula "is", pronoun + copula (referring to the referent Object, e.g. "it is"), contracted pronoun + copula (e.g. "tis"), or copula + mentioned word,
- (4) any combination of (2) and (3), e.g. "yeh it is",
- (5) any combination of (1) and (2), e.g. "yes, ball",
- (6) any combination of (1) and (3), e.g. "it's ball",
- (7) any combination of (1) and (4), e.g. "yes, it is ball".

The child's attention must not have shifted to the mentioned Object, i.e. scheme II.

Example: Referent Object: CAR

Stimulus: "that is a ball"

Child's response: "it is ball"

1.43 Non-relevant Response

This response-type is only irrelevant from the standpoint of the categories; it may be (but most frequently is not) very relevant to the situation, but is placed in this category, which consists of responses that do not belong in categories 1.1-1.42.

1. The COMPILED coding categories

For the purposes of a broader analysis of the subjects' protocols, which would not lose general trends in, for example, YES and NO use to the different statement-types, as the basic categorization scheme might, a compiled categorization scheme was elaborated. This compiled scheme involves two major principles. First, categories were compiled so that responses which had common features, such as the occurrence of a question, could be collapsed into a common category. Secondly, individual categories which had structurally complex responses, such as the Explicit Opposition categories (1.32-1.35) and the syntactic categories involving YES and NEG (1.3-1.6; 1.9-1.14) were partitioned in such a way as to be subsumed under compiled categories. The compiled categories are 13 in number- and are most clearly viewed when parcelled under 3 general headings. They are called by LETTERS rather than by numbers to distinguish them from the basic categories, which often have the same name. The letter "I" is omitted since it has been used as an abbreviation for the primary scheme Section 1, this appendix).

Primary Scheme (I)

- (A) YES I
- (B) NEG I
- (C) Indicate Referent I
- (D) Referent Word I
- (E) Mentioned Word

Secondary Scheme (II)

- (F) YES II
- (G) Indicate Referent II
- (H) Referent Word II

Other

- (J) Elaboration
- (K) Explicit Opposition
- (L) False Response
- (M) Question
- (N) NEG-phrase repetition

One result of the category-partitioning under the COMPILED categorization system is that some responses are multiply-categorized. A response such as "No, it's a ball. That's the car", which on the BASIC coding system would be characterized simply as Explicit Opposition: Type A3 (Section 1.34) would be categorized in the COMPILED categorization system as (B) and (D) and (H). It is thus a feature of this compiled system that it captures the fact that this complex response was an Explicit Opposition, and that it included a negative (I), referent word (I), and referent word (II). The table below illustrates the compilation involved in the COMPILED categories. The COMPILED category initial and name appear in the left-hand column, while the right column represents the list of numbers corresponding to the BASIC categories which have been compiled in this system (see the previous section of this appendix).

<u>COMPILED categories</u>	<u>BASIC category numbers</u>
(A) YES: Primary (I)	1,3,5,17,18
(B) NEG: Primary (II)	7,9,10,11,12,13,14,32,33,34
(C) Child Indicates Referent (I)	30
(D) Referent Word (I)	3,5,9,11,19,21,33,34,35
(E) Mentioned Word	23,24
(F) YES: Secondary (II)	2,4,6
(G) Child Indicates Referent (II)	31
(H) Referent Word (II)	4,6,10,12,20,22,32,34,35
(J) Elaboration Word	25
(K) Explicit Opposition	32,33,34,35
(L) False Response	36,37,38,39,40,41,42
(M) Questions	27,28,29
(N) NEG-phrase repetition	15,16,17,18

APPENDIX C

DATA FROM SENTENCE-VERIFICATION STUDY

APPENDIX C

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- Table A: BASIC Category Responses by Statement Type: 18 months
 Table B: BASIC Category Responses by Statement Type: 24 months
 Table C: BASIC Category Responses by Statement Type: 30 months
 Table D: BASIC Category Responses by Statement Type: 36 months
 Table E: COMPILED Category Responses by Statement Type:
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 36 months

Key to Tables A-D

- (1) The left-hand column numbers correspond to the BASIC coding categories 1-43 defined in Appendix B, Section 1.
- (2) There is often more than one codable response to a particular statement, so the number of responses in a column will usually sum to more than the total number of statements presented.

Key to Tables E-H

- (1) The left-hand column letters correspond to the COMPILED coding categories A-N defined in Appendix B, Section 2.
- (2) The columns of proportion figures do not sum to 1.0 because the data constituting the frequencies on which the proportions are based is not derived from mutually exclusive categories (as explained in Appendix B, Section 2).

Key to Tables A-H

- (1) The left-column abbreviation "#S" at the bottom of the page stands for the total number of statements presented of the type under consideration.
- (2) The table subheadings of "freq" and "prop" are abbreviations for "frequency" and "proportion", respectively.

TABLE A

BASIC category responses by statement type: 18 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
1.			1	.02	1	.02		
2.								
3.			1	.02				
4.								
5.								
6.								
7.	2	.05	8	.12	9	.17	4	.10
8.								
9.					1	.02		
10.								
11.								
12.								
13.			2	.03				
14.								
15.								
16.							2	.05
17.								
18.								
19.	3	.07	11	.17	8	.15	5	.12
20.			3	.05			2	.05
21.								
22.								
23.			3	.05				
24.								
25.	5	.12	4	.06	5	.10	3	.07
26.								
27.							1	.02
28.			2	.03				
29.			2	.03	1	.02	2	.05
30.	3	.07	1	.02	5	.10		
31.			12	.18			6	.15
32.								
33.								
34.								
35.			1	.02			1	.02
36.								
37.								
38.								
39.								
40.								
41.								
42.			2	.03				
43.	31	.76	23	.35	24	.46	22	.54
#S	41		66		52		41	

TABLE B

BASIC category responses by statement type: 24 months

	TA	FA	FN	TN				
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
1.	14	.18	6	.07	5	.06	5	.06
2.								
3.							1	.01
4.			2	.02				
5.					2	.02	1	.01
6.								
7.	6	.08	9	.10	13	.15	8	.10
8.								
9.			7	.08	1	.01		
10.								
11.							1	.01
12.								
13.								
14.								
15.								
16.					2	.02	2	.02
17.								
18.								
19.	8	.10	16	.17	17	.20	12	.15
20.			5	.05			8	.10
21.	1	.01	3	.03	13	.15	4	.05
22.			2	.02				
23.			1	.01			1	.01
24.								
25.	15	.19	6	.07	8	.10	3	.04
26.	3	.04	1	.01	3	.04		
27.			1	.01	1	.01	1	.01
28.			2	.02			3	.04
29.	1	.01	4	.04	5	.06	6	.07
30.	3	.04	4	.04	4	.05	2	.02
31.			8	.09			6	.07
32.			1	.01				
33.			1	.01				
34.			3	.03			1	.01
35.			5	.05			4	.05
36.	1	.01	1	.01	1	.01		
37.	1	.01	2	.02			1	.01
38.								
39.			1	.01				
40.								
41.							6	.07
42.			6	.07				
43.	39	.51	17	.18	26	.31	23	.28
#S	77		92		84		81	

TABLE C

BASIC category responses by statement type: 30 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
1.	21	.19	4	.03	20	.17	5	.04
2.			3	.03			1	.01
3.	2	.02			2	.02		
4.								
5.	1	.01			14	.12		
6.			1	.01				
7.	6	.05	28	.24	19	.16	33	.29
8.								
9.			3	.03	1	.01	2	.02
10.							1	.01
11.			4	.03	3	.03	1	.01
12.			7	.06			3	.03
13.			3	.03				
14.			20	.17				
15.								
16.					3	.03	14	.12
17.								
18.							2	.02
19.	10	.09	4	.03	12	.10	7	.06
20.			2	.02			9	.08
21.	4	.04	4	.03	35	.30	8	.07
22.			4	.03			10	.09
23.							1	.01
24.								
25.	13	.12	5	.04	11	.09	3	.03
26.	5	.05					1	.01
27.	1	.01						
28.								
29.	1	.01	5	.04	5	.04	8	.07
30.					2	.02		
31.			8	.07			12	.10
32.			11	.10				
33.			3	.03				
34.			2	.02			1	.01
35.							2	.02
36.	2	.02	1	.01	6	.05	1	.01
37.	2	.02			1	.01		
38.			1	.01				
39.			1	.01	2	.02		
40.	7	.06						
41.							17	.15
42.			8	.07				
43.	49	.44	10	.09	15	.13	9	.08
#S	111		115		117		115	

TABLE D

BASIC category responses by statement type: 36 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
1.	62	.52	4	.03	30	.25	6	.05
2.							1	.01
3.	1	.01			1	.01		
4.								
5.	4	.03	1	.01	28	.23	1	.01
6.								
7.	3	.03	23	.19	7	.06	27	.23
8.								
9.			4	.03			7	.06
10.								
11.			13	.11			9	.08
12.							2	.02
13.								
14.			6	.05				
15.					1	.01	4	.03
16.					2	.02	12	.10
17.								
18.								
19.	4	.03	9	.08	6	.05	8	.07
20.			3	.03				
21.	8	.07	16	.13	32	.27	29	.24
22.			10	.08			9	.08
23.			1	.01				
24.								
25.	17	.14	8	.07	13	.11	4	.03
26.	3	.03			2	.02		
27.					2	.02	2	.02
28.			1	.01				
29.			4	.03	5	.04	4	.03
30.	1	.01	1	.01				
31.			11	.09			8	.07
32.			1	.01				
33.			10	.08				
34.			2	.02			2	.02
35.			12	.10			2	.02
36.	1	.01			5	.04	1	.01
37.			3	.03	1	.01	1	.01
38.							1	.01
39.					2	.02		
40.	2	.02						
41.							6	.05
42.			4	.03				
43.	26	.22	2	.02	12	.10	6	.05
#S	120		120		120		119	

TABLE E

COMPILED category responses by statement type: 18 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
A.			2	.03	1	.02		
B.	2	.05	10	.15	10	.19	4	.10
C.	3	.07	1	.02	5	.10		
D.	3	.07	13	.20	9	.17	6	.15
E.			3	.05				
F.								
G.			12	.18			6	.15
H.			4	.06			3	.07
J.	5	.12	4	.06	5	.10	3	.07
K.			1	.02			1	.02
L.			2	.03				
M.			4	.06	1	.02	3	.07
N.							2	.05
#S	41		66		52		41	

TABLE F

COMPILED category responses by statement type: 24 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
A.	14	.18	6	.07	7	.08	7	.09
B.	6	.08	21	.23	14	.17	10	.12
C.	3	.04	4	.04	4	.05	2	.02
D.	9	.12	35	.38	33	.39	24	.30
E.			1	.01			1	.01
F.			2	.02				
G.			8	.09			6	.07
H.			18	.20			13	.16
J.	15	.19	6	.07	8	.10	3	.04
K.			10	.11			5	.06
L.	2	.03	10	.11	1	.01	7	.09
M.	1	.01	7	.08	6	.07	10	.12
N.					2	.02	2	.02
#S	77		92		84		81	

TABLE G

COMPILED category responses by statement type: 30 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
A.	24	.22	4	.03	36	.31	7	.06
B.	6	.05	81	.70	23	.20	41	.36
C.					2	.02		
D.	17	.15	20	.17	67	.57	21	.18
E.							1	.01
F.			4	.03			1	.01
G.			8	.07			12	.10
H.			27	.23			26	.23
J.	13	.12	5	.04	11	.09	3	.03
K.			16	.14			3	.03
L.	11	.10	11	.10	9	.08	18	.16
M.	2	.02	5	.04	5	.04	8	.07
N.					3	.03	16	.14
#S	111		115		117		115	

TABLE H

COMPILED category responses by statement type: 36 months

	TA		FA		FN		TN	
	Freq	Prop	Freq	Prop	Freq	Prop	Freq	Prop
A.	67	.56	5	.04	59	.49	7	.06
B.	3	.03	59	.49	7	.06	47	.39
C.	1	.01	1	.01				
D.	17	.14	67	.56	67	.56	58	.48
E.			1	.01				
F.							1	.01
G.			11	.09			8	.07
H.			28	.23			15	.13
J.	17	.14	8	.07	13	.11	4	.03
K.			25	.21			4	.03
L.	3	.03	7	.06	8	.07	9	.08
M.			5	.04	7	.06	6	.05
N.					3	.03	16	.13
#S	120		120		120		119	