DEVELOPMENTAL CHANGES IN RESOLUTIONS OF CONTRADICTORY COMMUNICATIONS

By

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This study attempted to define and examine some conditions under which various resolutions of contradictory verbal-facial communications are possible. These conditions included the receiver's cognitive developmental understanding of communication in general, and the nature of the context in which specific communications occurred. Preschoolers, grade school children, and adults participated in two studies. In the first, reaction time and message appraisal measures served to identify a group of subjects who responded differentially to contradictory and congruent communications. The second study examined the ways in which subjects resolved contradictions between verbal and facial messages. It was predicted that young children, unable to distinguish between the contents of a message and its meaning, would resolve the communications by negating the contents of either the verbal or facial cues. Older subjects were expected to resolve the communications by manipulating the relationship between the message contents and their referents, using specific contextual information when available to validate the meaning of both verbal and facial message components. These hypotheses were supported by the results of this investigation.
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Chapter 1: Introduction

If you were a howler monkey hanging by your tail in a Berba tree and the monkey next to you bared its teeth,uffed your head, and then bit your ear, you may respond to these signs as if they marked the onset of warfare. On the other hand, you could respond as if they were signals denoting an invitation to play (Carpenter, 1934). The fact that a single communicative act or group of acts may admit more than one meaning, and likewise that a single meaning may be conveyed through different substrates of channels, makes possible a distinction between the act itself and that which it represents, or is intended to represent (Taylor, 1971). In this vein, communication is said to occur at different levels of abstraction, at the level of the information cues themselves, and at the level of meaning. It has been argued that the ability to distinguish message and meaning is important for making sense of potentially ambiguous communications and constitutes a developmental phenomenon that is not fully operative until the latter part of childhood (Flavell, 1982). It will be argued in this thesis that the ability to keep this distinction clearly in mind is also important for understanding communications in which the propositional contents of two channels are contradictory. An attempt will be made to empirically assess developmental changes in the child's ability to make this distinction by comparing how children of different ages interpret contradictions between information conveyed through verbal and facial
channels. Information regarding the type of resolution process available to the subjects will inform two developmental issues; one concerns the relative contribution of a meaningful context, and the other concerns the subjects's ability to distinguish message and meaning.

The theoretical groundwork for this investigation is organized into four sections. In the first section an attempt is made to formalize definitions of contradictory communications and processes of resolution. In the second and third sections, investigations directly focusing on contradictory communications and those aimed towards an understanding of children's interpretations of ambiguous messages in referential communication tasks are reviewed. The fourth section summarizes past work and the implications it has for the current investigation. Cumulatively, these sections suggest that the theoretical considerations familiar to those who investigate interpretations of ambiguous messages may be usefully transported to the study of contradictory communications.

Defining and Resolving Contradiction

Before undertaking a study of how contradiction in communication is resolved, it is necessary to consider what is meant by "contradiction" and what is implied by "resolution". Although definitional issues have not been focal points for contemporary investigations in this area, "contradiction" is usually construed as a violation of the classical Aristotelian law of non-contradiction:
"Given a world \( w \), then for any proposition \( P \), either \( P \) or \( \neg P \) fails to obtain in \( w \). (That is, of the pair \( P, \neg P \) at most one obtains in \( w \).)" (Rescher & Brandom, 1980, p. 3). It is proposed that a violation of this law, that is, a definition of \( P, \neg P \), and their co-tenability may be characterized as follows:

(1) Two propositions each make an assertion about some common referent.

(2) The implications of the two propositions are such that if one is true, the other is false.

(3) The two propositions are connected in such a way that their claims are asserted to apply jointly and simultaneously.

The empirical focus of this thesis is on contradictions conveyed through verbal and facial channels. Each proposition therefore, will be asserted through separate channels or sources. The property of contradiction carried by two separate channels distinguishes contradictions that will be tested here from self-contradictions, or contradictions that arise from a single source. Additionally, the definition proposed here is meant to characterize contradiction as it exists at the transitory and literal level of the information cues themselves. In contrast to other types of contradiction (familiar examples include contradictions between fact and theory, between thought and action, between moral principles), a conflation of discordant information cues may be considered a relatively simple case.
in terms of both intensity and complexity.

With the preceding definition of contradiction in mind, we may now consider what is meant by "processes of resolution". In the context of this investigation, processes of resolution denote the ways in which a recipient comes to interpret the meaning of a contradictory communication. The term is meant to suggest active, cognitive effort on the part of the recipient for the purpose of understanding the meaning conveyed by the agent of the communication. It is postulated that this understanding may be expressed at two separate levels. At the first, the recipient may come to understand a communication by manipulating the elements of the verbal and facial information cues. In this respect, the resolution process may be described as content specific. In the process of understanding a communication in which the contents are contradictory, this can take the form of denying the occurrence of one of the contents by some act of omission or repression, or denying its positive or negative implications by some act of distortion. At the second level, the recipient understands the message as a gestalt embedded within a particular context. The recipient is then able to manipulate the contextual relationship between the information cues and the situation. Insofar as we are able to construct or abstract the speaker's meaning from the context in which the communication is embedded, the form of our resolutions is of the second type; we admit the validity of each of the propositions and focus on the relationship between them and their referents. This form
of resolution, however, presupposes an appreciation for the discontinuity between message contents and meaning. As stated earlier, young children may have difficulty making this distinction, and this may have implications for their processes of resolution. That is, if young children are cognitively inclined to "read off" message contents without respecting the agent's context of meaning, the form of their resolutions may be content specific. These resolution processes are formally captured in the following scheme; note that they dove-tail with the three conditions that define a communication as contradictory. These processes, singly or in combination, will be sufficient to resolve an apparently contradictory communication:

**Level 1--Content Transformations**

(1) Ignoring one of the two propositions so that no information is retained. Then the statement consists of a single proposition.

(2) Retaining the information of both propositions but transforming the content of one so that it no longer disagrees with the other.

**Level 2--Relational Transformations**

(3) Transforming the temporal relationship between the propositions to a sequential relationship.

(4) Expanding the context of the communication so that the two propositions are considered to be making assertions about different referents.
Consider the following scenario: A woman reaches into a jar, pulls something out and eats it. Her eyes water, her nose wrinkles up, she shudders and exclaims, "These pickles are delightful!" The contradiction inherent in the propositional contents of her verbal and nonverbal cues may be rendered non-contradictory as follows:

(1) Her verbal or facial proposition is ignored. For example, she may be interpreted according to her nonverbal proposition as disliking the pickles.

(2) The information of both propositions is retained but the content of her verbal or facial message is transformed. For example, her verbal message may be recalled as, "These pickles are frightful!"; it no longer disagrees with her nonverbal proposition.

(3) The temporal relationship between her verbal and nonverbal propositions is transformed so that she may be interpreted as initially disliking the pickles, and then liking them.

(4) The context is expanded to provide meaning for her contradictory verbal and facial messages. For example, her verbal statement is interpreted as an evaluative comment about the pickles and her nonverbal statement is interpreted as a physiological response to their sourness.

Items (1) and (2) characterize content transformations while items (3) and (4) characterize transformations of the relationship between
message contents and referents. The forthcoming literature review of contradictory communication research will reveal an historic trend that proceeds from a preoccupation with content transformations towards considerations of relational transformations. The methods employed in this thesis, which will be described in detail later, are meant to allow for the investigation of each of these processes.

Contradiction in Communication

The literature addressed to the study of contradictory communications has been propelled by two distinct research traditions. Both traditions have centered on contradiction between the cues (verbal, facial, intonational, etc.) of messages, but one has focused on the production of these messages while the other has been primarily concerned with their evaluation. Research from each of these traditions will be evaluated in turn, with an eye for revealing a general trend that is moving away from cue-dominated preoccupations toward a broader perspective that includes both the message and its communicative context.

Disturbed-Family Interaction

Some investigators researching the production of contradictory communications have been motivated by pragmatic interests in the dynamics of disturbed-family interaction. Bateson's double-bind theory of schizophrenia (1956) has often been acknowledged as animating the pursuit toward understanding the occurrence and implications of contradictory communications and of channel conflict in particular.
While theoretically intriguing, Bateson's model has been more fruitful in generating hypotheses than data. However, due to its theoretical import, a brief digression into its major premises will be presented. While an attempt to capture his theory in a paragraph or two does a disservice to its intricacies, it will suffice as a general rationale for subsequent research.

Bateson presents an analysis of how communication operates simultaneously at several levels of abstraction. He distinguishes between the message (sign), its referent (signal), and the extralinguistic relationship between them (metacommunicative frame). He postulates that the meaning of a communication is not contained just in the message or its referent, but in a correspondence between the two. Bateson's treatise on the double bind phenomenon is an attempt to account for the pathologic disorders characteristic of schizophrenic thought in terms of this theory of communication. He has enumerated five features that together define a double bind communication. The most salient of these include (1) a primary negative injunction (eg. "Do not do that or I will punish you"), (2) a secondary injunction conflicting with the first at a more abstract level (eg. "Do not submit to my prohibitions"), and (3) a tertiary negative injunction that prohibits the "victim" from escaping the situation (eg. "Regardless or whether or not you do that, you will be misinterpreting my intentions, and will disappoint me"). This latter condition prohibits the child from commenting on the conflict between the first two conditions.
Bateson proposes that an enduring sequence of double binding messages from family members may cause schizophrenia in the recipient. Schizophrenic symptoms are viewed as a consequence of a learned inability to distinguish between the logical types of the content of a message and its meaning because of the omission of the metacommunicative frame. In other words, Bateson postulates that schizophrenics fail to appreciate the discontinuous relationship between messages and their referents.

Initial research attempting to document the validity and occurrence of double bind communications from mothers to their schizophrenic children was inconclusive (c.f. Berger, 1965; Ringuette & Kennedy, 1966; Schuham, 1967). However, relaxing Bateson's original defining criteria for double bind communications and turning away from schizophrenia in particular, subsequent research has found that the prevalence of contradictory communications is clinically relevant for distinguishing between interactions of normal and disturbed families. For example, Bugental and her coworkers have found that mothers of disturbed children produce significantly more contradictions between intonation and verbal content (Bugental & Love, 1975) and between verbal content and facial expressions (Bugental, et al., 1971), than mothers of normal children. However, differences between mothers of normal and disturbed children with respect to contradiction in verbal and postural attitudes have not been demonstrated (Beakel & Mehrabian, 1969).
The empirical evidence and theoretical speculations discussed above are germane to the context of the present investigation because they highlight both the clinical relevance of contradictory communications in disturbed-family interactions and the importance of understanding how these communications are evaluated by the recipient. Bateson's model dealt primarily with contradiction between different levels of abstraction but the results of Bugental's work suggest that contradiction may also occur within levels (e.g., between the contents of facial and verbal messages). The following review will focus on the recipient's evaluation of contradiction between the contents of communications and the notion of several distinct resolution processes will be introduced. Further, the documentation of these processes will be found to shadow methodological advances that have grown out of a cue dominated orientation to include the relationship between cues and their context of occurrence.

The Recipient's Evaluation of Contradictory Communications

Unlike the research described above in which spontaneously produced messages were judged as they occurred in communications of mothers to their children, investigators addressing the recipient's evaluation of messages have looked at adult judgments of acted messages. In the information processing tradition, work in this area has focused on assessing how contradictory information is attended to and processed. Following after the theoretical presumptions contained in the person perception literature (c.f. Anderson, 1965), the
recipient is thought to receive information from various sources, assign weights according to their relative strengths, and sum them into an interpretation. To apply this to verbal and facial, or channel conflict, most researchers have studied contradictory information conveyed between facial, verbal, and intonational channels, using acted messages as stimuli, with conditions consisting of all possible permutations of negative/neutral/positive channel cues. Therefore, these conditions include both channel agreement and channel contradiction. The primary task of the subject has been to judge each total communication along a continuum ranging from very negative to very positive.

In line with the linear model of communicative meaning, one issue that researchers have addressed concerns the possibility of channel dominance. An early study by Mehrabian and Wierner (1967) on implicit attitude communication suggested an overall primacy of the nonverbal channels over the verbal channel. Later evidence, however, showed that the relative strength of the verbal and nonverbal channels interacted importantly with the types of judgments made. For example, Solomon and Yaeger (1969) studied the effects of verbal content and nonverbal intonation on college students' perceptions of verbal feedback. They hypothesized that content and intonation cues would be differentially weighted according to whether the feedback was perceived as being directed toward the performer personally or toward the performer's behavior. The stimulus consisted of a videotape of an actress giving
verbal feedback with negative/neutral/positive/content and intonation manipulations. Subjects were told that she was an art teacher talking to one of her pupils and were asked to rate the following questions on a five-point scale: Does the teacher like the picture? How does the child feel? How does the teacher like the child? The results indicated that content and intonation messages were indeed weighted differently according to whether the subjects perceived the feedback as applying to the child or to the child's picture. Verbal content messages were taken as objectively informative (whether she thought the picture was good or bad), and intonation messages were taken as emotionally or interpersonally informative (how she liked the student). These results run parallel to those reported in a similar study by Friedman (1978). Presenting high school students with conflicting face-sentence pairings of a "teacher" addressing a hypothetical student, it was found that the subjects's judgments of the messages depended on the type of question asked. Specifically, the subjects perceived the teacher's verbal content to be objectively informative of how the student's work would be graded, while the facial message was taken as informative of the teacher's general positivity toward the student.

It is important to note that proponents of the cue specificity model tacitly assume a one-to-one correspondence between the contents of a message and their potential referents (interpersonal attitudes or behavioral outcomes). This assumption has implications for
understanding the recipient's interpretation of both congruent and contradictory communications. Specifically, the model predicts that the weights of congruent multiple channel contents would sum together non-redundantly and that contradictory contents would be weighted heavily, or not at all, depending on the specific attitude or behavior being judged (i.e. the contents of each channel do not interact with one another). Ekman et al. (1980) and Bugental (1974) have taken issue with each of these predictions. Their work will be discussed in relation to each of these predictions and in relation to more recent research that has found evidence for unique meaning emerging from the interaction between channel contents.

In testing the prediction that congruent channel contents sum together, Ekman (1980) compared judgments of various personality traits (sociability, expressiveness, stability, etc.) based on partial information (verbal or nonverbal) against judgments made on the basis of total information. His results revealed two interesting phenomena inconsistent with the predictions of a cue specific model. For one, correlations between partial and total information were often very high, suggesting a redundancy factor. Secondly, the additive assumption was challenged since on three out of four groups of personality traits, the combination of channels failed to account for half of the variance in judgments based on total information. The implications of these findings with respect to cue interactions will be discussed shortly.
Regarding the second prediction of a single resolution process that discounts the content of one or another channel, Bugental (1974) has found evidence for a second process. Manipulating the credibility (defined by the congruence between intonation and nonverbal behavior unseen by the subjects) of naturally occurring communications, two distinct resolution processes, channel discounting and univalent discounting, were revealed. Channel discounting (predicted by the cue specific model) occurred with messages containing high credibility cues for intonation; contradictory verbal content was discounted regardless of positive or negative valence. Univalent discounting occurred with messages containing incredible or unreliable cues for intonation; the positive components were given greater weight with evaluatively moderate content and the negative components received greater weight if the evaluative content was extreme.

The results of Bugental's study have interesting implications given the original prediction made by the cue specificity model. The possibility of a second resolution process is provocative enough but the fact that the utilization of either process seemed to depend on the credibility induced by nonverbal cues unseen by the subjects is especially noteworthy: It suggests that important information emerges from the interaction between cues and further, that this information is available to an observer who views these cues in isolation from each other. This interpretation is also suggested in Ekman's documentation of a redundancy factor between partial and total information.
Paralleling the idea that in communication the whole is greater than the sum of its parts, Friedman (1979) has presented evidence that suggests the possibility of unique meaning emerging from particular cue combinations. Pairing photographs of emotional facial expressions (happy, angry, surprised, and sad) with sentences of varying affective tone (eg. "You're doing very well (poorly)"), he found that high school students inferred unique communicative meanings. That is, neither congruent nor contradictory messages summed together in a linear fashion nor were they given meaning by discounting processes. Instead, the students inferred unique meanings for each combination (eg. sincerity, sarcasm, sympathy, pride). These results support Ekman's conclusion regarding the importance of how cues are combined, and also have implications regarding potential processes of resolution. To the extent that Bugental's discounting processes represent a choice among opposites, Friedman's resolution by inference of unique meaning may be said to represent a synthesis of opposites. Given these two ways of resolving contradiction, the question becomes one of determining which factors may be involved in the subject's utilization of one process or another. In the studies above, one major factor seems to be task requirements. That is, if subjects are asked to rate the overall evaluative tone of a contradictory message, they will use discounting strategies; if asked to make inferences regarding the overall meaning of a message, subjects will synthesize the contents into a unique message.
The question of whether children combine information by additive rules or by overall synthesis is relevant to developmental models of the communicative process. There are, however, only a few studies which address these issues developmentally. As in the adult studies, children are asked to indicate their overall evaluations of congruent and contradictory messages. A typical developmental study is an investigation by Volkmar and Siegel (1980). They presented very young children (ages 1-3 years) with messages that varied in the visual and auditory channels. Auditory messages were coldly stated directions to "stay away", warmly stated directions to "come here", or no statements. Visual messages included cold facial expressions and body gestures, warm facial expressions and body gestures, or no expressions or gestures. It was found that 75% of the children approached the experimenter if requested to do so by either visual or auditory messages alone. Between 72 and 87% stayed away when negative visual or auditory information was presented alone. Regarding the contradictory messages, when the visual channel was positive and the auditory channel was negative, 34% approached the experimenter. When the visual channel was negative and the auditory channel positive, 59% approached. Therefore, in both of the contradictory conditions, more children obeyed the auditory than the visual message, regardless of age. In addition, these results were consistent with a unidimensional Guttman scale, leading the authors to suggest an underlying strategy of integrating the contradictory information of both channels as opposed to denying or discounting information. However, Bugental et al.
have presented evidence for discounting processes in 5-12 year old children.

Manipulating verbal content, facial expressions, and intonation, child and adult responses to "joking criticism" were compared. The subjects's task was to choose adjectives (sarcastic, disgusted, happy, joking) that described each message. No main effects were found between children and their parents. Children, however, were found to rate instances of joking criticism, in which the speaker smiled while making a critical statement, as more negative than did their parents, if the speaker was female. Whereas parents interpreted these communications by giving less weight to the negative verbal content, children totally discounted the positive information. It should be noted that the adult responses to Bugental's task lend additional support to Friedman's postulation of inferring unique meaning. That is, given the opportunity to do so, adults are able to synthesize the contradictory contents of a message. However, this was not true of the children's responses.

The developmental trend suggested here will be examined in more detail later. For now, it is sufficient to note that there has been a shift in the literature away from the cue specificity model toward a focus on what emerges from the combination of cues. This has allowed for a richer description of the ways in which contradictory communications are interpreted. While this new perspective may be applauded for considering both the meaning contained in the contents of
channels and the meaning contained in the relationship between them, what is notably lacking is an understanding of how these messages are interpreted in relation to a communicative context. In the research reviewed thus far, the context from which the subject abstracts the agent's meaning is defined by the experimental measures used by the investigator. That is, the subject judges the meaning of each message in relation to the evaluative measure (positive/negative, happy/sad, dominant/submissive, sarcastic/sincere, and so forth) supplied by the investigator. While a free response paradigm is probably less than optimal, an alternative to the methodological constraints discussed above is available from the more developmentally oriented domain of referential communication. A selective review of this area is presented below because it offers a perspective with which to view interpretations of contradictory communications as they occur in a referential context and because it addresses the role played by cognitive factors in influencing these interpretations.

**Ambiguity in Referential Communication**

Although investigators of referential communication usually employ communications that are ambiguous or incomplete, some of their conceptual analyses are appropriate for contradiction as well. Because the focus of the present investigation is on how children resolve contradictory communications, the review presented here will accordingly be limited to those investigations within the referential communication domain which have addressed how children recognize and
interpret ambiguous messages.

Generally, research in this area is meant to provide information about underlying cognitive abilities that influence the ways in which children of various ages respond to message ambiguity. The measuring procedures typically involve asking subjects to choose one referent from among an array of pictures or a sequence of verbal statements. The descriptions for the target picture or sentence vary from unambiguous (in which case they describe a unique referent), to ambiguous (in which case they describe more than one referent). The subjects are usually informed prior to testing that some of the messages will be "good" or "easy to understand", while others will be "not so good" or "hard to understand". Upon recognizing instances of ambiguity the subjects are encouraged to request more information from the experimenter in order to choose appropriately, or to indicate in some other way that the message did not provide enough information with which to make a decision (eg. state that the message was "good" or "bad"). The subject's task may therefore be described as a step-wise process in which they first recognize the ambiguity and then indicate that they have only partial information.

It is generally found that young children (5-7 years old) fail to appreciate the ambiguity contained in messages and respond equally to ambiguous and unambiguous messages. Several explanations dominate current accounts of why young children should have difficulty with these tasks. One position attempts to describe children's performance
in terms of message-referent comparison strategies and seeks to
delineate the optimal circumstances which will facilitate use of these
strategies. A second position describes performance on these tasks in
terms of the child's cognitive egocentrism and attempts to articulate
the ways in which egocentrism impinges on an understanding of the
communicative context. Each of these perspectives will be examined
below; both have implications for characterizing children's developing
cognitions of the relationship between message and meaning.

Message-Referent Comparison

As stated previously, most referential tasks involve a step-wise
process of first recognizing ambiguity and then expressing awareness of
it by making an evaluative statement about the message. Some
investigators measure the subjects's message evaluation alone, while
others employ more sensitive techniques for measuring recognition
separately from evaluation. A good example of the latter is provided
by Bearison and Levey (1977). Presented in the context of a word game,
kindergarten, second and fourth graders were read a series of
statements, each followed by a question regarding its content, and were
asked to judge whether the question was good or bad. Adequate messages
were of the type, "Jane got a bicycle for Christmas and Mary got a new
coat. What did Jane get for Christmas, a bicycle or a new coat?" In
the ambiguous conditions, question were of the type, "What did she get
for Christmas, a bicycle or a new coat?" Measures of the subjects's
abilities to distinguish adequate and ambiguous messages were based on
their evaluation of the question ("good" or "bad") and on their response latencies. It was found that all subjects were able to appropriately appraise unambiguous questions. However, in concert with a host of other findings (Asher, 1976; Asher & Oden, 1976; Glucksberg, Kraus & Higgins, 1975; Beal & Flavell, 1981; Robinson & Robinson, 1977, 1982), the youngest children (kindergarteners) consistently chose referents that were objectively unspecified while the oldest children (fourth graders) gave negative evaluations in response to ambiguous questions. It was suggested that the younger children failed to compare the message with all potential referents. Also of interest are the children's response latencies. In spite of their inability to appropriately appraise ambiguous messages, significantly longer response latencies were found for children of all ages in the ambiguous conditions. This discrepancy between response latency and message evaluation has also been documented by Ironsmith and Whitehurst (1978) and Patterson, Cosgrove and O'Brien (1980). Additionally, Beal and Flavell (1982) have noted that kindergarteners are poor message evaluators, yet, when asked to follow ambiguous instructions, will look puzzled and will verbally repeat ambiguous portions of the instructions. Several proposals have gained attention as possible explanations for this phenomenon.

One argument is that the discrepancy between recognizing ambiguity and evaluating ambiguous messages may be due to the task demands inherent in measures of verbal responses. It has been argued by Pratt.
and Bates (Experiment 1, 1982) that decreasing these task demands will facilitate the message-referent comparison process necessary for appropriate message appraisal. Using a procedure similar to that of Bearison and Levey, they compared preschoolers's performance in verbal and verbal plus picture conditions and found that preschoolers detected more ambiguities in conditions that included a physical context.

Investigators have also found it useful to distinguish between the two subskills of message-referent comparison and the awareness of the desirability of giving the speaker evaluative feedback (Ironsmith & Whitehurst, 1978). This distinction has prompted several attempts to increase message evaluation by modeling or training feedback styles and strategies (Pratt & Bates, Experiment 2, 1982; Ironsmith & Whitehurst, 1978; Cosgrove & Patterson, 1977; Patterson et al., 1978). These tactics have met with varying degrees of success and have generally indicated that fourth and sixth graders benefit most from the training sessions and learn to ask specific questions regarding attributes that distinguish between referents, whereas younger children may or may not be influenced by the training and tend to ask (or sometimes seem to parrot) more general questions that do not help to discriminate between referents.

The Decentration Account

A different way of characterizing the differences between younger and older children is to focus not on task demands, but on the level of
the child's understanding. Children's awareness that they have only partial information, that this is a consequence of the nature of the communication, and that the information they need is known by the agent of the communication, are issues that have been discussed in terms of children's developing abilities to decenter (Peterson et al., 1972; Robinson & Robinson, 1976, 1982; Pickert, 1981; Beal & Flavell, 1982). Consonant with the investigations just discussed, these issues have been brought to bear upon the distinction between recognizing ambiguity and evaluating ambiguous messages or resolving them by seeking more information.

For example, Pickert (1981) engaged kindergarten, second and fourth graders in a referential communication task designed to separately assess their abilities to identify ambiguity and then resolve it by seeking additional information. Her results were consistent with those of the training studies: Second graders recognized ambiguity but asked general questions that failed to accurately discriminate between potential referents, whereas fourth graders performed well on all aspects of the tasks. Pickert discussed children's performance in terms of the cognitive decenteration necessary to simultaneously consider similar and distinguishing attributes, and the decenteration necessary to realize that the information needed to resolve the ambiguity is known to the agent of the message and not themselves.

In another study, Robinson and Robinson (1982) have presented
evidence that suggests that the cognitive requirements necessary for distinguishing between a message and its potential referent are not specific to the context of communication. Instead, the child must come to the realization that information may be partial. In one experiment, they attempted to make the distinction between message and intended meaning more salient by presenting 5-7 year olds with visual messages (the experimenter held up cards) that were partially masked so that important attributes were covered. They compared children's performance on this task with performance on standard verbal tasks and found no differences in their abilities to evaluate messages. In the second experiment, they tested the extent to which children's performance was related to their understanding that information could be partial. In this experiment, the visual information to be evaluated was not conveyed by another as a "message", but was chosen by the child. Hence, the information could not be considered as a representation of another's intended meaning. Like the standard task, the child was to choose from among an array of pictures one which was similar to their chosen clue card. They were then asked whether the clue card provided sufficient information with which to make a correct choice. The results did not differ from those of the first experiment, leading the authors to suggest that the difficulty children have with identifying ambiguity is not specific to communicative contexts. They went on to speculate that young children who fail to identify ambiguous information attribute subjective meaning based on prior assumptions. Later, children are able to distinguish between a message and its
intended meaning and realize that this meaning may not be fully conveyed by the message. Robinson and Robinson (19822) write that "the child now has the capacity to conceive of incoming information as providing clues to reality, whereas before, that information was assumed to be reality itself" (p. 279).

This review of message-referent comparison and decentration explanations of why young children have difficulty identifying, evaluating, and resolving ambiguous messages has been presented to highlight the degree to which underlying cognitive variables may mediate children's performance in communicative contexts. The implications that this research has for the current investigation of contradictory communications will now be examined.

**Resolving Contradiction in Communication:**

**Developmental Predictions**

In the literature reviewed in the previous section, evidence was found for two distinct resolution processes, one of which is a discounting process, the other a process of synthesis from which unique meaning emerges. The subjects's utilization of one process or the other was found to be related to the types of cues presented, the age of the subjects, and the contexts of the tasks themselves. It was noted that depending on the task demands, adult subjects could use either process while children as a group primarily used discounting processes. These results, coupled with results from the developmentally-oriented area of referential communication, generate
certain predictions with respect to the processes of resolution proposed in the introduction to this thesis.

Of the four resolution processes potentially available to the recipient of a contradictory communication, two described transformations of surface content and two described transformations of the relationship between message contents and their contexts. In the second pair, the two propositions are considered to be making assertions about different referents. The two messages are retained as contradictory and the two referents are seen to be simultaneously or sequentially conjoined within a given context. This presupposes a distinction between the contents of a communication and its meaning, and we would expect this process to be unavailable to young children.

Instead, younger children may resolve contradiction by content transformations. Prior research suggests that young children fail to distinguish between the contents of a communication and its meaning. In the face of objectively defined ambiguous messages, they respond as if the meanings were explicit. That is, given a message which is indeterminant (ie. conveys incomplete information with respect to a particular context), preschoolers establish a coherence between message and referent by embellishing the referent with extraneous attributes. However, in the case of cue contradiction, the message is overdeterminant (ie. conveys an excess of information with respect to a particular context), and we may expect preschoolers to diminish this overdetermination by cognitively intervening at the level of the
information cues themselves.

In conclusion, past research suggests that the ability to distinguish between the contents of a message and its meaning is a developmental phenomenon which influences the ways in which children interpret communications. It is hypothesized that if presented with contradictory communications, children who are able to keep this distinction clearly in mind will also be able to use specific contextual information from which the agent's meaning may be derived. Children who are unable to make this distinction but who are nevertheless aware of the contradiction inherent in the propositional contents of a message will resolve the contradiction according to the content transformation strategies described above.
Chapter 2: Studies 1 and 2

Overview

The developmental issues presented in the previous chapter were addressed in two studies. Because an investigation of the interpretation of contradiction presupposes an awareness of contradiction, and requires that specific stimuli are perceived as contradictory, the first study was designed to assure that these considerations were met. In this respect, it functioned as a screening procedure for Study 2 which directly assessed the subject's understanding of contradiction.

Study 1 (described fully below) served two purposes. As noted above, the first was to identify a group of subjects who responded differentially to congruent and contradictory messages. Subjects that did not evidence an ability to discriminate in the context of these procedures were not included in the second study. The second purpose of Study 1 was to demonstrate that the stimuli intended for use in Study 2 constituted contradictions for the subjects. The separate components that would be combined into contradictory events in Study 2 were presented in isolation to ensure that they were given opposite interpretations. The procedures employed in this first session were designed to be both simple and engaging, and therefore it served the additional function of acquainting the subjects with the investigator.
In study 2 (described fully below), subjects were shown movies of simple interaction episodes in which one character conveyed contradictory information to another character. One episode was presented without contextual information (i.e., there was no broader frame of reference into which the otherwise seemingly contradictory piece of information could be sensibly placed), whereas the other episode was presented with contextual information from which the meaning of the contradictory communication could be derived.

Study 2 followed within three days of Study 1. All subjects were tested individually on both of these occasions by the author. Each session lasted from 15 to 20 minutes. Both sessions were audio tape recorded and nonverbal responses were recorded on answer sheets as necessary.

Study 1

Study 1 included two parts, a discrimination task to assess whether subjects responded differentially to contradictory and congruent messages, and a second task to gauge whether the individual message components to be combined in Study 2 were interpreted consistently when seen in isolation.

Subjects

A total of 75 subjects participated in the project. These included 3 age groups: 27 preschoolers (mean age 4.92 years), 24 young grade school children (mean age 8.91 years), and 24 young adolescents
and adults (12 sixth graders and 12 university students). These age groups were chosen to reflect different levels of cognitive-developmental competence (ie., preoperational, concrete operational, and formal operational). The majority of child subjects were drawn from university-area preschools, and an elementary school in a middle class neighborhood. Some sixth grade school subjects were recruited by word of mouth from a neighborhood comparable to that of the elementary school. The adults were drawn from a university population.

All subjects were tested in a quiet, familiar area. Children recruited from the schools were tested in areas designated by the school officials. Children and adults recruited by word of mouth were tested in their homes. Prior to testing the preschoolers, the investigator spent several hours at the preschools playing with the children in an effort to become a familiar figure in their school environments.

**Discrimination Task**

Research on ambiguous communications has employed both verbal and nonverbal measures for determining the subject's capacity for discriminating between message types. Subjects have been asked to verbally appraise or judge the adequacy of messages (eg. state whether they were good or bad), and their nonverbal behaviors have been measured during the course of making these judgments (eg. response latencies). Evidence from this area suggests, on the basis of
differential response latencies, that preschoolers are able to
discriminate between ambiguous and unambiguous messages, although they
are unable to appropriately appraise the messages (Bearison & Levey,
1977; Ironsmith & Whitehurst, 1978; Patterson, et al., 1980). Therefore, both reaction time and message appraisal measures were
employed to identify those subjects who were able to discriminate
between contradictory and congruent messages. It was anticipated that
results from these measures would parallel those from the area of
ambiguous messages. Specifically, response latencies were expected to
be longer for judgments of contradictory messages for all age groups,
and grade school children and adults were expected to appropriately
appraise contradictory messages while the preschoolers were not
expected to do so.

Apparatus and Materials. A movie of contradictory and congruent
messages was constructed and filmed in 8 mm color movie film. There
were eight brief episodes (presented in a predetermined, random order)
of a male actor drinking juice and giving verbal and nonverbal (facial)
messages about how the juice tasted (see Appendix A for a detailed
account of the movie script). In half of the episodes, his verbal and
facial messages were congruent (ie., he smiled while saying, "That
tastes good", or frowned while saying, "That tastes bad"); in the other
half his messages were contradictory (ie., he smiled while saying,
"That tastes bad", or frowned while saying, "That tastes good").

The subjects's response latencies were gathered with a reaction
time apparatus consisting of two buttons that each produced a different audible beep when pressed. Reaction time was recorded by audio tape recording the experimental session. The tape record provided information about when stimulus information was presented to the subject, which button the subject pushed, and how quickly the button was pushed.

**Procedure.** The subjects were brought into the testing room individually and told that the investigator was going to show them a movie and some pictures, and ask them what they thought about them. The subjects were first presented with two tasks in which they were requested to choose pictures of objects from an array. The subject's choices were to be used later in the procedure. The first task involved presenting the subjects with a set of three pictures of age appropriate toys plus one picture of a clothes hanger. The subjects were asked to choose one toy that they would like to receive as a birthday present and one toy that they would not like to receive. The chosen pictures were then put aside for use in the procedure of the second part of the study. In the second task, the subjects were presented with a set of four magnetized pictures of food items. The subjects were asked to pick one food which was "yummy" and one which was "yucky". Each of these pictures was placed over one button on the metal reaction time apparatus. (See Appendix A for scripts for determining yummy and yucky food items, and good and bad presents.)

The subjects were next informed of the film they would see, and
introduced to the reaction time apparatus. They were told that they would see a movie in which a man was drinking different kinds of juice, that sometimes the juice would taste yummy, like the food picture over one button of the apparatus, and that sometimes the juice would taste yucky, like the food picture over the other button. They were asked to judge, as quickly as possible after each episode, whether the juice tasted yummy or yucky by pressing one of the buttons. The food pictures were meant to serve as reminders to the subjects of which button to press in the course of making their judgments. The terms "yummy" and "yucky" were chosen to avoid biasing the subjects toward the verbal message (e.g., "That tastes good", or "That tastes bad"). Each subject was invited to play with the apparatus, and the apparatus and procedure were explained until the investigator felt they were fully understood. Two practice episodes were inserted at the beginning of the movie sequence (both congruent) to ensure proper use of the apparatus and to clarify any remaining questions. After each judgement, the subjects were asked whether or not the actor's message seemed silly (e.g., "Was that silly?", or "Was that man being silly?"). (See Appendix A for the detailed script for explaining the reaction time apparatus.)

Measures. Three measures were employed in this part of the study: Reaction times were calculated to assess differential nonverbal responding to congruent and contradictory messages; subjects's appraisals of the messages (i.e., silly or not silly) were used as a
verbal index of discrimination between message types; and finally, the subjects's evaluative judgments (i.e., yummy or yucky) were measured to examine possible verbal or nonverbal biases.

For the purpose of measuring the subjects's reaction times to the congruent and contradictory conditions, the original tape recordings were edited onto another tape. The edited version consisted, as much as was possible, of only the actor's statements ("That tastes good", or "That tastes bad"), and the tone delivered from the apparatus indicating the subject's judgments. Reaction times were measured from the onset of the actor's words "good" or "bad" to the onset of the tone, with a stop watch which measured to hundredths of a second. Because of the possibility of experimenter bias (the investigator was aware of the sequence to which the subjects responded), measurements were taken by both the investigator and a person naive to the film sequence and hypotheses of the experiment. Systematic differences between these two sources were not readily apparent but all further analyses were based upon the averages between the independent measurements for each reaction time. Each subject's reaction times were then averaged across contradictory and congruent conditions.

After each episode, the subjects were also asked whether the communication was "silly". The subjects's yes/no responses to this question were used in conjunction with their reaction time averages to determine whether or not they had discriminated between the contradictory and congruent conditions. Specifically, subjects whose
reaction time averages in the contradictory condition exceeded the reaction time averages in the congruent condition by one-third, or who were able to appropriately appraise the contradictory communications as "silly" on three out of four episodes and the congruent communications as "not silly" on three out of four episodes, were considered capable of discrimination. Subjects were tested until 24 of each age group met these criteria.

Evaluative judgments to the film sequences were coded from the audio recording. Recall that each button on the apparatus produced a different tone. It was evident from the tape recorded portion of the session in which the apparatus was explained to the subjects which tone indicated "yummy" and which indicated "yucky". These judgments were tallied for the purpose of determining the degree to which the subjects were swayed by either the verbal or nonverbal portions of the message in their judgments.

Results. Group mean reaction times for each condition are presented in Table 1. Latency scores were analyzed by analysis of variance (repeated measures) for the between group factor of age, and the within group factor of condition (contradictory and congruent). Both age and condition were significant main effects, $F(2,69) = 5.33, p < .01$, and $F(1,69) = 31.32, p < .001$, respectively, and were found to interact, $F(1,69) = 3.32, p < .05$. Separate simple effects tests (ANOVA, one-way) were then conducted for each condition to test for age effects and within each age to test for condition effects. Age was not
found to be a significant factor for the congruent condition, but was significant for the contradictory condition, $F(2,69) = 4.82, p < .05$. Post hoc comparisons (Tukey, $p < .05$) showed that in the contradictory condition, the preschoolers had significantly longer latencies than did the two other age groups which did not differ from each other. Condition effects were found for the youngest group, $F(1,23) = 40.33, p < .001$, and the oldest group, $F(1,23) = 13.15, p < .001$, but not for the middle age group, $F(1,23) = 2.89, p < .11$. 
Table 1

Mean Reaction Times as a Function of Viewing Condition

<table>
<thead>
<tr>
<th>Viewing Condition</th>
<th>Age</th>
<th>Contradictory</th>
<th>Congruent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preschool</td>
<td>3.95</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1.73</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>Grade School</td>
<td>2.46</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>3.01</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>Adolescent-Adult</td>
<td>2.18</td>
<td>1.35</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>1.23</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1.48</td>
<td>2.86</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>0.26</td>
<td>1.04</td>
</tr>
</tbody>
</table>

**Note.** The values represent reaction times in seconds.
With respect to message appraisal, all grade school and adult subjects appropriately labelled the communications as silly or not silly, with the exception of one grade schooler who judged most of the episodes as silly because the actor's ears were perceived as moving forward and backward. On the other hand, only 11 of 27 preschoolers tested appropriately labelled the communications.

In the four contradictory episodes, the subjects's evaluative judgments (yummy and yucky) indicated which message component (verbal or facial) determined their evaluations. The judgments were examined by calculating the frequency with which they agreed with the verbal or facial portions of the four contradictory messages. These agreements were then analyzed by a one-way analysis of variance for the factor of message component (verbal or facial), yielding significant effects for this factor, $F(1,142) = 36.98, p < .001$. That is, subjects were found to agree with the verbal portion significantly more often than with the nonverbal portion of the messages. This is reflected in Table 2 which shows the number of subjects who agreed with the verbal components 0, 25, 50, 75, or 100 percent of the time. (Note that given a total of four contradictory messages, 0% agreement with the verbal components corresponds to 100% agreement with the facial components, and so forth.)
<table>
<thead>
<tr>
<th>Age</th>
<th>Percent Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Preschool</td>
<td>1</td>
</tr>
<tr>
<td>Grade School</td>
<td>2</td>
</tr>
<tr>
<td>Adolescent-Adult</td>
<td>6</td>
</tr>
</tbody>
</table>
The evaluative judgments were also examined with respect to age group. The resulting statistic from the one-way analysis of variance (agreements with verbal component by age group) reached an acceptable level of significance, $F_{(2,69)} = 3.45, p < .05$, indicating age differences between the three groups, but a post hoc test (Tukey, $p < .05$) was unable to distinguish between the specific age group means. The frequencies reported in Table 2, however, indicate the direction of the overall age effect. That is, subjects in the two younger groups appeared to rely primarily upon verbal components in making their judgments, while subjects in the oldest group evidenced a verbal-nonverbal split. Therefore, separate analysis of variance tests were conducted for each of the three age groups. It was found that the two younger groups judged the messages according to the content of the verbal channel significantly more often than according to the facial channel, $F_{(1,46)} = 43.43, p < .001$, and $F_{(1,45)} = 29.25, p < .001$, respectively. However, no difference was found for the oldest group, $F_{(1,46)} = 0.25, p < 0.63$.

The results from the reaction time and message appraisal measures were examined in order to identify those subjects who were able to discriminate between message types according to the two criteria set forth earlier. Response time averages for the contradictory and congruent messages were calculated for all subjects, and examined in those cases in which the subject did not appropriately appraise the messages. According to the first criterion of message appraisal, 10
preschoolers were identified as being able to discriminate message types, as were 23 grade schoolers, and 24 adolescents-adults. An additional 14 preschoolers and 1 grade schooler were identified who failed to meet the first criterion, but who met the second criterion of differential reaction time. Therefore, of the 17 subjects who were unable to correctly label the communications as silly or not silly, 3 preschoolers also failed to discriminate between message types according to the reaction time criterion. The data collected from these three subjects were excluded from all analyses for both studies (including those reported above).

**Discussion.** The results from reaction time and message appraisal measures echo those that have been found in the literature addressing ambiguous communications. Measures of response latency indicate that preschoolers typically are able to distinguish between contradictory and congruent messages although they may be unable to make meta-communicative comments about the adequacy of such messages. The difficulty that young children have in taking communications as cognitive objects is a topic that has gained considerable attention in the area of referential communication (c.f. Flavell, 1981). Another possible interpretation is that young children take adult male communications very seriously, regardless of their content, and are thus reluctant to label such communications "silly". This interpretation, however, runs counter to the fact that every preschooler, on at least one occasion, labeled the actor's messages
silly, albeit inconsistently or inappropriately.

That significant age effects were found in the contradictory but not the congruent conditions discounts the possibility of attributing the preschoolers's longer response latencies in the contradictory conditions to longer response latencies in general. It is not immediately clear why the preschoolers appeared disproportionately disturbed by the contradictory communications, but these results clearly demonstrate the utility of reaction time as a measure of discrimination for this age group. On the other hand, a cautionary note is required because significant differences between the group means of the middle age group were not found with this measure. It is possible that this may be explained by the large standard deviation of the group in the contradictory condition, which was artificially elevated by one subject whose mean reaction time was 14.65 seconds. Nevertheless, until this discrepancy is accounted for, the reaction time measure should be used with care.

The two younger age groups were found biased toward using the verbal components of the contradictory communications in their overall evaluations of the messages. In the past, communication has been construed in such a way that verbal messages were taken as objectively informative, and nonverbal messages as subjectively, or emotionally informative (c.f. Solomon and Yaegar, 1967; Friedman, 1978). The results reported here are readily amenable to this interpretation given that the subjects were asked to judge how the juice tasted, and that
the juice was the only explicit referent to which the communications were directed. In order to properly evaluate this possibility, we would need to ask whether a bias would occur in the opposite direction (i.e., toward the nonverbal component) had the subjects been asked how the actor felt about the juice, or about the person who made the juice. It would also be necessary to account for the discrepancy between the younger and oldest age groups. It is possible that younger subjects assume that they are being asked for objective information, while older subjects may or may not make this assumption. These questions are, however, beyond the interest of the issues at hand.

Matching Tasks

Immediately following the discrimination task, the subjects were tested to ensure that the stimuli to be combined in Study 2 would be interpreted consistently when seen in isolation. This was accomplished by presenting the subjects with schematics of positive and negative facial expressions, verbal statements, and situational contexts to be used in Study 2, and having them match these stimuli with each other. The tasks consisted of labeling facial expressions, matching facial expressions to verbal statements, and matching both facial expressions and verbal statements to situational contexts.

Materials. The materials consisted of three pictures of facial expressions, four verbal statements, and four pictures of situations. The faces, which were mounted on cards, were schematic drawings representing positive, negative, and neutral expressions. Each of the
four verbal statements belonged to one of two sets. Each set was composed of one verbal statement that would be used in Study 2, and one verbal statement that had opposite implications (e.g., "You've been bad"/"You make me glad"; "I really like it"/"I really don't like it"). The four pictured situational contexts also belonged to one of two sets. One set consisted of two packages that could be opened to reveal presents. One contained a "good" present and one contained a "bad" present according to the toys that the subject chose at the beginning of the study. The other set was composed of two colorful drawings of kitchens. The kitchens were identical except that one drawing showed a clean kitchen with a nice breakfast set at the table, while the other drawing showed the kitchen in an exaggerated state of disarray. (See Appendix B for depictions of all materials.)

**Procedure.** The procedure consisted of a sequence of four short tasks in which the subjects labeled facial expressions, matched facial expressions to verbal statements, matched facial expressions to situation pictures, and matched verbal statements to situation pictures.

**Labeling Faces:** The subjects were first shown the three facial expressions, presented individually and in random order, and were asked to label each expression as it was presented (i.e., "How does this person feel?").

**Matching Verbal Statements to Faces:** After all three expressions
had been labeled, they were placed before the subjects in a row. The subjects were then read each of the four verbal statements (I really like it; I really don't like it; You've been bad; You make me glad) in random order, and asked, after the presentation of each, to point to the person (i.e., facial expression) that made the statement. After each response, the spatial arrangement of the facial expressions was rearranged to avoid the possibility of position bias.

Matching Verbal and Facial Expressions to Situations: The three facial expressions were again placed in a random array in front of the subjects. Next, each of the two pictures that belonged to one situation set (kitchen or present) was presented and verbally elaborated by the investigator (e.g., "A mother walked into this kitchen and saw that someone had made a big mess"). After the presentation of each situation picture, the subject was asked to point to one of the three faces which expressed how the character felt after seeing the scene depicted in the picture. This was repeated for the second picture (e.g., nice breakfast). The same two situation pictures were then placed before the subjects. Two opposing verbal statements appropriate to the specific situation were read to the subjects one at a time, and after hearing each statement, they were asked to point to the context picture to which the statement referred (e.g., "A mother walked into a kitchen and said, 'You've been bad'. Which kitchen did she see?"). This sequence of first matching facial expressions with pictures, and then matching verbal statements with pictures, was
repeated for the second set of pictures. The two situation sets were presented in counter balanced order as were the questions within each set. (See Appendix A for detailed scripts of the matching tasks.)

Results. All subjects appropriately attached positive or negative affect labels to the positive and negative facial expressions. For the neutral facial expression, a person naive to the purpose of the task grouped each of the subjects' labels into one of three categories of positive, negative, or neutral. Of the total 72 labels attached to the neutral expression, 43 were judged to be neutral and 29 were judged to contain positive or negative affect. Of these 29 labels, 5 were categorized as positive and the remaining 24 as negative.

The frequencies of judgments by the subjects in response to the three matching tasks are presented in Table 3. Notice that each subject contributed 4 judgments for each matching task. Overall, subjects were very accurate. Regarding the verbal-facial task, in only 6 of 288 judgments did subjects choose facial expressions opposing the verbal statements that they were presented with (5 of 96 preschoolers' judgments, and 1 of 96 grade schoolers' judgments). Likewise, in the situation-facial task, only 8 of 288 judgments indicated the matching of opposing facial expressions and situations (7 of 96 preschoolers', and 1 of 96 adolescent-adults'). Similar results were found for the situation-verbal matching task: Only 4 of 288 judgments associated opposing verbal expressions and contexts (all were preschoolers' judgments).
Table 3
Frequencies of Responses to Three Matching Tasks as a Function of Emotional Content

<table>
<thead>
<tr>
<th></th>
<th>Verbal-Facial Task</th>
<th>Facial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Verbal</td>
<td>Negative Neutral</td>
<td>Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>86</td>
<td>54</td>
</tr>
<tr>
<td>Positive</td>
<td>2</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Situation-Facial Task</th>
<th>Facial</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Negative Neutral</td>
<td>Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>117</td>
<td>21</td>
</tr>
<tr>
<td>Positive</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Situation-Verbal Task</th>
<th>Verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Situation</td>
<td>Negative</td>
<td>Positive</td>
</tr>
<tr>
<td>Negative</td>
<td>141</td>
<td>3</td>
</tr>
<tr>
<td>Positive</td>
<td>1</td>
<td>143</td>
</tr>
</tbody>
</table>
Discussion. It is clear from the data obtained from the matching tasks that the subjects consistently matched positive facial expressions, verbal statements, and situations with each other, matched negative facial expressions, verbal statements, and situations with each other, and did not match the opposing facial, verbal, and situation information. Although there was a tendency to associate negative contexts and verbal statements with the neutral facial expression, this seemed to reflect the subjects's understanding of "polite" behavior. Presumably, if the neutral expression had been excluded as a choice, the frequency tables for the verbal-facial and situation-facial tasks would closely approximate the frequency table for the situation-verbal task.

The stimuli used in the matching tasks were equivalent to those used in Study 2. Since it was rare for subjects to group opposing stimuli in this pretest, we felt confident that when presented with the opposing stimuli together in Study 2, the subjects would perceive them as contradictory.

General Discussion

Study 1 sought to identify a group of subjects who responded differentially to contradictory and congruent communications. Two criteria were set to distinguish between discriminating and non-discriminating subjects. Those subjects who were not able to appropriately appraise the communications and whose average reaction
times for the contradictory messages did not exceed the average reaction times for the congruent messages by one-third were excluded from Study 2. Subjects were tested until 24 of each of the 3 age groups met these criteria. A total of 75 subjects were tested. Of these, 3 preschoolers did not meet the inclusion criteria.

The subjects were also tested on several matching tasks to ensure that the stimuli to be presented in Study 2 would constitute contradictions for the subjects. Facial expressions, verbal statements, and contexts were presented in isolation and the subjects were asked to match one with another. It was found that the vast majority of subjects matched congruent stimuli and very few matched opposing stimuli. It was inferred on the basis of these data that the combination of opposing stimuli in Study 2 would be perceived as oppositional.

Having identified a group of subjects who notice a difference between contradictory and congruent messages, the resolution processes defined previously, and their developmental acquisition, will now be examined.

Study 2

This study was designed to test the specific resolution processes discussed in the introduction to this thesis. It was argued that these processes may be of two general forms, content transformations and relational transformations. These processes were theoretically linked
to the subject's developmental ability to distinguish message and meaning, and it was proposed that the presence or absence of a meaningful context might systematically influence the resolution processes used by the subject. In this study, subjects saw film sequences containing contradictory messages, were asked to interpret what they had seen, and asked to recall the messages in a delayed memory task. The tasks of interpretation and memory were designed to allow a characterization of the subject's resolution processes for contradictory communications.

**Subjects**

The subjects who participated in this study included those who had passed the discrimination criteria of Study 1. These included 24 preschoolers (mean age 4.97 years), 24 grade schoolers (mean age 8.91 years), and 24 adolescents-adults.

**Materials**

Two 8 mm color films were constructed in which characters were shown communicating contradictory verbal-facial messages in no context and context conditions. In the no context conditions, the films showed only a close-up of a character's face communicating a contradictory message; in the context conditions, a character was shown as a part of a narrated mini-story which provided meaningful information regarding the occurrence of the message. The content of both films was sequenced in such a way that the no context condition preceded the context condition. The verbal and nonverbal content of the messages varied
within films, and the situations in which the messages were embedded varied between films. Specifically, one firm (A) showed a close-up of a man who smiled and said, "you've been bad". This episode was followed by the context condition: a girl who received a disappointing gift from her aunt frowned while telling the aunt, "I really like it". The other film (b) began with a close up of a girl who frowned and said, "I really like it", and followed with an episode in which a father smiled while saying, "You've been bad", to his daughter who had both messed up the kitchen and made him a nice breakfast. (See Appendix A for complete movie scripts for the kitchen and present scenarios.)

For the memory task, a face "puzzle" was construed, containing schematic drawings of upper and lower face parts. The lower face parts consisted of a smile, a frown, and a neutral mouth. The upper face part was neutral. The four face parts were mounted onto individual cards, on the back of which were magnets. The puzzle could then be constructed on a metal board. (See Appendix B for materials.)

Procedure

The subjects were brought into the testing room individually and told that they would be shown a movie and asked questions about what they saw. Half of the subjects of each age group (randomly assigned) saw film A (with the present no context and the kitchen context episodes), and the other half was film B (with the kitchen no context
and present context episodes). After viewing each message as it occurred in the no context episode, the film was stopped and the subjects were asked a predetermined sequence of questions to test their understanding of the message. The questions were ordered from the most general (eg. "What happened in that movie?") to the most specific (eg. "What did he look like on his face? Why?"). (See Appendix A for the complete script for the task assessing resolutions.)

After answering the sequence of questions, the subjects were engaged in a distractor task for 3 - 5 minutes (see Appendix A), after which they were given a task to assess their delayed memory of the communication. In this task, they were presented with the top half of the schematic face and asked to complete the face puzzle as it had appeared in the film by fitting one of three lower faces (positive, negative, or neutral) to the upper face. After this, they were asked which of two verbal statements the character in the film had made (eg. "Did he say, 'You've been bad', or 'You make me glad'?"). These questions were presented in counter-balanced order. (See Appendix A for the script for the delayed memory task.) After viewing the no context episode and responding to the sequence of questions, distractor task, and memory task, the subjects were shown the context film episode, and the questioning sequence was repeated. Thus, there were two series of film, questions, and memory for each subject, one each for the no context and context episodes.

Measures
The two measures employed were meant to provide information concerning (1) the ways in which the subjects reasoned about, or resolved, the contradictions immediately after viewing them, and (2) how the communications were remembered at a later point in time (that is, whether they were correctly recalled or distorted).

Based on their answers to the sequence of questions, each subject was given overall reasoning scores for their interpretations of the messages in the context and no context conditions (one score for each interpretation). Although the reasoning scores were meant to test the four a priori hypotheses concerning the different modes of resolution (omission, distortion, temporal transformation, context expansion), an additional three categories were inserted to allow for a richer description of the data. The seven categories, and their defining criteria, are as follows.

1. Omission. The subject fails to mention the verbal or facial component of the message. When asked about it specifically (eg. "What did he say?"), the subject declares to have forgotten or does not know.

2. Distortion. The subject reports hearing or seeing a message component opposite to that of which was presented in the film. For example, having seen the smiling man in the kitchen scenario, the subject reports that the man was frowning or looked angry.

3. No message-referent association. The subject accurately
recalls both message components but is unable to comprehend any meaningful relationship between the message and referent. When asked why the message components occurred, the subject declares not to know.

4. One message-referent association. The subject accurately recalls both message components but relates only one of them to a referent and declares not to know why the other component occurred.

5. Separate message-referent association. The subject accurately recalls both message components and relates each to separate referents in isolation; information indicating an understanding of the temporal contiguity of either the components or the referents is not provided, and the referents are described as separate events.

6. Sequential association. The subject accurately recalls both message components and relates each to separate referents sequentially. The subject reports either or both components and referents as occurring at different points in time.

7. Combined association. The subject brackets together both message components and corresponding referents. The message components are reported to be meaningful parts of a single comment upon particular aspects of a context.

The data collected from the subjects's responses to the sequence of questions were scored according to the above criteria by the investigator and another person. Disagreements were resolved by
discussion. Inter-rater agreement was found to be 88%.

The delayed memory task was scored according to whether subjects correctly remembered or distorted information on each of their four responses to the verbal and facial portions of the tasks (the choice of the neutral face was always scored as a distortion). That is, the subjects were given a score of 0 or 1 for their memory of each verbal and facial component for both no context and context conditions. Each set of scores for each condition were then combined into one of two categories, according to whether or not a distortion had occurred in either the verbal or facial portions of the task.

Results

The frequencies and means for the reasoning scores of each age group are presented in Table 4. The subjects' responses were analyzed by analysis of variance because of a theoretical assumption that held the reasoning categories to be ordered from the most primitive to the most advanced, according to the amount of information (message components and situational components) successfully articulated by the subjects.

The analysis of variance (repeated measures) revealed significant effects for age, $F(2,66) = 26.51, p < .001$, condition (context and no context), $F(1,66) = 69.09, p < .001$, and film sequence seen (A and B), $F(1,66) = 5.12, p < .05$. No interactions were significant. Because firm sequence did not interact with either age or condition, subsequent
analyses were based on the combination of results from films A and B.
Table 4

Frequencies and Means of Reasoning Scores as a Function of Age and Condition

<table>
<thead>
<tr>
<th>Age</th>
<th>No Context</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preschool</td>
<td>Preschool</td>
</tr>
<tr>
<td></td>
<td>Grade School</td>
<td>Grade School</td>
</tr>
<tr>
<td></td>
<td>Adolescent-Adult</td>
<td>Adolescent-Adult</td>
</tr>
<tr>
<td>Reasoning Scores</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Preschool</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Grade School</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Adolescent-Adult</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Preschool</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Grade School</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Adolescent-Adult</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
The reasoning scores for the context and no context conditions were analyzed separately for age by one-way analyses of variance. Age had a significant effect for both no context and context conditions, $F(2, 69) = 10.66$, $p < .001$, and $F(2, 69) = 24.93$, $p < .001$, respectively. Tukey tests ($p < .05$) found that the preschoolers scored significantly lower on the reasoning task in the no context condition than did the other two age groups which did not differ from each other. That is, the preschool group scored lowest, followed by the grade school group, while the adolescent-adult group scored highest.

To assess the developmental trends suggested by the results reported above, we separated the responses according to reasoning category and calculated the median ages for subjects within each category. The results are presented in Table 5. In the no context condition, the median ages for both categories one and two were within the age range of the youngest group, and were within the middle group for categories three and four; the median age was between the ranges of the middle and oldest groups for category five, and for categories six and seven the median ages were within the range of the oldest group. In the context condition, where all three age groups were statistically distinguished with the ANOVA, the median ages for categories one through four were all within the age range of the youngest group; for categories five and six, they were within the range of the middle group; and for category seven, the median age was within the range of the oldest group.
Table 5

Median Ages of Reasoning Scores as a Function of Condition

<table>
<thead>
<tr>
<th>Reasoning Score</th>
<th>No Context</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>preschool</td>
<td>preschool</td>
</tr>
<tr>
<td>2</td>
<td>preschool</td>
<td>preschool</td>
</tr>
<tr>
<td>3</td>
<td>grade school</td>
<td>preschool</td>
</tr>
<tr>
<td>4</td>
<td>grade school</td>
<td>preschool</td>
</tr>
<tr>
<td>5</td>
<td>grade school/adolescent-adult</td>
<td>grade school</td>
</tr>
<tr>
<td>6</td>
<td>adolescent-adult</td>
<td>grade school</td>
</tr>
<tr>
<td>7</td>
<td>adolescent-adult</td>
<td>adolescent-adult</td>
</tr>
</tbody>
</table>
A justification was made for parsing up the subjects’s responses into the seven sequential categories, and subsequently for using the ANOVA procedure, on the grounds that each successive category could be seen to represent the subjects’s increased competency for handling larger amounts of information. However, the definitions of content and relational modes of resolution were meant to suggest qualitative differences in how subjects reasoned about contradictory messages in addition to the quantitative differences tested above. For this reason, and to further examine the typology of resolution processes with respect to the predicted pattern of developmental acquisition, the seven categories were collapsed into three: content, transitional, and relational transformations. The category of content transformations included the previous first two categories (omission and distortion), the transitional category included the next three categories (no message-referent association, one message-referent association, and separate message-referent association), and the relational category included the remaining two categories (sequential association and combined association). These data were analyzed for age effects with the Chi square procedure for each no context and context condition (see Table 6). In the no context condition, a significant age effect was found, $\chi^2(4) = 15.24, p < .05$. Post hoc contrasts between age groups for each category indicated that more preschoolers used content transformations (category one) relative to the grade schoolers and adolescents-adults, $\chi^2(1) = 7.11, p < .01$; no age group differences
were found for the use of transitional transformations (category two); and significantly more grade schoolers and adolescents-adults were found to use relational transformations (category three) relative to the prescholers, $\chi^2(1) = 4.48, p < .05$, and $\chi^2(1) = 9.0, p < .01$, respectively. No group differences between the middle and oldest groups were found in the preceding analyses.
Table 6
Frequencies of Reasoning Categories as a Function of Age and Condition

<table>
<thead>
<tr>
<th>Reasoning Categories</th>
<th>Content</th>
<th>Transitional</th>
<th>Relational</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>10</td>
<td>14</td>
<td>0</td>
</tr>
<tr>
<td>Grade School</td>
<td>2</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Adolescent-Adult</td>
<td>2</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Context</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preschool</td>
<td>3</td>
<td>20</td>
<td>1</td>
</tr>
<tr>
<td>Grade School</td>
<td>0</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Adolescent-Adult</td>
<td>1</td>
<td>3</td>
<td>20</td>
</tr>
</tbody>
</table>
In the context condition, no age group differences were found for the use of content transformations, but differences were found between all three groups for transitional and relational transformations. That is, significantly more preschoolers used transitional transformations than did grade schoolers, $X^2(1) = 4.75, p < .05$, and significantly more grade schoolers used transitional transformations than did subjects of the oldest group, $X^2(1) = 9.38, p < .01$. In contrast, subjects of the oldest group were more likely to use relational transformations compared to the grade school group, $X^2(1) = 7.38, p < .01$, and subjects of the grade school group were more likely to use relational transformations than were subjects of the preschool group, $X^2(1) = 11.11, p < .001$.

The frequencies of combined scores for the delayed memory task are shown in Table 7. Chi square analyses were employed because the data were dichotomous (subjects were given a score of 1 if they had distorted either the facial or verbal component, and a score of 0 if neither component had been distorted). A priori contrasts treating each age group as an independent sample were calculated for the group frequencies between the no context and context conditions. No differences between conditions were found for any age group (in ascending order $X^2(1) = 3.02, 2.04, \text{ and } 0.00$). Regarding the effects of age group on performance, it was found to be a significant factor in the no context condition, $X^2(2) = 14.66, p < .001$, and was also significant in the context condition, $X^2(2) = 7.20, p < .05$. Post hoc
analyses found that in the no context condition the preschool group was significantly different from the grade school group, $\chi^2(1) = 5.49, p < .02$, which did not differ from the adolescent-adult group, $\chi^2(1) = 2.4$. Likewise in the context condition, the preschoolers distorted significantly more often than did the other two groups who did not differ from each other, $\chi^2(1) = 4.55, p < .05$. 
Table 7

Frequencies of Distortions for the Delayed Memory Task

<table>
<thead>
<tr>
<th>Condition</th>
<th>Age</th>
<th>No Context</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Preschool</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Grade school</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Adolescent-Adult</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>
Of the total 22 distortions in the delayed memory task for the no context condition, 11 were from subjects who had distorted or omitted one of the propositional contents in the reasoning task (i.e., received a score of 1 or 2). These were 9 subjects from the preschooler group, 1 from the grade school group, and 1 from the adolescent-adult group. The other 11 distortions were from subjects who had scored a 3 or 4 on the reasoning task. This group consisted of 5 subjects from the preschool group, 5 from the grade school group, and 1 from the adolescent-adult group. In the context condition, of the total 12 distortions, 3 were from subjects who scored 1 or 2 on the reasoning task (2 from the preschool group, and 1 from the adolescent-adult group), 5 were from subjects who received scores of 3 or 4 (4 from the preschool group, and 1 from the adolescent-adult group), and 4 were from subjects who scored 5 or better on the reasoning task (2 from the preschool group, 1 from the grade school group, and 1 from the adolescent-adult group).

Discussion

It is clear from the analyses of the reasoning scores that the presence of a meaningful context greatly increased performance on the task. This effect, however, was not demonstrated for the delayed memory task. One possible explanation relates to the age group differences in distortions. Preschoolers were found to distort message components significantly more often than the older groups, regardless of condition. The older groups, however, did not differ from each
other in either condition. These results support the central hypothesis regarding age differences in resolution processes: Preschoolers were expected to distort message components regardless of condition, while older subjects were not expected to do so. Also of interest is the nature of the subjects's reasoning scores in relation to their subsequent performance of the delayed memory task. That is, while scores of 1, 2, 6, and 7 are meant to represent clear resolutions of contradiction, scores of 3 and 4 represent acknowledgement of the contradictory components (both are correctly recalled), but do not seem to entail resolutions of the contradictions to the extent that the subjects do not evidence an understanding of why one or both components occurred. This suggests that the contradictory components were recognized as such, but not resolved. Shortly after correctly acknowledging the contradictory components for the reasoning task, 20 subjects went on to distort one of the components in the delayed memory task (including 36% of the preschoolers who did not distort initially). Of these 20 subjects, 80% (16 subjects) had scores of 3 or 4 for the reasoning task, and were unable to interpret the meaning of the message at the outset.

Significant age differences were found for the reasoning scores in both context and no context conditions. Specifically, the preschool group performed at a lower level than did the other two groups regardless of the presence or absence of a context. However, in the context condition, the grade school group and the adolescent-adult
group were also found to be significantly different from each other, when they were not found to be so in the no context condition. That the presence of a context allowed for a discrimination between the older age groups suggests that the absence of a context placed an artificial ceiling on the oldest group's ability to reason about contradictory messages. This, indeed, is the picture which emerges from the frequency data of Table 4; the frequency of relational transformations for the oldest groups increased from 6 in the no context condition, to 20 in the context condition. This contrasts markedly with the relatively modest increase found for the middle age group. In contrast to both of these groups, of 24 preschoolers, only 1 received a score of 6 or 7. Of the remaining 23, 7 were able to associate message components with separate referents in isolation (i.e., received scores of 5), while the majority were at best able to associate only one message with a referent. It appears, then, that in reasoning about contradictory messages, the subjects were constrained by both the context in which the messages were observed to occur, and by their developmental understanding of communication in general. This will be the focus of the final discussion.
Chapter 3: Discussion

The hypotheses advanced in the introduction to this thesis were predominantly concerned with the developmental acquisition of content and relational transformations in two communicative contexts. The hypotheses were supported by results from the second study.

The Role of Cognitive-Developmental Understanding

Research in the area of contradictory communications has, to date, operated at a descriptive level. This approach has led to the accumulation of a quantity of interesting data. What is lacking, however, is a theoretical platform from which these data may be interpreted and from which predictions may be made. The investigations reported here demonstrate the efficacy of a cognitive-developmental approach for interpreting resolutions of contradictory messages. This approach has been found useful in the area of ambiguous communications, and its predictions with respect to contradictory communications were supported by results from the second study. Specifically, it was found that preschoolers resolved the contradictory communications by transforming the propositional contents of the messages while the older subjects used relational transformations. The two resolution processes, and the intervening transitional processes, are pictorially represented in Figure 1.
### Figure 1. Resolution processes and transitional categories.

<table>
<thead>
<tr>
<th>Content</th>
<th>Resolutions</th>
<th>transitions categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>(omission)</td>
<td>(P, -P) (no association)</td>
</tr>
<tr>
<td>R</td>
<td>(distortion)</td>
<td>(P, -P) (one association)</td>
</tr>
<tr>
<td>P, P</td>
<td></td>
<td>(P, -P) (separate association)</td>
</tr>
<tr>
<td>R</td>
<td></td>
<td>(R₁, R₂)</td>
</tr>
</tbody>
</table>

**Note.** P = propositional contents of message; R = referent.
Resolution by Content Transformation

Evidence canvassed from the domain of ambiguous messages suggests that preschoolers have difficulty maintaining the distinction between the content of a message and its meaning. On the basis of this theoretical postulate and its supportive empirical evidence, it was predicted that in the process of resolving contradictory messages, preschoolers would transform the propositional contents of the messages by omitting or distorting the information contained in one of the channels (see Figure 1). It is clear that the vast majority of omissions and distortions in both the reasoning task and the delayed memory task were made by preschoolers. When distortions on the delayed memory task are considered in conjunction with the content transformations on the reasoning task (i.e., when the number of subjects who received scores of 3 or better, but who subsequently distorted on the delayed memory task, are added to those who received scores of 1 or 2), approximately 63% of the preschoolers (15 of a total 24) used content transformations in the no context condition. This proportion stands in marked contrast to those of the other age groups. The preschool group improved significantly in the context condition, however, group differences remain salient (7 of 24, or 29% continued to transform message contents). If the preschoolers did not transform message contents, neither did they resolve the contradictions by relational transformations, but fell into transitional categories in
which the contradictory components were recognized but not resolved, or were resolved by treating their referents as separate events.

**Transitional Categories**

Three transitional categories were described in which subjects correctly identified message components, but (1) were unable to interpret the meaning of either component, or (2) were able to interpret the meaning of only one component, or (3) interpreted both components by juxtaposing the message-referent relationships.

A crucial question concerns the extent to which the transitional categories resemble both content and relational modes of resolution. Implicit in the label, at least, it the notion that these categories represent a meaningful passage from the preceding categories to those that succeed them. This follows empirically from the developmental succession between content and relational resolutions. That is, the transitional categories represent the upper limits of the preschooler's capacity for reasoning about contradictory messages. In contrast, the adolescent and adult subjects clearly surpassed these categories and resolved the messages by relational transformations, while the grade school subjects appeared equally distributed between them.

The relationship between these transitional categories and the two modes of resolution may also be defended on theoretical grounds. For subjects using content transformations, the message-referent relationship appears to be one of direct correspondence. For these
subjects, a message component is seen to converge on a single referent and components of a communication that fall outside this relationship are omitted or distorted. It follows that we may speak of content transformations as processes by which the subject resolves the contradiction: Whatever awkward components exist within a communication are dealt with in such a way that they are no longer problematic in terms of the subject's ability to interpret the meaning of the message. The transitional categories, on the other hand, and as shown in Figure 1, represent an ability to bracket together two opposing sources of information, but the subject's understanding of the relationship between this information and its meaning undermines their ability to construe the message-referent relationship as one which unites message and referent within a single communicative context.

For subjects who acknowledge but fail to interpret both message components (the first two categories), the message-referent relationship continues to be one of direct correspondence. That is, the subjects continue to labor under the assumption that a communicative event denotes at most a single referent. The difference between these subjects and subjects who transform message contents is that while content transformers negate message components, the others negate the referential implications of the components. Both components are acknowledged, but the communication either lacks all referential meaning (first category), or is perceived as corresponding to some single referent capable of validating one proposition or the other, but
not both (second category). Finally, as shown in Figure 1, the class of responses falling into the category of separate message-referent association represents an ability to entertain the possibility of separate referents validating separate message components, and therefore constitutes a resolution of sorts. For subjects falling into this category, the message components appear concretely connected to specific referents, and resolutions are accomplished by juxtaposing the two message-referent relationships. Although this process of juxtaposition may be considered a step forward from the more primitive hypothesis which maintains that a single communicative act must converge on a single referent, it represents a specific taxonomy of message components and referents rather than a process by which both are relativized to a communicative context.

Resolution by Relational Transformation

The fundamental difference between relational transformations and the preceding categories is the subject's interpretation of a contextual relationship connecting communication and situation, rather than separate linkages between communicative components and situational referents. Two such resolution processes have been described (see Figure 1). For one, the contextual relationship between message and referent is temporally sequential. For example, "She might have liked something in the window and she could have seen another picture and she couldn't have had time to change her expression, so instead of changing her face into a smile, she just said, 'I really like it.'"
(adolescent, no context condition). In contrast, responses in the final category were characterized by simultaneity. Here are some typical examples.

"He had a big smile on and he said, 'You've been bad', because he saw the big mess. He didn't want to hurt her feeling by saying, 'Go to your room. You've been very bad', but when he saw the breakfast he may have said, 'You were bad', but inside his head he said, 'That was kind of nice even if she did make a mess.'" (adolescent, context condition).

"He was probably happy that someone had been bad so he smiled and said, 'You've been bad.' He wanted the person to get in trouble." (adolescent, no context condition).

"She was very sad and then she didn't want to get embarrassed or hurt her aunt's feelings by saying, 'It's a bad present', so she said, 'I really like it', but she really didn't." (grade schooler, context condition).

For both categories, the message components and specific referents are subordinated to a global communicative context.

The Role of Context

In addition to the subject's cognitive-developmental understanding of communication, the presence or absence of a meaningful context was found to mediate interpretations of the contradictory messages.
Improved reasoning scores for all age groups provide sufficient evidence for claiming that subjects's interpretive capacities will be underestimated when conclusions are drawn from their responses to contextually impoverished communications. Indeed, in the no context condition, the majority of subjects presupposed the primitive hypothesis of single referent convergence. The fact that subjects made this assumption in the no context condition, yet were able to transcend it when given a supportive context, lends credibility to the theoretical stance that relational transformations represent a process by which the context of the communication is "expanded", allowing a countenance of contradiction.

A meaningful context also contributes more than an arithmetical constant across age groups. Were this not the case, age group differences would be equivalent in the context and no context conditions. It was demonstrated, however, that while the preschool group differed from all other groups in both conditions, it was only in the context condition that the grade school subjects were differentiated from the adolescent-adult subjects according to their interpretations.

It is also the case that the inclusion of a context allowed the subjects to express an understanding of contradictory communications previously untapped in the literature; the understanding that verbal and nonverbal components of a contradictory message both have meaning within a broader context. Freidman's (1979) investigation of
subjects's responses on an adjective checklist which indicated their ability to infer unique meaning from contradiction (pride, sarcasm, etc.), and Bugental's (1979) study of joking criticism, represent other examples of the need to look toward contextual variables for an adequate characterization of the multiple resolution processes potentially available to the subject.

Recommendations for Future Work

The position advocated in the foregoing section is that the role of context be granted parity with cognitive factors in any attempt to articulate a developmental typology of resolution processes. In the investigation reported here, a situation was simply present or absent. That the complexity of different contexts would intervene in the interpretation of communications seems a viable hypothesis worthy of investigation. Another potential area of inquiry concerns the developmental relationship between recognizing contradiction and reasoning about it. The methods employed in Study 1 proved useful for determining capacities for discrimination, but a finer test is needed to distinguish between genuine appreciation of contradiction and cognitive dissonance in general. In addition, it would be useful to know if there was a developmental period in which discrimination did not occur. Volkmar (1980) has found evidence for differential responding as early as the second year of life. At this writing, it is unclear whether we have been measuring responses to messages perceived as having opposing implications, or responses to misexpected events.
Knowledge of the relationship between recognizing and reasoning about contradiction in communication and contradiction in other cognitive domains would inform this issue.

Finally, to come full circle, the resolution processes articulated in the introduction to this thesis were distilled out of formal features of contradiction. In contrast to previous investigations of contradiction, the results reported here indicate that sophisticated cognitive effort effects a smooth systematization of contradiction, which does not vitiate the contradiction, but affirms its validity. It is therefore recommended that future research efforts in the area take this mode of resolution into account, and consider its relationship to different types of contradiction, including those which are not readily amenable to resolution.
REFERENCES


Discrepant social communications. Developmental Psychology, 16, 495-505.
APPENDIX A

Scripts
Script for Task Determining Good and Bad Presents

Now I'm going to show you some pictures of presents.

(Place picture of clothes hanger and three pictures of age-appropriate toys in front of subjects.)

Some of them are good presents and some of them are bad presents.

If it was your birthday, what would be a (good) present to get?
(Place subject's choice inside present envelope at top of display board).

And what would be a (bad) present to get?
(Place subject's choice inside present envelope at bottom of display board).
Now I'm going to show you some pictures of food. (Place four pictures of food items in front of subject).

Some of it is yummy food/food that you would like to eat, and some of it is yucky food/food that you wouldn't like to eat.

What is some (yummy food/food that you would like to eat)? (Place subject's choice above left button on beep box.)

What is some (yucky food/food that you wouldn't like to eat)? (Place subject's choice above right button on beep box.)
Now I'm going to tell you about this box. It makes noise when you push on the buttons, like this.
(Demonstrate.)
Why don't you try it?
(subject does.)

You get to push on the buttons sometimes while you watch the movie that I'm going to show you. It's about a man who drinks different kinds of juice. Sometimes the juice tastes yummy like (subject's yummy choice), and sometimes the juice tastes yucky like (subject's yucky choice).
(Push appropriate buttons during explanation.)
When I show you the movie you can listen and watch carefully, decide if the juice tastes yummy or yucky, and tell me what you think by pushing one of the buttons, O.K.?

So if you see a man drink some yummy juice, which button will you push?
(Reinforce correct response or correct incorrect response.)
And if you see a man drink some yucky juice, which button will you push?
(Reinforce as above.)
Script for Movie: Drinking Juice

Episode# 1. (Smiles) That tastes bad.
2. (Smiles) That tastes good.
3. (Frowns) That tastes good.
4. (Frowns) That tastes bad.
5. (Frowns) That tastes good.
6. (Smiles) That tastes bad.
7. (Smiles) That tastes good.
8. (Frowns) That tastes bad.
Script for Face Labeling Task

Now I have some other pictures to show you.

First I'm going to show you some pictures of people's faces and you can tell me how you think they feel.

How about this person? (Present first picture.) How do you think this person feels? (Record, remove first picture.)

And what do you think about this person? (Present second picture.) How does this person feel? (Record, remove second picture.)

Here is one more. (Present third picture.) How do you think this person feels? (Record.)
Now I'm going to put all of the faces down here so you can see them.
(Present the three face pictures.)

I'm going to tell you some things that the people might have said and you can tell me which person you think said them.

Which person said ("You've been bad/You make me glad/I really like it/I really don't like it")?
(Record response and repeat for each statement, changing sequence arrangement of face pictures after each response).
I'm going to put the faces down here again and show you some kitchens that someone's mommy/mother saw.
(Present three face pictures.)

These are the doors to the kitchen.
(Present first kitchen.)
You can open the doors and see what the mommy saw.
(Subject does so.)

She saw that someone had made a (big mess/nice breakfast for her).
Which face shows how the mommy felt when she saw that?
(Record response, remove first kitchen, change sequence arrangement of face pictures, repeat for second kitchen.)

Now I'm going to put the big mess next to the nice breakfast.
(Open both kitchen doors and place side by side.)
A mommy opened some kitchen doors and said ("You've been bad"/"you make me glad"). Which kitchen did she see?
(Record response, repeat for second verbal statement.)
I'm going to put the faces down here again.
(Present three face pictures.)

Pretend that it's your birthday and you got some presents.
(Present display board with two present envelopes, each containing good or bad present chosen previously by subject.)

Open the top present and see what's inside.
(Subject opens envelope.)
It's a (subject's chosen good or bad present). Which face shows how you would feel if you got that for a birthday present?
(Record response, close top envelope, change sequence arrangement of face pictures, repeat for bottom present.)

Now I'm going to open both of the presents so you can see them.
(Hold both envelopes open so presents are visible.)
Pretend it's your birthday and you opened a present and said ("I really like it"/"I really don't like it"). Which present did you get?
(Record response, repeat for second verbal statement.)
Script for Movie: Kitchen Scenario

Context:

(Back of child shown arranging food on breakfast tray in messy kitchen.)

Narrator: This is a story about Suzy. She wanted to surprise her dad so she made him a very nice breakfast. But she made the kitchen very messy. Watch what happens when her dad comes in and sees the messy kitchen and the nice breakfast.

(Father enters, surveys mess, turns toward Suzy who is extending breakfast tray. Zoom to father's face.)

Father (smiling): You've been bad.

(Pan to full context with Suzy extending tray, messy kitchen.)

No Context:

Father (close up, smiling): You've been bad.
Narrator: Today is Judy's birthday. She's very excited because her favorite aunt gave her a present.
(Child unwraps box.)
But when she opened it she found a baby toy inside.
(Child withdraws baby rattle from box, frowns.)
Watch what happens when her aunt comes in to see if she got her present.

(Aunt enters and sits on couch next to Judy.)

Aunt: Did you get you present Judy?

(Zoom to Judy's face.)

Judy (frowning): I really like it.

(Pan to full context with Judy holding baby rattle, sitting next to aunt.)

Judy (close up, frowning): I really like it.
1. What happened in the movie? (Subject responds.)

2. What did s/he look like? (Subject responds.) Why did s/he look like that? (Subject responds.) What did s/he say? (Subject responds.) Why did s/he say that? (Subject responds.)

3. Do you think s/he really meant what s/he did in the movie, or something different? (Subject responds.) (If answer "different" ask: What do you think s/he meant?)

(Responses recorded by audio tape.)
Script for Delayed Memory Task

Now I'm going to ask you some questions about the movie that you saw to see how you remember it.

(Place three lower halves of faces in front of subject. Hold up display board with upper half of face.)

If this is the top of the girl's/man's face, what do you remember the bottom of her/his face looked like? (Subject chooses and puts on board with upper face.)

And do you remember that s/he said (You've been bad/I really don't like it) or (You make me glad/I really like it)? (Record)
Materials: Two squares (3 by 3); four equilateral triangles which, when combined, are equivalent in area to the squares; four smaller squares which, when combined, are equivalent in area to the larger squares.

Look at these two large squares. Are they the same size or different? (Subject responds.)

Look at these little triangles. Are they all the same size or are they different? Line them on top of each other to be sure. (Subject responds.)
And what about these little squares? Are they the same or different? Line them up to be sure. (Subject responds.)

Now I'm going to put one of the little triangles here and put one of the little squares next to it. Do you think the square and triangle take up the same amount of room or is one bigger or smaller than the other? (Subject responds.)

Now you take the four little squares and make them into one big square and I'll take the four little triangles and make them into one big square.

Do you think your square is bigger than mine, smaller than mine, or are they the same size? (Subject responds.)

Let's see. (Place two constructions next to each other.) Which square is bigger or are they the same? (Subject responds.)

What about this little square and this little triangle? Do you still think the triangle is bigger than the square or do you think they are the same? (Subject responds.)
Script for Distractor Task: Questions About Physical Laws and social Rules

Who wears dresses, girls or boys? (Subject responds.)
Could a boy wear a dress? How come? (Subject responds.)
What if there was a country where everyone decided that boys could wear dresses. Then could a boy wear a dress? How come? (Subject responds.)

Is it OK to tell a lie? (Subject responds.) Can you think of times when it would be OK to tell a lie? How come? (Subject responds.) What if there was a country where everyone decided that it was OK to tell lies. Then would it be OK? How come? (Subject responds.)

When a rock is dropped into a bucket of water, will sink or float? (Subject responds.) Could a rock dropped in water ever float? How come? (Subject responds.) What if there was a country where everyone decided that rocks should float when they are dropped. Then what would happen? How come? (Subject responds.)
APPENDIX B

Materials
Materials for Face Labeling Task and Matching Tasks
Materials for Choosing Yummy Yucky Food
Materials for Choosing Good and Bad Presents and Matching Tasks
Materials for Matching Tasks
Materials for Delayed Memory Task: Face Puzzle