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CHILDREN'S UNDERSTANDING OF STRATEGIC INTERACTION

City University of New York

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CHILDREN'S UNDERSTANDING OF STRATEGIC INTERACTION

by

DENIS NEWMAN

A dissertation submitted to the Ph.D. Program in Psychology
in partial fulfillment of the requirements for the degree of
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ABSTRACT

A characterization of strategic interaction is proposed and used as a framework for analysing interviews of elementary school and college aged subjects which probed their interpretations of skits involving deception. A central feature of the analytic framework is a concept called "mutual belief" which refers to the beliefs that two actors share in common and assume each other to share in common. Deception is analysed as a strategic manipulation of these shared understandings which calls upon perspective-taking skills. The interpretations of the skits are analysed for their level of understanding of the deceiver's strategy in terms of the extent to which the subject understood the deceiver to have plans which contradicted the beliefs held by the victim. Because interpretations which include large discrepancies between the perspectives of the two characters require keeping the two views separate, it was expected that younger subjects would not understand the deceptions in the same way that the older subjects did. For many features of the interpretations of the skits such as lies, judgments of fairness, the victim's perception of the situation as well as the deceiver's overall strategy, age differences are reported which correspond to the complexity of the understanding as shown by the analysis. These analyses point to the usefulness of the proposed framework in accounting for the development of role-taking skills.

ACKNOWLEDGMENTS

The beginnings of this project can be traced back to 1975 when Mike Cole, then at Rockefeller University, arranged with Children's Television Workshop to get video copies of their Bert and Ernie skits. These fascinating episodes from Sesame Street were the basis for a small endeavour in his laboratory which attempted to elicit categories of social strategies from children and adults. Over the several years that this project has been pursued it has come to owe a great deal to many people.

Mike Cole gave the initial impetus for this line of work and has continued to support and encourage it. Mike Pratt organized an initial study which helped to formulate the questions for the present study. We are grateful to CTW for making the videotapes available to us. Chip Bruce provided the essential features of a formalism which showed how Ernie's social strategies could be understood and how we could begin to answer some of our questions. The importance of our collaboration and of his own work at the Center for the Study of Reading is obvious throughout this dissertation.

This dissertation is intended as a contribution to developmental psychology. During the five years I was at City University of New York, I was trained in developmental psychology under Joe Glick, whose teaching and guidance continues to be of great value. Martin Hoffman

is to be thanked for insisting that a general formulation of strategic interaction has to account for cooperative problem solving as well as deception. My collaboration with Maryl Gearhart has been an essential background to the present study. Many of the ideas presented here developed during our numerous conversations and owe much to her insightful comments. I am grateful also to the principal and staff of the unnamed public school in New York who greatly facilitated the data collection.

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CHAPTER I

STRATEGY AND MUTUAL BELIEF

Bert: I like bananas too ya know.

Ernie: I don't blame you Bert, they really taste terrific

Ernie is preparing to eat what Bert believes is the only banana in the house. Bert seems to be making an indirect request. But Ernie acts as though Bert had simply made a statement about what he likes. For many people who know Ernie, his reply can be heard as a clever and deliberate misinterpretation of Bert. Ernie is strategically ignoring what he knows to be Bert's real intent: that he should share the banana.

The study reported here is an investigation of children's developing understanding of what has been called "strategic interaction" (Goffman, 1969). This domain of social interactions is characterized by situations in which actors make moves on the basis of their assessment of the situation which includes assessing the other actor's assessment. The domain contrasts with interactive situations in which both actors can assume that their assessments of the situation coincide. Actors may call on strategic skills both in cooperative interactions, for example, when a misunderstanding must be corrected, and when conflicts arise. One important class of strategic interactions is deception in which at least one of the actors is playing his role for

motives not apparent to, and intended to be misunderstood by, the other. These interactions include the tactical maneuvers such as lying, flattery, half-truth and deliberate misinterpretation illustrated by Ernie's attempt to use an ordinary statement to cover up his real understanding.

The study describes levels of sophistication of understanding of strategic interaction on the basis of interview data from elementary school children. Skits produced for telecast on Sesame Street are used as stimulus materials. In these skits the tactics and strategies that a muppet character named Ernie uses on his somewhat slower friend, Bert, provide occasions for interview questions which concern the characters' motives and the extent to which each character understands (or misunderstands) the other's motives. The basic contribution of the study is to delineate a progression of increasingly more complex interpretations of the skits that reflect children's growing awareness and understanding of the tactics and strategies that are part of deception.

Strategic interactions are important for the practical reasons of getting along in everyday life. But they are also important for psychological theory because they require perspective-taking for their production and interpretation. Ways of interpreting such interactions between two story characters, for example, index the child's ability to coordinate the perspectives of the characters, e.g., to view them as acting on the basis not only of their own goals but on their understanding of the plans and goals of the other. The developing ability to understand deception may constitute a sequence which parallels to

some extent the levels of social perspective-taking identified by others (Flavell, Botkin, Fry, Wright and Jarvis, 1968; Selman, 1973; Byrne, 1973; Selman and Byrne, 1974; Feffer, 1970; Damon, 1977; Shantz, 1975).

The descriptions of children's understandings are presented within a framework which constitutes an integration of empirical and theoretical formulations of perspective-taking development. This framework places beliefs and understandings which are shared between participants in social interactions as the basis for both cooperative and deceptive interactions. Perspective-taking is seen to be used strategically to manipulate or act upon these shared understandings. This chapter provides an introduction to this framework. The next section reviews previous research on perspective-taking development concentrating on the notion of recursive perspective-taking and on the structural stages proposed by Selman and Byrne. The following section introduces the concept of "mutual belief" and illustrates how these shared understandings can be manipulated in strategic interaction. At that point, the framework is laid out which provides a reinterpretation of the previous research in terms of shared "cultural" knowledge and the capacity to represent discrepancies between one actor's perspective and the perspective the other actor believes to be held in common. The final section reviews the framework and sets out the hypotheses of the study reported in subsequent chapters.

Previous Research on Perspective-taking.

Perspective-taking is considered a central feature of social cognition. Cognitive-developmental studies of social knowledge (Damon, 1977; Kohlberg, 1969) for example, assume perspective-taking (or role-taking)¹ to be the critical aspect distinguishing social from non-social cognition. It is argued that because each person has a unique perspective, part of successful interaction with others (as opposed to with inanimate objects) involves forming some representation of their perspective and of how that perspective relates to one's own. Much of the work on perspective-taking has been concerned with subject's knowledge of the other's beliefs, thoughts and feelings and with their ability to distinguish the other's point of view from their own under various conditions. Being able to distinguish and identify the content of other perspectives is an important social ability but strategic situations often demand what has been called "recursive perspective-taking". That is, actor "A" must consider what actor B thinks actor A is going to do or think. The fact that one perspective can be represented in the other and so on indefinitely is both a central resource for strategic interaction and a central issue in its investigation.

1. "Perspective-taking" and "role-taking" are often used interchangeably. In discussing research the term used by the particular author will usually be used but "perspective-taking" will be preferred for the present research.

Studies of Recursive Perspective-taking

Several studies have examined this recursive quality of perspective-taking. Flavell et al. (1968) used a simple game of strategy in which the subject had to guess which of two cups her² opponent (actually a second experimenter) would choose. One cup had one nickel glued on top and one nickel under it; the other had two nickels on top and two nickels underneath. The subject "won" if she had correctly predicted her opponent's choice and had removed the coins from the cup he chose. The opponent (O) left the room and the subject (S) removed the coin(s) from under one of the two cups. The experimenter then questioned S about her choice. Her rationale was then coded under one of several categories. At the least sophisticated level (judged by S's verbally stated rationale) S removed the two nickels simply because that seemed to be O's most likely choice. At a more sophisticated level, S thought that O would realize that S would try to block his (O's) most likely move so S removed the single nickel. At the most sophisticated level, this recursive consideration of what O would think S would think was taken one or more steps further. Out of the 160 subjects between grades 2 and 11, only four were scored at the highest level but there was a considerable increase in the use of the second kind of strategy and decrease in the first. Thus it appeared that children increasingly considered and acted upon the possibility that O was considering and acting upon what he thought S was doing.

2. Feminine pronouns are used in referring to the subject and masculine pronouns are used in referring to the experimenter when his or her sex is unknown.

Flavell et al. believe that their task underestimated the abilities of their subjects because, as they point out, the subject may not have thought O was smart enough to warrant the more complex strategies. They also suggest that recursive perspective-taking may be more difficult in tasks in which the subject is an active participant than in those where the subject observes the recursive perspective-taking of two others. The subjects' abilities may also have been underestimated by the nature of the game which (when the infinite regress is realized) does not provide a better strategy than making a random guess on the single trial (since there is no payoff for S beyond predicting O's choice).

In another game task, DeVries (1970) found that over half of the first grade children could use a strategy which involved taking into consideration an opponent's strategy which in turn was based on the subject's strategy. Children played the familiar game of guessing which hand the experimenter had hidden a penny (and hiding it for the other to guess). Because there was a number of trials, it was possible to infer the child's strategy from the sequential pattern in which the child hid the penny or guessed where it was. Her subjects ranged in age from 3 to 7 years.³ In her discussion of the quantitative results, she identified a sequence of qualitative stages in the playing of the game.

The first stages involve the child coming to understand that within the framework of the game, there are two distinct motivational

3. There was also a sample of retarded children who were somewhat older.

perspectives. But when hiding the penny, a child at this stage does not appear to take into account the possibility that the opponent may also have a strategy.

Since the child at this stage still utilizes a transparent and easily predictable regular alternation strategy, it seems unlikely that he is actively taking the other's point of view, thinking what the other may be thinking, and then deliberately putting the penny in the opposite hand. This is supported by the observation that most of the children at this stage perform their alternation rapidly, unlike many [children at the next stage] who squint thoughtfully at the opponent and seem to undergo a lengthy decision process before presenting their fists to the guesser. (p. 769)

DeVries found that children would deceptively hide the penny before they would guess in a strategic manner. Deceptive guessing involved guessing in an unrecognizable pattern in order to prevent the opponent from being able to use the pattern to hide successfully. This last stage, deceptive guessing, implies, according to DeVries, that the child "is able to take account of the-other's-taking-account-of the child's perspective" (p.769). It appears, then, that children can act on the basis of recursive perspective-taking even if under other conditions they cannot state the rationale or see a reason for doing it.

In many studies concerned with recursive perspective-taking, the subject is not a participant in an immediate social interaction. Barenboim (1978), for example, asked children (aged 10 to 16) to talk about other people who they knew well. Their descriptions were coded as to whether they contained (a) no mention of the target person's thoughts, b) mention of thoughts only about concrete actions or objects or c) mention of thoughts about thinking. Frequency of this last category increased dramatically with age within the age span studied.

In another study directly concerned with the recursive aspect of perspective-taking, Miller, Kessel and Flavell (1970) showed first through sixth grade children cartoons representing people thinking about other people thinking about others etc. (using the comic strip convention of a thought balloon with balloons embedded in one another). They found that sixth graders gave only about 35% correct responses for what they called a two loop recursion (e.g., the boy is thinking that the girl is thinking of his thinking of her). Miller et al. believe their task underestimated the children's abilities because of the "verbal demands". It may also be the case that children's abilities to formulate recursions were underestimated because the cartoons were essentially contentless--the characters were not engaged in any activity that would naturally motivate such recursive thinking. It may be easier to formulate recursions when they are necessary for explaining some action or social interaction.

Several studies have shown that perspective-taking abilities are used to a greater extent among older than younger children in explaining social interaction. In these studies the subject is also not directly a participant but attributes perspective taking to observed (or read about) actors. Flapan (1968) showed subjects (aged 6 to 12) excerpts from a commercially produced movie depicting social interactions among two children and two adults. The subjects were shown two episodes broken into short segments. After each segment, the subject was asked to describe what happened and then was asked a series of questions about the motives and feelings of the characters. Flapan found that there was an increase with age in the number of explanations

which involved one character's consideration of another character's thoughts or feelings. This form of explanation exhibits a facility with perspective-taking.

The kind of recursive loops exemplified in Miller et al.'s study were not a part of her coding so it is not possible to determine to what extent such explanations were used by the children. Based on her findings, however, it is reasonable to predict that explanations involving recursive loops would also increase when given stimulus materials clearly requiring their use. A study reported by Newman, Dowley and Pratt (1978) used a Bert and Ernie skit as a stimulus and used a coding scheme similar to Flapan's except that it included what can be considered a one loop recursion at the highest level. They found an increase with age (between 6 and 9) in the use of this form of explanation.

In general, research which has made use of the notion of recursive perspective-taking has indicated significant changes during middle childhood. Several researchers, however, have pointed to the lack of correlation among various measures of perspective-taking ability (Hudson, 1978; Kurdek, 1977; Rubin, 1978). Rubin suggests that a factor which may account for the low correlations in the use of tasks which represent "different levels of perspective-taking". Landry and Lyons-Ruth (1980) have subsequently obtained far higher correlations among three tasks: Miller et al.'s (1970) cartoon task, Selman and Byrne's (1974) dilemma interview, and a story task based on Urberg and Docherty (1976). Landry and Lyons-Ruth specified two levels of performance on each task in terms of a model of recursive perspective-taking. Level 1

was defined as the subject thinking about another person thinking about an objective event. Level 2 was defined as the subject thinking about another thinking about a third person thinking about an objective event. The tasks were scored pass/fail at each level and the results for one task scored at a particular level were correlated with the scores from the other task scored at that level.

The high correlations are evidence that recursive structure presents the same cognitive demands across a variety of tasks. Unfortunately the model of recursions was unable to handle the distinction between sequential and simultaneous role-taking which is critical in the work of Feffer (1970; Feffer and Gourevitch, 1960) as well as the work of Selman and Byrne which is reviewed below. While they are critical of approaches which treat perspective-taking as "a unidimensional ability which varies only quantitatively rather than as a series of hierarchically related levels of ability, as various cognitive-developmental authors have proposed" (p. 386), their own model treats the levels as simple quantitative increases in the number of recursions the child is able to handle. One model of perspective-taking development which has gone beyond such linear increases is that proposed by Selman and Byrne (1974).

Three stages of Role-taking

Selman and Byrne (1974; Byrne, 1973; Selman, 1973) have outlined and documented a sequence of general stages of role-taking which children go through as they develop. Their stage descriptions are more complex than other accounts of perspective-taking development because

they include qualitative changes not simply an increase in the number of recursions a subject can handle. Diane Byrne (1973) has described these stages in greatest detail and has reviewed their relation to developmental sequences described by others. She describes a sequence of stages which encompass a broad range of social-developmental phenomena. Six different perspective-taking tasks were used with her subjects who ranged in age from 10 to adult. The tasks included social dilemma interviews and the game of strategy first used by Flavell et al (1968). Byrne believes that general structural change underlies development in these diverse activities.

Only Byrne's first three stages are of concern to this discussion of strategic interaction. Since her youngest subjects were 10, the first stage already shows a certain perspective-taking sophistication. In the first stage, Byrne describes the child as having a "recognition of the separateness and uniqueness of self and other, and that self and other may see a social situation in different ways." (p. 106). She notes that this is the stage Selman (1973) calls "social informational role-taking" because "S's discovery at this stage that others may not be privy to the same information that he is causes an interest in discovering who knows what" (pp. 106-107). Only in the second substage of this stage does the child become aware that "other may be thinking about a third person or about himself as a subject". But at this stage the child "does not base his actions on that knowledge" (p. 140).

The second stage shows advances on several fronts:

Stage 2 is the first true role-taking stage, the first stage at which S actually puts himself into the other's position and discovers that the other can view S as a subject just as

S can view the other as a subject. S is aware that his own thoughts and feelings are under scrutiny by the other and his view of other is based in part on other's view of self. (p 107)

It is at this stage that the child can "make his behavior contingent on O's [the other's] view of the self" (p. 108). This new ability to comprehend and act on the social world goes along with the understanding that "there can be conflicting motives. S understands that others can read off one's intentions, and recognizes deception as a motive" (p. 141).

At the third stage, social understandings become structured in quite a new way.

At stage 3 perspectives are taken in a mutual and simultaneously systematic way rather than in a sequential manner. There is recognition of a shared perspective among people. This stage is described by Mead (1934) as the one in which the fullest development of self is achieved, when the individual "takes the attitudes of the organized social group to which he belongs toward the organized, co-operative social activity or set of such activities in which that group as such is engaged" (p. 155). Mead says that the mere taking of another's perspective toward the self and toward one another, as at stage 2, is not sufficient for the full development of the self. One must generalize individual attitudes into group attitudes. (pp. 109-110)

While at stage 2, the child could act on the basis of his understanding that the other is thinking about the self, stage 3 represents an advance in the mutuality of that understanding. Byrne cites both Goffman (1969) and Schelling (1960) who consider this kind of understanding central to gaming. Schelling describes the essence of a game of strategy being a situation in which

the best choice for either depends on what he expects the other to do, knowing that the other is similarly guided, so that each is aware that each must try to guess what the second guesses the first will guess the second to guess and so on, in the familiar spiral of reciprocal expectations (p.

87).

The stages which Byrne and Selman have outlined are clearly central to the topic of strategic interaction and deception in particular. But their stages are expressed in quite general terms which are not always adequate for understanding particular cases. It is clear, however, that the ability to understand that one perspective may refer to another is critical for strategic interaction. It is also clear that with one person thinking about the other and vice versa, the possibility of an infinite regress is set up. This "mutuality" of understanding which characterizes their stage 3 plays a central role in strategic interaction as Schelling's example makes clear. While it has pointed to critical phenomena, research so far has not provided an adequate framework for the study of strategic interaction or its development as a cognitive activity. The developmental changes in perspective-taking have been described either in very general terms or in terms of specific task demands. In the following section a framework is proposed which integrates the features of perspective-taking recursions and "mutuality". We can return to a reconsideration of Selman and Byrne's stages after the framework is outlined.

Recursive Perspective-taking and Mutual Belief

The present research seeks to identify the cognitive demands and processes of social life. I have suggested that one of the processes involved in the understanding of deception is a kind of perspective-taking skill involving recursion. Understanding deception, however, is not a simple index of being able to do recursive thinking. The

processes involved in deception require a broader conception of recursive perspective-taking itself. In this section, I will develop a characterization of the domain of strategic interaction which forms the conceptual framework for the descriptions of children's developing understanding of deception provided by the present study.

Ordinary Episodes and Deception

Deception mimics the ordinary activities people do together (e.g., a good lie sounds like the truth) so a characterization of deception must also include a characterization of ordinary (cooperative) social interaction. It will be useful, then, to characterize cooperative interaction first and then consider how deception is the manipulation of the ordinary cooperative assumptions, i.e., of the beliefs both actors could ordinarily assume each other to have.

Perspective-taking is more than the knowledge of another's point of view. It has been characterized as the activity of constructing a model of that point of view from available information (Damon, 1977; Flavell et al., 1968; Turiel, 1978). The present formulation goes a step further in characterizing strategic perspective taking as the activity of manipulating the contents of that point of view. I will consider strategic perspective-taking as a kind of problem solving which is brought into play only when difficulties arise in the course of an interaction.

Many cooperative activities are possible without engaging specifically in perspective-taking. Cooperative social episodes require A to have a representation of the activity A and B are doing together but

A's representation of the interactive situation (which may contain distinct roles for A and B) will be assumed to be shared. That is, A assumes that both A and B share the same representation of the situation. In a case where the activity is familiar to A and where it presents no conflicts or misunderstandings between A and B, A will not have to form a representation of B's perspective independent of the representation which is part of the assumed-to-be-shared model of the interactive situation as a whole (cf. Newman and Gearhart, 1980). It can be further suggested that a shared representation is cognitively less complex and therefore easier to form and think about than two discrepant representations of the same situation. The actor will abandon the assumption of a shared representation only when necessary.

Social situations are seldom, if ever, entirely problem free and some activities are explicitly intended to solve problems. A "pleasant" conversation in which neither participant says anything controversial or puzzling to the other provides an example of an activity where both can assume a shared representation. Complexity is added to the situation if, for example, A undertakes to convince B of something. Here A would have to consider what facts would be persuasive to B given B's present knowledge state. Similarly, if A and B cooperatively take on the problem of understanding the other's ideas A will have to form a specific representation of B's idea as distinct from his own. The situation can become more complicated if A tries to understand what B thought A meant by his first remark. Here, strategic perspective-taking comes into play and each embedding makes the activity progressively more complex.

So far all the ways in which interactive problems result in strategic perspective-taking have been in the context of cooperative episodes. If two actors are in conflict, perspective-taking abilities also come into play. Whatever can be done cooperatively can also be done deceptively. Acting deceptively is more complex than a similar cooperative action because the deceiver must keep the false belief and the true belief in mind simultaneously. Expressed in the terminology to be introduced below, the deceiver must maintain two "Belief Spaces": one corresponding to what he actually believes, the other corresponding to what he is getting the victim to believe. Lying, of course, provides a straightforward example. The liar must maintain a careful differentiation between his own beliefs and those of the other without allowing that differentiation to become common knowledge.

Deception can involve more than isolated fact or events. Deceptive strategies can involve the whole plan of action that A and B are doing together. A can suggest a plan to be done together for some reason but actually wants to have the plan carried out because of some side effect that B does not know about but which satisfies some step in A's real plan. Bruce and Newman (Bruce, 1980; Bruce and Newman, 1978b) have called the plan that B thinks they are doing together a "virtual plan" since it only appears to be guiding A's actions. The complexity of such a situation is found not only in the strategic perspective-taking already required by the cooperative version of the activity, but also by the fact that A can take none of it for granted (assumed-to-be-shared) because B's assumption conflicts with the plan really being carried out. To mimic a plan requires carrying it out with a level of

self-consciousness not normally associated with the activity. Like other kinds of problems, deception, produced or understood, requires that the facts, which may ordinarily be taken for granted as shared, be brought into the foreground to be considered explicitly.

Mutual Belief and Cultural Knowledge

The notion that certain beliefs and understandings are assumed to be shared among participants in social encounters was central to the discussion of cooperative interaction. These background understandings continue to play an essential role in the framework being proposed for deceptive interaction. While young "egocentric" children may assume their own world to be held in common, adults also experience much of their social world as both objective and shared in common with others (Garfinkel, 1967; Schutz, 1962). The difference between adults and children is not so much in the experience of sharing a world in common with others as in the complexity of the understandings that are shared and the objective truth of the assumptions. Recent characterizations of young children as "sociocentric" (Garvey & Hogan, 1973) is a response to the recognition that a shared social reality is a feature of the interactive competence of very young children (cf. Gearhart, in preparation).

The term Mutual Belief will be used in the following discussions to refer to these assumed to be held in common beliefs. My use of the term originated with Schiffer (1972) who illustrates his concept of "mutual knowledge*" with the following example:

Suppose that you and I are dining together and that we are seated across from one another and that on the table between

us is a rather conspicuous candle. We would therefore be in a situation in which I am facing the candle and you, and you are facing the candle and me. (Consequently, a situation in which S is facing the candle and A, who is facing the candle and S, who is facing . . .) I submit that were this situation to be realized, you and I would mutually know* that there is a candle on the table (p. 31).

Schiffer thus defines mutual knowledge* in terms of the following set of states (where S, and A are the actors, K=knows and X=some fact):

SK X
 AK X
 SK AK X
 AK SK X
 SK AK SK X
 AK SK AK X
 and so on.

It may be noticed that this formulation resembles the situation that Byrne (1973) refers to as the stage 3 understanding that perspectives may be taken mutually and simultaneously. But it must also be noted that Schiffer was intending to describe "a very common, ordinary feature of our everyday life" (p. 30). While we would not expect very young children to be able to consider the fact that they share mutual knowledge of a toy placed between them, it is not hard to imagine that they would consider the toy to be available to both of them. From the point of view of developmental psychology (rather than philosophy of language), what Schiffer is describing is, first of all, an "end-state model" and second, the cognitions an adult would be capable of generating if s/he stopped to think about it (i.e., if it were no longer an ordinary situation). With respect to the psychological model being proposed here, Mutual Belief will refer to beliefs an actor⁴ assumes to

4. The proposed model treats the perspective of each individual independently. Thus Mutual Beliefs are those beliefs which an individual assumes to be held in common regardless of whether others actually share them.

be held in common whether or not the fact that they are held in common is explicitly considered by the actor.

Mental states and mutual belief. Any sort of fact may be mutually believed. Mental states such as intentions or beliefs may be assumed to be held in common just as physical states. For example, A and B can mutually believe that B intends to blow the candle out or that A wants him to. Theories of meaning such as Schiffer's (1972), show how the mutual belief status of mental states plays a critical and pervasive role in communication. Mental states can be "expressed" in speech acts, according to Searle's (1969) analysis, whenever they are specified in the sincerity condition of the act. For example, an assertion counts as the expression of belief and a promise counts as an expression of an intention. Since the speech act is a "public" act, both the speaker and the hearer know that each know that those mental states were expressed in the action. Grice's (1975) Cooperative Principle is also central to the establishment of mutual belief about mental states. The principle that conversation is essentially cooperative makes it possible for the speaker to count on the listener to make certain inferences about what must have been meant intended or believed. On the assumption that the speaker is being cooperative, the listener can work backward from the public act to mental states implied. Both parties to the conversation can expect those inferences to be made so the inferred states become common knowledge.

Co-presence heuristics. In their discussion of how speakers and listeners can refer to things and know (and know the other knows etc.) that the other will know what is meant, Clark and Marshall (in press)

raise the question of mutual knowledge. They present what appears at first to be a paradox. To be certain that a listener understands a speaker's words to refer to the same thing seems to require that the speaker consider the infinite number of propositions which are associated with mutual knowledge. They present hypothetical scenarios to argue that for any number of embeddings, a misunderstanding could result at a yet deeper level. But, as they point out, referring to something in ordinary discourse could not possibly require processing an infinite number of statements. One solution is that interlocutors do not go through the whole check or only check a few of the possible states taking their chances that the reference will be successful. But there is another set of heuristic strategies based on the notion that the basis for inferring that any of the states (e.g., that A believes that B believes that A is referring to some particular) actually obtains is some evidence that A and B both know what is being referred to. Their idea is that if you know the fact which would form the grounds for inferring the infinity of states, (given certain assumptions and a schema for induction) it is not necessary actually to go to the trouble of generating the inferences. In the case of the candle on the table between A and B, the grounds for inferring that there is full mutual knowledge is the simultaneity of A and B attending to each other and the candle and the assumption (that both make and can be expected to make) that the other is rational and would be drawing the same conclusions from the same facts.

With these grounds, Ann and Bob tacitly realize, so to speak, that they could confirm the infinity of conditions as far down the list as they wanted to go. Since they could do so in principle, they do not need to do so in fact. This is what gives the copresence heuristics their power. Once one

has found proper grounds for mutual knowledge, that is enough (Clark and Marshall, in press).

If the person has the necessary assumptions and inferential machinery, mutual knowledge can be treated as a "single mental entity."⁵

Clark and Marshall describe a variety of kinds of mutual knowledge classified in terms of the grounds on which they are secured. Physical co-presence (as in the candle example) is one kind which can lead to mutual knowledge (when combined with the assumption that the other would come to the same conclusions). But the object referred to need not be physically present. It may be present only in the current discourse between the two. They mention an even more remote but pervasive grounds for assuming mutual knowledge: community co-membership. By virtue of the fact that two people can assume common cultural knowledge, they can infer mutual knowledge of a wide variety of particular and generic facts. This kind of mutual knowledge requires that the actor know facts in common with others in the community and know that these facts are common knowledge.

Community membership, as a kind of co-presence, highlights aspects of mutual knowledge relevant to how development may proceed. Instead of assuming that mutual belief requires enormous perspective-taking skills, it can be seen, rather, as knowledge concerning what anybody in the community can be expected to know. In this view, the establishment

5. Clark and Marshall also note that "When mutual knowledge is treated as a primitive, it follows that most cases of non-mutual knowledge will require a more complex memory representation." The kind of scenarios in which Ann knew she knew something that Bob did not know were harder to understand than the cases in which there was full mutual knowledge, they observe.

of mutual belief is centrally a case of acquiring various kinds of cultural knowledge. Thus mutual belief can be separated from perspective-taking. The former can be considered knowledge of what is held in common while the latter can be considered a procedure for representing cases where mutual knowledge can not be assumed.

"Social facts." Observations of young children indicate that they are able to orient to facts of the social situation which apparently require mutual belief. For example, Newman (1978) has shown how a group of nursery school children created and sustained the fact that two of them had temporary rights over a toy and others did not during the course of a play episode. Recognition of this "ownership" was displayed in the behavior of both the participants and the outsiders. In the same way, Newman and Gearhart (1978) showed how nursery-school children can orient to the idea of a turn as an interpersonally constructed event. This "sociocentrism" would be difficult to account for without the assumption that children understand certain things to be mutual knowledge.

Borrowing Garfinkel's (1967) occasional usage of Durkheim's (1964) term, Newman and Gearhart (1980) use the term "social fact" to refer to facts such as whose turn it is, who has rights to do what, and other facts which would not exist unless the participants were in at least some level of agreement about them. Social facts are objects which exist only in a social world. Physical states (like a candle being on a table) or mental states (like somebody's intentions or beliefs) exist regardless of whether or not there is mutual belief about them. But for social facts, mutual belief is both a necessary and sufficient

condition. The dependence of social facts on mutual belief gives them an elusive quality. Whenever there is disagreement about a social fact, the fact may cease to exist. Also, because mutual belief is a sufficient condition, the facts can be brought into existence simply through agreement. They even have the peculiar quality of being establishable retrospectively if it is agreed that the social fact had been the case. Mutual belief in the facts of the situation and in the social facts in particular provide the basis for socially coordinated activity. But, at the same time it is the collaborative coordination of social actions, both verbal and nonverbal, that keeps the social facts alive.

In this view of social activity, it is not necessary for participants to reflect on the fact of mutual belief in order to maintain the existence of social facts. They need only act consistently with the social world as they see it. For young children as for adults who are not reflecting on mutual belief per se, social facts consist simply of the observable coordinated social activity itself. Verbal formulations of what the facts are (e.g., "it's my turn") are heard as referring directly to the coordinated social activity concretely in progress. Thus, social facts, while dependent only on some level of agreement, nevertheless appear to have an objective status. From a very young age, coordinated activity provides a concrete representation of knowledge held in common with others.

Summary. The concepts of co-presence heuristics and social facts are ways to understand how mutual beliefs may be held without necessitating an infinite regress of perspective-taking, or any perspective-

taking at all. What mutual beliefs do call for in many cases is cultural knowledge. This knowledge, which is understood to be shared by others in the community, consists both of facts, procedures, social rules, etc. and of inference or reasoning processes. Together these largely determine the content of the mutual beliefs of two people who are interacting. Actors can know what they are doing together and what each other mean without considering each other's particular perspective. When it comes to strategic interaction, however, particular perspectives as distinct from the "mutual perspective" become important. But, as we will see, the content of mutual belief remains of critical importance for strategic interaction. In many cases these interactions consist of one actor's strategic manipulation of what the other believes to be mutually believed.

A Model of Perspective-taking Development

At this point it will be useful to introduce a notation which can serve as a way of representing the various strategic perspective-taking activities involved in the tasks to be discussed. Recursive perspective-taking is notoriously difficult to comprehend when described in ordinary sentences. Notations help to schematize the situation which aids in comparing one perspective-taking situation and another. Several notations have been used in previous discussions (Flavell et al, 1968; Byrne, 1973); they have the advantage of relative simplicity over the one used here. During the course of the discussion, however, it will become clear that a relatively complex system is necessary. The notation system has not only provided a means for displaying analyses of perspective-taking situations, it has also

provided a method for discovering features which were previously obscure. The notation requires that situations be represented consistently, explicitly and in detail. Working with such a notation has many of the same advantages for research as are found with modelling psychological phenomena with computer programs.

The purpose of this section is to outline a particular psychological interpretation of the notation by linking the elements to various psychological phenomena which have been mentioned in previous discussions. Some of the levels of development that Flavell *et al.* (1968) describe for a guessing game will be used as illustrations.

The notation, which is described in full in Appendix 4 and in Newman and Bruce (1980), was applied by Bruce and Newman (1978b) to the representation of stories which contain two interacting characters. It can be used to represent an interactive situation from the perspective of both of the characters: the embeddings resulting from a character's plans which require recursive perspective-taking can be represented explicitly. The notation is similar to a story grammar (Mandler and Johnson, 1977; Rumelhart, 1975; Stein and Glenn, 1975); a representation of a story in the notation is a model of the subject's "schema" for the story. The notation system itself is a theory of the necessary and sufficient elements from which models of such schemata can be constructed. ⁶ Since each character is represented

6. Because story grammars are explicitly restricted to one character stories, they do not provide for representing plans or strategies which involve the manipulation of another character's beliefs. Our notation provides a representation of the events which display the plan hierarchy (as does a story grammar) but also shows the relations between the plans of two characters.

independently, the notation can also be used to model the situation of a child who is, for example, engaged in a guessing game.

The nickel-dime game. The guessing game described by Flavell et al provides a convenient example for illustrating how a developmental sequence may be modelled using the notation. As described earlier, the game involves two participants: the subject and a second experimenter who plays the role of the guesser. The subject (the hider) has to hide either a nickel under a cup which is labelled with a nickel or a dime under a cup which is labelled with a dime (actually two nickels). The guesser leaves the room knowing that when he returns either the nickel cup or the dime cup will have a coin under it.

Table 1 provides a key to many of the elements and their abbreviations or symbols which are used in the diagrams presented in this chapter and in chapter 4.

The basic game situation is modelled in Figure 1. The Figure shows two Belief Spaces. The outermost one, labelled "S.B" (subject believes) at the top, indicates that the entire model represents the interactive situation from S's perspective. The embedded Belief Space, labelled "MB(O,S)", is the Mutual Belief Space which O (the "other") believes S and O believe in common. (Since the whole model is of S's beliefs, the contents of this Mutual Belief Space are really what S believes that O believes that S and O mutually believe.)⁷ A turn at the

7. The term MB(X,Y) stands for X's Belief Space. The actor named first within the parentheses is the one whose beliefs are being labelled. So MB(X,Y) is an abbreviation for X believes that X and Y mutually believe....

Table 1
Key to Abbreviations and Symbols Used in
Interacting Plans Models

Nodes

Oval = Simple State
Embedded oval = Mental State
Square = Action
X.A = actor X Achieves (enclosed state(s))
X.B = actor X Believes (enclosed state(s))
X.M = actor X Maintains (enclosed state(s))
MB(X,Y) = X believes that X and Y mutually believe . . .

Relations

BMO = By Means Of
HE = Has Effect
Sp = Specifies

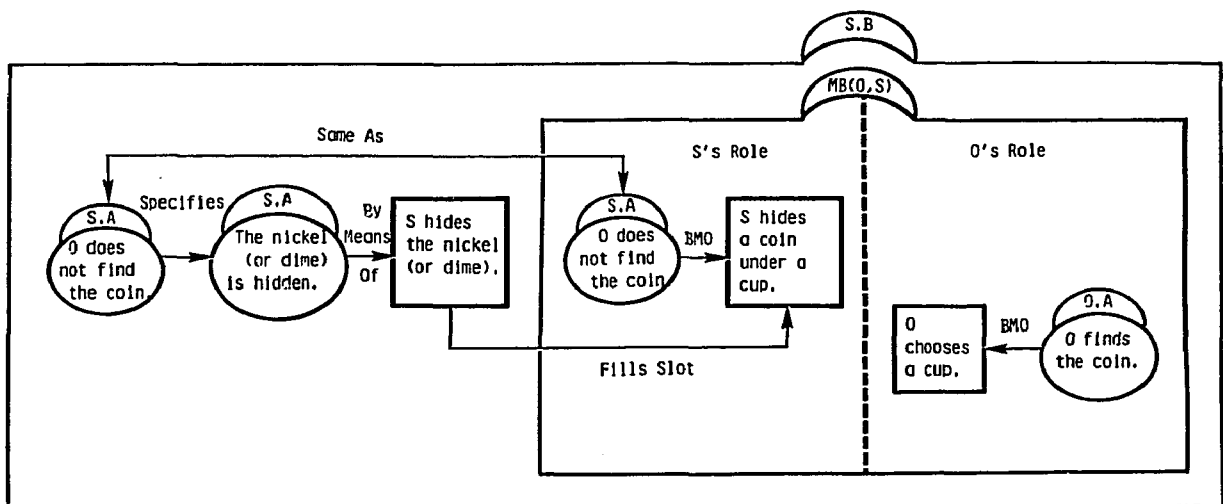


Figure 1. The nickel-dime game without strategy.

game is shown within the Mutual Belief Space while S's actual choice of which coin to hide is shown outside the Space. The Mutual Belief Space is divided into S's role and O's role. In this diagram, S's plan is read from left to right while O's plan is read from right to left and time is represented (roughly) on the vertical dimension.

Within a Belief Space, actions are represented by squares while States are represented by ovals. Mental States are shown as embedded ovals. The Mental States shown here are Achieve Intentions. The outer oval is to be read "subject achieves" or "other achieves" and the inner oval of an Intention shows the State to be achieved. Each of the Intentions is connected to an Action "By Means Of" which it is accomplished.

Within the Mutual Belief Space both parties understand that S is trying to prevent O from finding the coin and that O is trying to find it. The vertical dimension is used to represent temporal sequence. Thus, S's action of hiding the coin precedes O's choosing a cup. Outside of the Mutual Belief Space, are S's private thoughts and plans. Here also S is trying to prevent O from finding the coin, i.e., S's intentions are what O thinks they are. ("Same As" is a marker which is used to clearly display the similarities and differences between Belief Spaces but does not add new information to the model thus these markers may be omitted when they do not add to clarity.) To the right of S's "highest level" Intention is the more specific Intention to hide one of the coins in particular (which in turn leads to the Action.) S's specific Action, however, is not available to O although O believes that S will hide the coin under some cup. (The "Fills Slot" marker

indicates that the action in SB is simply a more specific version (or instantiation) of the one in MB(O,S).)

Figure 1 shows a quite elementary understanding of the game. But this understanding, which underlies all the more advanced strategies, should not be considered a trivial accomplishment. Flavell et al's youngest subjects were in second grade by which time such understandings would be taken for granted. Working with preschoolers, DeVries (1970) has described several stages in the acquisition of the understanding that two players may have different "motivational" perspectives. At the first stage in the familiar game of guessing in which hand a penny was hidden, the game is not understood to involve uncertainty.

Hiding, if attempted at all, is characterized by a total lack of recognition of a need for secrecy and deceptiveness. The child may simply offer the penny when asked to hide or hold out only the fist with the penny (p.767).

In the second stage, there is an awareness of different behavioral roles but not of different motivational perspectives.

Failure to appreciate the competitive nature of the game is revealed by indications of desire for the opponent to find the penny. For example, if the guesser picks the empty fist, the child at this stage may correct him by saying, "No, pick this one" . . (p. 768)

The third stage reflects an understanding of the competitive nature of the game.

The child at this stage recognizes the opposed goals of the players. He often expresses strong chagrin when his opponent guesses correctly and gleeful triumph when his opponent fails to guess correctly, for example, "Ha-ha, I tricked you," "I'm too sneaky for you, aren't I?" "How did you know where it was that time?" "I'm winning lots of times." Cheating may even occur at this stage, though usually in a joking fashion which belies any serious deceptive intent; the guesser may be told he is wrong when his is actually right, but then the child

will laugh and show where the penny is. (p. 768).

Figure 1 schematically represents the child's understanding at this stage. The fact of there being opposing goals is assumed to be shared and there is an awareness that the act of hiding is unavailable to the opponent. A child represented by this model has learned to play the game but has not yet learned to play it strategically.

The first strategy that Flavell et al describe (strategy A) goes beyond the basic plan of action in that S now attributes specific cognitions to O but:

The essence of Strategy A . . . is that it seems to attribute to E2 [i.e., O] nothing beyond cognitions and motives which bear on the game materials themselves, that is, it does not take into account any cognitions which E2 might have about S's behavior in the role of E2's opponent. (p. 47)

A typical example is illustrated in the following transcript (experimenter in parenthesis):

"Do you want me to tell you?" (Umhum. Which one do you think he'll choose?) "The dime." (You think he'll choose the dime cup. Why do you think he might choose that one?) "He'll get more money--if the money is under there."(p. 47)

This strategy does go beyond the basic understanding of the game as modelled in Figure 1 in that now S is hypothesizing about O's thoughts about the game. Assuming that S understands these thoughts to be O's private thoughts, then the model of this strategy would require an additional level of embedding.

Figure 2 is a model of strategy A. A Belief Space labelled "O.B" (for "other believes") has been inserted between S.B (which is still S's plan) and the Mutual Belief Space. (The Mutual Belief Space is now labelled MB(S,O) since Belief Space embeddings must always alternate--

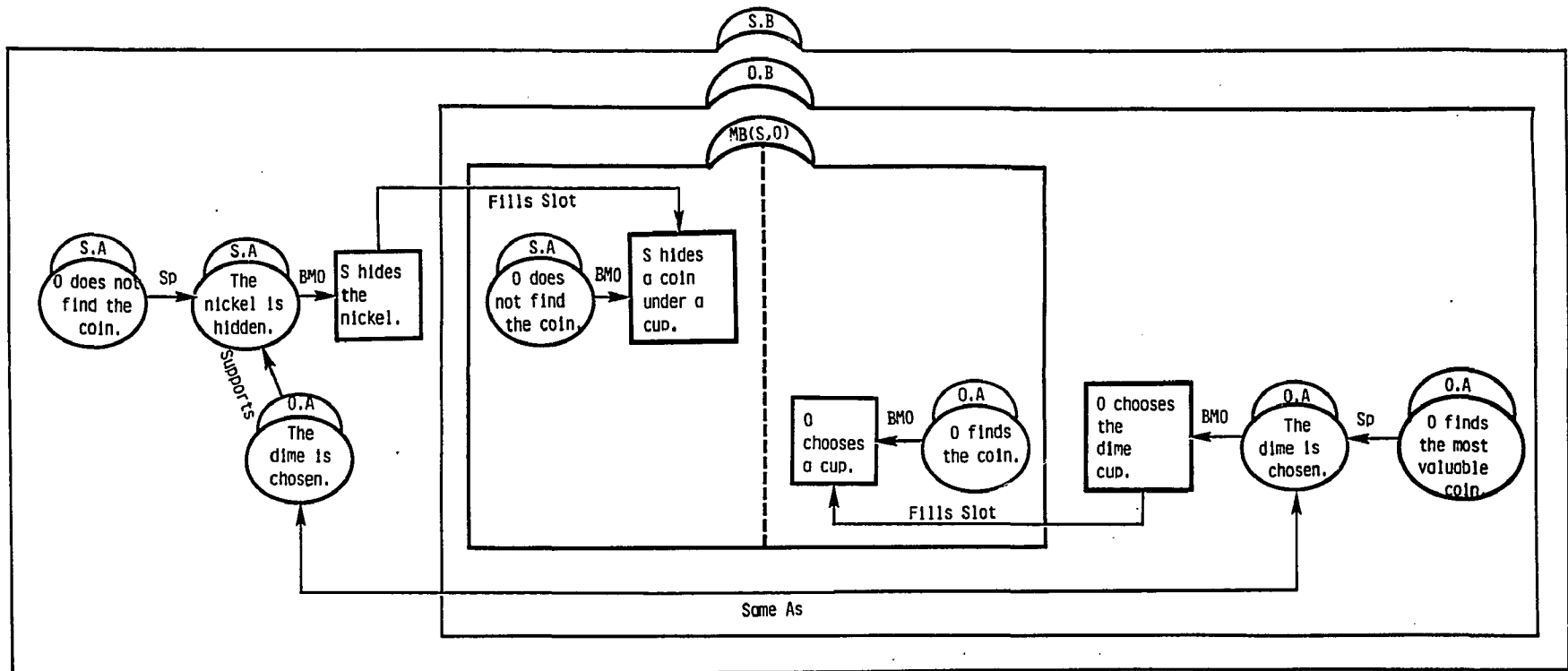


Figure 2. The nickel-dime game: strategy A

the space now contains the things which S believes O believes S believes that he and O share in common). The contents of the Mutual Belief Space are identical to those in Figure 1. This model, however, shows that O intends to get the most valuable coin and so decides to choose the dime cup (thus choosing the dime cup fills the slot in the game plan of choosing a cup). Having the O.B Space embedded within the S.B Space represents the fact that S has guessed that maximum monetary gain will guide O's choice. O's (presumed) Intention to choose the dime cup is also shown in S.B where it is support for S's Intention to hide the nickel instead of the dime.⁸ S's plan now includes that S should consider O's most likely choice in deciding where to hide the coin.

Strategy B contains additional recursions in S's perspective-taking. Now O is seen as thinking that S would think that he would probably choose the dime, so O chooses the nickel (even though it is less valuable) so S decides to hide the dime. An example subject described her thinking as follows:

(Why do you think he'll take the one-nickel cup?) "Well, I figured that, uh, if it was me I'd take this one (two-nickel cup) because of the money I'd get to keep. But he's gonna know we're gonna fool him--or try to fool him--and so he might think that we're gonna take the most money out so I took the small one (the one-nickel cup), I'd go for the small one." (p. 47)

In this view of the situation, both S and O (i.e., O as S perceives him) appear to think they are one-upping the other. O thinks that he

8. In the notation, relations such as Supports do not cross Belief Space boundaries. This restriction serves to make each Space a self contained level of analysis. When States or Actions are relevant to more than one Space they are simply duplicated and optionally indicated with a Same As marker.

knows what S's trick is going to be but S thinks that she knows what O's thinking is going to be. The fact that S is going to try to fool O is something that both S and O know. This fact may even be mutually believed in the sense of being considered an obvious fact about the game that any player would know. But the S's belief that O would be motivated to choose the most valuable coin has a more "sequential" flavor. That is, while O is seen as having inferred what S's trick is going to be, he is not seen as being aware that S would know that he would have inferred it. Figure 3 is a model of strategy B. While it may look at first glance to be overwhelmingly complex, its structure is a simple expansion of strategy A. The states included in it are very similar to those in the previous model. But here, two extra Belief Spaces represent the extra recursions evident in the subject's description. In this view of the situation, strategy A is understood by O who tries to counter it but S is one step ahead and undoes his plan.

Flavell et al provide the following transcript as an illustration of the level C strategy approach to the nickel-dime game:

"Uh, when we were, he chose the dime cup the first time . . . and uh . . . well, let's see . . . I think that he would, I think that he would think that we would choose the opposite cup." (Opposite cup from what?) "From the, in other words this cup, the nickel cup, but then might, he might, he might feel that we, that we know that he thinks that we're going to pick this cup so therefore I think we should pick the dime cup, because I think he thinks, he thinks that we're going to pick the nickel cup, but then I think he knows that we that we'll assume that he knows that, so we should pick the opposite cup." (Okay, so we should pick the dime cup?) "Yes." (p. 47)

Such strategies are defined by Flavell et al as "analogous to Strategy B, but are carried one or more steps further". This definition makes it sound as though development proceeds simply as an increase in the

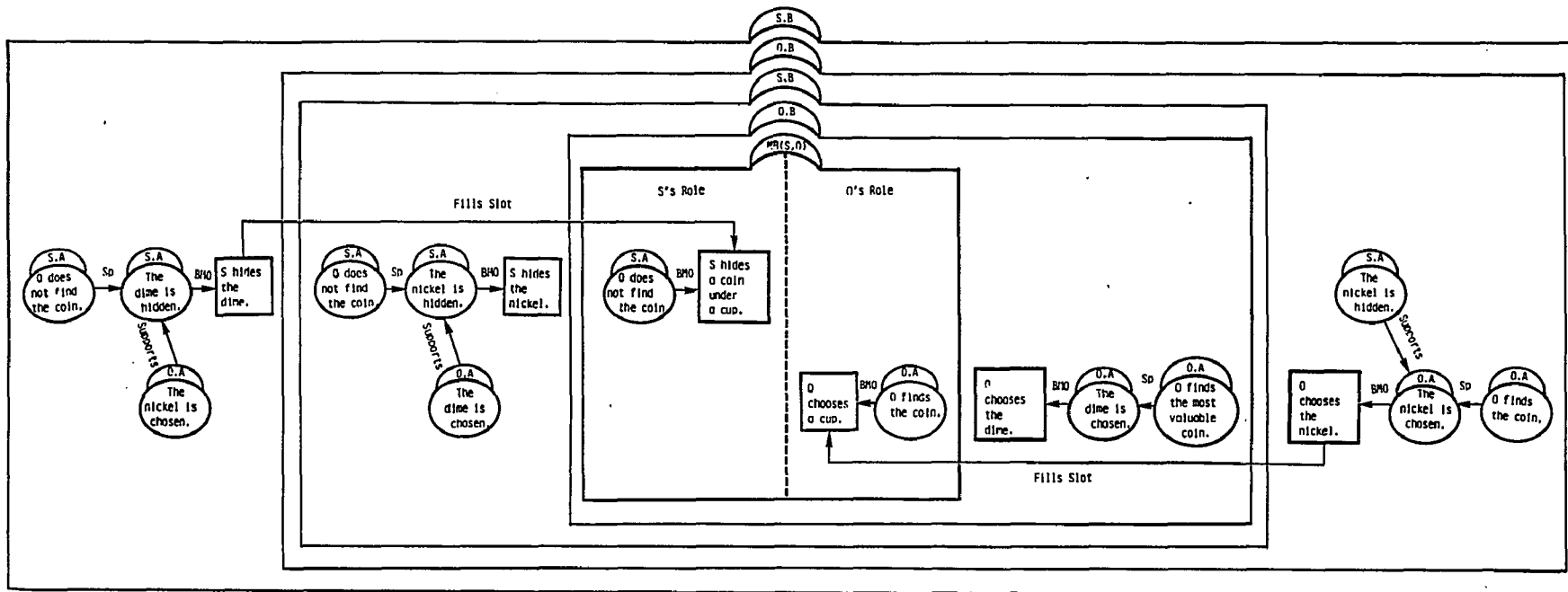


Figure 3. The nickel-dime game: strategy B

number of recursions that can be used in a strategy. Indeed, this subject's planning does seem far more complex than the previous cases. But is it a simple linear increase in the number of embeddings that differentiates strategies B and C?

A careful examination of the protocol suggests an alternative view. It will be seen that, with this strategy, it becomes necessary to represent the complexity, not in further Belief Space embeddings, but in the Belief States contained in them. That is, the content of spaces becomes more complex.

If the false starts are eliminated and plausible referents are filled in, the following propositions can be extracted from the transcript:

- (1) He (O) chose the dime cup the first time (in the demonstration trial).
- (2) I (S) think that he (O) would think that we (S) would choose the opposite cup (hide the nickel).
- (3) But then he might feel that we know that he thinks that we're going to pick this cup (hide the nickel).
- (4) So therefore I think we should pick the dime cup (hide the dime).
- (5) (We should pick the dime cup) because I think he thinks that we're going to pick the nickel cup.
- (6) But then I think he knows that we'll assume that he knows that (we're going to hide the nickel.)
- (7) So we should pick the opposite cup (hide the dime?)

Exactly how this plan was supposed to work is not entirely clear from

this description and there is some reason to suspect that "opposite" in proposition 7 means hiding the nickel. Nevertheless, it is possible to map these statements onto a representation in a way that reveals an overall picture of the situation as the subject described it.

Figure 4 represents these statements on a Belief Space configuration which is identical to Figure 2. The Mental States which are shown in the Spaces, however, are considerably more complex. Before explaining the details of this diagram, it is necessary to explain a principle of the notation system. The notation is designed to represent strategies at each of the levels of belief that are relevant to it. But at each level, that is, within a particular Belief Space, the plan is self contained and complete. This means that for any Action that is shown in a Space, its enabling and supporting conditions as well as its effects are shown also in that Space.⁹ That is, if one of B's Beliefs is a reason for an Action of A then that Belief (which may already be represented at some other level) is also shown within the same Space as A's Action. This has the advantage of showing explicitly the facts which must be considered at each level of the plan. This principle is incorporated in the notation in the form of a simple rule: relations do not cross Belief Space boundaries.

In Figure 4, rather than showing embeddings as Belief Spaces, Belief States with multiple embeddings are used. Because these States are referred to as the reasons for the subject's actions they must be

9. The important exception to the principle that each Space is self contained is that courses of action may continue into more deeply embedded spaces indicated by Same As or Fills Slot markers, that is, the same state may participate in plans at more than one level.

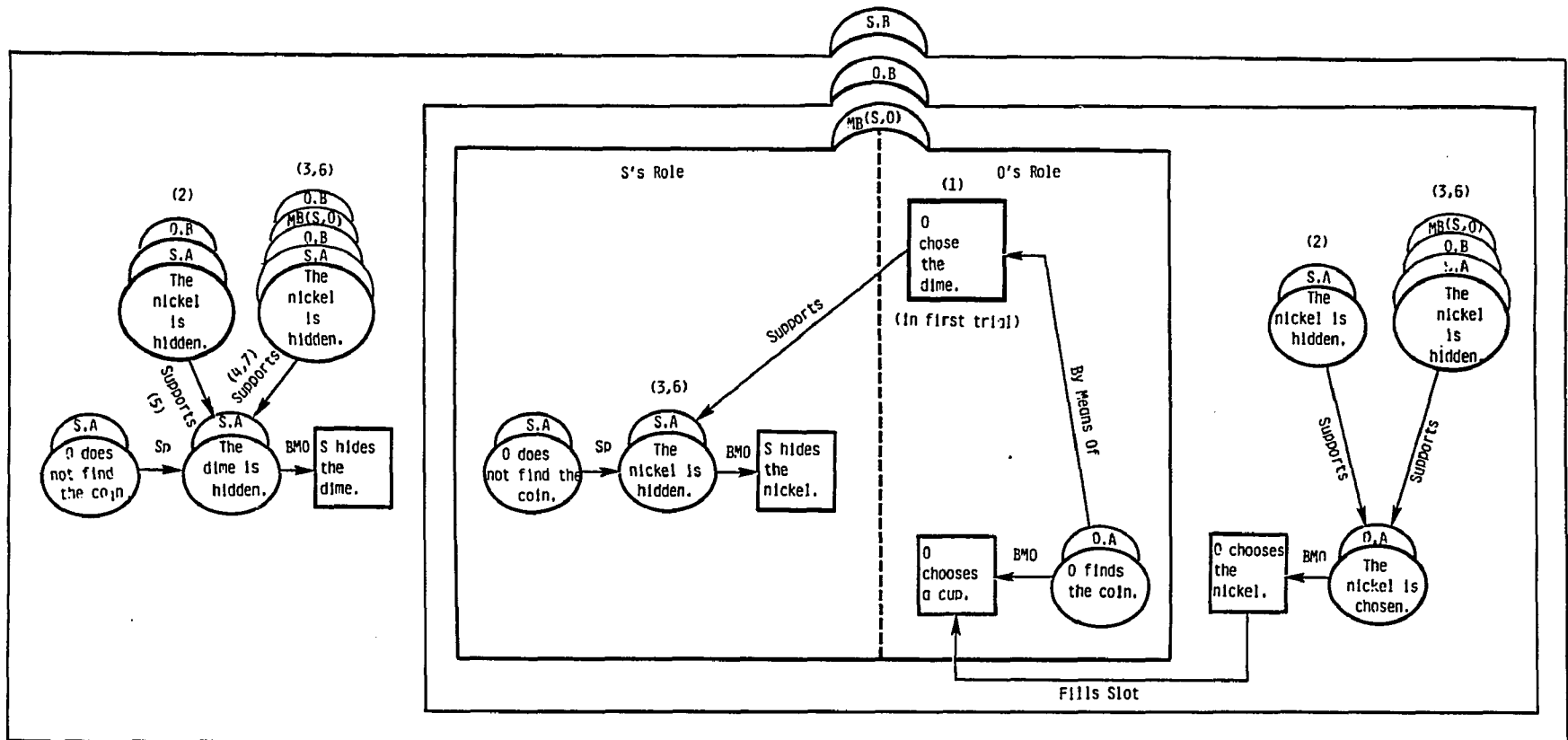


Figure 4. The nickel-dime game: strategy C

included in the space where the actual strategy is shown. As explained below, this is made necessary by the apparent mutual belief status of some of the States referred to. Proposition 1, for example, refers to an event which both parties obviously had access to: in the demonstration trial, O chose the dime. This fact is the basis for the rest of the strategy which hangs on what both parties would expect (and expect the other would expect) to happen next. In proposition 2, S says that she thinks that O would expect her to hide the coin which is opposite from the one he picked. Later, in proposition 6 she says she thinks that he knows that she will assume he knows that she is to be expected to pick the opposite cup. For some reason she assumes that the idea of hiding the coin which is opposite from the one last chosen is salient to both of them. But further, she assumes that this alternation procedure would be understood to be mutually believed. In the previous strategies, the relevant facts (e.g., that O was after monetary rewards) were not so clearly mutually believed. Since it appears that both the fact of O's dime choice and the inference that follows are both mutually believed, there is reason to consider subsequent inferences also to be mutually believed. It appears that these "recursive mutual beliefs" also play a role in the subject's planning.

We can now turn to Figure 4 and consider how these seven propositions can be represented as a strategy. The center Space ($MB(S;O)$) is the interactive situation as it is understood in common (or at least that which S believes O believes S believes to be understood in common). In the upper right of that Space is the action that O took in the first trial (choosing the dime). This corresponds to proposition

(1). Both actors understand that this Action Supports (makes reasonable) S hiding the opposite coin (i.e., the nickel). Therefore S's probable intention to hide the nickel is included in the Mutual Belief Space. This node is labelled (3,6) because it is referred to in proposition 3 and 6 of the protocol.

The middle-level Belief Space (O.B) and the outer Belief Space (S.B) represent O's strategy with respect to the mutually understood situation and S's strategy with respect both to the common situation and to O's strategy. Both these Spaces contain completely embedded Belief States. A Belief State is a kind of Mental State (like an Intention) which can represent Belief embeddings (recursions) in the same way that embedded Belief Spaces do. In this case it is necessary to indicate the embeddings with States rather than Spaces because the strategies being represented within the Spaces use embedded beliefs as part of their rationale. The principle, described above, requiring self contained plans at each level calls for showing embedded beliefs at the level at which they are relevant. Embeddings whether shown in States or Spaces are otherwise equivalent. Take, for example, the two States marked (2). (These could be marked with a Same As marker but for simplicity are not). These equivalent States represent that S thinks that O thinks that S intends to hide the nickel. It can be seen that the Belief Space labelled "O.B" is equivalent to the outer oval of the Belief State within S.B. Whenever Belief States are shown in more than one Space, the embeddings which are equivalent to the differences

in Space level are indicated as embeddings of the State.¹⁰ Within O.B, the State labelled (2) is not S's actual Intention but O's belief that S intends to hide the nickel. Returning out to the (2) State in S.B, it can be seen that this is one of the States which support the decision to hide the dime. This Supports relation is stated in proposition 5. The reason for hiding the dime is not that O is going to pick the nickel cup but that O thinks S is going to hide the nickel.

In propositions 3 and 6, the subject adds another consideration to her rationale. She points out that she believes that O believes that she believes that O believes that she will hide the nickel. (And this fact is also seen as a reason for hiding the dime as she states in proposition 4.) Since that embedded Belief State is, itself, the reason for action, it is necessary to include it as such in the Space (S.B) where S's real plan is being formulated. The node in Space S.B labelled (3,6) represents that embedded belief. It will be noticed that the structure of the embeddings of this Belief State reflects the structure of the embeddings of the Belief Spaces in the model. In particular, a Mutual Belief State, not another S.B. Space, is found embedded in the O.B State. But an additional embedding, below the level of the Mutual Belief State, is indicated by the (3,6) node in S.B. This level is not shown as an additional embedding within the MB(S,O) Space because the Mutual Belief Space is considered to be (potentially) equivalent to the whole set of states including SB X, SB OB X, SB OB SB

10. This is not true of Intentions which are simply duplicated without elaboration in other Spaces. This may be a weakness of the representation and points to an unresolved problem with the relation of Intentions and Beliefs.

X, and so on. ¹¹ In other words, the Intention (labelled (3,6)) inside the Mutual Belief State stands for any of the more deeply embedded versions of the Intention which (potentially) could be brought into play in plans of action being formulated in Spaces outside of Mutual Belief. In this case, the subject is "plunging" to a level below the surface of the Mutual Belief Space. She is suggesting that the fact that he knows (O.B) that she will assume (MB(S,O)) that he knows she would hide the nickel should be considered in making her decision. ¹²

The subject's use of this embedded Belief State makes her strategy considerably different from the previous ones. The important difference is not the number of embeddings per se but in the fact that embedded mutual beliefs are being considered in formulating the plan. This arises because the subject expects that both she and O will make the same inference about what she is probably going to do next and she expects that O will see that the grounds for the inference process are held in common.

Flavell et al use these three strategies to illustrate a sequence of developmental levels involving increasingly more perspective-taking

11. Any of the (potentially) infinite number of levels of the Mutual Belief Space are represented by the subject only when a problem arises which requires consideration of them. Otherwise, the subject would only represent the fact as a fact which is "shared". As Clark and Marshall (in press) have argued, actually representing the infinite number of states would be impossible but is unnecessary as long as it is established that the grounds for any such inferences are established.

12. It is not clear from her description just why that fact is important or whether she thinks that O, himself, is using the same fact in deciding what cup to choose as is tentatively indicated in the O.B Space.

recursions. The detailed reanalysis using the concept of mutual belief and a rather complex notational system points to the need for a more careful consideration of the factors involved in such a developmental progression. In particular, it is important to distinguish embeddings which occur outside of the Mutual Belief Space from those which can be represented within it. The analysis suggests that some of the apparent complexity of more sophisticated strategies can be accounted for by the subjects' strategic consideration of what can be expected to be mutually believed. We can return now to reconsider "stages of role-taking development", particularly the structural theory proposed by Selman and Byrne.

Role-taking Stages Reconsidered

The three qualitative stages of role-taking formulated by Selman and Byrne have been considered both as the most comprehensive treatment of perspective-taking development (Damon, 1977) and far too general to be useful in accounting for differential performance on various perspective-taking tasks (Urberg and Docherty, 1976). The analysis of the nickel-dime game has suggested that (at least) two conceptually distinct factors must be considered in explaining strategic game playing. These factors are the basis for a reinterpretation of the general stages of role-taking and particularly of the important transition between stages 2 and 3 in Selman and Byrne's theory.

The first factor derives from the structure of Belief Space embeddings. These structures call for a capacity to represent states outside of mutual belief, i.e., to do what may be called "strategic

perspective-taking". The second factor is the knowledge of what to expect others to know, infer, or otherwise think about under various circumstances. This may be referred to as "cultural knowledge". Urberg and Docherty (1976) make a similar distinction in attempting to explain the relative difficulty of various perspective-taking tasks.

It is important here to consider the distinction between structural and content components of role-taking tasks in general. The structure of the task can be thought of as the cognitive operations necessary to perform the task, involving such things as the number of dimensions or aspects of the problem which must be considered, and whether these aspects can be considered sequentially or must be simultaneously coordinated. . . Content is here defined as the concepts that the operations act upon to produce a solution to the task. That is, a subject who is being asked to infer (structural consideration) an emotional response must both have the concept of that affect in his cognitive repertory and also recognize what situations would produce that affect (content considerations). (Urberg and Docherty, 1976, p. 197)

Urberg and Docherty are concerned with defining features of various commonly used tasks. Structure and content can therefore be considered to refer to features of the task rather than features of the subjects who perform them. But presumably these task demands are reflected in the knowledge or abilities of children who are learning to perform them. Is development best described as a sequence of hierarchically ordered global stages or can development be accounted for by a more quantitative change, e.g., an increase in the knowledge base and in processing capacity? A reanalysis of Selman and Byrne's stages suggests that the latter approach may provide an adequate explanation.

Byrne's (1973) descriptions of stages 2 and 3 provide a pertinent case. In stage 2 the child discovers that the other can view the self as a subject. The first substage (2A) is represented by Byrne in a notation as follows: S → O → S. In substage 2B, S becomes aware that

O can be aware that S is taking O's perspective. This provides for more recursions which she represents as: $S \rightarrow O \rightarrow S \rightarrow O$, etc. At this stage, the recursions can be extended indefinitely so, unlike Flavell et al's levels, the stage is not defined in terms of a certain number of recursions. At stage 2, S can engage in recursive perspective-taking for as many loops as the task or her processing capacity allows. The essential structural feature which distinguishes this stage from the next is its "sequentiality". S sees that O is seeing S etc. but S does not consider S seeing O and O seeing S as an inherently recursive system. The third stage is represented somewhat differently: $S \rightarrow (O \leftrightarrow S)$; or (at substage 3B): $S \rightarrow O \rightarrow (S \leftrightarrow O)$. The new stage structure represented by the parentheses and double-ended arrows is one of simultaneous and mutual perspective-taking. S, at this stage, is able to stand back and consider the system from a third person perspective. Stage 3 thinking is clearly based on mutual knowledge. The examples from Goffman (1969) and Schelling (1960) which Byrne uses to exemplify stage 3 are cases where the game is based on a "mutual appreciation" of the situation. The difference between stage 2 and 3 can, at least in part, be accounted for by greater cultural knowledge of the conditions of the game and of the plans such games provide for any player.

This stage sequence can be seen as consistent with the analysis of the nickel-dime game in the previous section. Strategy A and B had the same general structure. In B the subject simply took the sequence of considerations a few steps further. These are equivalent to the stage 2 subject who reasons outward some number of recursions until she

reaches a satisfactory solution. The strategy C subject appears to be transitional between stages 2 and 3.¹³ She is still trying to outguess the opponent but what was introduced into the considerations was an inference (i.e., that alternation is the expected procedure) which is recognized as a mutual belief. The subject sees that O will also be able to make the inference since they share the same information about the game conditions. The difference between this more sophisticated strategy and the others resides in the strategic use of the beliefs assumed by the players to be held in common.

The "transitional" (strategy C) subject suggests how a stage 2 strategy may gradually be coordinated with growing cultural knowledge of a particular game and result eventually in a stage 3-like understanding. In learning to play a game, the child would work out strategies first in the interaction with another person before she could see that the strategy she just discovered is also available to the opponent. The stage 3 subject realizes the impossibility of outguessing the opponent. What is needed in order to produce the stage 3 boredom with the nickel-dime game is the realization that the opponent would be able to come up with the same plan that S did. It is not surprising, then, to find a subject who attributes to mutual belief some part of "what anybody knows about the game" but still traces, in a sequential manner, other parts through several embeddings outside of mutual belief. Only after the implications have been worked out by the

13. A considerable proportion of Flavell *et al.*'s subjects were not codable in his categories because they did not make a choice or were unable to justify the one they made. Most of these were in the older age groups so could represent stage 3 subjects who could not see any way to obtain a strategic advantage in the game.

subject can they be attributed to the other. Thus cultural knowledge may be the basis for stage 3 understandings even though that knowledge, itself, may be gradually consolidated through more sequential social activity.

When stage 3 is interpreted as the use of mutual beliefs in strategies¹⁴ a very natural interpretation of the "third party perspective" aspect of the stage becomes available. The use of mutually believed facts in strategies outside of mutual belief requires that the mutual belief status of the fact be taken into consideration since this status is the basis for its strategic usefulness. The mutual beliefs are established between two people in the course of interaction. To use those beliefs requires considering how the interactional system works (e.g., when inferences are likely to be made). This may seem like looking at the system from outside. It may be the case that young children are unable to manipulate mutual beliefs strategically. But this inability to take the third party perspective may be accounted for both by not knowing what inferences can be expected to be made and by an inability to represent those inferences outside of mutual belief. In this view, stage 3 is not a general structural stage. Rather, it is knowing, in relation to particular tasks, what anybody is (and can be) expected to know and being able to represent that knowledge outside of mutual belief.

14. Strategies may be cooperative as well as deceptive. For example, an individual may attempt to repair another's misunderstanding by figuring out what inference the other apparently thought he was expected to make.

The topic of strategic interaction lends itself more naturally to an "information processing" rather than a "structural" approach to development. In an information processing approach a concept of "capacity" plays a central role (Shatz, 1978). More efficient ways of handling information frees up capacity for carrying out more sophisticated procedures. The distinction between cultural knowledge and strategic perspective-taking capacity is clearly more appropriate for this approach than for one concerned with global knowledge structures. When this distinction is made, development is not seen as involving an overall reorganization. Rather the child learns, with respect to particular situations what the other can be expected to infer. The embedded "structure" of a strategy is not the structure of the cultural knowledge itself. It is a representation created at the moment to solve a particular problem. Of course, some of the things a child comes to know and understand to be shared are game strategies based on strategic perspective-taking. In these cases the distinction between cultural knowledge and the capacity for its strategic use seem blurred. But it is always the case that for any knowledge about the situation that is understood to be shared, how that knowledge is to be used in the situation remains problematic and subject to strategic considerations.

Describing the Developing Understanding of Deception.

Deception is characterized as a complex cognitive task involving the strategic deployment of perspective-taking skills. By its very nature deception involves a violation of mutual belief. The deceiver's real plan lies outside of the set of beliefs the other assumes to be

held in common. For the observer as for the actors themselves, the conflicting conceptions of the interactive situation resulting from the concealment of the deceiver's real beliefs and intentions disallow the "ordinary" assumption that the relevant facts of a social situation are shared. Mutual belief is at the heart of deception as it is for ordinary interaction. While much of the complexity of deception arises from the number of embeddings of perspective-taking required by any particular tactic, complexity arises also from the sophistication of the contents of mutual belief which are contradicted or manipulated by the real higher level plan.

The present study was designed to explore children's developing understanding of strategic interaction involving deception. The findings are descriptive of the ways in which children interpret observed deceptive strategies. The study made use of three videotaped skits which illustrate a variety of deceptive tactics and strategies. The skits have very simple "content" but a quite complex "structure". While most of the concepts involved (e.g., sharing, anger at a friend for losing a toy) are appropriate for preschoolers, the structure of Ernie's strategies is exceedingly complex and lend themselves to a variety of interpretations. The framework used in analysing the nickel-dime game is applied to the analysis of these interpretations. Perspective-taking is seen to be called for by many aspects of the interpretations. The concept of mutual belief and its strategic manipulation is seen to be a fundamental principle in these analyses.

Interviews focusing on Ernie's strategies made it possible to discover what kinds of deceptions are more easily formulated and discussed

by children at different levels of sophistication and how the same tactic or strategy is described by children of different ages. Because they can be assumed to have less perspective-taking capacity, younger children were expected to simplify observed situations in systematic ways. It was expected, for example, that younger children would interpret deception as cooperation or a lie as the truth since such an interpretation does not violate the assumption that two actors share the same beliefs. Since lies tend to mimic truth-telling, the appearance of cooperation can be quite compelling. The observer is required to maintain the belief that one of the actors is actively maintaining a representation of both his own and the other actor's perspective. And the observer's belief has to be held in the face of very little evidence from the surface behavior of the observed actors. But even where deceptions are seen as such, younger children should tend to see them as involving less complex structure than do older children or adults. That is, younger children should tend to attribute more beliefs to the shared experience of the two actors.

A developmental progression in children's understanding of a Bert and Ernie skit may be far from a general description of children's developing social competence. But the research strategy is exploratory, taking a small piece which seems, on the face of it, to instantiate more general principles.¹⁵ But in many ways, interpreting a Bert

15. This approach is consistent with the recent growing interest among developmental psychologists in tracing change in particular domains (Feldman, 1980; Turiel, 1978). But in this case, the specific domain does not exclude consideration of the more universal aspects. The form of the theory of a specific task must be informed by principles which are found to apply across domains.

and Ernie skit is not specific enough. As a "psychological task" it includes many elements from the "processing the information" to "interacting with the interviewer". Any interpretation will be a function also, as has been argued of the subject's processing capacity and cultural knowledge. These issues will be taken up again in the conclusion.

For the purposes of understanding the general question of strategic perspective-taking and the strategic use of mutual knowledge, Ernie's deceptions provide a rich starting place. The descriptions of how children characterize these complex social interactions begins to show how social knowledge is put to use in social interaction. Perspective-taking is not simply a process of thinking about other people. It is also used strategically in the social problem solving which constitutes social interaction. This study contributes to locating this process in the child's understanding of these strategic interactions.

The next chapter describes the methods used in the interview study. Chapter 3 describes the three main interpretations of one of the skits as well as some of the variants. Chapter 4 analyses the three interpretations from chapter 3 in more detail in order to reveal the sources of their relative complexity. It is seen that each kind of interpretation corresponds to a different use of the same piece of cultural knowledge. Chapter 5 takes up the interpretations of the other two skits and discusses general and specific sources of complexity. It also discusses characteristics of the subjects besides age which could account for differences in the interpretations. Chapter 6 takes up two

issues which apply to all the skits: lies and fairness. These are discussed in relation to cognitive-developmental approaches to the relation between social judgments and perspective-taking. Chapter 7 concludes with a summary of the approach to perspective-taking and strategic interaction which has been outlined in this introduction.

CHAPTER II

METHOD

The study which occupies the following chapters sought to describe the complexity of the perspective-taking demands involved in understanding deception. Forty-eight subjects ranging in age from six to twenty-two were interviewed about their interpretations of three short videotaped skits produced for telecast on Sesame Street. Each skit involved two muppet characters, Bert and Ernie. The interviews were coded for critical aspects of the subjects' interpretations of Ernie's deception as perceived (or not) by the subject. This chapter reviews the procedures used in collecting and coding the data.

The Interviews

Subjects

Twelve subjects from each of grade 1, grades 3-4, grade 6 and college were interviewed individually. There were equal numbers of males and females in the four grade levels. The mean ages for each of the groups were as follows: First grade, 6 yr. 11 mo.; Third-fourth grade, 9 yr. 3 mo.; Sixth grade, 12 yr. 1 mo.; College, 19 yr. 6 mo.

All but three of the elementary school children attended a public school in a middle class area on the east side of Manhattan. The remainder attended a public school in a middle class area of Toronto.

Children were selected by their teachers with the only restriction being that children whose native language was not English would not be interviewed. The college students attended undergraduate psychology courses at the University of California, San Diego and were fulfilling a course requirement by participating as subjects.

The Skits

The skits were chosen from a corpus of about 130 skits which were made available by Children's Television Workshop for research purposes. The three skits which were finally chosen were very attractive, well acted and funny both to (most) children and to adults and proved adequate for maintaining children's attention through the long interview. But entertainment value was only one of the many criteria by which the selection was made. The following criteria were also relevant to the study:

1. The skit should be a self contained story. Often Bert and Ernie appeared in introductory bits or in skits which were constrained by an educational goal in an obvious fashion. Thus the selection eliminated situations which were contrived for teaching numbers, words and so on.
2. The skit should not contain blatantly unrealistic events. For example, one skit contained a TV which could be reached into.
3. The skit should contain only Bert and Ernie. The analysis of recursive perspective-taking is complex enough without adding a third actor. But, in addition, Bert and Ernie tended to be better developed

as characters than the other muppets.

4. Ernie should be presented as clever rather than ignorant (to the adult viewer, at least). Bert and Ernie often have stereotyped characteristics. Ernie tends to be excitable and not knowledgeable, while Bert is dull but knowledgeable. Often these characteristics are used as a framework for episodes. For example, Ernie's lack of knowledge is sometimes used as an occasion for Bert to provide the correct information. While these skits further an educational goal of the program they do not illustrate a social strategy of the necessary sort. In some skits, however, Ernie appears only to be 'playing dumb', i.e., his foolishness is intentional. In the selected skits Ernie shows a cleverness at Bert's expense. It should be noted, however, that familiarity with Ernie will not necessarily lead a subject to expect a clever strategy.

5. Ernie should carry out an intentional deception. These skits are distinguished from those in which Ernie could not have reasonably foreseen the outcome or in which Ernie was not deliberately trying to bring it about.

Four skits met these criteria; one was eliminated because it was somewhat longer than the others. The three skits entitled "Bert Gets Angry", "Bert and Ernie Share a Banana", and "Ernie Shares Bert's Cookie" are presented in transcript form in Appendix 1. Adults usually interpret these skits as follows:

The Angry Skit. (162 sec.) The skit begins with Ernie coming in and asking Bert to do him the favor of pretending to be angry. Bert is

puzzled by the request so Ernie explains that he was just wondering what people look like when they are angry. (This is a lie and is critical because it states a goal which is intended to make the request seem reasonable by locating it as a step in a harmless plan). Ernie goes on to flatter Bert by telling him that the reason for approaching him in particular is that he's just great at getting angry. (This is a true statement but there's an irony to it since Ernie fears rather than appreciates this ability). Bert says he cannot just get angry but needs something to get angry at. Ernie pretends to think up a reason and then suggests that Bert pretend that Ernie lost his paper clip collection. (This, of course, really happened but Bert thinks its just a hypothetical example). Bert screams. Ernie compliments him on his abilities and asks him to do it again. Bert objects that its tiring but Ernie insists and retells the pretend example. Bert gets angry again. Ernie asks him to do it again but this time Bert is exhausted and says he cannot do it anymore. As Bert is catching his breath Ernie informs him he really did lose his paper clips. Bert faints (he is too exhausted to get angry. The shock that his paper clips were lost and, perhaps the dawning realization of Ernie's scheme caused him to faint).

The Banana Skit. (91 sec.) Ernie returns home with a bag of groceries. Bert asks him if he got bananas. Ernie says he did, pulls one out of the bag and begins eating it. Bert, thinking there was only one banana hints he wants some by saying "I like bananas, too, ya know." Ernie emphatically agrees: "I don't blame you Bert, they really taste terrific" (Ernie knows that Bert is requesting some of the banana and is pretending to misinterpret Bert's intent). Bert hints again before

calling Ernie selfish. Ernie now acts as though Bert has convinced him saying: "You're right...share and share alike..." (Bert thinks Ernie is now convinced and willing to share). Ernie says he is going to "divide this banana up so both of us can have some". And he turns his back on Bert. (Ernie is lying in that he is not intending to share the edible part of the banana but his statement is literally true.) Before Bert can see, Ernie gobbles up the rest of the banana. When Bert does see that Ernie has eaten all the banana Ernie explains that they are sharing it - he is taking the inside part and Bert can have the outside part. Bert faints. (Bert is shocked by the realization that he has been tricked). Ernie tells Bert he was only kidding and pulls another banana out of the bag.

The Cookie Skit. (116 sec.) Bert is about to eat a cookie that he has been saving all day when Ernie bursts on the scene, sees the cookie, and decides he wants it. Bert insists it is for him alone but Ernie begins trying to convince Bert to share it. Ernie argues that if he (Ernie) had the cookie, he would share it with Bert. (This is probably a lie. Ernie may be trying to convince Bert or may be setting the stage for his next move). Bert doubts that he would so Ernie takes the cookie away and tells Bert he's going to prove that he would. Bert objects to Ernie taking the cookie but Ernie says that he is just going to demonstrate. (This is a lie to obtain Bert's cooperation). Ernie asks Bert to ask him if he (Ernie) would share the cookie with him (Bert). (Bert believes this is to be part of a pretend scene). Bert reluctantly asks the question. Ernie answers that he would be happy to share the cookie. Ernie breaks it in half, gives half to Bert and

begins eating the other half as he walks off. Bert is left dumbfounded. (Ernie has half the cookie and maybe legitimately since if the demonstration has proved he would share then he does have a claim to half the cookie). Ernie returns momentarily to ask Bert if he would share his half a cookie. Bert screams.

Interview Procedure

Subjects were interviewed individually. The entire interview which lasted approximately 50 minutes was audiotaped. The children were brought into a room where a half inch videotape player and a 9 inch monitor had been set up. The child was given the following explanation (which was varied somewhat according to the age of the subject):

I am studying children's television and what children at different ages think about what characters do on television. I'm going to show you some skits from Sesame Street that I've been interested in because I've found that different children have very different opinions about what's happening in the skit. The two characters in the skit are Ernie and Bert. Do you know who they are? Do you ever watch Sesame Street? well mostly younger children like to watch it but it would help me understand why younger children think they way they do if I found out what older children think about it. I'd like you to help me by watching three different skits that I have here on the videotape machine and by answering some questions I have about them. Okay. I'm going to tape record what you say so I can remember it when I get back to where I work. We'll go through the skits one at a time. I'll show you each one and I want you to tell me the story after you've seen it. Then I'll play it again and stop it at some places where I have some questions about what Bert and Ernie are doing. Then we can go on to the next skit.

After the first skit was shown the child was asked if she had seen it before on television. Then she was given the following instructions:

Now pretend I hadn't seen the skit and tell me what happened. Just tell me in your own words whatever you can remember

about what Bert and Ernie did.

After the subject told the story, the skit was replayed but this time stopping at four preselected places for questioning. Thus the child had an opportunity to review the events up to that point in light of having already seen the entire skit once. It was recognized that it would be preferable to allow the subjects to determine their own stopping places thus indicating what they found relevant to their interpretation. Attempts during pilot work to give control to the children were not successful. Most often they would fail to stop the tape at all.

For each of the three skits, four stopping places were chosen. Each stopping place immediately followed an utterance or action of one of the characters and the questions that are asked at that point concern the action. These utterances and actions were considered critical to Ernie's plan and its effects. For each skit one of the stopping places was a lie Ernie told as part of his strategy; another was Bert's reaction at the end. In the descriptions of the skits in the previous section, an interpretation of each of these stopping places is given in parentheses. The exact stopping places are indicated on the transcripts in Appendix 1.

Between two of the skits, the subjects were asked their age and about their parents' occupations. After the last skit several questions were asked which elicited the subjects' concept of Bert and Ernie's personalities and their beliefs about the suitability of these skits for young children.

The questions asked of the subjects at each of the 12 stopping places are given in Appendix 2. The questioning always began with a general question about the utterance or action ("Why did he do that? What was he trying to do?") Then it became more specific (e.g., is he lying or telling the truth?) All of the questions listed were asked unless the subject answered spontaneously. These questions were chosen on the basis of pilot work where they were found to elicit elaborate explanations and conjectures. The questioning, however, was conducted as a clinical interview so additional questions were asked on the basis of the subject's response.

The order of presentation of the skits was counterbalanced with two subjects from each grade getting one of the six possible orders.

Coding the Interviews

The interviews were transcribed in preparation for coding. The transcripts indicate repetitions and false starts but do not show pauses, "uh"'s etc. Coding was done entirely from these transcripts.

A coding scheme was developed for specifying the subject's interpretation of the skit. The coding consists of the coder's answers to a set of relatively specific questions about the subject's interpretation as revealed by the questioning. The stories which were told before the questioning began have not been analysed. Some questions closely resemble questions asked during the interview. Other questions require using evidence from longer sections of the interview. For each coding question, a set of alternative answers is provided by the coding

scheme. The manual providing definitions and procedures which coders followed in answering questions of the transcribed interviews is given in Appendix 3.

The interpretation was treated as though it were a completed and static set of beliefs about the character's actions. No attempt was made to code features of the process of forming the interpretation. Thus, changes of mind were not noted (although there were rules for deciding which alternative to code as the subject's interpretation and which to ignore). Likewise, no attempt was made to code the subject's level of certainty about the interpretation--as long as a clear statement was made, it was coded as part of the interpretation.

Most of the questions referred to events or states in the story world as interpreted by the subject. Where the subject distinguished between ordinary reality and the reality within the story, the story interpretation was what was coded.

The Coders

The initial coding of the interview data was done by an undergraduate assistant (senior in Psychology with an interest in law) who did not know the theoretical concerns of the research. The transcripts of the interviews were identified by a number only so that the coder was blind also to the sex and age of the subject and would be unable to determine which three interviews involved the same subject.

The coder was trained in the categories for each skit by comparing her coding of an initial set of interviews with the author's coding.

Disagreements were discussed and rules and criteria were clarified until an acceptable level of agreement was reached. At that point, a previously uncoded sample was selected for calculation of reliability. The author and the assistant coded the sample independently to obtain a measure of reliability.

Reliability: Procedures and Results

The reliability between the two coders was calculated for each skit and independently for each particular age group. Reliability was measured in terms of percentage of agreements on those questions for which both coders provided a coding as well as percentage of disagreements

The Sample. For each skit, 10 interviews (20.8%) were selected such that for each skit, an equal number of the interviews were of girls and boys and two or three interviews were from each of the four age groups. Within those constraints, interviews were selected randomly.

Calculation of Reliability. The two coding sheets were compared question for question. Two kinds of disagreements were noted. First, disagreements consisting of one coder indicating "not clear" and the other providing a substantive code were recorded. Second, in cases where both coders provided a substantive code, disagreements consisting of different codes were recorded. ("Other" was considered a substantive code; differences in the descriptions of what the subject said were not considered as substantive disagreements.) Because the coding format requires that some questions be coded only if certain

alternatives were selected on previous questions, differences consisting of a code in one case and no code at all in the other were not considered as a disagreement. These did not enter into the calculation of reliability. Comparing the coding in this way provided two measures of reliability. First, "absolute % of agreement" was calculated using the sum of both kinds of errors subtracted from the total number of questions for which both coders provided a code of some kind (then divided by the total number of questions coded.) Second, "% of nonsubstantive disagreement" was calculated by dividing the number of disagreements involving "not clear" by the total number of questions coded. This provided a measure of how many errors were accounted for by one coder being more conservative than the other in considering an interview codable with respect to a particular question.

Reliability results Overall the reliability achieved was 87.0%. Of the remaining 13.0%, 5.0% involved disagreements between a substantive code and "not clear". The results are shown in Table 2. In this table the numbers not in parentheses are the "absolute" reliability which refers to the percentage of questions on which both coders provided the same coding. The numbers in parentheses refer to the percentage of the disagreements which resulted from one coder being more conservative (i.e., using "not clear") than the other. It appears that the Angry skit presented the greatest difficulty. The low reliability here may be partly explained by the fact that it was also the first skit to be coded. Of the age groups the third-fourth graders presented the greatest difficulty. This difference remains unexplained.

Table 2
Percentages of Agreement Between Two Coders.

Skit	Grade of Subject				
	1st	3rd-4th	6th	College	All
Angry....	79.4 (15.3)*	71.6 (13.3)	82.2 (8.0)	84.6 (12.8)	79.0 (12.0)
Banana...	94.1 (0)	91.6 (0)	86.9 (4.3)	93.0 (2.3)	91.9 (1.6)
Cookie...	95.4 (2.2)	85.0 (3.3)	89.0 (1.5)	86.7 (5.6)	88.6 (3.1)
Final....	95.2 (0)	87.5 (0)	93.3 (0)	100.0 (0)	93.2 (0)
All skits	90.5 (5.0)	81.8 (5.6)	87.1 (3.9)	89.7 (5.7)	87.0 (5.0)

* Percentages of disagreements involving "not clear".

CHAPTER III

THE COOKIE SKIT: RESULTS

A college student who was familiar with Bert and Ernie provided the following synopsis of the Cookie skit:

SC.8-CS

S: Bert's about ready to eat a cookie and Ernie sees Bert getting ready to eat the cookie and he comes up and Ernie wants part of the cookie or he wants, wants some cookie to eat. And he tries to talk Bert into giving him part of the cookie and Bert's not very anxious to give Ernie part of the cookie, in fact he says he won't give Ernie part of the cookie because he'd been saving it all day for himself. And so Ernie says that well if it was his cookie he would give some of it to Bert. And and Bert doesn't think that he would so Ernie grabs the cookie from Bert and and tries to demonstrate that he would in fact share the cookie if it was his and Bert wanted part of it and so he tells Bert to pretend that this cookie, that Ernie now has, which was Bert's cookie, is Ernie's cookie and to ask, and Ernie tells Bert to ask him if he would share the cookie. So Bert pretends to ask, or he asks Ernie if Ernie would share that cookie, that he has, with him and Ernie says sure he would and he takes Bert's cookie and he breaks it and gives half of it to, half of it back to Ernie, half of it back to Bert, and Ernie eats the other half.

I: Is that the end of the story?

S: That's- Okay, and Ernie eats it and walks away and then comes back and Bert's sitting there and he can't believe what Ernie just did and Ernie comes back and asks Bert if he would share his half of cookie with him and Ernie, Bert gets very upset and yells at, yells or screams at Ernie.

This story teller does not mention whether Ernie is deceiving Bert in this encounter. The interviews about the skits, however, yielded an array of interpretations most of which included some form of trickery, deception or unfairness on Ernie's part.

In this chapter the interpretations are examined to show in detail what their relative complexity consists of although a more formal analysis is left to Chapter 4. At that point we can return to the analytic framework outlined in the first chapter in order to show how Ernie's strategies can be understood as a manipulation of what Bert mutually believes and how the interpretations call for perspective-taking. In this chapter, the various interpretations are described and their relation to the age of the subjects discussed.

The interview focused on four events in the skit where the tape was stopped for questioning on the second time through. The first stopping place was Ernie's assertions that "If that cookie belonged to me, I would share it with you." This statement can be seen as one of a string of tactics Ernie used to get the cookie. After trying just to take the cookie, Ernie unsuccessfully suggested that they share the cookie. Bert, however, stands firm in response to which Ernie makes the assertion. Bert is not convinced either that he should share or that Ernie would. The tape was stopped again after Ernie snatches the cookie away and justifies his action to Bert who objects by saying "I I just want to demonstrate". The third stopping place occurs seconds later after Bert acquiesces and asks Ernie what he wants him to do. Ernie says "Just ask me if I would share the cookie with you." The skit continues as Bert asks the question. Ernie breaks the cookie in two saying

Why, yes, Bert. I'd be happy to share it with you. Here ya go. One half for me and one half for you, Bert. See there? I told you I would share it with you, Bert. That's what friends are for, Bert. Thanks a lot Bert.

He walks off munching on the cookie. The tape is stopped for the last time as Bert is looking down at the cookie mumbling "I don- I don't get it. I I don- I don't get it." The questions that were asked at each of these stops are in Appendix 2.

On the basis of the interview as a whole, the subject's interpretation was categorized as one of three basic types of interpretation of Ernie's plan. These were the following:

Share Plans. In the first, Ernie wants the cookie but is sincerely concerned to share or to demonstrate that he would share or how to share.

Trick Plans. In the second, Ernie is tricking Bert in order to get the cookie. These plans may contain an element of sincerity (like the first type) but contain a significant amount of trickery.

Con Plans. These are a particular kind of trick in which Ernie is trying to get part of the cookie by conning Bert into thinking (or momentarily believing or being confused as to whether or not) he is sincerely concerned with sharing. These are distinguished from the second type by having a clear account of Ernie's plan to confuse Bert. A common feature of "conning" is that the victim is not sure whether or not somebody has just done him a favor.

In what follows, each of the plan types is analysed in detail using transcripts of the interviews to illustrate each type and the various sub-types. This discussion of the empirical results is the basis for the further analysis of the plan types in the next chapter.

At that time, the Interacting Plans notation is used as a tool for displaying the similarities and differences and relative complexity among the types.

The Basic Plan Types

The Share Plans

Twenty-two of the 48 subjects believed that Ernie was trying get the cookie shared or otherwise sincerely trying to show Bert the proper way to act. In these plans Ernie wants part of the cookie and may even be acting unfairly but he is not deceiving Bert (though Bert may think he is.) There were a variety of versions of this basic theme. This variety can be discussed more fruitfully in relation to a concrete illustration which illustrates several typical features of these interpretations.

The following excerpts are from the interview of a first grade boy. Critical passages have been selected and the commentary represents some of the observations relevant to considering this a Share interpretation. The first question of the Cookie interview concerned Ernie's assertion that he would share the cookie.

S1.10-C1

- I: Ernie says: "If that cookie belonged to me, I would share it with you". Now why's he say that? What's he trying to do there?
- S: He wants the cookie just as Bert does and he wants to eat it with Bert but Bert doesn't want to.
- I: What's Ernie trying to do when he says "If that cookie belonged to me I would share it with you"?

- S: He's saying he would share it with me.
- I: Do you think Ernie's telling the truth or is he lying when he says I would share it with you.
- S: I don't think he would be telling the truth.
- I: You do?
- S: If there were lots of cookies I think he would but if there's one cookie I don't think he would want to.

At this point this first grader seems suspicious of Ernie. Nevertheless, as he continues through the skit, Ernie's intentions appear in a better light.

The next stopping place was Ernie's statement that he just wants to demonstrate.

S1.10-C2

- I: Okay, right there Ernie says "I just want to demonstrate". Now why does he say that? What's he trying to do there?
- S: He was going to make him believe that he would give him one half of the cookie.
- I: Do you think that Ernie's lying or is he telling the truth there when he says I just want to demonstrate.
- S: Telling the truth.
- I: Telling the truth? What is Ernie going to prove?
- S: That he will share the cookie.

What the child says here at first is consistent with the notion that Ernie is trying to get Bert to believe the falsehood that he would share the cookie. But he considers Ernie to be telling the truth about the demonstration. While it is not clear in what way Ernie's statement can be considered true, at least Ernie is being portrayed as, in some way, sincere.

The tape was stopped next at the point Ernie instructs Bert to ask him (Ernie) if Ernie would share the cookie with Bert.

S1.10-C3

I: Ernie says "just ask me if I'll share it with you". Now why does he say that? What's he trying to do there?

S: He wants him to ask him if he would share the cookie with him but I don't think () wants him to do it. I think he's hungry and should just go ahead and eat it.

I: He's gonna- tell me that again.

S: He wants to eat the cookie.

I: Ernie does?

S: No, yeah I mean Bert wants to go ahead and eat it. And Ernie just wants to demonstrate but Bert doesn't want to. He wants to go ahead and eat the cookie.

I: Does- what does Bert think Ernie's trying to do?

S: Trying to keep the cookie for himself.

I: So does Bert think that Ernie's gonna give him back the cookie or half the cookie or none of the cookie?

S: He thinks he's gonna eat it all ()..

I: Bert thinks Ernie's gonna eat it all? Well is it gonna- do you think this is a fair demonstration?

S: Yes.

I: Why, what makes you- it a fair demonstration?

S: He breaks it in half and gives him, Bert half of the cookie.

Now Ernie appears to be conducting a fair demonstration but Bert thinks that he is trying to take the whole cookie. Bert is portrayed as not only anxious to eat the cookie but distrustful of Ernie.

The tape was stopped for the last time as Bert is staring at the remains of his cookie.

S1.10-C4a

I: Bert's standing there looking down at his part of the cookie and he says "I don't get it, I don't get it". Now why does he say that? What's he thinking about?

S: He's thinking about Ernie doing all- breaking it in half. He didn't know that he would do that. He doesn't think- he was surprised that he shared the cookie with him.

I: What did Bert think Ernie was going to do?

S: Keep it all for himself.

I: Oh, oh I see, so he was surprised that Ernie gave him any at all? Well, how does Bert feel right now?

S: He feels nice.

I: Nice? So he is happy about what Ernie did? Well do you think that he might be confused or not?

S: Confused.

I: Why would he be confused?

S: Because he doesn't know that Ernie- why he did that. He thought he would eat it all for himself.

Bert was clearly not expecting Ernie to share the cookie fairly.

The last questions concerned fairness.

S1.10-C4b

I: Who got the big half or did they both get the same size?

S: ()

I: What?

S: Ernie, Ernie got the big half.

I: Ernie got the big half. So why did Ernie get the big half?

- S: Cause he- I think he wanted more than Bert.
- I: Do you think that Bert thinks it's fair what Ernie did?
- S: No.
- I: No, why not?
- S: Because he was looking at his cookie and then he saw that he didn't have that much and Ernie took most of the cookie.
- I: Well, what about Ernie? Does Ernie think it's fair?
- S: Yeah.
- I: Yeah, why does Ernie think it's fair?
- S: Because he gave him the part of the cookie and he gave himself part of the cookie.
- I: Okay, do you think it's fair?
- S: Well, no.
- I: No, why not?
- S: Because Ernie got more than Bert.

For this child, the problem of fairness concerns the evenness of the division. Ernie apparently thinks it is fair as long as they both got a part (or he may have unintentionally broken the cookie unevenly) but Bert and the child both think it is unfair for Ernie to have more. Ernie's sincerity in doing the demonstration is not an issue except for Bert who doubted that Ernie would end up sharing the cookie at the end of the demonstration.

The Trick Plans

In general terms, these plans were ones which contained any significant amount of trickery. But here the trickery is not of the particular kind coded for by the last category: "con plans". There were a

variety of Trick plans. The tricks were ways of getting the cookie by making Bert think, for the moment, that Ernie was doing something he was not actually trying to do. But Ernie makes no attempt to affect Bert's state of mind after the trick has been played.

Thirteen of the 48 subjects were coded in this way. The following excerpts from a representative subject illustrate the important features. The interview about the cookie skit with this sixth grade boy began as follows:

S6.3-C1

I: Okay, Ernie says if that cookie belonged to me I'd share it with you. Now why does he say that? What's he trying to do there?

S: He's trying to con him into giving him a piece cause he wants some. He knows he really wouldn't but he's just saying that like to get him to give him a piece of the cookie, give him some cookie so he could eat it.

I: So is Ernie lying or is he telling him the truth when he says that?

S: Lying.

I: He's lying. Well what do you mean he's conning him? What does conning mean?

S: Well he's tricking him into giving him the cookie by saying he'd would share it with me and then demonstrating it then actually eating the cookie.

It is quite clear that Ernie is tricking Bert and that the demonstration is not sincere. It seems that "actually eating the cookie" is somehow at the heart of this trick. ¹⁶

16. The subject's use of the term "conning" at this point appears not to be the same as the use in the coding scheme.

The next stopping place began with the question about Ernie.

S6.3-C2

I: Here Ernie says I just want to demonstrate. Now what, why does he say that, what's he trying to do there?

S: Well this is the part when he jerks, jokes, tricks him, demonstrating cause usually you wouldn't eat it and not get- I eat my half and then you eat your half but he ate the half so like he was just setting him up and then he finally took the half a cookie and then he was- Bert was left with half a cookie and he got mad.

Now it is quite clear that the trick involved eating the cookie which Bert would not expect because "usually you wouldn't eat it."

The next stopping place focused more on Bert's side of the story.

S6.3-C3

I: Well, how does, what does Bert think Ernie's trying to do there?

S: Bert?

I: Yeah.

S: Well it seems to me like Bert is just believing that Ernie is trying to prove it. So Bert is going to go along with it otherwise he'd be still arguing with him and wouldn't give him the cookie.

I: Well do you think Bert expects Ernie to give the cookie back after the demonstration or not?

S: Well, half and half.

I: What do you mean?

S: Well, he knows how Ernie is so sometimes Ernie wouldn't give it back and he'd eat the whole thing so he didn't, he's not really expecting it back all that much but since he's demonstrating so he's expecting to get some part back, he's gonna demonstrate it so he expects to get a part back, not all of it.

I: Well, is it a fair demonstration or not?

S: Well in a way it's not cause he should like he shouldn't have eaten the half he should have asked Bert if he could have it. Cause after he demonstrated it, like I get half and you get half, and then he should like give him back that half that he had so Ernie would have so Bert would have the whole cookie again and then ask him again if he could have half.

It remains clear that Ernie should have returned both halves after the demonstration rather than eating his half. The subject, however, appears to vacillate in describing Bert's point of view. At first he cites evidence from Bert's behavior that Bert must believe Ernie is sincerely demonstrating. But when the question of what Bert would be expecting is raised, the subject cites contradictory evidence that Bert undoubtedly "knows how Ernie is". This knowledge would lead Bert to expect Ernie to perhaps keep the whole cookie. The problem is resolved by having Bert expecting to get only half of the cookie.

The final questions about fairness reveal some more aspects of Ernie's plan.

S6.3-C4

I: Okay, did Ernie think it was fair or not fair?

S: Ernie knew that it wasn't quite fair cause Ernie knew that he wouldn't really share, share the cookie any other time so Ernie knew that it really wasn't that fair that he was saying and putting it you know telling Bert, making Bert think that Ernie thinks it's like fair but Ernie knew it wasn't, he was just trying to do that to get the cookie.

I: Okay I guess I got one more question about this then, was Ernie being mean or- Ernie wasn't being fair but was he being like mean or he just didn't know any better?

S: Well, sort of being mean because of the way he did it cause he knew that, you know, by demonstrating it he can get a piece without having to wait for Bert to you know.

Several aspects of what Ernie did are mentioned as reasons for Ernie, himself, to think his actions were unfair. First, Ernie knew he would not really share the cookie if it were his. Thus from the beginning, the demonstration was insincere. Second, Ernie was trying to make Bert think that he thought the demonstration (or his conduct in general) was fair when it was only directed at getting the cookie. This aspect contains a hint of the Con plan in which Ernie is explicitly getting Bert to feel (when the demonstration was over) that Ernie had been fair. It is not clear here, however, that Ernie is hoping that Bert would continue to think Ernie was fair after the demonstration. The third aspect of Ernie's deliberate unfairness was that he short circuited the proper procedure of giving the cookie back to Bert and allowing Bert to decide if he wants to share.

The Con Plans

The coding scheme defined the Con plan as one in which Ernie was trying to get part of the cookie but in which he is also conning Bert into thinking (or momentarily believing or being confused as to whether or not) he is sincerely concerned with sharing. A common feature of "conning" is that the victim is not sure whether or not somebody has just done him a favor.

Thirteen subjects interpreted Ernie's plan this way. An undergraduate discusses Bert's view of the demonstration as follows:

SC.3-C3

- I: What does Bert think Ernie's trying to do?
- S: I don't know if Bert ever catches on. He's so dumb sometimes.
- I: What does he think that Ernie's doing?
- S: What does he think that Ernie's trying to do? Just show him, I think that Bert thinks that Ernie's just trying to show him that he should share it, how Ernie would share if he had the cookie. What else could he be thinking?
- I: Well, he might, I'm not sure he may not, well, for instance, do you think that he thinks that Ernie's gonna give him the cookie back or half the cookie back or none of the cookie back?
- S: Well Bert, I don't know, he's always being taken by Ernie so it shouldn't surprise him if Ernie didn't give any of the cookie back but it just depends on Bert, how dumb, I don't know, I don't know Bert personally.

The subject seems to believe that Bert is being taken in by Ernie at this point in the skit but she is faced with much the same conflict as the sixth grader who illustrated the Trick plan. But in this case the question is left unresolved. She can not tell whether Bert suspects that Ernie is going to take some of the cookie because she does not have enough information about how dumb Bert really is.

Bert's mental state and Ernie's plan become very clear at the last stopping place.

SC.3-C4

- I: Bert's looking down at his part of the cookie saying I don't get it, I don't get it. Now why does he say that, what's he thinking about?
- S: He's going, he's so dense, he just doesn't know what happened. He's confused, he doesn't understand how he was taken by Ernie again.

- I: Do you think Ernie was trying to get him confused or not?
- S: Oh, yeah. Because at the end I think Ernie was trying to make Bert feel like Ernie had done him a favor. You know, that's what friends are for Bert.
- I: So you think that Ernie intended for Bert to feel that maybe he had done a favor in sharing the cookie?
- S: Yes
- I: Do you think that Ernie, why would Ernie want that, or wanted Bert to feel like that?
- S: To confuse him.
- I: Why would Ernie want Bert to be confused?
- S: So that Bert can't say you took half of my cookie. Cause Bert asked Ernie to share half of Ernie's cookie with him, right?

Later, in the discussion of fairness the characters are evaluated.

SC.3.C4b

- I: Do you think that Ernie thought that he was being fair?
- S: Yeah.
- I: Even though he confused Bert into giving him half his cookie?
- S: Yeah, because I think Ernie's selfish and I think what he thinks does for him is right and fair.
- I: Okay, what about Bert. Do you think Bert thought Ernie was being fair?
- S: I think Bert is totally confused. I don't think he knows what's going on.
- I: Do you think that Ernie was fair?
- S: Yeah, just cause he's so sly.

Two sub-types of Con plans. Two questions which were coded independently contributed to distinguishing the Con plans from the

Trick plans as well as distinguishing between two types of Con plans. The first coding question was about what Ernie was trying to do in the demonstration. The second question was based on the last segment of the interview where the source of Bert's confusion was discussed. Among the subjects who thought Ernie was being insincere, there were three interpretations of what he was doing in the demonstration. One was that he was trying to get Bert to think that he was really demonstrating. Another was that he was trying to get Bert to think that the cookie actually belonged to Ernie. For example, a sixth grader gave the following interpretation:

S6.2-C2

I: What's not fair about it?

S: Well, Ernie tricked him, Ernie tricked Bert into giving him the cookie.

I: How did he tricked him into giving him the cookie?

S: Well it was sort of like (pause) he tricked Bert into thinking that the cookie was his and he ate the half, he ate a half.

The third way of understanding what Ernie was doing in the demonstration was that he was trying to get Bert to think that Ernie had just done him a favor. An undergraduate at first explained that Ernie was using the demonstration to get half the cookie. This was a common answer which was met with the following probe:

SC.11-C2

I: Well, what do you mean he's trying to get a piece. I mean he's already has the whole cookie.

S: Right, right. Well, I guess then maybe what it would come down to is that Ernie more than trying to make Bert feel

guilty I think is trying to do it in such a way so that he can still appear as a friend in the process of getting some cookie and that's why he's only getting part of it.

Coding the subject's interpretation of what Ernie was doing in the demonstration in either of the last two ways was sufficient for coding it as a Con plan type.

In the last segment of the interview, the subject was asked if Ernie had been trying to get Bert confused. Among those subjects who saw Ernie as intentionally confusing Bert there again were three understandings of how he was confusing him. The first was that Ernie had been getting him confused about what he was doing in the demonstration. Here Bert's confusion was only about the status of the demonstration and did not necessarily have to extend beyond the demonstration. The second and third alternatives were the same as for the earlier question. Subjects who earlier had said Ernie was trying to get Bert to believe that he was demonstrating would occasionally offer a slightly different interpretation at this later point in the interview. For example, a fourth grader gave the following interpretation:

S3.4-C4

- I: Do you think Ernie was trying to get him confused or do you think he just got confused?
- S: Well, I think Ernie's trying to get him a little bit confused.
- I: How do you think Bert feels?
- S: He feels sort of confused. Doesn't know what's happening.
- I: Uh huh, okay, I'm interested in this thing like-
- S: Like a fish with a, in a tank without a water.

- I: Fish out of water?
- S: Uh huh.
- I: Uh huh, do you think, okay, I was interested in this idea that Ernie was trying to get maybe you said that Ernie was trying to get Bert confused possibly.
- S: Yeah.
- I: Do you think that, do you think that's true or you, just sort of.
- S: I, I, I still think it's true.
- I: You think that Ernie was trying to get Bert confused?
- S: Yeah, so they would still be friends and he'd get to con more for himself.

The Trick plans are the residual category which remains after removing all the subjects who saw Ernie as getting Bert to think that for one reason or another he should be grateful for Ernie's generosity or at least not be angry about Ernie taking half the cookie.

Results of the Basic Plan Type and Other Coding

Data Analysis Procedures

Analyses of the coded data are presented here and in Chapters 5 and 6. The coding provides nominal and, in some cases, ordinal categories. Chi square or Fisher's test are used in most cases to test the relationship between two variables the values of which can not be assumed to be ordered. Kendall's Tau is used to test the relationship between pairs of categories which are assumed or argued to be ordered. In all cases, the data is reported as frequencies of subjects. 17

17. The SPSS subprogram CROSSTABS was the main tool for exploring hypotheses among the 115 variables resulting from the interview.

Because of occasional omissions in the interview and unclarities in what the subject said (see the coding manual for specific criteria) some subjects could not be coded on some questions. These "missing values" are not included in the tables or in the calculations. Where the number of missing values is large and unevenly distributed, distributions are interpreted with caution.

In some cases categories are collapsed for reasons of simplicity or for purposes of argument. Whenever the reported categories differ from those in the coding manual examples and/or arguments are provided to justify the new category. Often the four grade levels are collapsed into two categories: Younger and Older subjects. This is done for simplicity of presentation and to allow statistical tests to be applied to the data. It should not be taken as an implicit claim that sixth graders are more like undergraduates than they are like third-fourth graders.

Plan Types and Sub-types

Table 3 displays the results of the coding for basic plan types. In the next chapter it will be argued that the three plan types can be considered to lie on a dimension of complexity with Share as least and Con as most complex. When both variables are thus considered as ordinal scales, there is a significant relation between grade of subject and the three plan types. Kendall's tau gives a correlation of .47 ($p < .0002$). It is clear from the table, however, that this correlation is mostly a result of the contrast between the Share plan and the two trick plans. When the Share plans are eliminated from consideration,

Table 3
Frequency of Cookie Plan Types for Each Grade

Plan Type	Grade of Subject				Total
	1st	3rd-4th	6th	College	
Share.....	11	5	4	2	22
Trick.....	1	3	5	4	13
Con.....	0	4	3	6	13
Total.....	12	12	12	12	48

the correlation between the two trick plans and grade, while positive, is not significant ($p < .28$).

Sub-types and Anomalies

As explained in the coding manual, certain more specific coding questions were expected systematically to covary with the coding of the plan type. In this sense the plan type is a summary of other more specific questions. For example, how the fairness questions were answered was part of the information available for coding plan type. Where the coding of plan type and these other categories do not correspond as expected, anomalies can be identified which call for explanation. Other coding questions were not so closely associated with the coding of plan type. These allow us to specify subtypes of the three plan interpretations. We can begin with the coding questions which were more or less definitional of the basic plan types and then consider important subtypes of the plans.

Fairness. At the end of the Cookie skit interview, subjects were asked if they thought Ernie was fair, if Ernie thought it was fair and if Bert thought it was fair. It was expected that Share subjects would feel that Ernie was being fair while Trick and Con subjects would not. While it was often the case that the subjects saw Share plans as fair, it was not always the case. For example, nine subjects thought that Ernie divided the cookie unevenly in his own favor. Six of these were Share subjects who considered Ernie to be unfair. Other reasons for Share subjects to think Ernie was unfair are discussed in detail in Chapter 6 so will not be covered here. It was the case, however, that

for those Share subjects who could be coded on the question of whether Ernie thought he was being fair, all (13) thought that Ernie would think he was being fair.

The demonstration. Like the question of fairness, it would be expected that Ernie would be more likely to be heard by the Share plan subjects as telling the truth when he tells Bert that he is just going to demonstrate. The reasons why this was not the case are also discussed in Chapter 6. It was the case, however, that even for subjects who (for reasons covered in Chapter 6) thought Ernie was lying, the demonstration itself was considered sincere by subjects who were coded Share. The part of the interview concerned with the demonstration was coded first and entirely independently of the first and last part of the interview. This was done in order to determine on what part of the interview the plan type coding was based. In all but two cases, these subjects described the demonstration as sincere. Two undergraduates described it as insincere and these were the only undergraduates to interpret Ernie's plan as a Share plan. Neither had seen any of the skits before the interview and the Cookie skit was the first to be shown in the interview. Both subjects showed some equivocation about what Ernie's plan really was but settled finally on a Share interpretation. Toward the end of the interview, one of them deliberated as follows:

SC.1-C4

- I: Do you think that Ernie was trying to get him confused or wanted him to be confused or not?
- S: No, I think Ernie just wanted half the cookie and proved his point that he would share the cookie but we don't know if

that's his real motive or the motive is just to have the part of the cookie.

The possibility that Ernie was just tricking Bert was there and was expressed during the discussion of the demonstration but overall Ernie is given the benefit of the doubt.

It was also expected that subjects who thought Ernie was Tricking or Conning Bert would see the demonstration as insincere. This was true in all but one case. One fourth grader described Ernie's actions in the demonstration as though from the perspective of somebody who was taken in. It was clear from the last part of the interview, however, that the subject was not actually taken in. The independent coding of the demonstration shows that subjects in most cases held to a single interpretation consistently.

Bert's suspicion. In the third segment of the interview, several questions were asked about what Bert thought was happening. These questions were not expected to depend on the coding of plan type since what Bert thought was happening could be independent of what Ernie was actually doing. Subjects who saw Ernie as Sharing the cookie tended to think that Bert was suspicious. Only one child (of the 16 coded on this question) thought that Bert thought that Ernie was demonstrating that he would share. Most (13) thought that Bert believed that Ernie was trying to take his cookie. The remainder (2) thought that Bert just wanted the cookie back and was not really thinking about what Ernie was doing. Subjects were also asked how much of the cookie Bert was expecting to get back. Of the 20 Share subjects coded, 7 thought Bert expected the whole cookie back, 11 thought Bert expected none of

the cookie and 2 thought Bert expected half of the cookie. Thus, most of the subjects who thought Ernie was trying to show Bert that he would share thought that Bert was nevertheless suspicious. While Ernie is seen as doing what he says he is doing, from Bert's perspective there is a discrepancy between what Ernie believes and what he is trying to establish as mutual belief.

More Trick and Con subjects saw Bert as not suspicious of Ernie than did the Share subjects but the difference is not significant. Also more Trick and Con subjects thought that Bert thought he was going to get the whole cookie back after the demonstration (but again, this is not a significant difference). In general it appears that the Trick and Con subjects are somewhat more evenly split on the issue of Bert's suspicion than are the Share subjects. Whether or not Bert is seen as suspicious of Ernie can be considered with respect to the age of the subject (ignoring plan type). Here a trend can be seen in the direction of older subjects being more likely to consider Bert as not suspicious ($\chi^2 = 2.92$ (1) $p < .09$). Unfortunately 8 younger subjects as opposed to one older one could not be coded on this question.

The Cookie skit allows for a wide variety of interpretations. The differences are not in just the quantity of detail or accuracy of the recall but are qualitative differences relating both to Ernie's motives and to his strategies. In the next chapter, these interpretations are analysed in great detail. This attempt to determine precisely the source of the qualitative differences makes it possible to determine to some extent the sources of differential complexity. These analyses show how the qualitative differences among the interpretations

discussed here can be understood in terms of the events of Ernie's strategic manipulation of what Bert thinks is mutually believed.

CHAPTER IV

THE COOKIE SKIT: ANALYSIS OF THREE PLANS

In the previous chapter, three types of interpretations of the Cookie skit were described. This chapter presents an analysis of each of these plan types using the "interacting plans" notation. Modeling each of the three interpretations specifies an intuition that they are orderable according to complexity. Here, complexity means the perspective-taking demands of the representation. Deceptive strategies call for perspective-taking because the perspective of one character is discrepant from what the other character supposes is mutually believed. The difficulty of the perspective-taking can be considered in terms of the extent to which the perspectives are discrepant. In this sense, the differences among the three plans are in the "structure" rather than in the "content" of the plans. In each plan the same basic information about sharing comes into play. But, how it comes into play, at what levels of belief and to what ends, is quite different in the three cases. These analyses show how the content of mutual belief which is dependent on Bert and Ernie's shared cultural knowledge of proper sharing is manipulated by Ernie from "outside" of mutual belief. Thus these analyses further elaborate the framework outlined in the introduction and demonstrate its application to children's interpretations of complex strategic interactions.

It is assumed that the overall complexity of an interpretation is reflected in the age of the subjects who make those interpretations. The relation of plan type to grade shown in the last chapter would lead us to expect that the representation of the Trick and Con plans would be more complex than that of the Share plans. As is shown, the difference between Share and the two classes of Tricks can be clearly specified in the "interacting plans" notation by the number of embedded Belief Spaces required for each type. It is also shown that there are important differences between the Trick and Con plans. While the differences in this case did not result in an age difference between these two types of plans, they are nevertheless of theoretical importance.

The analysis of these three interpretations is in two parts. The first part is concerned with the overall structure of Belief Space embeddings and their relation to the perspective of the subject. The second part presents a detailed analysis of each strategy from Ernie's point of view. The final section of the chapter reviews the sources of complexity in terms of the strategic use of shared knowledge.

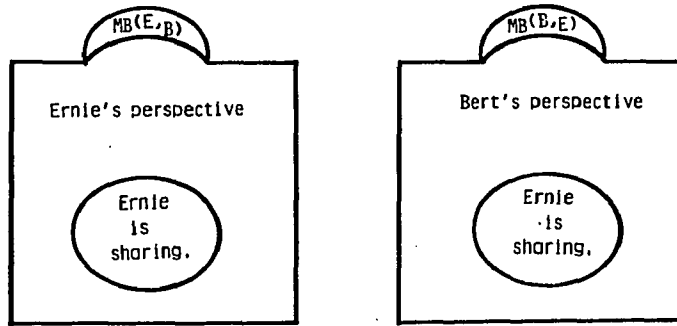
Modelling Points of View

The first chapter introduced the notation as a way to display levels of strategy in the nickel-dime guessing game. In this chapter the same notation is used to model subjects' interpretations of the Bert and Ernie skits. (Table 1 in Chapter 1 is a useful reference for interpreting the diagrams presented here). What is being modeled in the two situations is quite different. In one case it is the subject's

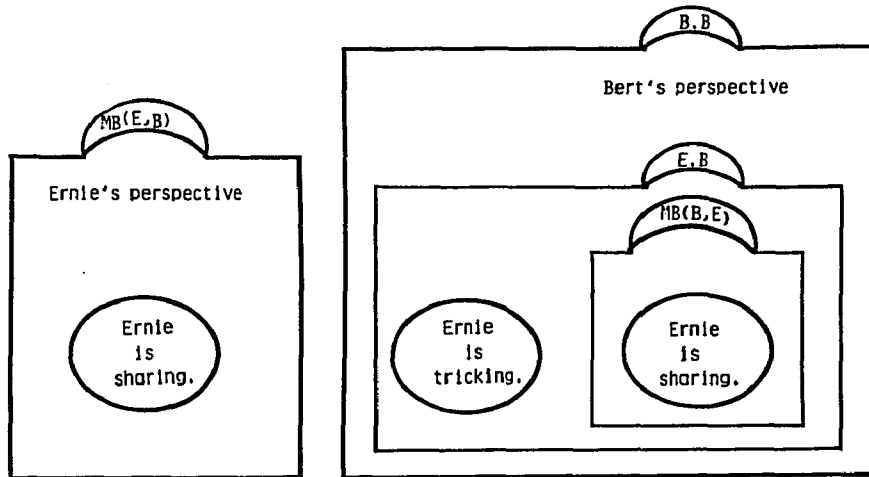
view of her own interactive situation, in the other, it is the interactive situation of two story characters. In the game, modeling the separate points of view of the two participants would be irrelevant to the research. All that is needed is the subject's point of view. In the skit interpretation, the subject's point of view contains the separate points of view of the two characters. The ways in which these separate perspectives are actually differentiated in the subject's view of the skit is a critical aspect to be represented.

The detailed models of the interpretations to be presented later in this chapter make clear that, from Ernie's point of view, the Trick and Con plans require one extra level of belief which is not found in the Share plan. In the plans involving deception, his strategy is to keep Bert unsuspecting while he carries out his real plan. The embeddings required to model Ernie's perspective, however, are not the only Belief Space configurations of interest here. It is also important to know how the subject sees the interactive situation between the two characters. The subjects' views are analyzed in this section before going on in the next section to consider in detail the structures of Ernie's plans.

Figure 5 shows two possible configurations of the perspectives of the two characters which could happen in a Share interpretation. Each pair could be considered as the subject's perspective on the relations between the character's perspectives. Each pair could be enclosed in a further Belief Space labelled S.B (for subject believes) but for simplicity these have been omitted. Part (a) shows the simplest possible case. Here the subject thinks that both Bert and Ernie think that he



a) Ernie is sharing and Bert is not suspicious.



b) Ernie is sharing but Bert is suspicious.

Figure 5. Two Configurations of Perspectives for Share Plans

and the other mutually believe the same state of affairs, namely that Ernie is sharing the Cookie (or demonstrating he would share etc.) (The symbol "MB(E,B)" means "Ernie believes that he and Bert mutually believe (in the enclosed state)" and "MB(B,E)" means "Bert believes that he and Ernie . . .") Bert and Ernie both believe the same thing and each believes it is mutually believed. From the point of view of the subject, there is really only one Belief Space which contains the beliefs which the two characters share in common. While the notation always represents the perspectives of the two characters independently, in this case, the separation of the two views is artificial. There would be no reason for the subject to maintain two separate views since they are the same. ¹⁸

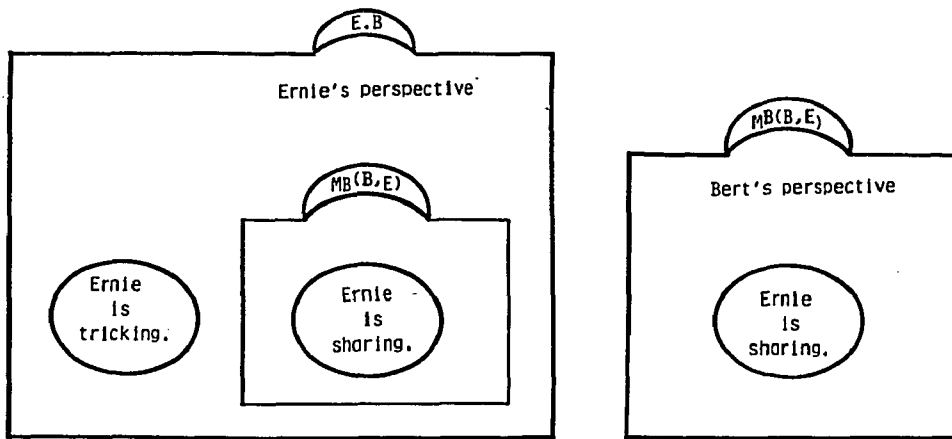
Part (b) represents the situation in which the subject thinks that Ernie is sincerely demonstrating he would share but that Bert thinks that he is trying to trick him. Ernie's perspective is the same as in (a) but Bert's perspective contains a representation of Ernie's Belief Space in which he is planning to trick Bert. "B.B" stands for "Bert believes" and "E.B" for "Ernie believes". ¹⁹ Here Bert is thinking about the possibility that Ernie is secretly attempting to Trick Bert and that Ernie thinks that Bert believes that the Sharing plan is what Bert thinks is mutually believed. Since (the subject thinks that)

18. The Mutual Belief Space may contain goals, Intentions of other Mental States but these would be Mental States that both characters assumed each other to know about. Mental States do not require perspective-taking in the sense represented by Belief Space recursions.

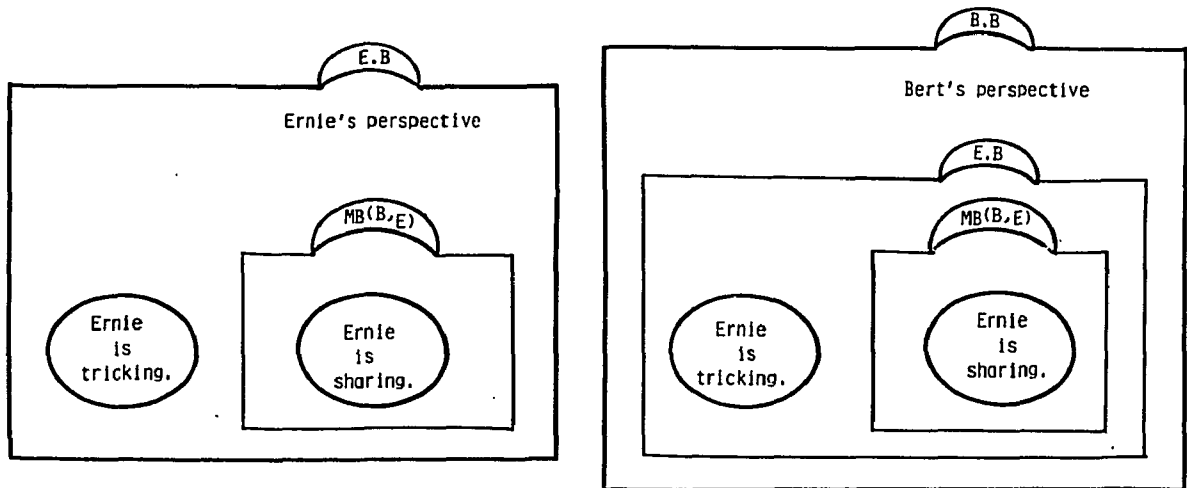
19. Belief Space recursions always alternate between the views of the two characters. Thus within E.B, the Mutual Belief Space is represented as Bert's view of what is mutually believed, i.e., MB(B,E).

Ernie is not actually trying to deceive Bert, Ernie's perspective is the same as the perspective that Bert thinks that Ernie thinks Bert has. Thus, these two perspectives are not entirely distinct. To understand this configuration, the subject would have to understand Ernie's share plan as what the two characters are doing together. Bert's view of Ernie, however, would have to be kept distinct. The empty recursion in (b) is necessary only to show that this is Bert's perspective. If Bert were planning a strategy to counter what he thinks Ernie is doing, that strategy would be shown in the Space labelled B.B.

Figure 6 shows two possible perspectives of a subject who thinks that Ernie is actually trying to deceive Bert. In (a) Ernie is tricking Bert but Bert does not suspect it. Like the case shown in Figure 5, in this view it is possible to assimilate one of the perspectives to the other. Bert's perspective is contained in Ernie's perspective. It is therefore not necessary to represent Bert's perspective independently. In (b) Ernie also is attempting to deceive Bert but Bert is suspicious. Here the two perspectives are almost identical (though Bert's view of Ernie's plan is probably less well specified than Ernie's actual plan). It is important to note that just because the two characters believe the same thing it is not possible to represent their beliefs entirely within a Mutual Belief Space. While they believe the same thing they do not believe that the other knows they know. Ernie assumes that Bert is taken in and Bert assumes that Ernie does not know that he is suspicious. The two perspectives are in that sense distinct but in a psychological sense they may blend into one



a) Ernie is tricking but Bert is not suspicious.



b) Ernie is tricking and Bert is suspicious.

Figure 6. Two Configurations of Perspectives for Deception Plans

another. The subject's understanding of Bert's view of Ernie may simply reflect her understanding of Ernie's perspective. There may be a greater distinction between the characters in the case where Ernie is tricking Bert but Bert does not suspect. That is, it may take greater effort for the subject to keep in mind that Bert has no idea what Ernie is doing than to allow Ernie's plan to enter into Bert's perspective as well.

We can return to the question of calculating relative complexity after considering in detail the structure and content of Ernie's plans. In the next section, Ernie's three plans are modelled from Ernie's point of view.

Models of Three Interpretations

The notation provides a way of being very explicit in representing an interpretation and of precisely stating the relations between one interpretation of the skit and another. In all three interpretations the same basic content is found in the Mutual Belief Space. This content is based on the characters shared understandings of procedures for sharing, pretending, etc.. The differences are found in Ernie's strategies and how they relate to what Bert thinks is mutually believed.

Representations and Interpretations

While the "interacting plans" representations tend to be complicated, there is a principle which constrains what is and is not shown in a representation. The principle is to include all details which are, and to exclude all details which are not, relevant to explicating

the interaction between the plans of the two characters. For example, actions may be described at many levels of detail: an action may simply be named or each of the substeps may be described. In an "interacting plans" model, an individual substep would be indicated only if it had an effect which alone was somehow critical to the other character's plan. This principle motivates a level of descriptive detail which is sensitive to the problem being represented rather than tied to some absolute level.

The series of models presented in this chapter do not always follow the above principle. For clarity of presentation, facts about the interactive situation may be shown in a model, not because they are directly relevant to that interpretation, but because they become relevant in models to be presented later. In fact the particular sequence of interpretations to be presented were chosen so that the commonalities among them would be maximized.

For the present discussion it must be kept in mind that what is being modeled is the investigator's interpretation of the subject's interpretation. The notation itself places constraints on the model, but the model must be judged in terms of common-sense plausibility as a representation of what subjects said. While important features of the modeled interpretations will be recognized from the previous chapter, the models are in many ways idealizations. No actual subject stated these interpretations in just these ways. For example, often plausible higher level goals or intermediate steps have been filled in. These are idealizations of the structure and content of the subjects' understandings. But they are "concrete" idealizations, i.e., they represent

a particular understanding in considerable detail rather than schematically. The models presented here are concrete theories of the kind of understanding which could have resulted in the interpretations expressed in the examples of the previous chapter.

Models of interpretations will be presented from least complex to most complex in order to use the simpler versions as the building blocks of the later ones. As each new model is presented, aspects which it shares with the previous one can be abbreviated to save space and simplify the presentation. The abbreviated representations are to be considered expandable into their earlier forms.

The Pretend Scenario

Figure 7 shows a hypothetical episode. It represents the pretend scenario that Ernie constructs in order to (pretend to) demonstrate that he would share the cookie. This scenario is part of all the interpretations and appears in abbreviated form, in all of the subsequent diagrams. Since it is a relatively simple sequence of events, it also serves as an introduction to or reminder of common features of the representation system. Some new elements and symbols are used here which were not needed for the diagrams in Chapter 1. These are introduced as needed. A full explanation of the notation is provided in Appendix 4.

The events are enclosed in a dotted line which indicates that this Belief Space is hypothetical (or in this case, pretend). At the top the Belief Space is labelled as "MB-P(B,E)" which simply indicates that it is a mutually believed Pretend Space within the Mutual Belief Space as

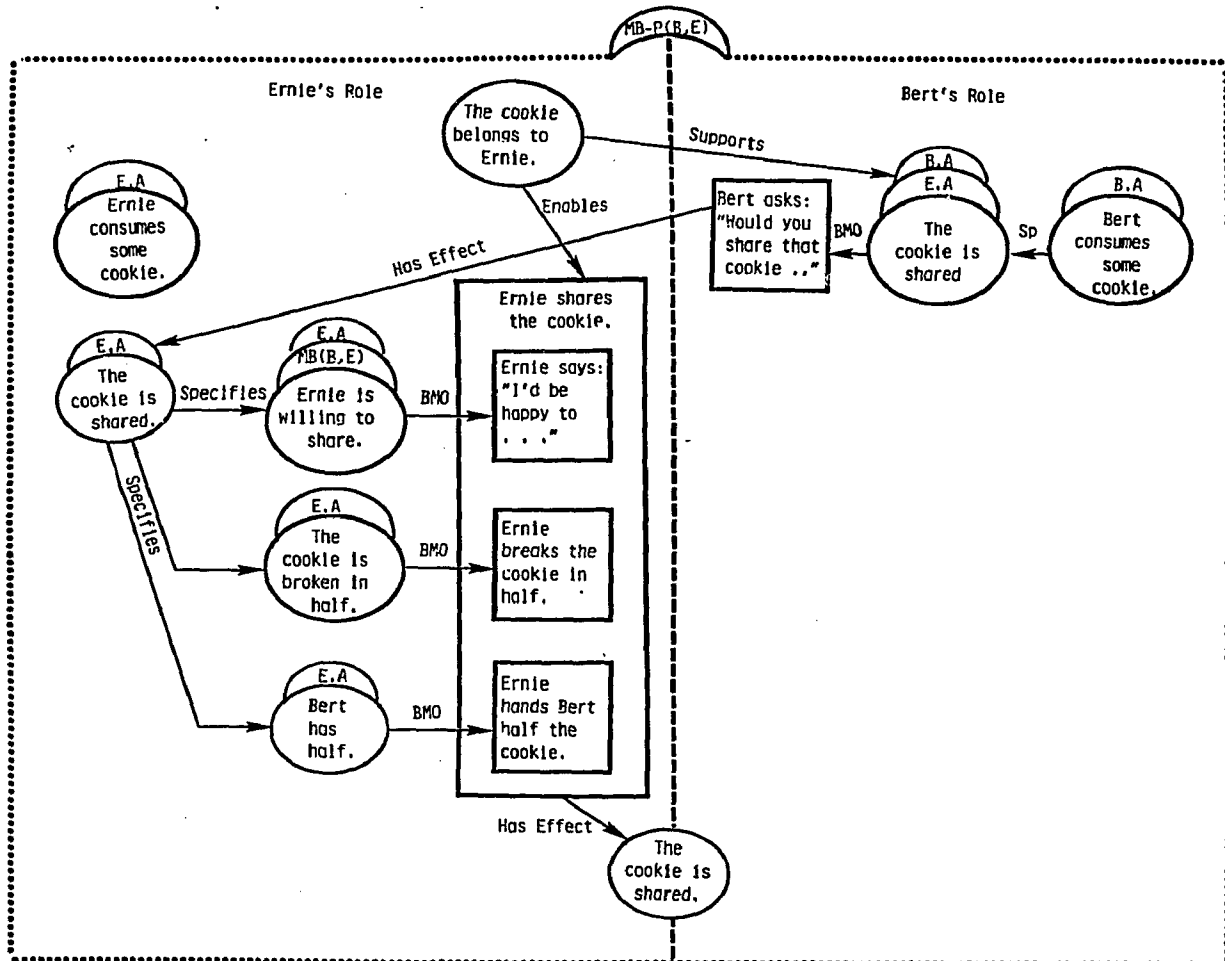


Figure 7. The cookie skit: the Pretend scenario

understood by Bert. That is, it is contained within any of the Mutual Belief Spaces in Figure 6. Ernie's role in the scenario (his Intentions and Actions) appear on the left while Bert's is on the right. Ernie's highest level Intentions appear on the far left. (Actions are indicated by squares while States are shown as Ovals; Mental States are shown as embedded ovals; Mental States may be Beliefs, Achieve Intentions, or Maintain Intentions which may be embedded within one another.)

As the scenario begins, Ernie owns the cookie and (like Bert in real life) is intending to consume some (or all) of it. On the far right it can be seen that Bert also wants to consume some cookie. Bert recognizes that Ernie owns the cookie so his goal of consuming some cookie Specifies the Intention to get Ernie to share the cookie. This specification is Supported by the fact that the cookie (in this scenario) belongs to Ernie.

Bert's intention to get Ernie to share is carried out By Means Of asking Ernie "Would you share that cookie with me?" Bert's speech act has the effect of creating in Ernie the Intention to share the cookie. His Intention is realized by the Complex Action of sharing the cookie. This Action is enabled by the fact that he owns the cookie. Three sub-Actions are specified as part of the complex Action. Together they produce the effect of the cookie being shared. First Ernie makes it known that he is willing to share (presumably a condition on sharing.) Then he breaks it in half and hands Bert half. For simplicity, the effects of the individual actions are not shown. Also it is not shown that Ernie says "One half for you and one half for me" which can be

considered part of the Complex Action of sharing. The complex action has the effect of the cookie being shared which is both a physical and social fact in the scenario.

The way in which sharing is enabled by ownership is important for understanding the more complex plans. The Enables relation is different from the Supports relation in that Enables indicates a necessary condition while Supports indicates a condition which makes the Action or Intention reasonable in that context. The fact that Ernie owns the cookie (in the Pretend scenario) makes Bert's request a reasonable course of action. He could have done other things (like trick Ernie, for example) but asking Ernie to share is the expected course to take. To say that ownership of the cookie Enables Ernie to share it is something quite different. Because it is a socially constituted act, sharing has many of the same properties as speech acts (Austin, 1962; Searle, 1969). In particular, there are a number of "constitutive" rules which are necessary for properly carrying out the action. Some of these "felicity conditions" are definitional of the act in question (Katz, 1977) such that one would not say that the act was simply improper but that it did not actually occur. Ownership appears to have such a necessary relation to sharing: one has not shared if the object was not one's to share.

This is, of course, all pretend. A cookie that is divided up as part of a pretend scenario is not actually shared in real life either.

The Share Plan

We have seen that some subjects consider Ernie's intentions in the Cookie skit to be honorable or at least not aimed at deceiving Bert. Figure 8 represents such an interpretation. The model can be treated as Ernie's or Bert's perspective although it is labelled as though it were Bert's perspective.²⁰ As is shown in Figure 5, Share plans are represented simply as the Mutual Belief Space (labelled MB(E,B)). Within this space is the Pretend scenario from Figure 7. For simplicity, this space has been considerably abbreviated. (The Complex Action of sharing is now shown as a simple Action.) What is shown here is Ernie's plan leading up to the enactment of sharing. The plan begins at the left of the Mutual Belief Space. Ernie is trying to consume some cookie but since the cookie belongs to Bert (in real life) Ernie decides to try to get Bert to share it with him. But it is not as easy for Ernie here as it is for Bert in the pretend scenario--he can not just ask Bert. (In the skit he tried that but Bert flatly refused). Ernie first has to convince Bert that Ernie would share the cookie if the cookie were his. And he does this convincing by establishing the pretend Scenario (By Means Of the Complex Action) and "demonstrating" what he would do.

The Complex Action of establishing the pretend scenario consists of three sub-Actions. First Ernie has to get Bert to accept that, for the purposes of the pretend demonstration only, the cookie belongs to

20. For this Figure to represent Ernie's perspective all the Belief Spaces and States labelled MB(B,E) would simply have to be labelled MB(E,B).

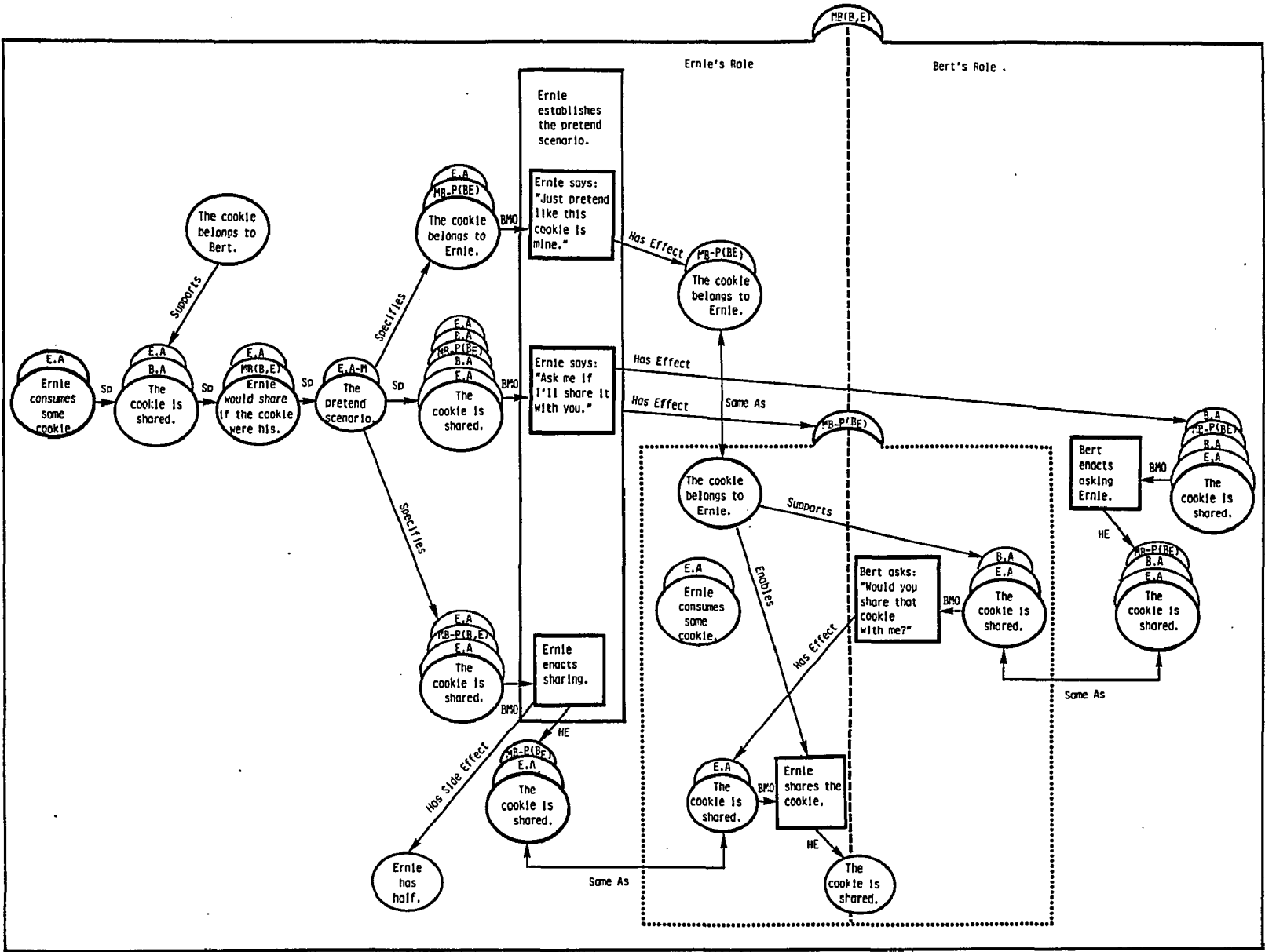


Figure 8. The cookie skit: the Share plan

Ernie. After commandeering the cookie as a prop, Ernie asks Bert to pretend the cookie is his. When Bert concedes, the cookie belonging to Ernie becomes part of the the Pretend Space (MB-P(B,E)).²¹ Ernie then asks Bert to enact asking Ernie to share the cookie with Bert. Ernie's Intention for this sub-Action is a five layer embedded Mental State. Ernie has to get Bert to achieve the pretend state of Bert getting Ernie to share the cookie. Ernie's action succeeds in getting Bert to enact asking Ernie and this enactment has the effect of Bert getting Ernie to share within the Pretend scenario. Then, as though in response to Bert's request, Ernie shares the cookie within the Pretend. Outside of the Pretend Space, Ernie's action of enacting sharing (using the real cookie) can be seen as part of his maintaining the pretend scenario for the purpose of his demonstration. Nevertheless, it has a side effect of Ernie having half of the cookie.

The Share interpretation presents a difficulty in its representation because in the accounts of many subjects the demonstration as a hypothetical case to prove a point as opposed to a display of proper behavior seems poorly articulated. It often seems that because the side effect is a fair outcome (they both have part of the cookie) the original intention to demonstrate in order to convince is easily overridden. The justice of Ernie's actions also overrides Bert's original ownership of the cookie. But the essential feature of these interpretations is that Ernie's real plan can be represented entirely within

21. This adding of a State to the Pretend scenario is an example of the general configuration for representing pretend shown in Appendix 4. The effect is first shown as a Belief State in the Space surrounding the Pretend and linked to the corresponding State within the Pretend by a Same As marker.

his Mutual Belief Space.

The Trick Interpretation

Figure 9 models an interpretation of Ernie's plan in which Ernie is deceiving Bert. This diagram shows the situation from Ernie's point of view. Ernie's real plan is shown in the space labeled E.B. $MB(B,E)$ is the mutual belief space that Ernie believes Bert thinks is mutually believed. The virtual nodes (shown as dashed ovals), are states which Ernie does not actually think are mutually believed. Toward the left is the now familiar Pretend Space. This Space now contains an extra Action (Ernie eats the rest of the cookie) which is not there in the Share plan. This "pretend" action is at the heart of the plan Ernie is trying to carry out.

Essentially Ernie's plan is to go ahead and eat the cookie after he pretends to share it and to do this as if eating were still part of the Pretend. This plan can best be explained by starting with Ernie's Pretend Action (within $MB-P(B,E)$) and tracing it's antecedents outward. Within the Pretend scenario, the Action of eating appears to be specified by Ernie's Intention to consume some of the cookie (specifically the rest of the cookie). In previous representations of the Pretend scenario Ernie's Intention to consume some cookie was an assumed background fact but was not acted on in the scenario. It must have been assumed that Ernie wanted to eat some of the cookie otherwise Ernie would not have been demonstrating a generous act. Within the scenario, in addition, it is reasonable that Ernie should eat the cookie since it belongs to him. So, in this plan, the scenario is simply extended to

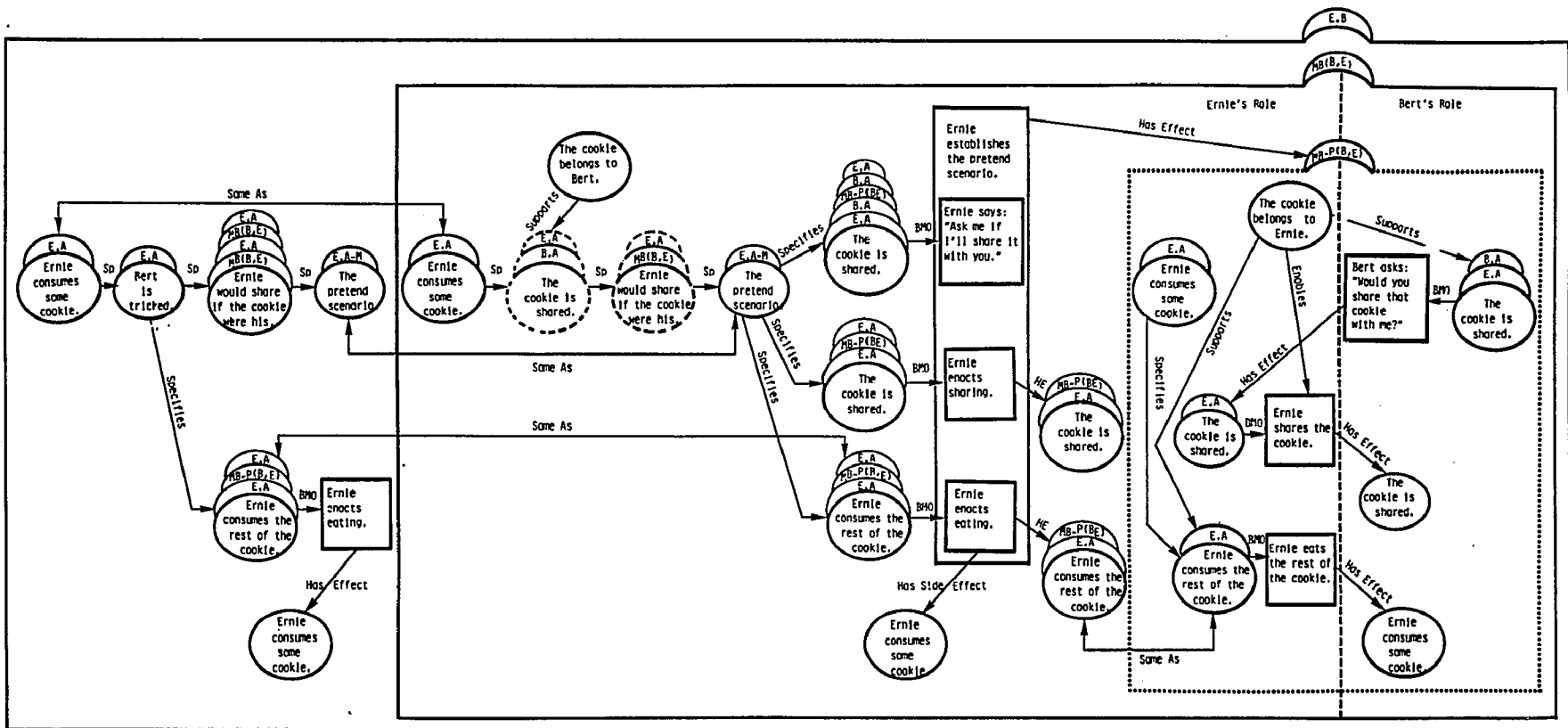


Figure 9. The cookie skit: the Trick plan

the next step that would ordinarily happen in such sharing episodes. The key to the trick is that Ernie carries off the eating as though it were a legitimate part of the Pretend scenario before Bert has time to realize it and to object.

Within the Mutual Relief Space (MB(B,E)) the enactment of eating is done as though it were part of the Complex Action of establishing the Pretend scenario. (In this diagram, this Complex Action is abbreviated in that it no longer shows the action of getting Bert to pretend that the cookie is Ernie's as in the previous diagram). The enactment of eating has the Side Effect of Ernie consuming some cookie. Although this satisfies Ernie's highest level goal, it is disguised as a Side Effect by virtue of being made to appear as simply an enactment.²² The Specifies relation between Ernie's Intention to Achieve-Maintain the Pretend scenario and his Intention to enter consuming the cookie into the Pretend is actually a Virtual relation. That is, it only appears to be there from Bert's point of view. It is not actually believed by Ernie.

The Same As marker can be followed out to the left to the same Intention to enact eating in Ernie's real plan (in E.B). Here the Intention is also carried out by enacting eating but here the State of Ernie having consumed some cookie is considered an Effect rather than a Side Effect of the Action since Ernie, of course, recognizes that the eating Satisfies his highest level goal in the situation. Unlike in

22. Ernie could have said something like "Okay, now pretend that I eat my half". This description would also have had the effect of placing the Action of eating the rest of the cookie into the Pretend but would have avoided the Side Effect in real life of prop being eaten.

the plan that Bert thinks is mutually believed to be the case, the Intention to enact eating is Specified by the Intention to trick Bert rather than the Intention to maintain the Pretend.

Ernie's trick also Specifies that Bert should consider it to be mutually believed that Ernie is trying to establish that he would share the cookie if it were his. Getting Bert to think that he is carrying out a demonstration is setting up the rationale for having the cookie in his possession and for enacting a sharing scene in the first place (which provides for the possibility of eating some of the cookie if he can slip it in before Bert realizes that he is going too far.) It is important to note that Intentions get placed into another character's Belief Space (in this case into $MB(B,E)$) as inferences by that character on the basis of inferences from the other's verbal and nonverbal Actions and from Beliefs assumed to be held in common. Thus Ernie can place versions of his own Intentions into the Bert's Mutual Belief Space simply by acting as though he had those intentions.²³ For Ernie it is important only that Bert think he is trying to get Bert to share the cookie by getting him to think that Ernie would. But Ernie is actually trying to do neither of those things so the Intentions are marked as Virtual (dashed lines). In the real plan as in the one Bert is lead to believe Ernie is carrying out, Ernie does want to establish

23. And ultimately, the actors of the skit can place all the Intentional States into the Belief Space of the viewing subject By Means Of their enactment of it. The process by which Bert's or the subject's interpretations of Ernie's plan are built up is neither specified by the notation nor an intended topic of this research. But in both cases it is a working assumption that such an inferential process takes place and proceeds to some extent from the Actions to the presumable Intentions.

the Pretend scenario (as marked by Same As). From that point on (i.e., toward the right) the two plans are the same so that it is unnecessary to show the real plan (in E.B) beyond the point of Intending to establish the Pretend.

It can be seen in this diagram that the number of places that the real plan conflicts with the Virtual plan is relatively small. Most of the actions can be carried out as though they were sincere because it is only some of the higher level Intentions that are at issue in the deception. Barring parts of the diagram which are abbreviated, the Mutual Belief Space in this figure is substantially the same as the one in Figure 8. Ernie's trick involves throwing in an extra Action into the Pretend scenario but more importantly, it involves carrying out the demonstration while only appearing to be doing it for the reasons shown in Figure 8.

The Con Plan

Figure 10 represents a Con interpretation of the Cookie skit. In Figure 10 as in Figure 9, the Mutual Belief Space is what Ernie is getting Bert to think is mutually believed by both of them. It contains in an even more abbreviated form the Pretend Space which is established by Ernie, apparently in order to show Bert he would share. Ernie's real plan is contained in the Space labelled E.B.

Ernie's plan is to manipulate the contents of the Mutual Belief Space so that he not only gets some of the cookie but gets Bert not to be angry about it. Essentially the plan is to get Bert to think that

Ernie had actually shared the cookie with Bert. This causes Bert to feel grateful and therefore not angry. Ernie gets Bert to think that he shared the cookie by doing several things which presuppose that he has shared the cookie. This is done by subtly undoing the Pretend scenario causing the social and mental facts contained in it to become true of the surrounding Mutual Belief Space. This is a rather complicated maneuver.

The plan has two parts: first the Pretend scenario is established much as it was in the Trick plan and second it is undone leaving Bert thinking that the Pretend events were actually real. In the upper left of the diagram is Ernie's plan to establish the Pretend. This is reflected within the Mutual Belief Space just as it was for the Trick plan. As in the Trick plan, two of the Intentional States are Virtual.

The second part of the plan can be traced beginning at the middle left of the diagram. Ernie wants to maintain Bert in a state of non-anger. This (combined with the desire to eat some of the cookie) specifies the plan to con Bert by making him feel grateful. Bert will feel grateful if Ernie can get him to think (i.e., to assume that it is shared knowledge) that Ernie had shared the cookie. This can be done by not maintaining the Pretend status of the events in the Pretend scenario. That is, Ernie gets Bert to believe that Ernie has really shared the cookie rather than just pretended to do it. This is done by getting Bert to think that the cookie belongs to Ernie. To understand how this strategy works it must be understood that Ernie expects his actions to have their effects retrospectively. This is reflected in the model where, within the Mutual Belief Space (as Bert understands

it) the effects (as Ernie understands them) appear as preconditions rather than as effects.

In the discussion of the Trick plan, it was pointed out that the cookie belonging to Ernie was a precondition for Ernie legitimately eating the rest of it within the Pretend scenario. That somewhat unremarkable fact was part of what helped Ernie to slip the enactment of eating past Bert before Bert could realize the trick. In the Con plan, the Supports relation operates in the opposite direction. Since eating the rest of the cookie presupposes that Ernie owns it, by means of eating it Ernie can get Bert to believe that he owns it. In the Trick plan, the conflict of Ernie eating Bert's cookie was resolved by seeing Ernie as still pretending that he owns the cookie. In the Con plan, Ernie is seen as eating the cookie for real (i.e., Bert thinks that it is mutually believed that he is eating it and not pretending to) and the conflict is resolved by interpreting Bert as being lead to believe that Ernie must really own it. Thus, in E.B, mutual belief in the cookie belonging to Ernie is the effect of Ernie eating it while in MB(B,E) Ernie's (virtual) ownership of the cookie is seen as supporting Ernie's Intention to eat the rest of it. While Ernie's ownership of the cookie supports his eating the rest of it, it is a necessary condition for his having shared it with Bert. Insofar as Ernie's Action has the effect of Bert thinking that it is mutually believed that Ernie owns the cookie, Ernie's Action also helps to produce the Belief in Bert that Ernie has shared the cookie.²⁴ For this, Bert is grateful.

24. Producing this belief is also the goal of another of Ernie's Actions. As he is munching on the cookie, Ernie says: "See there? I told you I would share it with you." He is referring to his earlier

What is Complexity?

The purpose in representing each of the interpretations in the notation was to specify more precisely the intuition that they are orderable in terms of complexity. The models can now be examined for the sources of their relative complexity. These can then be related to the discussion, in the first chapter, of strategic perspective-taking and mutual belief.

Two Sources of Complexity:

Complexity can be considered in terms of the perspective-taking demanded by the strategies. The form of the notation makes it possible to distinguish the Belief Space embeddings from the nodes and relations which are contained within the Belief Spaces. It will be seen, however, that these aspects are very much entwined.

Perspective-taking embeddings. A notable fact about the three models is that they do not vary widely in the number of embeddings they require. Considering only the subject's representation of Ernie's perspective, the Share plan can be represented entirely within the Mutual

assertion: "if that cookie belonged to me I would share it with you." It was Bert's not believing it which prompted Ernie's hypothetical demonstration. But for the demonstration to actually have proven the original point, Ernie would have had to own the cookie. (In his summary statement, Ernie conveniently leaves off the critical condition: "if the cookie belonged to me", though he clearly refers to the previous statement.) Ernie is acting as though he had promised to share and now has fulfilled that commitment. Such a statement would be false unless sharing had taken place. Thus, the Virtual State of Ernie sharing the cookie supports Ernie's statement in the Mutual Belief Space while in Ernie's real plan Bert's resulting Belief (that Ernie is stating that he kept the promise) produces in Bert the belief (that it is mutually believed) that Ernie shared the cookie.

Belief Space while the other two both require one additional embeddings. The Con and Trick plans were both being carried out by Ernie who does not think (or is not concerned) that Bert is suspicious. The one extra embedding does make the difference between sincerity and deception but the plans look nothing like the multiple embeddings found, for example, in the nickel-dime game strategy modeled in figure 3.²⁵ As for embeddings represented by Mental States, again the models are not strikingly different. All the interpretations include Ernie's five layer intention when he gets Bert to pretend that he is asking Ernie to share.

Besides the embedding representing Ernie's deception, another source of complexity can be seen when the subject's perspective on both the characters is considered. The simplest case is the one in which both Bert and Ernie are operating within the Mutual Belief Space. This would be simple both because there are no Belief Spaces outside of what is mutually believed and because there is no distinction between the perspectives of the two characters. A slightly more complex view of the situation would have either Ernie carrying out a plan and Bert not suspicious or Bert suspicious but Ernie sincere. Here, complexity is added both by the extra embedding and by the differences between the two perspectives. It would follow from this way of reckoning, that the case of Ernie planning a deception and Bert realizing it could be simpler than either of the more asymmetrical cases. Symmetry of

25. The Pretend Space, which is constant across the models, adds another level of embedding but not in the same sense as Spaces outside of Mutual Belief. This Space, as part of mutual belief, is the same for both characters so does not require perspective-taking. Both characters must, however, keep in mind that the events are hypothetical.

embeddings could result from a weak differentiation between the characters which allowed facts to bleed from one character's beliefs into the other's.

It is not possible on the basis of the present study to determine the relative difficulty represented by embeddings and by asymmetry between the characters. It seems clear, in any case, that the content of the Belief Space would also have to be considered. The empty embeddings shown in Figures 5 and 6 would not be expected to represent as much difficulty as a Space containing a complete plan. Likewise the Space representing the plan Bert suspects Ernie is carrying out would not be as well specified as the Spaces in Figure 6 which contain Ernie's actual plan. Since the Trick plan and the Con plan can both be found in the same Belief Space configuration, it is possible to consider differences in the configurations of nodes and relations which constitute the two plans.

"Size" of the Plan. The most straightforward measure of complexity might be the number of nodes included in the plan. Because later diagrams contain more abbreviations than earlier ones, the differences may not be immediately apparent. A simple count of number of nodes and relations would show a clear increase across the sequence. A reflection of the difference can be found in the number of virtual nodes in the three plans. The Share plan, of course, has no virtual nodes. In the deception plans, these represent Intentions that could reasonably be inferred on the basis that Ernie is being a cooperative conversationalist. These virtual nodes correspond to what Ernie believes Bert would take to be mutually believed on the basis of what he (Ernie) says

and does. That is, Ernie can expect his actions to be the basis on which Bert can (be expected to) infer mutual belief in those virtual elements. In the Trick plan, Bert infers the relation between eating and the plan to enact a pretend scenario. In the Con plan, Bert infers that Ernie had actually shared the cookie which had belonged to Ernie. Both the size of Ernie's plan and the number of virtual elements point to an important aspect in calculating complexity. The belief Space configuration must be considered in relation to what the Spaces contain. In considering the effect of embeddings what must be accounted for is the amount of difference between each space and the next lower one.

Beyond differences in the number of virtual elements in the two plans, the retrospective nature of the Con plan indicates a qualitatively different kind of inference which Ernie is expecting Bert to make. Attempting to characterize this difference raises again the issue of the relation between cultural knowledge and the strategies which bring it into play.

"Scripts" and Strategy

In the introduction it was suggested that a child's understanding that much of her knowledge is mutually believed with others can be attributed to the acquisition of cultural knowledge rather than to the acquisition of perspective-taking skills. Making the distinction between cultural knowledge and perspective-taking capacity provides a useful analysis of the abilities involved in strategically bringing shared understandings into play in an interactive situation. Just

because a child may have obtained some cultural knowledge (which is known to be known in common) does not mean that she can make use of the fact of mutual belief in carrying out a strategy. Perspective-taking skills are still of crucial importance. The interpretations of the cookie skit provide a clear case of this relation between cultural knowledge and its strategic use.

The sharing script. The cookie skit provides a clear example of a piece of cultural knowledge and the interpretations of the skit show various ways it can be brought into play. Sharing can be considered a cultural practice with known rules. It is of particular interest in the present study because it is a plausible assumption that all the subjects in the study understood the procedure and its felicity conditions. Different interpretations of the skit can thus be attributed to how the subjects saw this piece of knowledge being used by Ernie in carrying out his plan.

Borrowing Schank and Abelson's (1977) term, the knowledge of sharing can be called a "script". The central features of this script are the following: At the beginning of the event actor A owns some object X. Actor B (and perhaps others) want some of X. Usually A also wants some of X (which accounts for why sharing is a generous act.) Because he knows that B wants some of X, A distributes X in some equitable way. This distribution is done publicly so that it is clear to all concerned that X was shared. After the sharing it is understood that A has relinquished ownership of the shared portion of X.

It can be seen that mutual belief is already built into this script. Ownership, for instance, is the kind of "social fact" which requires mutual recognition to be maintained (Newman, 1978). But, while there are two roles to the script, the events and understandings could be located entirely within a Mutual Belief Space. Both actors can assume they share the same representation of the situation and therefore do not have to consider explicitly the fact that the facts are mutually believed. The basic script has already been illustrated in Figure 7. That figure shows that ownership of the cookie enables Ernie to share the cookie. It also shows that both Bert and Ernie want to consume some of it.

The sharing script is central to each of the interpretations and the differences among the plans can be accounted for by the various ways that Ernie uses the script in planning his strategy. The Share plan, while relatively simple, does show one way that the script may be used. Since both Bert and Ernie know the script, Ernie can get Bert to help him enact it as a way of showing Bert what he would do in a hypothetical situation. In this case, Ernie's plan is completely out in the open. His method of using the script is, itself, mutually believed.

Ernie's use of the script in the Trick plan is kept a secret from Bert. He uses the fact that ordinarily the actor doing the sharing would also want some of the "X". Thus the script for the enactment could quite naturally include "A" eating the cookie after the sharing. Because Ernie can expect Bert to expect it, he is able to slip the eating in before Bert has time to think. Thus Ernie uses the script and

the fact that the knowledge of it is shared to carry off his trick. In the Con plan Ernie also uses the fact that he and Bert share the script in order to take advantage of Bert. But instead of defining an extra event as still within the enactment of the script, he makes it appear that enacting the script was not really an enactment. This is accomplished partially by taking advantage of assumptions of the script to make it appear that he actually owned the cookie.

In each case the script, insofar as it can be assumed to be shared, is a resource for Ernie. Borrowing a phrase from the ethnomethodologists, the script is used rather than followed. While culturally shared knowledge such as scripts are essential for accomplishing social interactions, it accounts for only a small part of how these interactions are done. The scripts, themselves, do not specify when or how they are to be called up to deal with particular problems. ²⁶ Scripts represent how things are "ordinarily" done so, in general, the events and other elements of the script could be represented entirely within a Mutual Belief Space. Strategic interaction requires stepping outside of mutual belief. Only from that standpoint can the other's understandings be manipulated.

26. A script may be "followed" once it is known with certainty what the occasion is understood to be by all concerned. In practice, however, situations are seldom entirely clear so that evoking a script by appearing to others to be following it would be part of the tacit negotiation over the definition of the situation. By acting as though a restaurant were a "fancy" one, a waiter can attempt to establish that understanding as a social fact. But if customers refuse to respect that definition, the restaurant will eventually fall into disrepute.

CHAPTER V

ANGRY, BANANA AND GENERAL RESULTS

The analysis of the Cookie skit has shown how perspective-taking can be located in interpretations of the skit. Ernie's deceptive strategies were seen to call for a Belief Space embedding outside of the beliefs Bert was led to believe they held in common. The results from the coding of the interviews shows that these general features of the interpretations are related to age. This chapter extends the analysis to the other two skits. The Angry skit and the Banana skit are discussed in turn. In each case, features of the skit which call for perspective-taking are analyzed and their relation to age is examined. The analytic framework provides an account for why one understanding would be easier to come to than another. In the third section, questions about the subjects' performances across all three skits are raised as well as questions about characteristics of the subjects which (in addition to age) may be related to their understanding of Ernie's strategies.

The Angry Skit

The Angry skit begins with Ernie coming up to Bert and asking him to do Ernie a big favor. Bert is at first willing but is puzzled when Ernie requests that Bert pretend that he is angry. Ernie quickly explains that he was "just trying to imagine what people look like when

they're angry". Ernie goes on to explain that he chose Bert because "nobody can get angry like my old buddy Bert gets angry". and that Bert is "really just great at getting angry". Bert is flattered but still objects that he does not have anything to get angry at. Ernie thinks for a moment then suggests that Bert pretend that Ernie lost his favorite paper clip collection. Ernie describes the hypothetical event in vivid detail causing Bert to scream in anger. Ernie praises his effort and asks him to do it again. Bert is tired but Ernie manages to elicit another display of anger by repeating the story. Ernie asks him to do it yet again but this time Bert is exhausted and insists: "I'm sorry I promise you I just could not do it one more time." Then Ernie says: "Oh okay Bert. By the way Bert, I really did loose your favorite paper clip collection down the sewer." Bert faints.

The skit was shown once through before backing up and replaying it for the interview which focused on four events. The first place the tape was stopped was Ernie's statement that he was just trying to imagine what people look like when they are angry. This was important because it established Ernie's pretext for getting Bert to be angry. The second stopping place was Ernie's statement that Bert is "just great" at getting angry. This was of interest because it was a case of flattery. The third place was after Ernie's first description of his loosing the paper clips, just before Bert gets angry. At this point it was possible to examine the subject's understanding of why Bert was getting angry and why Ernie chose the paper clips as a hypothetical example. The final place the tape was stopped for discussion was just as Bert was fainting. This was an opportunity to discuss the situation

as Bert saw it.

Two Plan Types

Two different kinds of interpretation of the Angry skit were found. In the first kind, which will be referred to as the "Know" plan, Ernie may or may not have lost the paper clips but, in either case, sincerely wants to know what people look like when they are angry. In the second kind, referred to as the "Avoid" plan, Ernie has lost the paper clips and is attempting to avoid what could be adverse consequences for him when Bert finds out.

An example of a Know interpretation. The interview of a first grade girl illustrates an interpretation in which, for the most part, Ernie is taken at his word. The interview began with the following:

S1.9-A1

- I: Here Ernie says I was just trying to imagine what people look like when they're angry. Now why does he say that? What's he trying to do here?
- S: He's trying to see what people look like when they get angry.
- I: Uh huh.
- S: Their faces.
- I: Cause what?
- S: On their faces, like he wants to know.

Later in the third stopping place after Ernie vividly describes his losing the paper clips down the sewer, the subject was asked:

S1.9-A3

I: Why did Ernie choose the paper clip collection as an example? Couldn't he have said I lost your pigeon collection or I lost your bottle cap collection or anything else? Would that have been just as good to see how Bert looks when he's angry?

S: He really likes ().

I: What?

S: He really liked his paper clips a lot. It's like if I lost my paper clips if my paper clips dropped in the sewer I'd never see them again. My favorite () and then Ernie would have to ().

I: Uh huh, well, if Bert loved his bottle cap collection just as much as his paper clips, would it be just as good as an example?

S: Yeah.

Ernie chose the paper clips for no other reason than that they were Bert's favorite. The tape was stopped for the last time just as Bert was falling over in a faint.

S1.9-A4

I: What happened to Bert?

S: He sort of like fell down for a couple of minutes.

I: Why?

S: Because he-

I: Why did he do that?

S: Because he wanted he wanted his favorite paper clip collection back.

I: Oh so how is he feeling?

S: He's feeling like my paper clip collection is lost in the sewer.

I: So does he-

- S: I'm gonna get that Ernie.
- I: Oh so, is he- so does he think that Ernie's telling the truth at the end?
- S: Yeah.
- I: Or that he's just pretending?
- S: But he just wants to see Bert get angry one more time and he didn't really lose his favorite paper clip collection.
- I: Oh, so Ernie didn't really lose it but Bert thinks he did or not? Or does he think that it's just pretend?
- S: He thinks it's real.

In this interpretation Ernie's punch line is a lie but Bert thinks it is the truth. This interpretation is also reflected in later questions about fairness.

S1.9-A4

- I: What's not fair about it?
- S: Because-
- I: What?
- S: I think Ernie is lying.
- I: Well, what's he lying about?
- S: That he just wants Bert to get angry again and it's not ().

In this interpretation, Ernie is mostly doing what he says he is doing. The project of finding out what people look like when they are angry is taken to be the highest level goal driving his actions. Ernie considers this goal to be mutually believed by himself and Bert. Ernie does deceive Bert, however. Bert's unwillingness to get angry again leads Ernie to lie about the paper clips being really lost. Five of

the nine subjects who were coded as "Know" thought Ernie was not telling the truth about the paper clips being lost. The others thought he was. Unlike the subject whose interpretation was just given, these subjects did not make a connection between Ernie's final statement and his plan. Another kind of connection which some subjects made between Ernie's last statement and his plan leads to a very different interpretation of Ernie's plan.

An example of an Avoid interpretation. Most subjects did not believe Ernie's story about trying to imagine what people look like when they are angry. But they did believe him about the paper clips being lost. The following segments from the interview with a fourth grade girl illustrate some of the features of these interpretations. At the beginning of the interview, she describes Ernie's whole plan in detail.

S3.6-A1

- I: Okay, Ernie says, I was just trying to imagine what people look like when they are angry. Now, why does he say that? What's he trying to do there?
- S: Cause he wants Bert to think that Ernie just wants to know what somebody looks like when they're angry because Ernie knows that Bert would get mad if he told him that he lost his paper clip collection so he goes I want to see what somebody looks when they're angry, so he gets angry and he can't do it again, he does it again though, and he gets angry and he just can't do it again. So Bert, so Ernie tells him that he lost it so Ernie's right now thinking that if he can get Bert all angry and get him all tired out he won't get angry when he tells him the truth.
- I: Well, what when Ernie says I was just trying to imagine what people look like when they are angry, then is that a lie or is he telling the truth?
- S: It's a lie.

Ernie's flattery is also seen to be part of this plan:

S3.6-A2

- I: Ernie says you're just great at getting angry. Now why does he say that? What's he trying to do there?
- S: Because he's trying to get Bert to feel like he can do something special. So that he will get angry.

The subject also sees a good reason for Ernie to choose the paper clips.

S3.6-A3

- I: Why do you think Ernie uses the example of the paper clips?
- S: Because at the end he has to tell Bert that he did lose them, so he might as well tell, he might as well say pretend that the thing that he did lose.
- I: Well, could he have told him about anything else like would have-
- S: No, it would have been different, like he could have gotten angry all over again at a different subject.

The subject evaluated Ernie's actions as follows:

S3.6-A4

- I: Do you think it was fair for Ernie to try to get Bert to be angry and just pretend-
- S: ()
- I: That was fair?
- S: Not to Bert but to Ernie, yeah.
- I: So Ernie is fair but not with Bert, what do you mean by that?
- S: Well, it wasn't fair for Ernie to get Bert all upset and stuff like that, but it was fair for Ernie to get Bert all tired out so that he wouldn't get in trouble.

I: Do you think that it's good to keep out of trouble, like that?

S: Well, if you're gonna lie, no.

Comparison of Know and Avoid plans. This interpretation contrasts strongly with the previous one. From the beginning Ernie is seen to be deceiving Bert about his plan while in the previous case Ernie is sincere until the end. As with the interpretations of the Cookie skit, the differences between these interpretations can be understood in terms of the amount of discrepancy between Ernie's real plan and the plan that Bert is led to believe they are carrying out together. Thus, these two ways of seeing Ernie's plan can be compared in terms of their perspective-taking complexity. Both plans contain a deception consisting of some facts which Bert believes but Ernie does not. The greater complexity of the Avoid plan can be attributed to the "size" of the deception. In the Know plan, the deception involves only the single fact of Ernie loosing the paper clips. In the Avoid plan, the deception involves Ernie's entire plan of action including the highest level goal which Bert thinks is motivating Ernie's involvement in the episode.

The difficulty in forming the more complex interpretation may arise from at least two factors besides the difficulty of processing the more complex information. First, the subject would have to have some reason to be suspicious of Ernie since he gives no overt cues as to his real motives until the very end. Whether he is believed at that point may have to do with how suspicious the subject is of Ernie's motives up to that point. The strangeness of Ernie's request and the

flattery with which he backed it up may only seem strange to subjects who know what flattery sounds like and who know what are reasonable kinds of things to want to know.

A second reason besides perspective-taking complexity that would make the more complex interpretation harder has to do with the particular story convention used. It is not until the end of the skit that the critical piece of information for the Avoid interpretation occurs. The skit does not show Ernie losing the paper clips. Rather it starts just as Ernie walks up to Bert with his request for a favor. Thus it shows the situation as Bert would experience it: the viewer gets only the information that Bert gets. It is the converse of perspective-taking tasks such as Chandler and Greenspan's (1973) cartoon task in which a story character has less information than the subject. Here, the story character has more information than the subject. This skit presents a situation which is designed so that Ernie is simultaneously tricking Bert and the viewer. If the child is used to stories in which the characters share a mutual belief space then she may not know to look outside of the presented episode for a solution to things that may be puzzling. Children presumably have to learn that stories can be told so as to systematically keep the viewer uninformed in order to achieve suspense or other dramatic effects.²⁷

For any of the above reasons it would be expected that how this skit is interpreted would be related to the age of the subject. Table

27. Conversely, they would have to learn that there are also rules for when not to go outside of a frame, for example, in syllogisms (Scribner, 1977) or cartoon tasks like Chandler and Greenspan's.

4 shows the breakdown by Grade for the two plan types. The relation to Grade when both variables are considered ordinal is: Kendall's tau = .52, $p < .0004$. Considering only the younger subjects and considering the variables as nominal the association is still significant (Fisher test $p < .05$).

Subtypes of the Avoid interpretation. There were several variants of the avoid interpretation. Most subjects (25 out of 35) thought Ernie was trying to incapacitate Bert but this was not the only way to see the how his deception functioned. Two sixth graders thought Ernie was trying to find out how Bert was going to react before he told him about the paper clips. This interpretation seems to preserve part of the idea that Ernie wants to know what people look like when they are angry. Eight of the subjects (5 of them undergraduates) combined the two functions. These subjects thought that Ernie started out just wanting to find out how Bert would react but when Bert showed how angry he could get, Ernie decided to attempt to reduce his anger. For these subjects, Ernie's plan was flexible and was modified based on information obtained in the first step.

There were differences also in the way that Ernie was attempting to reduce Bert's anger. Most subjects (14 of the 24 who were codable on this question) saw Ernie as exhausting Bert. There were 10 subjects who thought that Ernie was not trying to exhaust Bert but to get him used to or bored with the idea of the paper clips being lost. Six of these were undergraduates and 3 were 6th graders. It is not clear what would have led to this interpretation or why it would be made predominantly by older subjects.

Table 4
 Frequency of Angry Basic Plan Types at Each Grade

Plan Type	Grade of Subject				Total
	1st	3rd-4th	6th	College	
Know.....	7	2	0	0	9
Avoid.....	4	9	11	12	36
Total.....	11	11	11	12	45

What Ernie was expecting. Another area of differences is found in what the subjects thought Ernie was expecting Bert to do when he told him the paper clips were lost (41 subjects, evenly distributed between younger and older, were codable here). The alternatives were: Bert would faint, Bert would get angry, Bert would not get angry. Subjects who thought that Ernie wanted to know what people looked like when angry thought either that Ernie expected that Bert would get angry when he told him about the paper clips (6) or that Bert would faint (3). As would be expected, none of these children thought Ernie expected Bert simply not to get angry. In contrast, most subjects who thought that Ernie was avoiding Bert's anger thought he would expect Bert not to get angry (18 out of 30) and 3 others thought Ernie expected Bert to faint, that is, they saw Ernie as assuming his plan had worked. (Eight avoid plan subjects thought Ernie expected Bert to get angry, however). When "faint" and "get angry" are collapsed to allow a statistical test, a significant age difference is found ($\chi^2=7.95$ (1) $p<.01$) resulting from the fact that no older subject thought Ernie expected Bert to faint and older subjects were far more likely to say that Ernie just expected him not to be angry (for Ernie's expectation that Bert would get angry, the numbers are close to evenly split). Considering only subjects who thought Ernie was trying to avoid Bert's anger there is still a significant age difference though somewhat weaker. This difference can be accounted for by the younger subjects who thought Ernie would expect Bert to faint. It may be that younger children tend to attribute to Ernie's intentions the result that actually happened while older subjects are more likely to recognize that Ernie may not be sure what is going to happen.

Other Strategic Perspective-taking Features

The plan that Ernie was carrying out was not the only place where strategic perspective-taking comes into play. Two other issues which were raised in the interview are discussed here. The first is the "flattery" Ernie lavished on Bert to get him to think he was the best at getting angry. The second is Bert's view of the situation just before he faints.

Flattery. In trying to explain to Bert why he wants him to get angry, Ernie says that he chose Bert because he is "just great" at getting angry and he can get angry like nobody else.²⁸ The subjects' understanding of how these utterances are supposed to work may reveal their ability to comprehend strategic perspective-taking. Flattery as it is commonly understood is a good case of strategic manipulation of shared understandings because it is the use of an ordinary compliment to further a concealed goal.

Three kinds of interpretations of Ernie's "flattery" were identified. In the first kind, Ernie is seen as paying Bert a compliment. The second way of understanding Ernie's "flattery" is that he is getting Bert to have a favorable attitude toward him. This attitude is directly beneficial to Ernie in some way (for example, Bert may be mollified). The third understanding of Ernie's "flattery" is that it is

28. Nine subjects (8 of them are older) noticed an irony in these statements. Ability at being angry is not something that is usually taken as a compliment although Bert's reaction shows that he does take it as such. For the Avoid plans, at least, Ernie is seen not so much to admire Bert's abilities but to fear them.

instrumental in getting Bert to get angry (which in turn incapacitates Bert). It was expected that these three categories would show the effect of perspective-taking demands because the first category takes Ernie's statements at face value whereas the others see a plan behind them. In addition, of the two deceptive kinds, the last kind attributes a more elaborate plan to Ernie in that the "flattery" is hierarchically integrated with the plan to incapacitate rather than being a separate attempt to please Bert.

While many of the younger subjects were not codable on this question (14 missing versus 1 for the older group), those who were coded mostly fell in the compliment category as can be seen in Table 5. This difference mostly accounts for the significant correlation between grade and kind of "flattery" (considering both variables as ordinal: Kendall's $\tau = .33$ $p < .02$). There is apparently no difference between sixth graders and College students on how this question was answered. Of the 12 subject's who saw Ernie as paying Bert a compliment, three thought Ernie had a Know plan (the remaining 6 Know plans were not codable on this question) the rest saw Ernie as trying to Avoid Bert's anger. The compliment interpretation which made no mention of selfish motives or deceit on Ernie's part fits well with a Know interpretation but is less appropriate for a plan in which he is attempting to incapacitate Bert. When subjects who gave Know plans are removed from consideration there is no longer a significant correlation ($p < .13$) between type of "flattery" and grade.

Subjects were also asked if they knew what the word "flattery" meant. Answers were coded using categories similar to the previous

Table 5
 Frequency of Three Understandings of Ernie's
 "Flattery" by Grade

Type of "Flattery"	Grade of Subject			Total
	1st-4th	6th	College	
Compliment.....	7	3	2	12
Getting on Bert's good side.....	1	5	4	10
Part of plan.....	2	4	5	11
Total.....	10	12	11	33

question: compliment; involving some insincerity; involving an ulterior motive. Below sixth grade, only two children offered a definition, the others did not know the word. Among the older subjects, college students were not more likely than sixth graders to give a definition involving deception. These results do not support the perspective-taking analysis of flattery. Younger subjects appear more likely to accept Ernie's statements as a compliment. Seeing his statements in this way may have contributed to thinking that Ernie wanted to know what people look like when angry or it may be the other way around. In any case, older subjects are more likely to see the strangeness of Ernie's "compliment" and this strangeness may have affected the descriptions of what Ernie was doing.

What Bert thought at the end. Most of the discussion so far has been about Ernie's plans. These plans were often understood to consist of his manipulation of the beliefs that Bert thought were shared between them. The discrepancy between the "shared" view and Ernie's real view would demand perspective-taking skills. Perspective-taking comes in also with respect to how Bert saw the situation. In particular, the subject was asked what she thought Bert would be thinking about in the moment after Ernie told him the paper clips were gone just before he faints. Three alternatives were coded: Bert thought about the fact that the paper clips were lost; Bert thought about the fact that Ernie lost the paper clips; Bert thought about the trick that Ernie just played on him.

These categories can be ordered with respect to perspective-taking demands in the following way: The first considers only the objective

fact that the paper clips are gone. Ernie makes this fact public so no perspective-taking is called for. The second considers the fact that Ernie lost them. This is also an objective fact and differs from the first only in that Ernie is in the picture. This would not require more perspective-taking unless, for example, Bert were to go on to consider whether it was an accident (i.e., Ernie's intentions). Recursive perspective-taking is clearly required by the third alternative since Ernie's trick, itself, was a deception in which Ernie manipulated Bert's understanding of the interactive situation. In this case, the subject attributes to Bert the same inference that she has made about Ernie: that he was tricking Bert all along by creating a "virtual" shared plan.

As would be expected, none of the subjects who gave Know plans said that Bert thought Ernie tricked him into incapacitating himself. Three said that Bert thought just about the paper clips and 6 phrased it as Bert thinking that Ernie lost them. Table 6 shows just the subjects who saw Ernie as trying to Avoid Bert's anger broken down by age group for each of the categories. The relationship between age and the categories is clear especially for the last two which is the critical comparison. (Collapsing the first two categories to allow a statistical test, chi square = 7.34 (1) $p < .01$.) Older subjects are more likely to say that Bert thought about Ernie's trick. Insofar as we can assume that the other responses indicate that the subjects did not think Bert thought about the trick, these data indicate how perspective-taking may apply to several aspects of an interpretation not just globally to the situation as a whole. The fact that a subject inferred Ernie's real

Table 6

Age Comparison of What Bert Thought About
at the End of the Angry Skit
(Frequency for Avoid Plans)

What Bert Thought About	Age Group		Total
	Younger	Older	
The paper clips are gone.....	1	2	3
Ernie lost them..	8	5	13
Ernie tricked him.....	2	15	17
Total.....	11	22	33

plan does not guarantee that she will attribute the inference to Bert. That additional piece of processing may require greater processing capacity or it may require the knowledge that anybody, including Bert, would come to that conclusion or it may require both.

The Banana Skit

The Banana skit begins as Ernie returns home with a bag of groceries. Bert asks him if he got any bananas and Ernie pulls one banana out of the bag to show him. Ernie then begins to peel it. Bert (apparently thinking that Ernie bought only one banana), reminds Ernie that he likes bananas too. Instead of offering to share, Ernie simply agrees with Bert that bananas taste terrific and continues peeling. After another hint, Bert loses his temper saying: "Are you gonna stand there being selfish and eat that banana all by yourself? What kind of friend are you?" Ernie stops eating and agrees saying "share and share alike we always say. Right Bert?" Ernie goes on to say he is going to divide the banana up so both of them can have some. Ernie turns his back so Bert can't see and eats the rest of the banana. When Bert realizes what Ernie did he says "you ate it all" but Ernie replies "no Bert we're sharing it . . . I took the inside part, here's the outside part for you. Ernie hands Bert the peel but Bert faints. While Bert is lying on the ground, Ernie says he was just kidding and pulls a second banana out of the bag.

The interview focused on four events. The tape was stopped first just after Ernie replied to Bert's first indirect request. The second place was Ernie's agreement that they should share and share alike.

This was to check if anybody (besides Bert) thought that Ernie had just then realized that Bert wanted some. The third place was Ernie's promise to divide the banana up. This was the crucial lie in the trick he plays. The tape was stopped for the last time just as Bert faints.

Types of Interpretations

The interpretation of Ernie's overall strategy was remarkably similar across grade levels. Subjects agreed that Ernie was teasing Bert. The tease involved a deception in which Bert was led to mutually believe that Ernie was going to share the banana. As with the other skits, Ernie has a plan that Bert does not know about. In this case, Ernie's real plan had no instrumental advantage to Ernie and at the end Ernie admits that he was "just kidding".

There were two variants on this basic theme which, however, do not represent major reorganizations of the tease interpretation. Six of the 48 subjects talked about Ernie doing what he did because he was selfish. These were mostly younger subjects. Another seven (5 of them older) subjects thought that if Bert had not fainted, Ernie would not have given him the second banana which he still had in the grocery bag. Only two subjects (a first grader and an undergraduate) thought that Ernie both was being selfish and would have withheld the other banana. These differences in Ernie's underlying motive do not affect the perception of the tease itself or the perspective-taking that is called for by the interpretation.

Perspective-taking features

All subjects agreed that Ernie was tricking Bert when he said he was going to divide up the banana. Aspects of how this lie was understood, however, turned out to be quite different depending on the subject. The relation of these different understandings to perspective-taking is taken up in the next chapter. But there was another feature of the skit which had two different interpretations depending on perspective-taking which is somewhat independent of how Ernie's main trick is understood.

Intentional misinterpretation. When Bert sees that Ernie is preparing to eat what he thinks is the only banana he tells Ernie that he likes bananas too. But Ernie attempts to avoid this indirect request by acting as though Bert had made a simple statement by saying "I don't blame you, they really taste terrific". Almost all subjects agreed that Ernie knew at that point that Bert wanted some of the banana (3 thought Ernie did not know until Bert lost his temper moments later). Ernie is seen as pretending not to know. But then the question was asked: does Bert know that Ernie knows Bert wants some or not? The question asks whether Ernie is successful in maintaining the discrepancy between their two perspectives or whether the two have similar understandings of what is happening. Maintaining the discrepancy would be expected to be more difficult because of the asymmetry of the two views. That is, younger children may be more likely to collapse the two views than to see that Ernie was successful in keeping Bert in the dark.

While the numbers fall in the expected direction, the age difference is far from statistically significant. The idea that younger subjects would tend to see the situation as symmetrical is not supported by these data. The difficulties involved in asking the question which itself demanded recursive perspective-taking may have masked a real difference, however. Because the coding required information in addition to a simple "yes" or "no" response, 13 subjects were coded "not clear" and these were predominantly younger subjects. Thus the hypothesis of an age difference is untouched. This example may serve as an illustration of the difficulties of using an interview technique to assess these abilities. An a priori analysis is only as useful as the techniques for examining it empirically.

Characteristics of the Subjects

Up to this point in the discussion, various strategic perspective-taking features of the skits have been examined independently for their relation to age or grade of the subject. In this section, some other facts about the subjects will be examined, first, to see the extent to which subjects are found at similar levels of understanding across various features of the skits (and across skits) and, second, to consider the possible effect of features of the subjects other than age (for example, their conceptions of the characters) on their level of understanding.

The Relations Among the Skits

If a subject makes a sophisticated interpretation of Ernie's strategy in one skit, is she more likely to make a sophisticated

interpretation on another skit? An answer to this question requires partialling out grade of the subject since grade is consistently related to the level of sophistication and alone could account for why subjects would tend to be found consistently at the same level across skits and various features of the skits. Examining each grade separately is not possible because of the small number at each grade. However, in cases where both variables can be assumed to form ordinal scales, Kendall's tau provides a partial correlation coefficient which can be used. Unfortunately there is no test for the significance of this coefficient (Siegel, 1956).

For both the Angry and the Cookie skits interpretations were identified which were very different yet orderable according to the perspective-taking they required. It can now be asked whether subjects who interpreted one skit in the less sophisticated way were more likely to interpret the other skit in the less sophisticated way. Table 7 shows the relation between the Angry and Cookie plan types. The correlation is significant though not particularly high (Kendall's tau = .38 $p < .002$). There are only 9 subjects coded as Know on the Angry skit and all but one of them gave a Share interpretation of the Cookie skit. When grade is partialled out the remaining correlation is .27.

In some of the following discussions it will be useful to have a general index of how subjects interpreted Ernie's strategies. Combining the scores for the Angry and the Cookie skit has the effect of dividing the Share plans into those subjects who saw or did not see the deception in the Angry skit (i.e., assigning 1, 2 and 3 to the Share, Trick and Con plans and 1 and 2 to the Know and Avoid plans provides a range

Table 7

Crosstabulation of Cookie and Angry Plan Types
(Frequencies)

Angry Plan Types	Cookie Plan Types			Total
	Share	Trick	Con	
Know.....	8	1	0	9
Avoid.....	12	12	12	36
Total.....	20	13	12	45

between 2 and 5). This ordinal scale, which will be called the "Angry-Cookie Index" (or ACI), is used below in some of the discussions of the effects of other subject variables on skit interpretations.

The same question can be asked of other coding questions which are considered as an ordinal scale and which are found to be related to age. Do subjects who show greater perspective-taking facility on a feature of one skit also show greater facility on features of other skits and does this relation hold with grade partialled out? Ideally, the analysis of perspective-taking features of the skits would identify questions which placed similarly structured demands on the subject's interpretation. Unfortunately, the design of the study and the analysis of the skits does not provide features which are clearly an ordinal scale, for which a relation to age was found and which theoretically should be closely related. One case which can be examined, however, is the question of what Bert was thinking at the end of the Angry skit. While it does not make the same kind of demand as the interpretation of the Cookie skit, both questions are age related and ordinal. With grade not partialled out the correlation is .44 (Kendall tau, $p < .0007$) When grade is partialled out the resulting correlation is .34.

The correlations among the aspects of the subjects' interpretations suggest that the questions shared something in common. What that is can not be determined by a descriptive study such as this one. While it is clear from a priori analysis of the skits that there were many aspects which required perspective-taking, it is also clear that understanding Ernie's trick in the Cookie skit and interpreting Bert's mental state at the end of the Angry skit are quite different tasks.

They differ both in the content of the perspectives and in which character's perspective has to be considered. Given "natural" materials like these skits, it is unlikely that the same cognitive task would ever happen twice. But the range of tasks incorporated in these skits has allowed a broad sampling of strategic interaction problems.

The Subjects

The subjects differed in several ways besides age. These were not always controlled in the selection of subjects but possible influences can be considered. The measure to be used is the "Angry-Cookie Index" (ACI) which was invented in the previous section. Sex was one subject variable which was controlled: the grades were split evenly between the sexes. There was no difference attributable to sex, however. Two other variables are of interest.

Social Class. The social class of the subject was noted and coded in a informal manner. The subject was simply asked what her father or mother did for a living. Subjects whose parents were doctors, scientists or other professionals were coded as "upper". Subjects whose parents were in business or had other jobs that required college but not advanced training were coded "middle". Blue collar workers and the unemployed were coded "lower". The sample as a whole was predominantly "upper class" (29 out of 48) and only 4 subjects were coded "lower". While no attempt was made to assign equal numbers, it turned out that the social class was fairly evenly divided among the grades (first grade and college samples had a slightly higher proportion of upper class subjects). In relation to ACI there is a significant correlation

with social class (Kendall's tau = .32 $p < .02$). No attempt will be made to interpret this relation. The point to be made is that if there is some consequence of having professionally trained parents it is not confounded with age in this study.

Familiarity. After each skit, subjects were asked if they had seen it before. Their combined answers provided a rough index of how familiar they were with the characters. (Yes was assigned 3, maybe 2, and no 1; the scores for the three skits were summed for each subject; then subjects were divided into two groups: high and low familiarity). Younger subjects tended to be more familiar with the skits (chi square=4.11 (1) $p < .05$). Familiarity, however, is unrelated to ACI ($p < .50$). (Using Kendall's tau and partialling out the effect of age the correlation is very close to zero). A related measure to familiarity is the order in which the skits were shown. and Cookie skits.

Concepts of the Characters

One important difference among the subjects was how they perceived the characters. At the end of each interview several questions were asked about about Bert and Ernie in general. It is assumed that, to a large extent, these impressions came from their experiences outside of the interview situation as well as from the skits they just saw. It would be expected that these impressions would color their interpretations of the skits to a certain extent.²⁹ The concern here is to see

29. It was noted in chapter 2 that the skits used in this study were not entirely representative of the Bert and Ernie corpus. In the skits used here, Ernie was portrayed as clever whereas in other skits he is portrayed as honestly foolish.

whether different impressions were related either to age or to how Ernie's plans were interpreted.

Being Friends. Subjects were asked both who they liked better as characters and who they would more likely be friends with if Bert and Ernie were kids at the school. Ernie was far more popular as a character (28 out of 38 subjects who chose one or the other). But when it came to being friends the choice was more evenly split. There were no age differences in these choices.

Who's Smarter? Subjects were asked who they thought was older. They were almost unanimous that Bert was older than Ernie. There was some disagreement as to who was smarter. Ernie was generally considered smarter specially among older subjects but this relation to age was not statistically significant. The relation of this question to the "Angry-Cookie Index" was roughly the same as for age. While these trends are not strong, there is still some reason to suspect that different initial beliefs about the characters may have influenced the subjects' interpretations.

The importance of how Ernie's smartness was perceived can be seen the the following examples. One first grader gave the following account of what caused Bert to faint in the Banana skit:

S1.3-B4

- S: Because because because he thinks he's dumb because he has the inside and should have the outside.
- I: Who's dumb, who does Bert think is dumb?
- S: Ernie.

- I: Ernie. Oh he thinks Ernie is dumb.
- S: Because he gave him the outside and he thinks people can eat the outside of a banana.
- I: Is that what Ernie thinks? Do you think that Ernie really thinks that or does Bert just think that?
- S: Bert, no Ernie just thinks that.

While this child's interpretation is not entirely consistent (earlier in the interview she said that Ernie was just doing it because he had another banana), it appears at this point that Ernie does not know any better and it is his dumbness that causes Bert to faint. (It also may be that it is only Bert who thinks Ernie is dumb--the last question-answer is difficult to interpret.) A third grader raised the same issue about Ernie's lie in the banana skit much more explicitly:

S3.10-B3

- I: Is Ernie lying or is he telling the truth when he says I'm gonna divide this banana up right now so both of us can have some?
- S: Well, it depends on how he how much he knows.
- I: Well.
- S: If he's dumb.
- I: Yeah.
- S: He he's saying the truth. But if he's smart, he's not.
- I: Okay, so, if he's dumb, then what Ernie thinks that it--could you tell me what.
- S: That if he eats the inside then Bert would eat the outside that would be fair and square because they each have part of it.
- I: And what if he's smart, what is that?
- S: Like, like he's doing if he was smart he would be playing a trick on Bert. Like he'd eat the whole banana cause the

outside you don't eat. So he would be smart and eat the good part and let the- give the bad part to Bert.

I: Uh huh, do you think that Bert, do you think that Ernie's smart or not or or dumb? Which one do you think he is? I mean maybe you're not sure but which would you guess?

S: Dumb.

I: You think he's dumb?

S: Yeah.

I: What do you think Bert- do you think Bert thinks he's dumb or do you think Bert thinks he's smart?

S: Bert thinks he's, well, I don't know ().

I: Uh huh, okay, when did-

S: Maybe he thinks he Ernie's smart and he maybe he- after when he sees that that Ernie's giving him the out- the out- the skin of the banana, he'll think Ernie's smart and was playing a trick on him. Then he's gonna faint.

By the end of the skit the subject decided that Ernie was smart after all and explained: "Well, I I got confused too because all the other cartoons he he uses he acts so dumb".

A subject who begins the interview with the assumption that Ernie is dumb may have difficulty noticing his trick as the second example shows. It may also be the case that young children tend to miss Ernie's deceptions and consequently think that he is dumb (as he often tries to get Bert to think). Since Ernie's cleverness is in his trickery the two concepts are difficult to unravel.

CHAPTER VI

LIES, FAIRNESS AND PERSPECTIVE-TAKING

This chapter explores two kinds of social judgment. The first is the judgment that Ernie told a lie or told the truth. The second is the judgment that Ernie was fair or unfair in what he did. Subjects were asked both for their judgments and for their justifications for the judgments. These judgments and justifications are treated here separately because both kinds of judgments occur in all three skits. Considering them together allows for a more systematic discussion of the relation of these judgments to perspective-taking demands and to the strategies they are concerned with.

Piaget (1965) observed that the young children's thought in both these realms was characterized by "realism". When presented with stories about various wrong doings, this egocentric attitude leads children to judge lies by the magnitude of their discrepancy from reality and to judge wrong doing by its consequences or its relation to a rule rather than by the intentions and motivations which led to the action or the lie. In other words, actions are judged by the features that are "objective", that can be plainly seen by all concerned e.g., by the parent and child in Piaget's stories. The concept of realism has a clear interpretation in the terms of the present discussion. The intentions behind the child's lie or wrong doing are not shared or

mutual knowledge between the story characters (the parent does not necessarily know it was an accident or that the child was attempting to deceive) so these facts may be difficult for young children to consider in judging the action. The consequences of the actions or the rule that was broken, on the other hand, are shared knowledge and therefore easier to consider.

Realism and other aspects of perspective-taking can thus be found as features both of the subjects' interpretations and of their judgments of Ernie's strategies. The relationship of perspective-taking and social judgments is still a matter of much debate. The controversies will be raised after presenting analyses of the interviews about the three skits.

Lies

A lie is a common deceptive tactic in which the liar gets the victim to believe that he is offering a statement as something which should be mutually believed but, in fact, the liar does not believe it himself. Lies usually serve some larger purpose for the liar. In each of Ernie's deceptive strategies, a lie plays a key role. In the Angry skit, he tells Bert that he was just trying to imagine what people look like when they are angry. In the Banana skit he tells Bert that he is going to divide the banana up so both of them can have some. In the Cookie skit he tells him that he is just going to demonstrate. Ernie can also be heard as lying in the Angry skit when he tells Bert he is just great at getting angry and in the cookie skit when he says that he

would share the cookie if it belonged to him.³⁰ The following discussion will first consider the hypothesis that a lie should be more difficult to see than the truth. and then consider in detail the differences for some of Ernie's lies with respect to the kinds of justifications given and to the plan Ernie was seen to be carrying out.

Age Comparisons of Whether Ernie was Lying

When a speaker tells the truth and the listener believes it, the fact can then be attributed to their shared mutual beliefs. Since a lie would produce a discrepancy between the perspectives of the two characters and since such a discrepancy should add to the difficulty of perceiving the situation, it should be expected that younger children would be less likely to see a lie than older children. This prediction is not confirmed by the data, however. For none of the five lies that Ernie tells is there a significant relation between age group and whether Ernie's utterance was called "a lie" or "the truth" (subjects who said it was both were dropped from this tabulation) although in some cases the figures are in the expected direction. These results are somewhat surprising since for the Angry and Cookie skits, a lie played a critical role in the plans involving deception and these plan types were related to age. Other strong patterns in the data help to explain why the simple hypothesis was not adequate.

30. Each of these lies (which were not always seen as lies by the children) were the subject of interview questions. The subjects were asked first if Ernie was telling a lie or the truth and in many cases what made it a lie. Unfortunately, the justifications proved difficult to elicit and to code in many cases so the data are incomplete.

Evidence. Ernie's lie at the beginning of the Cookie skit showed one important kind of difference in the ways younger and older subjects interpreted Ernie. In this case Ernie was arguing that if the cookie belonged to him, he would share it with Bert. To know whether this is true, the subject has to consider Ernie's past and future actions. Table 8 shows that many of the older subjects answered that they could not tell if he was lying or not. This difference may be explained by a difference in familiarity of the younger and older subjects with Ernie's character. Five of the 7 subjects were relatively unfamiliar with the skits.³¹ This was the only interview question which elicited this kind of response consistently. Perhaps related to this questioning of evidence were the justifications given by three subjects who cited Ernie's behavior in the Banana skit as evidence for saying he was lying about his willingness to share in the Cookie skit. This realism presents a striking contrast to the weighing of evidence found among some older subjects.

Partly both. Table 8 indicated that two subjects considered Ernie's utterance partly a lie and partly the truth. These responses are of interest because they indicate that the subject is able to see the statement from two points of view. For the lies where this kind of response was common, it tended to be related to age group.

31. It was noticed while coding that older subjects would be more likely to question whether they knew or on what basis they were answering. For example, one undergraduate (SC.12) answered: "I don't know because, I don't know. Maybe I'm getting too technical but you know, I'd have to know how he operated. If he always told the truth before and I knew him for a year, then I'd assume he's telling the truth". Unfortunately, because these kinds of comments were very sporadic, it was not possible to code them reliably.

Table 8

Age Comparison of Judging as a Lie or the Truth
Ernie's "I would share" Lie in the Cookie Skit
(Frequencies)

A Lie or the Truth?	Age Group		Total
	Younger	Older	
Truth.....	11	4	15
Lie.....	11	13	24
Partly both.....	1	1	2
Can't tell.....	1	6	7
Total.....	24	24	48

Tables 9, 10, and 11 show the responses of the two age groups to three of Ernie's lies. Each of these is critical to the plan Ernie is carrying out. The first, shown in Table 9, is Ernie's statement at the beginning of the Angry skit in which he tells Bert that he was just trying to imagine how people look when they are angry. In response to the question of whether Ernie was lying or telling the truth, younger subjects more often answered that he was telling the truth. It can also be seen that it was predominantly older subjects who could see both sides of Ernie's statement. That older subjects were more likely to see both a lie and the truth in Ernie's assertions is most clearly shown in Table 10 which shows the responses to Ernie's saying that he is going to divide the banana in half so they can both have some. Only three subjects unequivocally called this the truth (and these are not actually unequivocal as we will see). Dropping these subjects from consideration, a substantial age difference ($\chi^2=8.12$ (1) $p<.01$) is found between seeing the assertion as a lie versus seeing it as a half truth. The third lie in which Ernie claims that he is just going to demonstrate what he would do if the cookie were his is shown in Table 11. These data also show a difference between younger and older subjects in the same direction although the relationship does not approach significance.

While it is not the case that younger subjects were more likely to consider Ernie to be telling the truth, they were less likely to see that his utterance could be both the truth and a lie. It is in relation to the justifications for considering Ernie to be telling the truth or lying that this aspect becomes clearer.

Table 9

Age Comparison of Judging as a Lie or the Truth
Ernie's "trying to imagine" Lie in the Angry Skit
(Frequencies)

A Lie or the Truth?	Age Group		Total
	Younger	Older	
Truth.....	8	2	10
Lie.....	13	16	29
Partly both.....	1	5	6
Total.....	22	23	45

Table 10

Age Comparison of Judging as a Lie or the Truth
Ernie's "divide this banana up" Lie in the Banana Skit
(Frequencies)

A Lie or the Truth?	Age Group		Total
	Younger	Older	
Truth.....	1	2	3
Lie.....	16	5	21
Partly both.....	7	17	24
Total.....	24	24	48

Table 11

Age Comparison of Judging as a Lie or the Truth
Ernie's "just going to demonstrate" Lie in the Cookie Skit
(Frequencies)

A Lie or the Truth?	Age Group		Total
	Younger	Older	
Truth.....	8	9	17
Lie.....	10	11	21
Partly both.....	1	4	5
Total.....	19	24	43

Justifications

Subjects often spontaneously or in response to a probe gave a reason for saying that Ernie was telling the truth or lying. (But such justifications were often difficult to elicit since what makes a statement the truth or a lie was apparently considered self evident.) There were two kinds of justifications. One kind was about the evidence that the statement was true or false. The other kind was about the relationship between Ernie's statement and the state of affairs it referred to. This second kind which was more common is of interest here. These justifications raised the question of what aspect of the situation would count as evidence rather than simply stating the source of the subject's evidence. We can look first at the justifications for considering the utterances to be the truth and then at those for considering them to be lies.

Literal Truth. There were two main kinds of justifications for considering Ernie to be telling the truth. The first can be called "the plain truth". This simply asserts that Ernie's proposition was true. The second kind can be called "literal truth". Here the subject recognizes that what Ernie says is, in itself, true but that it implies something which is false. (A third, less frequent kind more closely resembled the evidence kind of justification in that Ernie's later action is what makes his statement true.)

The literal truth is of interest because it orients to the specific way that Ernie manipulates Bert's perspective. It shows how the same utterance can simultaneously be taken two ways. There is the

way Bert takes it because he makes a warranted inference from what Ernie says and there is the literal meaning which Ernie could play on if he wanted to argue that he didn't really lie. Because there were a large number of missing values (especially among younger subjects) it is not possible to test for an age difference. Literal truth justifications tended to be more frequent among older subjects, however. (Of the 35 examples, 25 were from older subjects). In the Banana skit, literal truth accounted for all but two of the subjects who thought Ernie was telling (or partly telling) the truth about dividing the banana up. As was seen on table 10, these were predominantly older subjects. The greater frequency of literal truth justifications in this case can be accounted for by the fact that at the end of the skit Ernie claimed to have been telling the truth about dividing the cookie. These cases of literal truth also were coded as "partly both" most frequently. For the other lies, there was no tendency for literal truth to go with partly both.

Lie Justification Levels. The justifications given for calling Ernie's statement a lie also can be analyzed in terms of the implied perspective-taking. Again the Banana lie provides a clear case because of the large number of codable justifications. Table 12 shows the frequency of response for the two age groups at four levels. The first level is the "plain lie". These subjects simply asserted that what Ernie said was false. For example a first grader gave the following reply:

Table 12

Age Comparison of Justifications for Calling
Ernie's "divide this banana up" Lie a Lie in the Banana Skit
(Frequencies)

Justification Type	Age Group		Total
	Younger	Older	
Plain lie.....	5	2	7
People don't eat peels..	9	6	15
Bert expects.....	4	5	9
Ernie misleads.....	1	7	8
Total.....	19	20	39

S1.8-B3

I: Well is Ernie telling the truth or is he lying . . .

S: Lying.

I: What's the truth?

S: He's really gonna eat the whole thing.

At the next level, the subjects mentioned the facts that would be the basis for inferring that Ernie meant that he would divide the inside part but Bert's actual inference is not mentioned. For example, a fourth grade boy answered:

S3.4-B3

S: Well, lying in a, he's telling the truth, but he's not really. Sort of lying.

I: What's the, what part of it is true and what part of it is a lie?

S: Well, it's a lie because he knows that you, most people don't eat the outside of the banana.

I: Uh huh.

S: And he's telling the truth when he says he's gonna divide it up.

Another fourth grade boy answered:

S3.2-B3

S: I think he's lying. You know, its not fair. He gets the good part that you can eat. The other, and Bert gets the part that you, just, just the plain old banana peel. Can't eat that.

The third justification type cited the fact that Bert expects to get some of the inside part thus indicating that Bert actually made the inference. A sixth grade girl gave this answer:

S6.6-B3

- I: . . .is he telling the truth here or is he lying or what?
- S: He's telling the truth but he's not telling it the way that Bert's thinking because Bert thinks he's going to get some of the part you eat, not the outside. And Ernie's, he's giving him the outside.

The final alternative says that Ernie was misleading Bert into making that inference. An undergraduate answered:

SC.6-B3

- I: Is Ernie lying or is he telling the truth, you think, when he says I'm gonna divide the banana up?
- S: Well, he is misleading Bert again. He's in the strict sense, he's, is gonna share the banana so that they can each have some. But he's making Bert think that he's gonna get some, that Bert will get part of the banana and so literally, no, I guess he's not lying, but, but again he is.

Each of these levels makes progressively more explicit the inference process Ernie set off: the plain lie ignores the process; the next states the grounds but does not refer to the inference being made; the third shows the result of the inference in terms of a discrepancy between Bert and Ernie's beliefs; the final alternative mentions Ernie acting strategically to cause the inference to happen. All of the justifications except "plain truth" refer to Ernie's strategy at least indirectly. The differences are, thus, more in expression than in understanding. These categories and age are seen to be correlated when considered as an ordinal scale (Kendall's tau = .42 $p < .009$). The relation of these categories to whether the subject said the utterance was just a lie or partly both is close to the same level (Kendall's tau = .40 $p < .01$).

Ernie's other lies were less clearly meant to mislead in the way the Banana lie did. Reasons other than the falsity of the utterance were often given to justify calling them lies (but subjects who thought it was a plain lie may have often been coded "not clear"). The lie at the beginning of the angry skit was most often considered a lie because Ernie was really carrying out another plan. This is very close to calling Ernie's statement (that he wants to know what people look like when they are angry) a plain lie but gives Ernie's specific contradictory belief. Five of the 8 subject's who justified their calling Ernie's statement that Bert is just great at getting angry a lie did so also by citing Ernie's plan to exhaust Bert. In this case his plan does not directly contradict his statement but the general insincerity of the plan appears to color any utterance which is instrumental to it. For other lies, considerations outside of the plain falsity of the utterance were also brought in. For example, three subjects mentioned the fact that Ernie knew that the paper clips were lost as the reason for saying he was lying about wanting to know what people look like when they are angry. Likewise, when Ernie says he his going to demonstrate that he would share, four subjects felt it was a lie because Ernie would not really share the cookie. Unfortunately the data on these justifications is too sparse to determine if there are age differences.

Justification and Plan Type

Three of Ernie's lies played a critical role in his plan. It would be expected that whether these are seen as a lie or the truth

should be determined by what plan the subject thought Ernie was carrying out. This was not always the case, however. As was seen in the Banana skit, even though all subjects could see that Ernie was tricking Bert into thinking he was going to share the edible part of the banana, many subjects said that Ernie was telling the truth about dividing the banana up. In this case the anomaly was explained by the notion of literal truth. A number of anomalous cases occurred in the Angry and Cookie skits as well.

The Angry Skit. Table 13 shows that the relationship between the plan type and whether the subject said Ernie was lying or not is in the expected direction. Most subjects who thought Ernie was trying to Avoid Bert's anger said he was lying about wanting to see what people look like when they are angry. Two of the subjects who thought Ernie was sincere nevertheless thought he was lying at this point. One of these (S1.4) was unclear and apparently contradictory. The other (S1.12) brought in an unusual consideration: "he's really wants to find out how Bert can get mad, not anybody else just Bert." Altogether 9 subjects thought that Ernie was tricking Bert but thought he was telling the truth or partly the truth. Four older subjects thought that it was literally the truth since Ernie was trying to find out what people (at least Bert) look like. One sixth grader (S6.9) said it was partly true because "he did what he is trying to pretend to him" apparently referring to the fact that Ernie lost the paper clips. One first grader (S1.1) thought Ernie was really trying to avoid Bert's anger heard Ernie as telling the truth at this point because: "he's always imagining something, even if he goes to his bed, he can't really go to sleep

Table 13

Plan Type Comparison of Judging as a Lie or the Truth
Ernie's "just trying to imagine" Lie in the Angry Skit
(Frequencies)

A Lie or the Truth?	Plan Type		Total
	Know	Avoid	
Truth.....	5	3	8
Lie.....	2	26	28
Partly both.....	0	6	6
Total.....	7	35	42

so he has to imagine sheep and balloons, fire engines". The plausibility of Ernie's statement appeared to override seeing it as part of the plan. The remaining subjects did not provide codable justifications or changed their mind about Ernie's plan later in the interview.

The Cookie Skit. There were far more anomalies in the Cookie skit than in the Angry skit. Table 14 shows that the frequencies are in the expected direction though there is not as clear a relation between the plan attributed to Ernie and whether he was judged to be lying or telling the truth when he says that he just wants to demonstrate. As in the Angry skit, all the subjects who thought Ernie was telling partly a lie and partly the truth also thought Ernie was tricking Bert. Nine of the subjects (7 from the younger group) saw Ernie as sincerely sharing (or showing Bert how to share) the cookie and as lying about "just demonstrating". All of these subjects said that in order to be telling the truth, Ernie would have to give both halves back at the end of the demonstration. In these cases, the lie has more to do with what counts as a proper demonstration than with Ernie's attempt to deceive Bert. The truthfulness of the utterance is being judged against a rule for conducting demonstrations rather than Ernie's intentions which appear to be sincere.

Twelve subjects (9 from the older group) saw Ernie as telling the truth or partly telling the truth. Five of these heard Ernie as telling the literal truth that he was going to demonstrate but implying that nothing improper would happen. Four other subjects gave justifications which seemed close to the notion of literal truth but did not clearly imply that Ernie was being deceptive. For example a fourth

Table 14

Plan Type Comparison of Judging as a Lie or the Truth
Ernie's "just going to demonstrate" Lie in the Cookie Skit
(Frequencies)

A Lie or the Truth?	Plan Type		Total
	Share	Trick	
Truth.....	10	7	17
Lie.....	9	12	21
Partly both.....	0	5	5
Total.....	19	24	43

grade girl (S3.6) answered: "I think he's telling the truth cause you can also demonstrate by doing the real thing by eating the other half". Here it seems more to be a matter of definition than deception. Another fourth grader (S3.4) thought Ernie was partly telling the truth because at the end he did give Bert part of the cookie. Finally one sixth grader had temporarily changed her mind about considering Ernie to be tricking Bert.

The perception of lies is a very complex topic and only the surface has been touched on here. The aspect which is seen most clearly is the equivocal nature of lies. A lie is often only partly false but more importantly it is often designed to be partly true in case the lie teller is made to account for his deed. Some of the ways that utterances can mislead were illustrated by Ernie's tactics. In general there appears to be with age an increase in children's understanding of the equivocal nature of Ernie's lies and a greater appreciation for his tactical use of equivocality. The idea of a lie appears to be a relatively early acquisition but the fine tuning that is evident in these interpretations of Ernie involves seeing how statements can be intentionally misleading because they depend on an inference one actor can expect another to make. Thus, understanding these kinds of lies requires both skill at thinking about what one character will expect the other to infer and the understanding that one character can expect the other to make a particular inference.

Piaget (1965) has observed that young children tend to evaluate lies in terms of the likelihood of the statement and tend to define lies in terms of their relationship to the objective situation rather

than in terms of the intention to deceive. As was noted, one subject appeared to orient to the "size" of Ernie's lie. A few subjects appeared to judge lies in terms of the objective situation rather than Ernie's plan. This is seen for example in a first grader's (S1.3) answer about the Banana lie: "he's lying because he didn't give him any".

The objective view of what counts as a lie is also be found embedded in the literal truth justifications. Here the literal meaning is matched up to the objective situation though this match is not taken seriously. But the subject who sees that Ernie is literally telling the truth is recognizing that hypothetically Ernie could claim (on the basis of a concrete justification) he had told the truth after all. Recursive perspective-taking could be seen in the responses of seven (mostly older) subjects who, in answer to a later question, said that just before he fainted Bert would have seen that Ernie had told the truth by the objective criterion. Thus the objective criterion is reconstructed on the plane of the characters' embedded thoughts. That is, the concrete criterion is, for the older subjects at least, considered to be available to the characters as common knowledge.

Fairness

At the end of the discussion of each skit the subjects were asked whether or not they thought Ernie was being fair and why. ³² Ernie was

32. The subjects were first asked whether they thought Ernie and then Bert would think it was fair and then asked for their own opinions. Only the subjects' opinion are considered here. In some cases the justifications have been regrouped from the original categories eliminating some seldom used categories which were similar to others. A few

voted unfair by what might be considered a landslide. But differences in these judgments and in their justifications are related both to age and to the plan attributed to Ernie. Like the question about lies, the question of whether Ernie was being fair is clearly related to the strategy Ernie is seen to be carrying out. But while Ernie's strategy somewhat constrains the possible judgments of fairness, it does not exhaustively account for the sophistication of the judgments. These differences provide an opportunity to evaluate the adequacy of theories of the relationship of perspective-taking to moral judgment. The theoretical discussion will follow a discussion of the subjects' responses to the questions about fairness.

Tables 15, 16 and 17 show the number of subjects in each of the younger and older age groups who saw Ernie as being fair or as being unfair (or both). For the Angry and Banana skits, there appears to be a significant relation between age and judgment. The older subjects are more likely to consider Ernie to have been fair. But for the Cookie skit there appears to be a tendency in the opposite direction. Not surprisingly it is necessary to look at the patterns of the subject's interpretations of the skits and their justifications for an explanation for this pattern of judgments.

Justifications and Plan Type

Each skit presented a different set of issues. In each Ernie commits a different kind of transgression. The issues at stake also dif-

subjects gave more than one justification; only the more sophisticated category is used in the following discussions

Table 15

Age Comparison of Judgments of
Ernie's Fairness in the Angry Skit
(Frequencies)

Was Ernie Fair?	Age Group		Total
	Younger	Older	
Fair.....	0	8	8
Unfair.....	18	14	32
Partly both.....	1	1	2
Total.....	19	23	42

Table 16

Age Comparison of Judgments of
Ernie's Fairness in the Banana Skit
(Frequencies)

Was Ernie Fair?	Age Group		Total
	Younger	Older	
Fair.....	1	8	9
Unfair.....	17	10	27
Partly both.....	2	2	4
Total.....	20	20	40

Table 17

Age Comparison of Judgments of
Ernie's Fairness in the Cookie Skit
(Frequencies)

Was Ernie Fair?	Age Group		Total
	Younger	Older	
Fair.....	6	2	8
Unfair.....	8	14	22
Partly both.....	0	1	1
Total.....	14	17	31

ferred depending on how the skit was interpreted. But there are also commonalities among the justification offered for judging Ernie fair or unfair. Some of these appear as consistent age differences. The Angry, Banana and Cookie skits will each be discussed in turn.

The Angry Skit. A variety of justifications were provided for considering Ernie to have been fair or unfair in the Angry skit. These are shown in Table 18 with the frequency of subjects broken down by age. There was general agreement in both age groups that Ernie should have told the truth about the paper clips being lost right off. As one first grade boy put it:

S1.2-A4

I: It wasn't fair? Why not?

S: Because he really lost the paper clips and he should have told him.

An undergraduate said much the same thing.

SC.4-A4

I: Do you think personally do you think it was fair to . .

S: Condition him like that?

I: Yeah.

S: No. I think he should have just told him the truth.

A smaller number of subjects said that it was Ernie's deception of Bert that made his actions unfair. These, mostly college, subjects emphasised Ernie's trick, in particular, rather than his more general failure to tell the truth as the reason for considering Ernie unfair. These subjects gave more elaborate accounts as, for example, this

Table 18

Age Comparison of Justifications for Considering
Ernie Unfair in the Angry Skit
(Frequencies)

Justification Type	Age Group		Total
	Younger	Older	
Inequality.....	3	1	4
Harm or punishment...	4	0	4
Tell truth at first..	6	7	13
Deception.....	1	4	5
Total.....	14	12	26

undergraduate:

SC.5-A4

I: Why not, what wasn't fair?

S: Because he sort of manipulated, you know, Bert to think that you know, just pretending because he was using the word pretending all the time and so he uses that word pretending, it's not really fair because in truth he, you know, he was lying.

Four subjects, mostly younger, were concerned with the fact that there was an inequality of harm or effort. One first grade girl answered as follows:

S1.5-A4

I: Do you think it was fair?

S: No.

I: Why not?

S: Because one didn't have it, they didn't have it even.

I: What's not even?

S: One gets mad more times than the other one.

I: So it should be, everybody should get angry the same amount.

S: Yeah, it should be even if they're best buddies.

It appears here that the application of an equality principle is being forced on the situation. Damon (1977) has described a stage within the domain of distributive justice in which children use a principle of strict equality to solve hypothetical problems involving distribution. This girl's response suggests that the principle is not necessarily restricted to cases of "distributive justice" but is a more general

principle which can be applied to any question of fairness.

The remaining four justifications (all from younger subjects) focused more on the harm to Bert or lack of harm to Ernie. One child was concerned that Ernie was not punished; another that Bert was made to be tired; another that Bert did not have a chance to get really angry. Each of these justifications implies some concern with equality but that aspect was not made explicit. One of these, a first grade girl, invoked something like the golden rule.

S1.3-A4

S: Because people don't do that to people () they are not supposed to.

I: They are not supposed to, about what?

S: They're not supposed to do anything because if they did it to you, how would you like it. If they did it to you and they didn't want you to get mad.

Unlike the others coded in this category, this subject shows some concern with the motives involved.

Overall there appears to be two main concerns in these justifications for considering Ernie unfair. The first is a concern with what Ernie did (or failed to do) in the course of the episode. The second is a concern with the outcome or consequences of the episode. The "tell truth at first" and "deception" alternatives focus attention on Ernie's strategy (though "deception" does this more directly). These two types can be characterized in terms of the perspective-taking they call for. The plan that Ernie carries out and the fact he delays in telling the truth both produce a discrepancy between Ernie's perspec-

tive and the one Bert wrongly believes is mutually held. The "inequality" and "harm" justifications, on the other hand, refer to the objective situation at the end of the episode. It is a situation that can be evaluated without considering the intentions or beliefs of either character. The state of affairs referred to is objective also because, if the characters were to think about it, they would understand it to be mutually seen. The discrepancy is in an objective state of the world not in the beliefs and intentions of the characters.

The distinction bears a resemblance to a well known but controversial phenomenon. Piaget (1965) originally observed that young children tend to focus on the consequences while older children consider the intentions behind actions when asked to judge the blame-worthiness of the action. The child who exhibits "moral realism" demands that the letter rather than the spirit of the law be observed thus conformity to the rule and not the motive is what is important. This attitude induces "an objective conception of responsibility" in which the consequences of action are used as the measure of obedience to the rule. While Piaget argued that the attitude of moral realism was a result of adult constraint and would change only through experience with cooperative interactions with others, a more functional explanation can also be offered. Focusing on an "objective" rule or result is easier because it does not require consideration of a discrepancy between two perspectives. It requires less effort at perspective-taking so is mastered at an earlier age than justifications which involve differences between perspectives.

Methodologically refined studies have shown this phenomenon of objective responsibility to be partly conditional on factors such as the medium of presentation (Chandler, Greenspan and Barenboim, 1973) or the order information is presented (Feldman, Klosson, Parsons, Rholes and Ruble, 1976). Most studies, however, still find a somewhat greater interest in the end state among younger children and a greater interest in what the character did to produce the state among older children.³³ In the present study, the younger children's concern with equality and harm does not reference what Ernie was trying to do or how he was doing it. The concern with Ernie's failure to tell the truth and his trick, which is somewhat more frequent among the older subjects, indicates greater attention to the discrepancy which Ernie produces in carrying out his strategy between Ernie's perspective and the perspective Bert thinks is shared. (When adjacent categories of the four categories of justifications in Table 18 are collapsed, the age difference is significant: Fisher, $p < .05$).

When the justifications for considering Ernie to be fair are examined it becomes clear that the concern for consequences does not disappear with age. Of the 10 subjects who considered Ernie fair (or partly fair) only one was from the younger group (see Table 15). Of these, five provided codable justifications. One undergraduate (SC.9) felt that avoiding Bert's anger justified Ernie's actions and that Bert would probably do the same thing. Another undergraduate reasoned as

33. Piaget's contention that children do not put the two parts together is not warranted from the kind of choice task Piaget used, as Leon (1977) points out. Leon shows that the valuation process by which the child weights the factors can be deconfounded from the rule by which the factors are integrated in coming up with a judgment.

follows:

SC.6-A4

S: . . . I mean you could say it's fair in that nobody got hurt as a result of Ernie's actions whereas if Ernie hadn't say, taken the, done what he did in the story, then Ernie might have gotten hurt so he prevented himself from getting hurt. Whereas Bert, whereas if Bert had gotten angry, nothing would have been gained by that except hurting Ernie. I mean it wouldn't have got his paper clip collection back so I guess it's fair.

Thus for some of the older subjects there is a reversion to an interest in consequences. This pattern suggests that there are processes of weighting and integration of factors in arriving at a judgment as Anderson (1980) and Leon (1977) have argued. If the damage is valued at zero, a multiplicative integration rule would reduce the bad intent to zero also.

Judgments and justifications concerning Ernie's fairness in the Angry skit appear to be age related. It was seen earlier in this chapter, however, that the interpretation of the skit itself was also age related. In their interpretation of the Angry skit, a small number of subject's (predominantly first graders) saw Ernie as actually wanting to know what people look like when they are angry. For these subjects, there was no major deception although some heard Ernie's "confession" that he had lost the paper clips as a lie designed to make Bert angry one last time. The remaining subjects saw Ernie as carrying out a strategy to incapacitate Bert the thereby avoid his anger when he finally found out about the paper clips being lost. The issue can now be raised as to how much of the age difference in the justifications can be accounted for by the kinds of interpretations of Ernie's plan

and how much can be attributed to a difference in what younger and older subjects consider relevant to their judgments.

Since all the subjects who described Know plans, were in the younger group, it can be seen from Table 15 that all these subjects nevertheless considered Ernie unfair. Five of these subjects provided codable justifications. A first and a third grader (S1.10, S3.11) thought that although Ernie did lose the paper clips he was trying to see how Bert gets mad. Ernie was unfair because he should have told Bert instead of doing the other thing first. Another first grader (S1.4) thought it was unfair because Bert did not like to get angry. A first grader who thought the paper clips were not lost was concerned about inequality.

S1.8-A4

S: . . .Bert didn't get a try and it was very tiring for him. He didn't do, Ernie didn't do anything for Bert. He only thought something for him to get angry, that's all.

Another first grader (S1.9) was concerned about deception--but the deception came not at the beginning but at the end when Ernie lied about the paper clips being lost in order to get Bert to display anger one last time. These justifications were codable under the same categories as were used to code subjects who thought Ernie was deceiving Bert in order to avoid his anger. While the Know plan accounts for only a small number of subjects, there does not appear to be any effect due to this difference in interpretation.

For the subjects who saw Ernie as trying to Avoid Bert's anger and who felt that Ernie was unfair, there is still a significant relation

of age to justification type. (With the "truth first" and "deception" categories collapsed and the "inequality" and "harm" categories collapsed, Fisher, $p < .01$). Thus it appears that both the plan types and the justification types can be understood in terms of more or less discrepancy between mutually believed situations and other perspectives. But it also appears that plan type does not determine justification type. While both can be understood in terms of strategic perspective-taking demands, the justifications appear to place their own load on the subjects' capacity.

The Banana Skit. All subjects perceived the banana skit in roughly the same way: Ernie was seen as lying about his intention to divide the banana in half and this was usually seen as a way of teasing Bert. As was seen in Table 16, a small group of (mostly older) subjects considered Ernie to have been fair (or partly fair). The justifications for these judgments are shown in Table 19 broken down by age group. As in the Angry skit, there appears to be a tendency for the older subjects to consider Ernie to be fair because no harm was done. (The numbers are too small for a statistical test). These subjects typically felt he was just joking and that kind of tease is not unfair. Another six subjects thought it was fair because both characters ended up with a banana. This justification appears evenly split between younger and older subjects. While both these justifications are focused on the consequences of Ernie's actions, the No harm type does take into account Ernie's tease but discounts its importance. The Equality justification ignores the tease and looks to the final result (although pointing to that result may be an implicit discounting of the

Table 19

Age Comparison of Justifications for Considering
Ernie Fair in the Banana Skit
(Frequencies)

Justification Type	Age Group		Total
	Younger	Older	
Equality.....	3	3	6
No harm in teasing..	0	5	5
Total.....	3	8	11

tease). Older subjects appear more willing to not take teasing seriously.

Older subjects also tend to consider the tease as a reason for calling Ernie unfair. As can be seen in Table 20 a majority of the subjects felt that Ernie should not have withheld the other banana or should not have teased him. These types of justification are very similar and differ mainly in whether the focus is on what Ernie did or on what he should have done. Younger and older subjects appear about equally concerned with Ernie's lie ("deception") but only the younger subjects cited the inequality of the banana division (inside versus peel) as a reason to think that Ernie was unfair. This concern with inequality may be a reflection of the younger subjects' greater tendency to take Ernie's actions seriously. While the older subjects are debating the naughtiness of Ernie's tease, the younger subjects are dwelling on sharing the bananas: whether it was done equitably and with proper dispatch.

As was the case with the justifications in the Angry skit, two orientations can be distinguished in terms of the perspective-taking they imply. The concern with inequality focuses on an objective consequence which would be equally apparent to both characters. The justification which says Ernie should have given Bert the banana right away seems quite similar to the justification in the angry skit that Ernie should have told the truth right away. Both draw attention to what Ernie should have done. Insofar as they both focus on a procedure (telling the truth and sharing) that would be mutually understood by both characters rather than on the actual discrepancy produced by one

Table 20

Age Comparison of Justifications for Considering
Ernie Unfair in the Banana Skit
(Frequencies)

Justification Type	Age Group		Total
	Younger	Older	
Inequality.....	4	0	4
Should have given banana right away....	7	3	10
Teasing.....	1	4	5
Deception.....	2	2	4
Total.....	14	9	23

of them, these justifications may be considered less demanding of perspective-taking skills than the "deception" alternatives. In any case, the age differences are less pronounced for this skit than for the Angry skit.

The Cookie Skit. The pattern of judgments of Ernie's actions in the Cookie skit is different from the other two skits but the pattern of justifications shows some similarities. As was seen in Table 17, most of the subjects who thought Ernie was fair were younger children. This contrasts with the Angry and Banana skits where it appeared that the harm was not great enough for some of the older subjects to consider Ernie unfair. But as with the other skits, Ernie in the Cookie skit is predominantly considered unfair. The justifications for considering him unfair are shown in Table 21 broken down by age group. The pattern here is quite clear. Most older subjects focused on the deception and another group pointed out that it was Bert's cookie originally. Both of these point to flaws in Ernie's sharing but the first is explicit about Ernie's intention to trick Bert. Among the younger subjects, some also pointed out that it was originally Bert's cookie or that Ernie should have given both halves back. Interestingly, three first graders claimed that Ernie was unfair on the grounds that the cookie was divided unevenly. In all, nine subjects (5 first graders and 4 sixth graders) had insisted in response to an earlier question in the interview that the cookie was divided unevenly in Ernie's favor. The three younger subjects gave this as the reason for calling Ernie unfair.

Table 21

Age Comparison of Justifications for Considering
Ernie Unfair in the Cookie Skit
(Frequencies)

Justification Type	Age of Subject		Total
	Younger	Older	
Inequality.....	3	0	3
Should give whole cookie back.....	2	1	3
Cookie was Bert's..	2	5	7
Deception.....	0	7	7
Total.....	7	13	20

Five of the 8 subjects who thought Ernie was being fair in the Cookie skit gave codable justifications. These were all younger subjects, four of whom thought Ernie was fair because both Bert and Ernie got part of the cookie. The other subject thought Ernie was justified since Bert was being selfish. It should come as no surprise that these children also thought that Ernie was carrying out a plan to Share the cookie not one to trick Bert. In these cases the subjects' initial interpretation of Ernie's actions has a direct effect on their judgment. Table 22 shows the relationship between the type of plan attributed to Ernie (Trick and Con are collapsed into Trick since both involve a deception) and judgments of fairness. The relationship of judgment to plan type is slightly stronger than the relationship to age shown in Table 17 (contingency coefficient for age = .35; for plan = .42). This relation between plan type and fairness is to be expected since the subject's opinion about fairness was used as part of the evidence for coding plan type. But since Share plans are expected to be fair and Trick plans unfair, Table 22 presents a number of anomalous cases. Two undergraduates thought Ernie was playing a trick but nevertheless considered him to be fair. One (SC.3) seemed to think that Ernie's endearing slyness compensated for his obvious con. Another (SC.8) thought that Bert would consider Ernie's trick unfair but did not provide a justification for personally considering Ernie "a fair guy". The subjects who thought Ernie was unfair are shown again in Table 23 this time broken down by plan type. This table shows how the 8 anomalous cases where Ernie is sharing but unfair can be explained. Two first graders considered Ernie to be sharing unfairly because he gave himself more. Five others are cases where (mostly

Table 22

Plan Type Comparison of Judgments of
Ernie's Fairness in the Cookie Skit
(Frequencies)

Was Ernie Fair?	Cookie Plan Type		Total
	Share	Trick	
Fair.....	6	2	8
Unfair.....	7	15	22
Partly both.....	1	0	1
Total.....	14	17	31

Table 23

Plan Type Comparison of Justifications for Considering
Ernie Unfair in the Cookie Skit
(Frequencies)

Justification Type	Cookie Plan Type		Total
	Share	Trick	
Cookie was Bert's..	5	2	7
Deception.....	0	7	7
Inequality.....	2	1	3
Other.....	1	1	2
Total.....	8	11	19

older) subjects noted that the cookie was originally Bert's. However, these subjects did not indicate that this infelicity was part of a trick. For example, one undergraduate gave the following account:

SC.12-C4

- I: Do you think Ernie thinks that what he just did was fair?
- S: I don't know. He may not. Because he came back and later he tried to get half of the half of the cookie. He may think that he's using an honest principle correctly but he doesn't really realize that he's sort of tricking Bert out of some of his cookie.
- I: So do you think that, well, Bert would think that he's unfair, right? [S had already stated this]
- S: Yeah, or tricky . . .
- I: Do you personally think that it's fair to do that kind of thing or not?
- S: I guess I don't think it's fair for the other guy to use someone else's cookie because if it's Bernie's cookie, then it's sort of his right to eat it . . .

In this case the subject, who was not familiar with Ernie and for whom this was the first skit, is equivocating slightly about what Ernie had done but had basically interpreted the skit in terms of the honest principle. While Ernie's motives are a little unclear, the fact of the cookie having belonged to Bert leads to a judgment of unfairness.

For the Cookie skit, the judgments of fairness and the justifications can be accounted for both in terms of age and in terms of the subject's interpretation of Ernie's plan. In the case of subjects who complained of Ernie's deception, age and plan type coincide: they are all older subjects who saw Ernie's trick. But seeing Ernie's trick does not necessarily mean that the deception will be cited as the issue

for fairness. Considering only the subjects who saw the trick and who considered Ernie unfair, there is still a small but significant age difference in justification (collapsing the three less sophisticated categories into one, Fisher test $p < .05$). Likewise, while a number of both first and sixth graders saw Ernie as dividing the cookie unevenly, only first graders used that as a reason for considering Ernie unfair.

In the case of the cookie skit, the subjects' initial interpretation of the events had a strong influence on judgments and justifications but other factors were at work also. Like the interpretations of Ernie's actions, these factors having to do with what issues are considered relevant may also be related to mutual beliefs and discrepancies in perspectives. In the Angry and Banana skits justifications appeared to be related to age with the younger subjects tending to choose justifications based on consequences or on mutually perceived rules. Older subjects tended to be concerned with the interpersonal aspects of the conflict situation. Like the well known distinction between judgments based on consequences and judgments based on intentions, the present distinction between mutually perceived states and interpersonally discrepant states has clear interpretation with respect to perspective-taking demands. Perspective-taking is required when the subject considers a perspective which is different from than which is (supposedly) mutually shared by both characters. The perspective-taking demands of making fairness judgments appear to work in conjunction with the demands of the initial interpretation of the situation, which also can be formulated in terms of mutual beliefs and discrepant perspectives, to produce a particular judgment.

The final section of this chapter will discuss the cognitive-developmental approach to the relation of perspective-taking to social judgments.

Role-taking and Moral Judgment

Several writers from the "cognitive-developmental" tradition have proposed specific relations between role-taking and moral thought (Damon, 1977; Kohlberg, 1969, 1976; Selman, 1971; Selman and Damon, 1975; Walker, 1980). While these assertions have not always received support from studies of the correlations among tasks which are supposed to measure development in these domains (Kurdek, 1978), the relations which are said to obtain arise primarily from theoretical analyses of the respective domains. What is usually proposed is that perspective-taking or some other general logical structure is necessary but not sufficient for a particular stage of moral development. Damon (1977) points out that such models do not justify predicting that a task which measures the other structure will be ontogenetically prior to the stage since the child may be able to use the logical structure in the moral domain before she can use it in the specific domain of the task.

The claim of the cognitive-developmental theorists is that moral development consists, in part, in role-taking development. That is, the stages of moral development are defined in terms of the stages of role-taking or in terms of a higher level structure which is common to both domains. Given this interpenetration of moral and role-taking development as an initial theoretical assumption, it is not surprising to find that Selman has based his stages of role-taking almost entirely

on clinical interviews revolving around "dilemma" stories which, in many cases, are identical to those used in studies of moral judgment. While, in Kohlberg's view, role-taking and moral judgment are centrally related, they are also distinguished, however. Kohlberg posits a structural construct, identified as "sociomoral perspective", which encompasses "the way an individual differentiates his perspective from other perspectives, and the way in which he relates these perspectives to one another" (perspective-taking as studied by Selman) as well as the specifically moral judgments which he studies (p. 33). This deeper level structure seems to correspond to the very general formulation of role-taking presented by Byrne (1973) and can be distinguished from the more specific problem of thinking about other peoples perspectives. In the generally accepted cognitive-developmental view there are a number of related "domains of social knowledge" all of which are dependent on role-taking (in the more general sense). That is, there are a set of parallel developments which are separate from moral judgment per se (Damon, 1977; Turiel, 1978) as well as a deeper level structure which is identified with understanding the social world in a general way. 34

The development of general role-taking abilities, however, is considered a necessary but not sufficient condition for moral development

34. Turiel (1978) provides the following rationale for expecting differential domains of social knowledge. He argues that "if the child interacts with fundamentally different types of objects and events, then we would expect that child to form different conceptual frameworks" (p. 29). Different domains have their source in differences in environmental objects and so "thinking is organized (and changes sequentially) within a domain, but not necessarily across domains" (p. 30). But on the relation of these domains to role-taking he takes a somewhat different position from Kohlberg's. He argues that role-taking or perspective-taking are neither separate domains nor deeper level structures but activities which will be done better or worse depending on the domain to which they are applied.

because "to make a judgment of fairness at a certain level is more difficult than to simply see the world at that level" (Kohlberg, 1976, p. 32).

The judgments and justifications of fairness in the Bert and Ernie skits provides some evidence for the claim that there are two processes at work: one being the initial interpretation of the situation and the other being the judgment of fairness. While both the type of strategy Ernie was carrying out and the kinds of justifications offered could be ranked in terms of their perspective-taking demands, it was found that subjects who had the same general interpretation of Ernie's strategy nevertheless would bring different considerations to bear in evaluating his fairness. This is not to say that the two processes are entirely independent. Clearly, not seeing a deception would eliminate that fact as a candidate justification.

A parallel can be seen between the necessary but not sufficient relation claimed by cognitive-developmental theorists to hold between general role-taking and moral judgment, and the obvious fact that a child would not be able to justify calling Ernie unfair on the basis that he deceived Bert if she did not notice that a deception took place. The necessary but not sufficient condition arises because the judgment is an action on the interpretation. The interviewer's question about what is fair necessarily refers to the events as the subject understands them. A deeper level of structure is necessary only because the structure of moral judgments is the structure of action on moral dilemmas and action is difficult to describe independent of its object.

The concern among cognitive-developmental theorists for the "global" aspect of stages has led them to include in each of the subdomains the more general constraints on social understanding. But there may be principles for resolving conflict which get used across different kinds of situations and which would allow an characterization of moral judgments independent of the constraints on understanding the situation. The problem is not so much to establish the relationship between role-taking and moral judgment but to find a way to distinguish them. What appears to be called for is not more demonstrations that the way a situation is judged is related to how it is understood, but an attempt to separate the two processes.

The judgments of Ernie's fairness and the interpretation of his strategies were both characterizable in terms of a functional constraint referred to as their perspective-taking demand. No attempt was made to place subjects at an overall stage of "strategic understanding". While correlations among skit interpretations were found, they could be accounted for simply in terms of similar levels of difficulty of the interpretations rather than in terms of a stage of knowledge which the subjects had achieved. The same was true for the kinds of justifications which were offered. In this approach, perspective-taking is not a domain of knowledge either higher or lower than the understanding of the situation or the moral justifications. Consonant with Turiel's (1978) view, it is seen as an activity with definite constraints which would be expected to condition the understanding of social situations and the principles used in judging them. In this approach it is not necessary to posit a general underlying structure.

Just because two structures (i.e., from two different domains) develop under somewhat the same conditions (i.e., the child's functional ability to consider other perspectives) does not necessarily mean that they are connected in actuality to the same lower level structure.

The understanding of situations and moral principles may undergo stage-like developmental change but perspective-taking itself does not necessarily go through such changes. Changes in the ability to consider multiple perspectives (in the course of interpreting an interaction or judging one of the actors) may be more appropriately explained as an increase in cognitive capacity. As the present data shows, the development of knowledge about what actors can be expected to know and do and the development of principles for judging them may be, to a certain extent independent of each other. Progress in the study of how social situations are understood and how those understandings develop will require distinguishing and clarifying the knowledge and capacities which are brought to bear on the situation. The analysis of these data has attempted to isolate the workings of a functional aspect as it applies to understanding and judging social events.

CHAPTER VII

CONCLUSIONS

The interpretations of these Bert and Ernie skits show, at least, the remarkable complexity of social information that children may be exposed to from an early age. But they also show that much of that complexity appears to "go over the heads" of many of the younger children. Within specific aspects of this limited domain developmental progressions can be detected. The present study provides a map to show where some of the complexity of social situations may lie. In this final chapter, the results of the study are summarized and some of the features and limitations of the map as well as some directions it indicates are discussed.

The analyses of the interpretations of the three skits point to a large number of somewhat independent aspects which require a capacity to consider a perspective which is different from the perspective that one character assumes to be mutually shared. The analyses of the Cookie skit shows that the discrepancy between the two views may vary considerably depending on the interpretation. The variation may be considered quantitatively in terms of the number of nodes and relations which are found in the outside Belief Space which are absent in the Mutual Belief Space and in terms of the number of nodes which are actually in conflict between the two Spaces. The same analysis applies to

the Angry skit. It also applies to many of the specific tactics which Ernie brings in to accomplish his strategies. His lies and his flattery, for example, can also be understood as a violation of what Bert is led to believe that they both believe. It has been argued throughout the presentation of the data that each skit presents many sources of complexity. While the same analytic principles show what makes these aspects difficult to comprehend, no attempt has been made to argue that global stages account for the age differences found. Rather, what appears more appropriate is an account based on specific cultural knowledge (including specific beliefs about Bert and Ernie themselves) about what Bert or Ernie are likely to conclude from each other's actions. This knowledge is called into play by a greater or lesser capacity to form representations of discrepant perspectives. The understanding of strategic interaction cannot be studied independently of the particular inferences that one actor can expect the other to make.

Toward a Theory of Perspective-taking

What has been evolving throughout these discussions is a framework for understanding the place of perspective-taking in a diversity of tasks which a child may face. Perspective-taking can not be considered essentially as having knowledge of other people's mental states although coming to know what to expect other people to think, feel, see, intend and so on is an important aspect. The aspect which has been stressed here is how this knowledge comes to be used strategically and the complexities of doing so.

The system of notation which has been used to represent various strategic perspective-taking situations along with the psychological interpretation of it in terms of various developmental phenomena, provides the beginnings of a theory of perspective-taking. The central elements of the theory are the following:

(1) the Mutual Belief Space represents the "ordinary" situation, that is, a situation which the actor takes for granted as both objective and "what anybody knows". (The infinite recursion often associated with mutual belief is a potential which is partially realized when mutually believed states are used in strategies formulated outside of the Mutual Belief Space.)

(2) The content of the Mutual Belief Space depends on cultural knowledge and mutually held inference procedures. Cultural knowledge is the knowledge others can be expected to have by virtue of membership in some community. Mental States may be included in mutual belief when there are culturally known reasons for the participants to expect that some action expresses them.

(3) Belief Spaces outside of mutual belief represent the actors private thoughts which he presumes are not shared (at least not shared in the sense of mutual belief). States are represented in these Spaces in the case of deceptive plans which are concealed from the other and in cooperative cases when one actor has an understanding which has not yet been communicated.

(4) Embedded Mental States³⁵ may be found inside or outside of mutual belief. Embeddings outside of mutual belief take the form of Belief Spaces. Inside mutual belief there may be multiply embedded Mental States. (For example, two actors may mutually believe that one of them believes some fact which the other does not believe. This public disagreement would be represented inside mutual belief).

(5) Both kind of embeddings (Belief Spaces and embedded Mental States within mutual belief) contribute to the processing demand of forming representations of the situation. (The calculation of processing demand will depend of the content of the embeddings, e.g., the plans which fill the Spaces. Also, the kind of Mental State (Beliefs vs Intentions) may make different demands).

(6) When mutually believed States play a role in plans being formed in an outside Belief Space then the mutually believed States must be copied to the outside Space. The difficulty of representing such States is some combination of the difficulty of representing the embedded State within the Mutual Belief Space and the difficulty of representing the outside Space to which it is copied.

These proposals and the notation to which they refer provide a framework for interpreting a variety of phenomena associated with perspective-taking. We can consider first some formulations that others have made about the relative difficulty of various perspective-taking tasks. Then we can consider the implications of the present

35. The term "recursions" is often applied to these structures in discussions of perspective-taking. The term "embedding" is preferred here since it does not imply a single dimension.

proposals for understanding these relations. This leads ultimately to the question of the role of perspective-taking in development.

Calculating Cognitive Demand

Several researchers have made proposals for how to order perspective-taking tasks according to levels of difficulty. They have typically been concerned with the structure of the tasks not with specifying developmental stages. The following examples illustrate the wide array of features which have been considered in calculating the relative difficulty of various tasks.

Urberg and Docherty (1976) performed a cluster analysis on items from five commonly used tasks. They suggest that the following levels account for the relative difficulty of these tasks. At the lowest level are tasks which require only that the subject recognize that certain common situations produce certain reactions in people. At the next level are tasks which require "sequential decentering". For example, they used a story task which two children want a toy but it is given to one but not the other. The subject must describe the emotions of both children. This can be done by thinking about one child and then the other but there is no need to think about the two at the same time. At the third level are tasks which require "simultaneous decenteration". In these tasks both characters' views must be considered at the same time because one story character has information which the other one does not. They suggest that "iterative" (i.e., recursive) role-taking such as that demanded by Miller et al's (1970) cartoon task may be at an even more difficult level but their data are not clear on

this point.

Kurdek (1977) did a principle components analysis of scores on four common tasks. He found that Selman and Byrne's dilemma's were most closely related to Feffer's RTT task and that Chandler and Greenspan's (1973) "bystander task" was most closely related to the nickel-dime game. He notes that in neither of the first pair was the perspective of the main character engineered to be different from the subject's own viewpoint. In the other two, the subject had to consider two conflicting perspectives.

Thus, for both the Dilemma and RTT tasks one cannot be certain of the processes in which the child engages to infer another person's cognitions, since the child could merely be attributing his own social cognitions about the social interaction to the other person; in effect, this would involve identifying only one perspective, rather than simultaneously coordinating and balancing two differing viewpoints. (Kurdek, 1977, p. 1509).

Landry and Lyons-Ruth (1980) suggest that number of recursions provides a measure of task difficulty and they demonstrate high correlations among tasks when tasks were scored and compared according to the "levels" achieved by the subjects. In relation to the three tasks they used, they began their counting of levels at the subject and considered level 1 as the subject thinking about a story character. A case of level 3 would be the subject thinking about story character A thinking about character B thinking about A. The "thinking about thinking" cartoon task of Miller et al (1970) lends itself most easily to this analysis. They were also able to identify recursive levels in the subjects' discussions of Selman and Byrne's dilemmas. But here they note that the usual scoring of these dilemmas equates the

subject's thinking about others with the subject discussing the story character's thinking about others. They chose to systematically consider discussion of a story character as an additional recursion.

Landry and Lyons-Ruth did not use a task in which the subject was in an immediate perspective-taking situation with another person such as, for example, the nickel-dime game. Flavell et al (1968), however, suggest that a subject in the role of observer may appear to be more advanced since in an active role the subject's own perspective would be likely to exert greater pull ("centration") than would the perspective of either of two observed (or read about) actors. This hypothesis, however, has not been evaluated in any of the studies which compare task demands.

Implications for Task Analyses

The framework that is proposed here may be of some value in evaluating the various explanations for why some perspective-taking tasks are more difficult than others. Three issues are raised: recursions, the difference between actors and observers, and the distinction between sequential and simultaneous perspective-taking.

Recursions. It is proposed that embeddings of beliefs may occur inside or outside of mutual belief. If this is the case, any simple notion of recursion is inadequate. The two kinds of embeddings are quite different. The embeddings outside of mutual belief are not consistent with what the other believes. The embeddings inside of mutual belief are by definition shared by the two actors and are based on shared understandings and inference procedures. It is proposed also

that embedded states within mutual belief may, in certain cases, have to be represented in the outside Belief Spaces. Calculating the cognitive demand of such cases would have to take into account both sets of embeddings.

All things being equal, it is certainly the case that more embeddings call for more effort. Chapter 4 provided an extended discussion of what made one interpretation of the cookie skit seem to be more complicated than another. Number of recursions of perspective-taking, is perhaps the clearest criterion for judging complexity. But this, of course, relates to the content of the spaces. Presumably the content of the Belief Space (i.e., the content which is different from the next lowest Space) will give the Space a certain weight which would have to be considered in reckoning its demand. For example, the interpretations differed in terms of the number of virtual elements included in the Mutual Belief Space. This was an indication of the number of elements in the Mutual Belief Space which were contradicted by the plan that Ernie was really trying to carry out.

Observer and actor. The distinction between attributing perspective-taking to an observed actor and doing perspective-taking is important but is often treated unsystematically. In Selman's writings, for example, the stages of social perspective taking are defined in terms of the subject interacting with another person but the method of discussing stories actually puts the subject in the role of an observer. The relation between a subject's perspective-taking abilities vis a vis another person and his ability to attribute those skills to story characters remains a complex problem. The concept of mutual

belief is relevant to analyses of differences here. In any experimental situation the location of Mutual Belief Spaces can be identified. There is always one between the experimenter and the subject. In the case of games like the nickel-dime game, this Space is the central context of the experimental task since one of the experimenters is the opponent in the game. In other tasks, subject-experimenter interaction is not of concern because the subject is not engaged actively but is observing story characters. In some cases, like some dilemma stories and Bert and Ernie, the characters are engaged in interaction and set up between them mutual beliefs. In other tasks, the characters are not actively engaged with one another. Sometimes a character may be thinking about the other without actually interacting but in cases like some of the bystander stories, the characters never see or think about each other.

When two story characters do not interact, there is still the possibility of recursion if one character is thinking about the other. These recursions would be equivalent to embeddings outside of mutual belief except that the most deeply embedded Space is an ordinary Belief Space not a Mutual Belief Space. But the task in these cases is more often one of keeping the two separate points of view separate. It is not entirely clear in what ways this problem is the same or different from the problem of keeping one character's view distinct from the mutual beliefs that the characters share in cases where the two characters are interacting (or from the subject's problem of keeping her own and the experimenter's own perspective separate from each other and from their mutual perspective). The interactive situation (either

between characters or between subject and experimenter) introduces a question of content in that the facts in one Space refer to or contradict facts in the other Space. This is different from one Space simply containing more or less information than the other Space.

Interpretations of the Cookie skit were analysed with respect to the separation of the character's views. It was seen that in the simplest case both views were reduced to a single Mutual Belief Space. In other cases, there was an asymmetry: either Ernie was showing he would share but Bert thought he was just trying to get the cookie or Ernie was tricking Bert but Bert was unsuspecting. In a final set of cases, Ernie was tricking Bert and Bert was suspicious. This situation seems most like the cases of lack of differentiation between two characters which is measured by bystander tasks. Because the subject can see that Ernie is tricking Bert, Bert must see it also. The interpretation in which Bert is unsuspecting of Ernie's trick may be more difficult to represent because what Ernie knows about what is going on is very different from what Bert thinks. Kurdek (1977) describes this aspect of perspective-taking as "simultaneously coordinating and balancing two differing viewpoints" (p. 1509). But the simultaneity does not require that the characters actually be in the same interaction. He attributes this property to two tasks. One is the nickel-dime game the other is a bystander task. In both cases, two perspectives must be differentiated but in the nickel-dime game, the simultaneity required is much more immediate.

Sequential vs simultaneous perspective taking. The terms "sequential" and "simultaneous" has been applied to several different aspects

of perspective-taking. Urberg and Docherty use them to distinguish tasks in which two characters have access to the same information from tasks in which one character has information unavailable to the other. In the second kind of task the subject must keep the two views separate. Kurdek uses the terms in much the same way. Selman and Byrne (1974) use the terms in quite a different way. They distinguish their second and third levels of role-taking in terms of the child's ability to reflect on the other's perspective and to realize that the other can reflect on the child's perspective. At the second level,

these reflections do not occur simultaneously or mutually. They only occur sequentially. The child cannot "get outside" the two-person situation and view it from a third-person perspective (p. 804).

In the discussion of the distinction in the introductory chapter, the relevance of having mutual knowledge was pointed out. It was argued that the achievement of the third stage is dependent on the acquisition of shared knowledge and shared inference procedures such that others could be expected to come to the same conclusions given the same information and membership in the same community.

The "third-person" perspective can be interpreted as the ability to represent mutually believed facts in Belief Spaces outside of mutual belief. In the introductory chapter, this was illustrated in relation to the nickel-dime game where the "sequential" strategy required representing only States from the adjacent lower Spaces and did not involve mutual beliefs. The use of mutual beliefs can thus be seen as central to strategic interaction. The simultaneity their use affords is dependent as much on the acquisition of cultural knowledge as on the ability to differentiate perspectives and levels of embedding.

The Process of Development

We can assume that young children do not clearly differentiate between what they know in particular and what is shared in common with others. All facts are objective. There should be no problem then representing facts as mutually believed. They should be that way from the beginning. The situation may be reversed, however, in the case of particular inferences which the child generates during strategic interactions. Paradoxically, a child who may infer what the other thinks may be less "egocentric" than an older subject in not supposing the other will come to the same conclusion.

For example, the analysis of the nickel-dime game distinguished a sequential strategy from the more sophisticated strategy which began to incorporate simultaneous elements in Selman and Byrne's sense. The first strategy involves inferences about what the opponent is going to think about. These inferences are based on what the opponent is thought to believe not on what the opponent is thought to have as mutual beliefs with the subject. Thus it appears to be the case that facts which the subject discovers through a process of inference are not be attributed to the opponent until the inference is sufficiently secure for the inference process itself to be attributed to the other. Thus, sequential strategies may be learned or discovered before the same strategies would be attributed to the opponent.

Attributing the products of inference to another requires a firm grasp of the particular inference as well as of the fact that others think the same way. Understanding that others will carry out the same

cognitive operations on the facts is obviously also of critical importance. Growth of this understanding is central to strategic interaction.

Piaget (1973) describes cognitive development as the "socialization of individual intelligence". The social world is not just an object to be known but is the essential context of intellectual development. Logic and cooperation are indistinguishable:

Logic constitutes the system of relationships which permit the coordination of points of view corresponding to different individuals, as well as those which correspond to the successive percepts or intuitions of the same individual. (Piaget, 1967, p. 41)

The intellectual operations which the child acquires in the course of her interactions with others are in no way independent of her social understandings and abilities to cooperate with adults and other children. Piaget (1967) describes children in an activity oriented school where they are free to work together or alone:

Among the younger children, there is no distinct dividing line between individual activity and collaboration. The young children talk, but one does not know whether they listen. Several of them may be at work on the same project, but one does not know if they are really helping one another. Among the older children, there is progress in two directions: individual concentration when the subject is working by himself and effective collaboration in the group. (p. 39)

Piaget makes clear in this passage that he considers "egocentricity" or lack of it as much a feature of the children's intellectual structures as feature of the social organization of the work group. The same process of equilibration operates both to coordinate the schemes of the individual and to coordinate the collective action.

If we ask whether the intellectual operations are the cause or effect of cooperation, Piaget answers that it is like the question of "whether the chicken appears before the egg". Piaget does consider "interpersonal coordination" to be an important factor in cognitive development, however. An essential role can be found for the fact that "in any environment individuals ask questions, exchange information, work together, argue, object, etc." (Piaget, 1974 p. 302) if we consider the process by which points of view are coordinated. This process is simultaneously a social and individual coordination.

In a discussion of the origin and status of logical "groupings", Piaget makes the following argument:

Let us suppose, however, with common sense, that a superior individual, by ceaselessly shifting his viewpoints, manages all by himself to co-ordinate them with one another so that their grouping is assured. But how could a single individual, even if he were endowed with sufficient experience, manage to recall his previous viewpoints, i.e. all the relations he has perceived at one time or another but which he no longer perceives? If he were capable of this he must have succeeded in establishing a kind of interaction between his various successive states, i.e. he has built up, by continual agreement with himself, a system of notation which could consolidate his memories and translate them into a representative language; he would then have achieved a "society" between his different "selves"! In fact, it is precisely by a constant interchange of thought with others that we are able to decentralise ourselves in this way, to co-ordinate internally relations deriving from different viewpoints. In particular, it is very difficult to see how concepts could conserve their permanent meanings and their definitions were it not for co-operation; the very reversibility of thought is thus bound up with a collective conservation without which individual thought would have only an infinitely more restricted mobility at its disposal (Piaget, 1973, p. 164-165).

Current Genevan research is pursuing this hypothesis (Doise, Mugny and Perret-Clermont, 1975). The importance of this view in the present discussion is that it shows how cognitive development arises from the

coordination of perspectives. A rationality which originates in interactions would be an essential basis for community membership. The child's growing ability to be "rational" is central to the structure of her social life. This rationality is not something which applies only to the child's private thoughts. It is what she has in common with others and what she reconstructs in every cooperative interaction.

This view contrasts with Kohlberg's (1969, 1976) theory of the role of the child's social life in development. Kohlberg argues that environmental stimulation in the form of "role-taking opportunities" results specifically in socio-moral stages. These arise from the child's participation in social groups which allow for mutuality of role taking. Groups differ in the opportunities they provide and these differences can be used to account for differences in the moral stage achieved by children of the groups. To illustrate this difference, Kohlberg cites research showing much higher levels of moral judgment among children growing up on an Israeli kibbutz than among children from an American orphanage which provided far less social stimulation. Piaget (1974) makes a similar argument with regard to general cognitive development. Cultures which provide few opportunities to interact with peers or with adults in a mutual manner would be expected to show a lag in the average age that operational thought is achieved. While Kohlberg sees the effect of social interaction only the moral sphere, Piaget argues that it is crucial to the development of thought in general. It is necessary neither to accept the implication of a general "cultural deficit" nor to accept the notion of global stages in order to accept the notion that social development cannot be divorced from

cognitive development (Laboratory of Comparative Human Cognition, 1980). It is crucial to rationality that it is shared.

This common rationality allows us to expect that others will draw the same inferences from events as we do and that they will see the world as we do. When particular cultural practices are learned, greater sophistication arises in being able to see what (under particular cultural circumstances) others would think and the growing ability to make use of that information--to reflect on the fact that others would also come to those conclusions. Development may be characterized as learning what any member knows (whether these are specific details or general, even universal, principles) and learning to use that knowledge strategically.

Strategic interaction calls for an ability to stand back from an interactive situation and to represent it from another's point of view. To represent the other's view may require considerable effort especially if the expectations are relatively unfamiliar. It requires also an intimate knowledge of a culture's ways of doing things, and a member's rationality.

APPENDIX 1: TRANSCRIPTS OF THE SKITS

The following are transcripts of the three skits. The transcription conventions are those established by the Laboratory of Comparative Human Cognition. These conventions are detailed in "OSP Transcription Manual".

Angry Skit

Ern: Hey Bert. *taps on B's shoulder*

Bert: Hey:::: Ern. *turns around to face E*

Ern: Hey I was wondering if you could do me a big favor.

Bert: Aw sure Ernie, what is it?

Ern: Well I was wondering if you would pretend that you're angry for me.

Bert: *0.5 sec* I should pretend that I'm angry, for you?

Ern: Uh hum. You see, I was just trying to imagine what people look like when they're angry you know?

First stopping place.

Bert: Oh yeah=

Ern: =And I said to myself. Boy, nobody can get angry like my old buddy Bert gets angry=

Bert: =Huh, is that what you said to yourself?=
[

Ern: =Ya, honest I sure did Bert.]

Bert: I'll] be, huh=

Ern: =Cause you're really just great at getting angry=

Second stopping place.

Ern: =ya know.]

[

Bert: We:::ll Ernie] gee thanks ya know really=]

[

Ern: Uh huh, uh huh.]

Bert: =I- but but I can't just get angry like that, ya know I mean I, hum, I need something to get angry at, ya know I mean=

Ern: =Oh::: well that's easy Bert. Ya see we could just- uh we could think of something.

Bert: Yeah=

Ern: =See. Sure let me just] think for a second.

[

Bert: Like what?]

Ern: Uh:::] well you know. For instance,=

[

Bert: Uhm.]

Ern: =you you know your paperclip collection.

Bert: Oh oh my favorite one yeah, yeah.

[

Ern: Yes.] You you have a favorite collection of little paper clips] that you=

[

Bert: Right.]

Ern: =just love.]

[

Bert: Oh I love] it so much.

Ern: Okay well] see now just pretend that] I=

[

Bert: Uh. Uh.]

[

Yeah.]

Ern: =borrowed that collection of paper clips and I took it out doors and was playing with it ya see=

Bert: =Yeah?

Ern: And pretend that I had it over there by the sewer ya see=

Bert: =By the sewer?

Ern: Yes. And pretend, that I dropped it in there and lost it for ever ya see Bert.

Bert: Ma ma my favorite paper clip collection? *starts getting angry*

Ern: Yeah yeah uh just pretend that I lost it down the sewer=
Third stopping place.

Bert: =*Screams, is angry and contorts face. 5 sec.*

Ern: Oh wow that was really great Bert, that was just beautiful.

Bert: Eah why eah thanks Ern. *out of breath*

Ern: You are you are-

Bert: Heah.

Ern: You are so good at being angry Bert.]

Bert: [Yeah?]

Ern: Oh yeah.

Bert: Oh::: we:::ll=

Ern: =Hey listen Bert.]

Bert: [Huh wha? yeah?]

Ern: Do it again for me?

Bert: Again?

Ern: Uh huh.

Bert: Oh Ernie.]

Ern: [I mean] it's so good Bert. I mean you can do it like nobody else can Bert.

Bert: Yeah Ernie but ya see it really is hard to do ya know.]

Ern: [Oh I'm] sure it's hard to do] but you can do it by just pretending=]

Bert: It's tiring.] [Huh?]

Ern: =ya see now now just pretend, pretend ya see, that I took your favorite paper collecton ya see, and I dropped it and

lost it.]
 [

Bert: Yeah?] *begins to get angry again*

Ern: Forever.]
 [

Bert: Lost it?]

Ern: Down the sewer=

Bert: Down the sewer? *screams, 4.5 sec.*

Ern: Oh that was fantas]tic Bert just] fantastic.
 [

Bert: Hu::h.] Yeah.] *out of breath*

Bert: *breathing heavily* Uh.

Ern: Hey list]en' Bert, Bert.
 [

Bert: Wha?]

Bert: Whu.

Ern: Bert?

Bert: Huh?

Ern: Do it once more=

Bert: =Oh Ernie look, I really I can't do it again, Ernie.

Ern: You can't] do it again?
 [

Bert: Oh no] it's so tiring.] *puts hand on head*
 [

Ern: How come?]

Bert: Oh Ernie see uh getting angry is very hard and and oh]=
 [

Ern: Uh huh.]

Bert: =boy it's so tiring too I I couldn't do it again no I just
 couldn't=

Ern: =Aw gee. You're absolutely sure you just couldn't get
 angry just one more time?

Bert: *out of breath sighs* Ernie I'm sorry I promise you I just
 could not do it one more time.

Ern: Oho]kay Bert.

[

Bert: Huhh.]

Bert: *sighs*

Ern: Uhm?]

[

Bert: Oh boy.]

Ern: By the way Bert.

Bert: Yeah.

Ern: I really did loose your favorite paper clip collection down the sewer. *Bert falls over backwards and Ernie walks away*

Fourth stopping place.

Banana Skit

Ern: Hello Bert, I'm home Bert.]

[
Bert: Hey Ernie yeah yeah I see.]

Ern: *E is carrying in grocery bag* Oh yes indeed. I'm home from the grocery store.

Bert: Oh good. Hey did ya get everything on the uh grocery list Ernie=

Ern: =Oh I certainly did. I have] a quart of milk there.

[
Bert: Good.] *E takes milk out of bag*

Bert: Yeah.

Ern: Jar of peanut butter. *takes jar out of bag*

Bert: Yeah.

Ern: And a uh...loaf of bread= *takes bread out of bag*

Bert: =Hey uh Ernie did ya get the bananas?

Ern: Oh oh bananas I certainly did uh. *E takes out one banana* Look at that.

Bert: O:::h] wo:::w. *looking at banana*

[
Ern: See.] *refering to banana*

Ern: Really looks yummy, doesn't it?

Bert: Yea:::h.

Ern: Yup. I think I'm gonna eat one right now. *hums while peeling banana*

Bert: Hey Ernie. *0.7 sec while staring at E with the banana* Ernie?

Ern: Yes Bert.

Bert: I like bananas too ya know.

Ern: Oh I don't blame you Bert, they really taste terrific. *Bites banana and chews*

First stopping place.

Bert: *0.7 sec* Hey Ernie in in fact I uh I love bananas Ernie.
puts hand out to banana and stares intently at E chewing
Bananas are just about my favorite, Ernie.

Ern: Oh I know, I know they are Bert. Uhhh. *1 sec., while
continues chewing on banana*

Bert: Ernie are you gonna stand there being selfish]=

Ern: [Huh?] *while chew-
ing on banana*

Bert: =and eat that banana all by yourself?

Ern: *mumbles while eating*

Bert: Huh? What kind of friend are you?

Ern: *swallows* You're right Bert. You're right. Why what
kind of a friend am I?

Bert: Yeah=

Ern: =Share and share alike we always say. Right=

Bert: [We:::11] =

Second stopping place.

Ern: =Bert?]

Bert: =that's better.

Ern: Part] for you and part for me.

[
Bert: Yeah.]

Bert: Okay.

Ern: Yes indeed Bert I'm gonna divide this banana up right now
so
both of] us can have some huh Bert?

{
Bert: Well.]

Third stopping place.

Bert: *E turns around away from B* What are you doing? *1.2 sec.,
B trying to look over E's shoulder* Ernie? *0.5 sec* Ernie?
Ernie you you're eating all the banana. *E turns back
around with banana peel* You ate it all.

Bert: No Bert we're sharing it.

Ern: Sharing it?

Bert: Sure I took the inside part, here's the outside part for you. *0.5 sec., E hands B the banana peel. Ernie then laughs his sneaky laugh and B looks crestfallen down at the peel*

Bert: A:::::gh. *faints*

Fourth stopping place.

Ern: Bert, oh Bert. Hey listen Bert I was just kidding. Look Bert, I have another whole banana just for you. *brings out another banana* Bert? *drops other banana down to Bert.*

Cookie Skit

Bert: Um um um uh. *B is holding a cookie and smelling it while smacking his lips. E enters*

Ern: Bert, oh Bert! *Stares at B's cookie* What'd ya have there Bert?

Bert: Uh, oh nothing, Ernie.] *turns back on E*

[
Ern: Why Bert, that looks like] a cookie Bert.]

[
Bert: Huh-no] Ernie.]

[
Ern: Bert,] that's a cookie and boy am I hungry. *B in trying to hide his cookie from E has turned around in a circle with E following and grabbing at the cookie*

Bert: Ernie, Ernie- ho ho ho ho ho:::ld it. *protects cookie and makes E stop grabbing for it*

Ern: Ho, Bert why?]

[
Bert: Not] so fast, this cookie is for me. Um.

Ern: Bert, but just just a second, Bert.] *holds B's cookie arm*

[
Bert: What?]

Ern: I think, Bert, that we have a problem. *puts arm around B's shoulders*

Bert: No no, I don't.]

[
Ern: Yes, yes] we do Bert. *attempts to bite cookie and E holds B's hand back* You see uh just a second Bert. No, no don't.]

[
Bert: It's] my cookie. *E lets go of B's arm*

Ern: No, you see, Bert, you want to eat the cookie and I want=

[
Bert: Yeah.]

Ern: =to eat the cookie. So what] can we do about it, Bert? *E scratches head*

[
Bert: Uh.]

Bert: Well uh=

Ern: =I, I have the answer.

Bert: You do.

Ern: Yes. We will share the cookie Bert.

Bert: I have a answer.

Ern: Um?

Bert: No we won't. *makes movement to bite cookie and E prevents him*

Ern: Oh yes we- Bert, Bert] just a second Bert.

Bert: [What?]

Ern: You wouldn't share that cookie with your very best friend Bert?

Bert: Ernie, I've been saving this cookie] all day for me.

Ern: [I can't believe my ears.] *B leans over toward cookie and E pulls B's cookie arm away from B's mouth*

Ern: Oh but Bert no no no just just just a moment, just a minute Bert, now listen Bert if this] were my cookie, if] this=

Bert: [Wha?] [Yeah.]

Ern: =were my cookie, I would share it with you, Bert. *0.5 sec.*

Bert: No you wouldn't!] *B opens mouth and raises the cookie*

Ern: [If that] cookie belonged to me, I would share it with you.

First stopping place.

Bert: No you wouldn't.

Ern: Aw, of cour- Bert just a minute. I'll prove it to you.=]

Bert: [What, ah, ah, ah.] *E takes the cookie from B, and B tries to grab it back*

Ern: Just, just, just a second, Bert. Now listen. Just pretend like this cookie is mine, see. Now you ask me if I will share this cookie with you. *B smacks his lips and wipes his mouth*

Bert: You took that cookie from me.

Ern: I just want to demonstrate.

Second stopping place.

Bert: Haaah. All right, all right, all right. Uh, what do I do?

Ern: Just ask me if I'll share it with you, Bert.

Third stopping place.

Bert: Uh, all right, um, this is silly. Ernie. Ernie.]

Ern: [Yes,] Bert.

Bert: Would you share that cookie with me? *speaks slowly and emphaticly*

Ern: Why, yes Bert. *breaks cookie in two* I'd be happy to share it with you. Here ya go. *hands B half of the cookie and eats the other half* One-half for me and one-half for you, Bert. See there? I told you I would share it with you, Bert. *0.7 sec.* That's what friends are for, Bert. *1.2 sec., E finishes eating cookie* Thanks a lot Bert. *1.7 sec., E walks off*

Bert: I don- I don't get it. I I don- I don't get it. *stares down at the half of cookie in his hand*

Fourth stopping place.

Ern: *Ernie returns* Hey Bert, will you share that half-a-cookie with me?]

Bert: A:::::G::H!]

B holds cookie away from E

APPENDIX 2: INTERVIEW QUESTIONS

Introduction

This list of interview questions is based on the typewritten list of question used by the interviewer as a guide during the interview. A few questions were added to the list where additional questions were consistently asked during the interview.

The interview was conducted somewhat as a clinical interview. Additional questions were asked when what the subject said required clarification. The way questions were phrased varied with the subject's apparent ability to comprehend. Questions were omitted if the subject spontaneously provided the answer. Occassionally questions were omitted unintentionally. No attempt has been made to determine the extent to which the following list reflects the actual interviews.

1. Angry Skit1.1 First Stop: 'I was just trying to imagine . . .'

- 1.1.1 Why did E say that? What was he trying to do?
- 1.1.2 (Did B know E was trying to do that?)
- 1.1.3 Is E telling the truth or is he lying?
- 1.1.4 (if lying) Does B know what E is really up to?
- 1.1.5 (if truth) What does B think about this?

1.2 Second Stop: 'Cause you're just great . . .'

- 1.2.1 Why did E say that? What is he trying to do?
- 1.2.2 Is E telling the truth or is he lying?
- 1.2.3 Another child said E was flattering B.
- 1.2.4 What does flattery mean exactly?
- 1.2.5 Does B think E is flattering him?
- 1.2.6 Why does B think E is saying that?
- 1.2.7 How does B feel?

1.3 Third Stop: 'And pretend that I dropped it in there.'

- 1.3.1 Why did E say that? What is he trying to do?
- 1.3.2 Does B think that E really lost the paperclips or does he think it's just pretend?
- 1.3.3 Is it possible to get angry at something that's just pretend?
- 1.3.4 (if no) How does B feel? Why is he angry?
- 1.3.5 Why did E choose the paperclips as an example?

1.4 Fourth Stop: Bert faints

- 1.4.1 What happened to B?
- 1.4.2 Why did he faint (fall over etc.)?
- 1.4.3 From B's point of view, what would B be thinking just before he fainted?
- 1.4.4 Was B surprised that E lost the paperclips?
- 1.4.5 Why didn't B get angry like he did before?
- 1.4.6 When B said he was too tired was he telling the truth or was he making an excuse?
- 1.4.7 Was E trying to get B to faint or was he expecting B to do something else?
- 1.4.8 Did E think what he did was fair or not? Why?
- 1.4.9 Did B think E was fair, or not? Why?
- 1.4.10 Do you think what E did was fair, or not? Why?

2. Banana Skit2.1 First Stop: 'Oh I don't blame you Bert'

- 2.1.1 Why did E say that? What was he trying to do?
- 2.1.2 What was B trying to do?
- 2.1.3 (if get banana) Does E know B wants some?
- 2.1.4 (if yes) Does B think that E knows that B is asking for some?
- 2.1.5 What does B think E is doing?

2.2 Second Stop: 'Share and share alike'

- 2.2.1 Why did E say that? What is he trying to do?
- 2.2.2 How does B feel? Why?
- 2.2.3 When did E realize that B wanted E to share the banana?

2.3 Third Stop: 'I'm going to divide this Banana up'

- 2.3.1 Why did E say that? What is he trying to do?
- 2.3.2 Why does E turn his back.
- 2.3.3 Is E lying or telling the truth?
- 2.3.4 When did E decide to give B the outside part?
- 2.3.5 (Does B think E's telling the truth?)

2.4 Fourth Stop: Bert faints

- 2.4.1 What happened to B?
- 2.4.2 Why did B faint (fall over etc.)?
- 2.4.3 What E trying to get B to faint? Did he expect B to faint?
- 2.4.4 Why did E do it when he had another banana?
- 2.4.5 If B hadn't fainted what would E have done?
- 2.4.6 (At end does B see that E had been partly telling the truth?)
- 2.4.7 Did E think what he did was fair or not? Why?
- 2.4.8 Did B think E was fair or not? Why?
- 2.4.9 Do you think what E did was fair or not? Why?

3. Cookie Skit3.1 First Stop: 'If this were my cookie'

- 3.1.1 Why did E say that? What is he trying to do?
- 3.1.2 Is E lying or is he telling the truth?
- 3.1.3 Does B think he's lying (telling the truth)?
- 3.1.4 Another child said E was trying to make B feel guilty.

3.2 Second Stop: 'I just want to demonstrate'

- 3.2.1 Why did E say that? What is he trying to do?
- 3.2.2 (if 'to get 1/2 the cookie' point out E now has whole cookie.)
- 3.2.3 Is E lying or telling the truth?
- 3.2.4 (if lie) If E was going to tell the truth, what would he do?
- 3.2.5 What is E going to prove?

3.3 Third Stop: 'Just ask me if I'll share it with you.'

- 3.3.1 Why did E say that? What is he trying to do?
- 3.3.2 What does B think E is trying to do?
- 3.3.3 Does B think E's going to give the cookie back to him or not?
- 3.3.4 Is it a fair demonstration?
- 3.3.5 (if no) What's not fair about it?
- 3.3.6 (if yes) What's B going to think about E eating 1/2 the cookie?
- 3.3.7 How does B feel? Why?

3.4 Fourth Stop: B: 'I don't get it.'

- 3.4.1 Why is B saying that? What's he thinking about?
- 3.4.2 How does B feel?
- 3.4.3 Was E trying to get B confused or not?
- 3.4.4 (if yes) What was confusing about what he said?
- 3.4.5 Who got the bigger piece or did they both get the same?
- 3.4.6 Did E think what he did was fair or not? Why?
- 3.4.7 Did B think E was fair or not? Why?
- 3.4.8 Do you think what E did was fair or not? Why?
- 3.4.9 Was E being mean or did not not know any better?

4. Final Discussion

After the Last Skit:

- 4.1 What do you think of E? What kind of person is he?
- 4.2 What do you think of B? What kind of person is he?
- 4.3 Who do you like better?
- 4.4 If they were kids in school, who would you be more friends with?
- 4.5 Who do you think is older? What ages are they?
- 4.6 Who is smarter?
- 4.7 Do you think these are good skits to show to little children?

APPENDIX 3: CODING MANUAL

Introduction

The coding scheme described here attempts to specify the subject's interpretation of the skit. The coding consists of the coders answers to a set of relatively specific questions about the subject's interpretation. Some questions closely resemble questions asked during the interview. Other questions require using evidence from longer sections of the interview. For each coding question, a set of alternative answers is provided by the coding scheme. This manual sets out definitions and procedures which coders followed in answering questions of the transcribed interviews.

The first section sets out general and recurrent procedures. The following three sections set out the questions, alternative answers with specific definitions and procedures for each of the three skits: Angry, Banana and Cookie. A fifth section explains the coding of the final general questions of the interview. The interview questions, which are referred to in this manual are in Appendix 2.

General Rules and Criteria

The following rules and procedures apply generally to all the skits. The first set of rules concern general decision criteria which have application throughout the coding. The second set of rules con-

cern questions which recur several times in the coding of the skits. The next set concern answer alternatives which are possible coding categories for all or many of the coding questions.

General Decision Criteria

The interpretation is treated as though it were a completed and static set of beliefs about the character's actions. No attempt is made to code features of the process of forming the interpretation. Thus, changes of mind are not noted (although there are rules for deciding which alternative to code as the subject's interpretation and which to ignore). Likewise, no attempt is made to code the subject's level of certainty about the interpretation--as long as a clear statement is made, it is coded as part of the interpretation.

Most of the questions refer to events or states in the story world as interpreted by the subject. Where the subject distinguishes between ordinary reality and the reality within the story, the story interpretation is what is coded.

Yes/No Answers. Except where specifically stated, a one word answer to a Yes/No question is not sufficient information by itself for making a choice among alternatives. The subject must also formulate the situation in some other way. This additional information may simply be the statement of the proposition in the question, or it could be an answer to another question bearing on the same topic which is answered consistently with the Yes/No answer. Likewise, a statement which presupposes the answer to the Yes/No question would be sufficient additional information for using the original answer as the basis for

coding the item

When the Subject Says Two Things. The subject may say that more than one of the alternatives are true or could be true. There are four kinds of cases.

First, the subject may state that two (or more) noncontradictory alternatives are true. This is an expected occurrence for questions followed (on the coding form) by "more than one possible". In this case, both alternatives are indicated on the coding sheet.

Second, the subject may give contradictory information. If there is no indication that the subject achieved a new insight or changed her mind, then the question is coded as "not clear". Changes of mind may be mentioned explicitly or manifested in a coherent reformulation.

Third, the subject may change her mind about some situation. In this case the coder must decide which of the alternatives was more strongly held. Indications that the subject had achieved a new insight favor the new alternative. Indications that the second alternative was suggested by a statement or question of the interviewer would favor the first alternative. Without either indication, the first alternative is favored.

The fourth case is one in which the subject proposes two alternatives with each but not both possibly correct. As with the case of change of mind, the coder decides which of the alternatives is more strongly believed to be the case. If there is no indication of which one is considered more likely, then the first alternative to be pro-

posed is chosen.

Answer Alternatives

The alternatives are to be understood in relation to the definitions provided in this manual. Some alternatives contain terms in parentheses which are to be understood as alternative phrasing. The alternatives can be used for a range of subject interpretation. How wide the range is must be determined by the constraints stated in the definitions as well as the phrasing of the alternative itself.

Relations among alternatives. Some sets of alternatives are exclusive of each other. For others (where indicated) more than one alternative is permitted. Sometimes, for those which are exclusive, the alternatives are "ordered". This usually means that an alternative later on the list implies or assumes one that is earlier on the list. In this case, it is not necessary to indicate the earlier alternative if the later one can be selected.

Other. A question is coded "Other" when the other stated alternatives do not fit the case or when (where permitted) there is additional information parallel to the alternatives. The category is used only for information which is parallel (i.e., the same topic) to the stated alternatives. Preference is given to a stated alternative if what the subject says captures the gist of the alternative. When "other" is used, OT is written next to the question number on the coding sheet and is followed by a short description of what the subject said. The description should stick as close as is practical to the words the subject used.

Not Clear. This choice is made whenever there is not enough information in the interview to decide among the preceding alternatives. Lack of information may occur if the subject's response to a question is inaudible, if the subject's response is audible but incomprehensible, or if no questions were asked which gave the subject a chance to provide the information. A case where the subject refused to or was unable to give an interpretation because the skit seemed impossible or unrealistic, the response is coded as unclear. Except in particular cases where "subject doesn't know" is given as an alternative a don't know response is coded as not clear.

When a definition or procedure states that something must be "clearly implied", the coder has to decide if, from what the subject says (as transcribed), it is clear that the subject meant to imply that the something is the case in the story world. No attempt has been made to formulate more specific criteria.

Recurrent Question Types

Is it a lie or the truth? "Lie" and "truth" mean what the subject means by them for the purpose of coding. For example, the subject may say that Ernie is telling the truth but also say that the fact which Ernie asserted was not true of the world in the skit. In this case, it is assumed that for the subject "telling the truth" does not require that the asserted fact be true. The question would be coded as "telling the truth" because the subject uses that term to describe Ernie's action. The coding of the justification would distinguish among the meanings that "telling the truth" has for the various subjects.

When the subject gives reasons for calling the utterance both true and false, two cases must be distinguished. In one case, the subject may be weighing two alternatives which for her are incompatible. This could be handled as explained above under "When the Subject Says Two Things". In the other case, the subject sees the utterances as both true and false at the same time. Here the "Little of both" alternative is selected.

Justifications for Lying or Truth. These question types refer to the subject's reason for seeing the character's utterance as a lie or the truth. They do not refer to the character's (Ernie's) motive or reason for lying unless the subject's belief that Ernie has that motive is the subject's reason for thinking that Ernie is lying. In general, justifications are beliefs or intentions of the character which make what he says a lie or the truth. While a subject may or may not consider them as a character's beliefs or intentions, it is possible to construe them as such. Features of the interaction such as tone of voice which may have been the subject's reason for thinking the utterance was a lie or the truth are not counted as justifications because they can not be construed as beliefs or intentions of the character. These cases are coded "Not clear". If the subject offers, as a justification for calling an utterance a lie or the truth, a fact about the world in the skit of which the character was unaware, this justification is coded as "other".

Often under "Justification for truth", there is a "plain truth" and/or "literal truth" version. The plain truth is the case where Ernie

is knowingly saying something that is true of the story world and does not imply anything false of the story world. In addition to saying the utterance is the truth, the subject must clearly imply that the utterance is the plain truth for this alternative to be chosen. The literal truth alternative is chosen when the subject clearly implies that Ernie is clearly implying something he knows is false.

Is Ernie fair or unfair? Fairness expresses a very general moral judgement. Subjects usually respond with "fair" or "unfair" and this is the basis of the coding regardless of the justification given.

As with the true/false questions, cases where the subject is weighing incompatible fair/unfair alternatives must be distinguished from those where the action is seen as both fair and unfair at the same time.

Since the questions about whether Ernie and Bert thought what Ernie did was fair precede the question about whether the subject thought it was fair, there is a danger that the subject took the question to be about himself rather than about the characters. Unless the subject makes it clear that he is talking about the character, it is assumed that he is talking about himself (and his answers are relevant to that question. One way he may make it clear is by using the character's name. Another thing that would make it clear that he is not talking about himself is if he expresses a different opinion when speaking for the character than when speaking for himself.

Justifications for Fair or Unfair. As with the justifications for lying or truth, these questions are concerned with the subject's reason

for thinking that the actions carried out were fair or unfair. They do not refer to the character's reason unless the character's having that reason was the subject's reason for thinking what she did. These justifications are not necessarily beliefs or intentions of a character. They may also be, for example, the physical consequences of the action which make the action seem unfair to the subject.

Angry Skit: Coding Categories and Criteria

(1) Basic Plan Type

Alternatives

- A. Ernie is trying to avoid the consequences of having lost the paper clips.
- B. Ernie wants to know what people look like when

Definitions. Two basic plan types are considered. In the first, (alternative A), Ernie has lost the paper clips and is attempting to avoid what could be adverse consequences for him when Bert finds out. In the second kind (B), Ernie may or may not have lost the clips but, in any case, is trying to find out what people look like when they are angry.

Procedures. Location in the interview: Evidence for determining the basic plan type can come from anywhere in the interview.

(2) Ways of Avoiding Consequences

Alternatives

- 1. Wants to make Bert so he won't be angry
- 2. wants to find out how Bert's going to react
- 3. First does 2 then switches to 1.

Definitions. These alternatives apply to A type basic plans. Alternative 1 is a complete plan for incapacitating Bert.

Alternative 2 is perhaps just the first step in a plan but may be the entire plan. That is, Ernie may simply want to prepare himself for what will be Bert's reaction when he tells him.

Alternative 3 is a combination of 1 and 2. Ernie first checks out Bert's reaction but, finding that he gets enraged, he goes on to incapacitate him. It could be that Ernie formed the plan after finding out Bert's reaction, or it could be that Ernie had already considered what to do if Bert turned out to be angry. Either form would be coded as 3. In the case where Ernie formed the plan after seeing Bert's reaction, it could be the case that Ernie noticed that Bert got tired as a consequence of expressing anger and decided at that point to exhaust him.

Procedures. This question is coded only if alternative A was selected for question 1.

Location in the interview: Evidence may be found anywhere in the interview. For alternative 2, in particular, question 1.3.5 is often helpful since there the subject is asked why Ernie chose the paper clips as the example. If Ernie's plan was to check Bert's reaction, he would have to use the paper clips.

(3) Ways of Incapacitating BertAlternatives

- a. Exhausted from pretending to be angry.
- b. Bored with or tired of (not from) being angry.
- c. used to or conditioned to the idea of the paper clips

Definitions. These alternatives refer to mental or physical conditions which Ernie is trying to bring about in Bert in order to prevent or reduce his expression of anger. Alternatives b and c are quite similar. In b Bert is tired of the activity of getting angry, i.e., it is no longer gratifying, or he feels he has done Ernie enough of a favor, etc. In c, getting angry about the paper clips has the effect of making the idea of the paper clips being lost less terrible. It has a cathartic effect.

Procedures. Location in the interview: Evidence may be found anywhere in the interview.

The question is coded if either 1 or 3 is chosen for question 2.

(4) Did Ernie Lose the Paper Clips?Alternatives

1. lost the paper clips.
2. not lost the paper clips.
3. not clear if Ernie has lost the paper clips.

Definitions. This question is answered from Ernie's point of view. Did Ernie believe that he actually lost them (also was he lying when he said he did.)

Procedures. The question is coded only if alternative B was selected for question 1.

Location in the interview: Evidence for this is often difficult to locate but additional probes sometimes occurred during the fourth stopping place.

Care must be taken, in this case, to distinguish the subject's quoting of what Ernie said to be the case from what the subject actually believes to be the case.

(5) 'Just trying to imagine': Lie or Truth?

Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.
- C. Little of both or partly true or not entirely either

Definitions. Refer to the general rules section.

Procedures. Location in the interview: Question 1.1.3 asks this specifically.

(6) Justification for Truth

Alternatives

- 1. Ernie wants to know what people (or just Bert) look like . .
- 2. Ernie wants to know how Bert would react to the paper clips being lost.

Definitions. Refer to the comments on these kinds of questions in the General Rules section. Alternative 1 corresponds to the proposition being the "plain truth" although some minor variants are accepted

here also. Alternative 2 refers to the plan of checking out what Bert's reaction will be.

Procedures. This question is coded if A or C are chosen for question 5.

Location in the interview: The justification usually follows directly after the answer to question 1.1.3.

Alternative 1 is used where the subject thought the statement was true because the proposition described a state which Ernie thought was true of the world. The subject need not state explicitly that this is the case but it must be clearly implied by what he says.

(7) Justification for Lie

Alternatives

1. He's really planning as in alternative A to question 1.
2. Ernie lost the paper clips.

Definitions. Refer to the General Rules section.

Procedures. This question is coded if B or C are chosen for question 5.

Location in the interview: Same as for question 6.

For alternative 1, what the plan is does not have to be completely explicit within the first stopping place. It would have to be clear in the course of the interview that the subject had in mind an A type basic plan, however. The subject need only appear to be referring to the plan Ernie is undertaking.

(8) 'You're just great': Lie or Truth?Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.
- C. Little of both, partly true, or not entirely either

Definitions. Refer to the General Rules section.

Procedures. Location in the interview: Question 1.2.3 asks this specifically.

(9) Justification for TruthAlternatives

- 1. Ernie believes Bert is great at getting angry (gets angry a lot etc.)

Definitions. Alternative 1 refers to the plain truth (Ernie believes his proposition is true) although what it means to be great is allowed some flexibility.

Procedures. This question is coded if A or C are chosen for question 8.

Location in the interview: The justification is usually elicited by question 1.2.2 or by subsequent probes.

Alternative 1 need not be stated explicitly but, as in question 6, it must be clearly implied.

(10) Justification for Lie**Alternatives**

1. Ernie believes Bert isn't great (or the best)
2. Ernie is carrying out some other plan
3. Ernie doesn't really like or care about the way Bert get angry.

Definitions. Alternative 3 is used when the subject thinks that Ernie's not caring about Bert's abilities to get angry is enough to make Ernie's (otherwise possibly true) statement into a lie. That is, it seems that the subject is reasoning that Ernie's statement implies that he is interested in Bert's ability and it is this implied proposition which is false.

Procedures. This question is coded if B or C are chosen for question 8.

Location in the interview: Same as for question 9.

(11) What Mechanism is Ernie Using in 'You're just great'?**Alternatives**

- A. Ernie is complimenting Bert.
- B. Ernie is getting on Bert's good side, buttering him up
- C. Ernie has an ulterior motive
- D. Subject notices the irony in complimenting Bert

Definitions. Alternative A is used when the subject makes no mention of selfish motives or deceit on Ernie's part.

In B, the subject mentions that Ernie is getting Bert to have a favorable attitude toward him. This attitude is directly beneficial to

Ernie in some way (for example, Bert may be mollified in some way.)

In C, the subject also believes Ernie is trying to get Bert to have a favorable attitude but the subject mentions an action which Ernie hopes Bert will cooperate in doing and which is contrary to Bert's interests. That is, in C, what Ernie says leads to a good feeling in Bert which, in turn, leads Bert to be willing to do the action (which is against his own interests.) The difference between alternatives C and B is that in B the ulterior motive (or hidden agenda, see question 12) is at best implied; in C it is clearly stated.

These alternatives are ordered such that C implies B (which is true but not the whole truth) and A (which is true from Bert's point of view). So: if C then B and A; if B then A.

Procedures. Location in the interview: Anything within the second stopping place could be relevant to answering this.

Alternatives A, B and C are exclusive of each other but D can be used with any of them. In choosing between A, B and C, choose the highest one possible. C is highest since it includes B and A; B is next because it includes A. C or B are not chosen unless the aspects from the other alternatives which are implied by C or B are at least alluded to by the subject.

(12) The Subject's Definition of Flattery

Alternatives

- A. Same as a compliment.
- B. Falsehood or lie involved.
- C. Specific ulterior motive involved.

D. Subject doesn't know what flattery is.

Definitions. The A alternative is used when "compliment" and "flattery" are used interchangeably. That is, when something like the following is meant: The principle intention behind the utterance is to let the hearer know the speaker thinks well of him in some respect. (The speaker will probably also expect that the hearer will feel good about himself but this is less critical.)

Alternative B is used if the subject defines flattery as an utterance which is intended to be taken as a compliment but which is a lie or an exaggeration usually intended to create in the hearer a favorable attitude toward the hearer. This alternative is used also if the subject makes some general reference to deceit where it is not clear that she is referring to a hidden agenda of the sort described in alternative C.

The C alternative involves defining flattery as saying something which the hearer is supposed to take as a compliment but where the utterance is motivated by some consideration which the hearer is unaware of and which is contrary to his interests. The critical deceit for this view of flattery involves this consideration or hidden agenda. Whether the "compliment" is true, an exaggeration or an outright lie is a separate issue.

Procedures. These alternatives are ordered in the same sense as are those in question 12.

Location in the interview: Interview question 1.2.4 which specifically asks for a definition of flattery is used in answering this question. Additional questions were often asked which clarified the definition.

If in answering a definition question, the subject simply elaborates on what Ernie is doing, the subject's answer is used to code question 11. Use an answer to code question 12 only if the subject is attempting to give a definition.

The definition that is implied by the subject's interpretation of Ernie and Bert's actions is not considered. This implied definition may be different from or contradictory to the stated definition.

If the subject's stated definition of flattery contradicts what he says about what Ernie is doing, the definition overrides the description for coding this question. Non-Bert and Ernie anecdotes may suffice for coding this question providing a definition is clearly implied by the details of the story telling.

(13-16) Does Bert Think Ernie is 'Flattering' Him?

Alternatives

1. Yes.
2. No.

Definitions. This question presupposes that the subject thinks that Ernie is "flattering" Bert (regardless of what the subject thinks flattery means.) That is, the subject must use that term or at least agree that it is appropriate.

Procedures. Questions 13 through 16 are the same but are coded if, for question 12, alternatives A through D (i.e., "other") are chosen respectively.

Location in the interview: The coding is based on the answer to question 1.2.5 which asks if Bert thinks Ernie is flattering him.

If the subject does not think that Ernie is "flattering" Bert or if the subject does not provide a definition of flattery, this question is not coded.

(17) What Does Bert Believe?

Alternatives

- A. The situation is pretend.
- B. Momentarily or partially believes the situation is real.
- C. The situation is real.

Definitions. This question is about Bert's beliefs about whether or not the paper clips are lost. The question is related to question 19 because the subject may appear to contradict himself when the concrete case (17) and the hypothetical case (19) are compared.

Procedures. Location in the interview: Question 1.3.2 asks about this specifically.

(18) How Does Bert Feel?

Alternatives

- A. Bert is feeling angry.
- B. Bert is (mostly just) pretending to be angry.
- C. Bert is being angry (either A or B).

Definitions. - Alternatives A and B are a contrastive set. In A, it is clear that Bert has an actual emotional reaction of anger. In B, Bert is pretending to be angry. He may also feel some anger but he is primarily pretending. Alternative C is used when it is not clear whether or not Bert is pretending although he appears angry.

Procedures. Location in the interview: Question 1.3.4 was usually asked and provides basic information. Often an additional question was asked about if Bert is pretending. This was usually asked to disambiguate between alternatives A and B but also to clarify the situation when a subject thought it was not possible to get angry at something pretend.

(19) Is it Possible to Get Angry at a Pretend Situation?

Alternatives

- A. Yes.
- B. No
- C. For some people but not for others.

Definitions. A "yes" answer may or may not be qualified in question 20. If the subject answers "no" but qualifies it, it is coded as a "yes" answer (alternative A) but with the appropriate qualification in question 20.

Procedures. Location in the interview: Question 1.3.3 asks about this specifically.

For this question, if the subject distinguishes between real life and life in the story world, then her opinion about the real world is what is coded. So if the subject says it's possible for Bert because he's a puppet, then A rather than C is used.

(20) Qualification on Being Angry at Something Pretend

Alternatives

1. No qualification.
2. If you believe (for a moment) that it really happened.
3. If it's important (your favorite thing etc.)

Definitions. Alternative 1 is used if there are no qualifications. Alternative 2 applies if the subject believes that it is necessary to believe the situation is not pretend. Usually this belief goes along with thinking that the person could slip into thinking the situation was real just during the time of being angry.

Procedures This question is coded if A is chosen for question 19.

Location in the interview: Qualifications usually follow the answer to question 1.3.3.

As with question 19, the real world is what is at issue. Thus, if the subject says Bert is angry because it is important to him, this is not sufficient for coding 3.

(21) Bert's State Just Before Ernie Tells Him

Alternatives

- A. Too physically or emotionally exhausted to express anger.
- B. Bored or tired of getting angry about the paper clips.
- C. Suspicious of Ernie.

Definitions. This question is about Bert's mental, emotional and physical state just before Ernie tells him that the paper clips are lost. Alternative B is different from A in that in B, Bert would still be capable of getting angry with close to full force if there was something real to be angry about. Alternative C is of a different sort. It refers to Bert's suspicion that Ernie is up to something or that Ernie really lost the paper clips.

Procedures. Location in the interview: This question is coded on the basis of the answer to question 1.4.6 which asks about whether Bert was tired or just making an excuse when he said he couldn't get angry anymore. Other questions within the fourth stopping place may also provide relevant information.

The "excuse" question provides the main evidence but if the subject says Bert was making an excuse, this is not sufficient evidence for selecting alternative B. It only shows that alternative A is not correct. Additional information is required for coding B.

(22) What is Ernie Hoping Just Before He Tells Him?

Alternatives

- A. Bert will get angry.
- B. Bert won't get angry.
- C. Bert will faint (fall over etc.)

Definitions. This questions asks about what Ernie is expecting to happen to Bert when he tells him. Unless the subject says specifically otherwise coding is done assuming that Ernie thought his plan (whatever

that is) was successful. The degree to which Ernie may have been uncertain about the outcome is not represented. Alternative A includes descriptions of Bert's feelings and/or usual behavioral manifestations of anger.

Procedures. Location in the interview: Question 1.4.7 asks if Ernie was trying to get Bert to faint or whether he was expecting Bert to do something else.

(23) Bert's State Just Before He Faints

Alternatives

- A. Angry and/or shocked that the paper clips are really gone.
- B. Angry and/or shocked that Ernie lost the paper clips.
- C. Angry and/or shocked by Ernie's actions in the current

Definitions. This question refers to Bert's thoughts or beliefs which would cause anger, shock or surprise which, in turn, would lead to his fainting. Alternatives A, B and C are ordered such that C implies A and B; and B implies A. In A there is no mention of Ernie's actions. In B Ernie is mentioned as the loser of the paper clips but it does not have to be the case that Bert's upset was entirely or primarily caused by the fact of Ernie, in particular, being the loser of the paper clips. Alternative C refers to any thought about what Ernie had just done in the present episode which Bert would have just realized. Again, this realization need not be the primary cause of Bert's fainting but if it is mentioned at all, C is used instead of B or A.

Procedures. Location in the interview: Usually the first two questions in the fourth stopping place (1.4.1 and 1.4.2) will provide

the answer but other questions in that section may also contribute.

(24) Does the Subject Think Ernie is Fair?

Alternatives

- A. Ernie is fair.
- B. Ernie is unfair.
- C. Partly fair, partly unfair.

Definitions. Refer to the General Rules section.

Procedures. Location in the interview: The subject is specifically asked her opinion in question 1.4.10. As explained in the General Rules section, answers to questions about whether Bert or Ernie thought it was fair may also be used.

A one word answer of "fair" or "unfair" is acceptable as a basis for coding.

(27) Does Ernie Think it's Fair?

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.

Definitions. Same as in question 24.

Procedures. Location in the interview: This question is specifically asked in 1.4.8.

Refer to General Rules section.

(30) Does Bert Think it's Fair?

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.

Definitions. Same as above.

Procedures. Location in the interview: This is specifically asked in 1.4.9.

Refer to General Rules section.

(25, 28 and 31) Justification for Fair

Alternatives

- 1. Self protection.
- 2. Not harmful (physically, mentally) to Bert.

Definitions. Refer to the General Rules section. In this case, two reasons are coded for and others are to be captured by "other". Self protection includes protection against any kind of consequence that may occur when Bert finds out the paper clips are lost regardless of whether Bert would have intended those consequences. This alternative is appropriate only for subjects who believe that Ernie is trying to avoid the consequences (in question 1). The second alternative could apply to any plan type.

Procedures. These questions are answered if alternatives A or C are chosen for questions 24, 27 or 30.

Location in the interview: Coding is based on the "why" question which follows the question about fairness.

(26, 29 and 32) Justification for Unfair

Alternatives

1. Unequal distribution of harm or effort.
2. Ernie deceived and/or tricked Bert.
3. Ernie should have told him the truth right off.
4. Ernie wouldn't like it if Bert did it to him (Golden Rule).
5. Bert didn't have a chance to get angry at him.
6. Harmful (physically, mentally) to Bert.
7. Ernie didn't ask permission for the paper clips.
8. Ernie was trying to avoid punishment or bad consequences.
9. Ernie wasn't punished for losing the paper clips.

Definitions. Refer to the General Rules section. Nine possible justifications are listed here. None are given specific definitions.

Procedures. The questions are answered if alternatives B or C are chosen for questions 24, 27 or 30.

Location in the interview: Same as for questions 25, 28 and 31.

Banana Skit: Coding Categories and Criteria

(1) Basic Plan Type.

Alternatives

- A. Ernie is teasing or playing a trick (joke) on Bert.
- B. Ernie is trying to get all of the banana.

Definitions. In alternative A, Ernie is primarily, motivated to play a trick or joke on Bert. These motives may be somewhat malicious or entirely for fun. In alternative B, he may also be playing a trick

but the motive includes a desire for bananas or an unwillingness to share.

Procedures. Location in the interview: Evidence for determining the basic plan type can come from anywhere in the interview.

(2) If Bert hadn't fainted, Ernie would have:

Alternatives

- A. Given him the other banana.
- B. Teased him with the second banana before giving it to him.
- C. Teased him with the second banana and kept it for himself.
- D. Kept the second banana for himself.

Definitions. Question 2 can be considered as two separate questions. First, would Ernie have eventually given Bert the other banana or not. Second, would Ernie have attempted some other tease, joke or trick on Bert using the second banana or not. Alternatives A and D may be used when it is clear whether or not Ernie would give Bert the other banana but it is not clear whether or not Ernie would have teased him further.

Procedures. Location in the interview: This question is specifically asked in 2.4.5.

(3) When did Ernie decide to give Bert the outside part?

Alternatives

- A. Before returning home.
- B. When Bert says "what kind of friend are you?" or before.
- C. When he presents Bert with the peel or before.

Definitions. These alternatives divide the story into four parts. The first part of the story is before the skit starts. The second part begins where the skit begins with Ernie's entry into the apartment. It ends when Bert says "What kind of friend are you" (and includes the pause after that utterance). The third part begins after that utterance and goes up to the point where Ernie presents Bert with the peel. The last part of the story is not considered as an alternative because it is after the peel is presented to Bert.

Procedures. Location in the interview: This question is specifically asked in 2.3.4.

(4) When did Ernie first realize Bert wanted some banana?

Alternatives

- A. Before returning home.
- B. When E says "I know they are" or before.
- C. When B says "Are you gonna stand there" or after.
- D. When E says "Oh I don't blame you" or before.
- E. After E says "Oh I don't blame you".

Definitions. Like the alternatives for question 3, these divide the story into segments. Alternatives A, B and C divide the skit into three parts. A again refers to the segment in before the skit begins. Alternative B starts where the skit starts and goes to the end of Ernie's utterance "Oh I know, I know they are Bert. umm." The segment referred to in C goes from Bert's next utterance to Ernie's reaction to that utterance.

Alternative D and E are used to note finer distinctions within segment B and to note certain contradictions made by the subject. These

segments divide segment B at the "first stopping place" of the interview. Their use is explained below under Procedures.

Procedures. Location in the interview: Two questions are relevant to answering this. First, it is asked specifically in 2.2.3. Second, in 2.1.3 the subject is asked if Ernie knows Bert wants some at the point he says "Oh I don't blame you."

The subject's answers to these may be contradictory. If only the answer to 2.1.3 is available and that answer is "yes", then code B unless the subject makes it clear that Ernie knew before the skit. If the subject answers "no" and does not elaborate, then question 4 is coded "Not clear".

If both answers are given, then the following configurations of codings are used:

If 2.2.3 is answered A and 2.1.3 is answered Yes then code A. If 2.1.3 is answered No, then indicate the contradiction by coding A and E.

If 2.2.3 is answered such that Ernie knew somewhere vaguely in B (but not clearly before or after the first stopping place) and 2.1.3 is answered Yes, then code D. If 2.1.3 is answered No then code E.

If 2.2.3 is answered so that it is clear that Ernie knew before the first stop and 2.1.3 is answered Yes, then code D. But if 2.1.3 is answered No, then indicate the contradiction by coding B and E.

If 2.2.3 is answered so that it is clear that Ernie knew within B but after the first stopping place and if 2.1.3 is answered No, then code E. But if 2.1.3 is answered Yes, then indicate the contradiction by coding B and D.

If 2.2.3 is answered as C and 2.1.3 is answered No, then code C. But if 2.1.3 is answered Yes, then indicate the contradiction by coding C and D.

(5) Does Bert think Ernie knows Bert wants some?

Alternatives

- A. Yes.
- B. No.

Definitions. This question is about Bert's mental state.

Procedures. Location in the interview: This is specifically asked in question 2.1.4.

Particular care must be taken in coding this question that it be clear the subject understood the question. It is recognized that a subject may have interpreted this interview question as the same as question 2.1.3. The following interview question was an attempt to get the subject to describe Bert's point of view such that the yes/no answer was disambiguated. This question did not always succeed and the proper coding remains unclear.

(6) Is this a lie or the truth?Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.
- C. Not entirely the truth or not entirely a lie.

Definitions. This question is about what Ernie's utterance can be called. Alternative C includes any kind of equivocation about whether or not Ernie's utterance is the truth or whether or not it is a lie. It includes the notion that Ernie is misleading Bert rather than telling either the truth or a lie. Alternative A is used where the subject firmly denies Ernie is lying or firmly states it is the truth.

Procedures. Location in the interview: Question 2.3.3 asks this specifically.

If the subject says the utterance is misleading (rather than strictly telling a lie or the truth) then C is coded for this question and 4 is coded in question 8. If alternative A or C are selected then on question 7 a distinction can be made as to whether it is true because it is only literally true or it is true for some "Other" reason.

(7) Justification for Truth.Alternatives

- 1. Ernie is going to divide the banana up.

Definitions. Only one alternative is given and this one refers to the notion of literal truth. It is used when the subject gives some

indication that the 'semantic' proposition but not the 'pragmatically implied' proposition is true. If a subject believed that Ernie was telling the truth because he intended to share the banana in an equitable manner, then the answer would be coded "Other".

Procedures. This question is coded if alternatives A or C are selected for question 6.

Location in the interview: The justification usually follows question 2.3.3.

The word "literally" modifying "telling the truth" in the subject's answer to question 2.3.3 is sufficient (though not necessary) for coding alternative 1 rather than Not clear.

(8) Justification for Lie.

Alternatives

1. Ernie isn't going to (doesn't) give Bert any of the inside
2. One doesn't (most people don't) eat the peel
3. Bert thinks (most people would assume) Ernie will divide inside part.
4. Ernie is misleading Bert into thinking he will give him some of the inside part.

Definitions. Alternative 1 refers to Ernie's future action. This action is a violation of what would be expected but its status as a violation is not clearly implied by the subject. Alternative 2 refers to the usual or fair way of doing it.

Alternative 3 refers to the expectation Bert has (or others would have). It is ordered with respect to 1 and 2 in that it implies 1 and 2 (but 3 is not implied by a subject coded as 1 or 2).

Alternative 4 describes Ernie's activity of misleading Bert. Alternative 3 describes only Bert's state of mind having been misled, i.e., the outcome of Ernie's activity. Alternatives 3 and 4 are also ordered in that 4 implies 3 as an outcome (but subject's coded as 3 do not clearly imply that 4 caused the state.)

Procedures. This question is coded if alternatives B or C are selected for question 6.

Location in the interview: The subject usually gives a justification after answering question 2.3.3.

(9) Does Bert see 'the truth' at the end.

Alternatives

1. Yes.
2. No.

Definitions. This question asks if Bert realized that Ernie had been telling the "literal" truth at the end.

Procedures. This question is coded only if alternative C was selected for question 6.

Location in the interview: This question is specifically asked in 2.4.6.

(10) Does the subject think Ernie is fair?

Alternatives

- A. Ernie is fair.
- B. Ernie is unfair.

C. Partly fair, partly unfair.

Definitions. Refer to the General Rules section.

Procedures. Location in the interview: Question 2.4.9 asks this specifically.

(13) Does Ernie think it's fair.

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.
- D. Fairness didn't occur to Ernie.

Definitions. Refer to the General Rules section.

Procedures. Location in the interview: Question 2.4.7 asks this specifically.

(16) Does Bert think it's fair.

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.

Definitions. Refer to the General Rules section.

Procedures. Location in the interview: Question 2.4.8 asks this specifically.

(11, 14 and 17) Justification for Fair.Alternatives

1. It's okay to play a joke or trick (tease) like that.
2. There was another banana that Bert got.

Definitions. These alternatives are not further defined.

Procedures. This question is coded if alternatives A or C are selected for questions 10, 13 or 16.

Location in the interview: Coding is based on the "why" question which follows the question about fairness.

(12, 15 and 18) Justification for Unfair.Alternatives

1. Should have divided the inside of the banana in half or given Bert the other one right away.
2. Ernie didn't really share--Bert only got the outside.
3. Ernie misled or played a trick on Bert.
4. Ernie teased (etc.) Bert.

Definitions. Alternative 1 focuses on what Ernie should have done rather than on the value of what he did do. Alternative 2 refers to the outcome of Ernie's actions rather than on his actions of tricking or teasing him. Alternative 3 focuses on Ernie's deceiving Bert (by getting him to think he was going to share when he wasn't.) The fourth alternative considers Ernie's actions not so much as misleading Bert as causing him mental pain (e.g., humiliation). This alternative is used also for cases where it is not clear whether or not the subject had in mind the more "cognitive" sense of trickery (i.e., misleading rather than teasing).

Procedures. This question is coded if alternatives B or C are selected for questions 10, 13 or 16.

Location in the interview: Coding is based of the "why" question which follows the question about fairness.

Cookie Skit: Coding Categories and Criteria

(1) Basic Plan Type.

Alternatives

- A. Ernie is conning Bert into thinking he is sharing the cookie.
- B. Ernie is tricking Bert to get half the cookie for himself.
- C. Ernie is trying to (show Bert how to, that he would) share the cookie.

Definitions. Three basic plan types are considered. In all cases Ernie wants some of the cookie. In the first two, Ernie is intentionally deceiving Bert. In the third, Ernie is sincere or at least not clearly deceptive. Deception (not fairness) is the critical idea distinguishing the third from the first two. In most cases, the basic plan type can be derived from the alternatives chosen on later coding questions. Questions 6 through 8 and questions 27 and 28 relate directly to basic plan type. In most cases, subjects coded A on question 6 are coded C on question 1. Subjects coded B on question 6 may either be A or B on question 1. (But there are important exceptions--see below). Basic plans A and B are distinguished primarily on the basis of question 8 and questions 27-28.

In the first, (alternative A) Ernie is trying to get part of the cookie by conning Bert into thinking (or momentarily believing or being confused as to whether or not) he is sincerely concerned with sharing. An common feature of "conning" is that the victim isn't sure whether or not somebody has just done him a favor.

In alternative B, Ernie is tricking Bert. B is distinguished from A in that A includes B but has, in addition, a clear account of Ernie's plan of confusing Bert. B type plans may also contain an element of sincerity (like C) but plans are coded B if they contain any significant amount of trickery.

In alternative C, Ernie wants the cookie but he is sincerely concerned to share or to demonstrate that he would share or how to share. In these plans Ernie does want part of the cookie and may even be acting unfairly but he is not deceiving Bert (though Bert may think he is.)

Procedures. Location in the interview: Evidence for determining the basic plan type can come from anywhere in the interview. But in most cases coding of other questions will determine the coding of Basic Plan Type. The coding questions most closely related to this question are 6-8 and 27-28. Questions about fairness may also play a role. There may be cases, however, where these rules do not apply so ultimately the coding of this question makes use of evidence from anywhere in the interview.

(2) Is 'I would share it' a lie or the truth?

Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.
- C. Little of both, partly true, or not entirely either.
- D. Can't tell (would have to see Ernie with his own cookie.)

Definitions. Refer to the general rules section.

Procedures. Location in the interview: This is asked specifically in question 3.2.3.

(3) Justification for truth.

Alternatives

- 1. Ernie usually does (probably would) share.
- 2. Ernie did share the cookie later.
- 3. Ernie shared Bert's cookie.

Definitions. Alternative 1 refers to Ernie's disposition to share or simply to the subject's prediction (regardless of whether the prediction was based on a belief in such a disposition.) The subject may be referring here to events outside of the skit. If alternative 2 is chosen for question 4, then "usually" may be interpreted as "sometimes".

In alternative 2, the subject refers to the event at the end of the skit. Like alternative 1, this alternative does not refer to a mental state of a character so is not strictly an aspect of the subject's interpretation of the skit. That is, it need not be assumed that at this point Ernie intends to share the cookie at the end.

Alternative 3 contains the notion that Ernie is telling the literal truth. Here, the subject at least clearly implies that Ernie knows that his statement implies that he is not actually going to eat the cookie at the end.

Procedures. More than one alternative may be chosen for this question.

Location in the interview: The justification follows the answer to question 3.2.3.

(4) Justification for lying.

Alternatives

1. Ernie didn't share the banana.
2. Ernie usually doesn't share (tends to be greedy).
3. Ernie is trying to trick Bert.
4. It's not his cookie to share.

Definitions. Alternative 1, refers to the events in the Banana skit where Ernie did not share the banana. This alternative is different from 2 because here there is less sense of a disposition. The banana skit is the only evidence cited by the subject. This may not be strictly part of the subject's interpretation of the cookie skit.

Alternative 2 is like alternative 1 in the previous question but refers to the opposite subject belief. The subject may have established Ernie's disposition not to share on the basis of previous skits. Here, "usually" may also be interpreted as "sometimes".

Alternative 3 refers to Ernie's strategies for getting the cookie. The trick may refer to the local strategy of getting Bert to believe he

is generous or to the later strategy which involves the demonstration.

Procedures. More than one alternative may be selected for this question.

Location in the interview: The justification follows the answer to question 3.2.3.

(5) What does Bert think?

Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.

Definitions. These alternatives refer to Bert's opinion of Ernie's statement.

Procedures. Location in the interview: This is asked specifically in question 3.1.3.

(6) What is Ernie doing in the demonstration?

Alternatives

- A. Trying to get the cookie shared.
- B. Trying to trick etc. Bert out of part of the cookie.

Definitions. Alternative A is used when Ernie seems to sincerely think that sharing is a solution to the "problem" of their both wanting the cookie. The subject may see Ernie as acting unfairly but Ernie is not trying to deceive. Ernie may think he is not unfair or he may not know better. He may even think he is acting unfairly (e.g., in how he divides up the cookie or in taking Bert's cookie to divide up) but is

doing this openly. Note also that Bert may think it is a trick without Ernie actually trying to trick him. Alternative B refers to any of the insincere strategies that Ernie may be undertaking to get the cookie. These strategies involve some deception.

Procedures. Location in the interview: Coding of this question is based entirely on the second and third stopping places. In particular, the questions focussing on what Ernie is doing (3.2.1, 3.2.2, 3.2.5, 3.3.1, 3.3.4, 3.3.5) are used. The questions about whether he is lying (3.2.3, 3.2.4) are not sufficient for establishing that Ernie is being deceptive since some subjects appear to believe that simply a conflict between what characters believe (with no deceptive intent) is enough to call a statement a lie.

(7) In particular, to get the cookie shared, Ernie is:

Alternatives

1. Sharing the cookie (dividing it up).
2. Showing Bert how to share.
3. Showing (proving) he would share if the cookie were his.

Definitions. These alternatives assume Ernie is using the demonstration sincerely. In 1, the demonstration is not clearly intended to prove anything but rather is a procedure for sharing the cookie. Note that here the procedure may be unfair.

In 2, Ernie is demonstrating the proper way of dealing with the conflict over the cookie. For example, he is showing Bert the way friends should act.

In 3, Ernie is using the demonstration to prove the point he was trying to make earlier, namely that he would share the cookie if it were his.

Procedures. This question is coded only if alternative A is chosen for question 6. If there is evidence for more than one alternative, choose the one with the higher number.

Location in the interview: See question 6.

(8) In particular, to trick Bert, Ernie is trying to get him:

Alternatives

2. to think he is proving (just demonstrating) he would share take the cookie during the demonstration.)
4. to think E had done him a favor (good motives)
5. to think that the cookie had belonged to Ernie.

Definitions. These alternatives assume that Ernie is tricking Bert in some way. Some of the alternatives are implied by ones later in the list so there is a partial ordering.

Alternative 2 assumes that Ernie is getting Bert to think he would share but is referring to the prerequisite to this namely that Bert should think that he is engaged in the process of trying to prove it to him by means of the demonstration. This alternative also includes the idea that Ernie is getting Bert to think he will return the cookie after the demonstration.

The fourth alternative refers to Ernie's plan of getting Bert to think he has done him a favor or, in general has good, helpful motives. This plan usually includes getting Bert to think he is trying to prove

his point or at least to demonstrate proper sharing.

In alternative 5, it is assumed that Ernie is getting Bert to believe he is proving his point but in addition Ernie is getting Bert to think (or used to the idea) that the cookie is (at least temporarily) to be considered as belonging to Ernie. He is doing this by getting Bert to play act etc.

Procedures. This question is coded only if B is chosen for question 6. Location in the interview: See coding question 6.

(9) Is 'demonstration' a lie or the truth?

Alternatives

- A. Ernie is telling the truth.
- B. Ernie is lying.
- C. Little of both, partly true, or not entirely either.

Definitions. See general rules section.

Procedures. Location in the interview: Question 2.3.3 asks this specifically.

(10) Justification for truth.

Alternatives

- 1. Ernie is demonstrating.
- 2. Ernie is going to give Bert part of the cookie (sharing).
- 3. Ernie is "literally" demonstrating.

Definitions. Alternative 1 is the "plain truth". Here there it seems that the subject does not consider "just demonstrating" to imply that the cookie would be returned.

Alternative 2 refers to the later event in the skit. The subject may be referring to the outcome of the demonstration but it is not clearly implied that the fact that Ernie is carrying out a demonstration is the justification for calling the utterance the truth.

Alternative 3 is the case where Ernie is telling the literal truth but is aware that his utterance implies something else which is not true, namely that he will return the cookie after the demonstration.

Procedures. Location in the interview: The justification usually follows the answer to question 2.3.3.

(11) Justification for lying.

Alternatives

1. Ernie wants to get (is going to take) part of the cookie.
2. If it were his cookie, Ernie wouldn't share.
3. It's not really (just) a demonstration.
4. Bert expects Ernie to return (both parts of) the cookie.
5. Ernie is misleading Bert into expecting (4).

Definitions. Alternative 1 refers to Ernie's general motive to get the cookie. Alternative 2 refers to the falsity of the thing that Ernie is supposed to be trying to prove. Alternative 3 is somewhat like 1 but refers directly to the demonstration which is insincere rather than to the fact that makes it insincere. This alternative at least implies some motive like in 1 which makes the demonstration not have the purpose it may appear to have.

Alternatives 4 and 5 are ordered such that 5 implies 4. Alternative 5 refers to Ernie's activity of misleading Bert. Alternative 4 refers only to Bert's state of mind having been misled, i.e., to the outcome of Ernie's activity.

Procedures. Location in the interview: The justification usually follows the answer to question 2.3.3.

(12) What would the truth be?

Alternatives

1. Ernie would return both parts (wouldn't eat the cookie.)

Definitions. This question asks about what would have to have happened for Ernie's statement ("just going to demonstrate") to be true.

Procedures. This question is coded only if B or C are chosen for question 9.

Location in the interview: This question is asked specifically in 3.2.4.

(13) Bert's state leading up to the demonstration.

Alternatives

- A. Just wants the cookie back (doesn't want to share.)
- B. Confused about what Ernie is doing.
- C. Thinking Ernie is trying to take (part of) his cookie.
- D. Thinking Ernie is tricking him somehow.
- E. Thinking Ernie is trying to demonstrate (show how he would share the cookie).

Definitions. Alternative A refers to Bert's state of mind without reference to Bert's thoughts about what Ernie is doing. It may include, however, Bert's general annoyance that Ernie is taking up his time etc.

Alternatives B to E refer to Bert's cognitive rather than affective states, particularly to various aspects of Bert's thoughts about what Ernie is doing.

B to D are ordered as follows. In B, Bert is not sure whether or not E is tricking him or whether or not Ernie is about to take some of his cookie. In C, Bert may or may not be partly confused but does think Ernie is trying to take some of the cookie. In D, Bert thinks Ernie is trying to trick him (but may or may not be confused about exactly how) and this trick may involve Ernie taking some of the cookie.

In E, Bert considers Ernie to be (mostly) sincere in what he is doing.

Procedures. Location in the interview: Questions 3.3.3, 3.3.6, and 3.3.7 ask about Bert's thoughts and feelings about what Ernie is doing in the demonstration.

If the subject refers to Bert's thoughts about Ernie then code B to E (or Other) even if he also mentions the state referred to by A. In choosing among B to E, select the one which describes Bert's thoughts most specifically. Bert's thoughts may be implied by the subject's statements about his emotional reactions.

(14) What does Bert expect to get back?

Alternatives

- A. All of the cookie.
- B. None of the cookie.
- C. Half (part) of the cookie.

Definitions. This question is closely related to the one above in that it focuses on a specific aspect of Bert's state.

Procedures. Location in the interview: This question is asked specifically in 3.3.3.

(15) Bert's state after the demonstration .

Alternatives

- A. Thinking (sad etc.) about the cookie or the half he has left.
- B. Angry that Ernie took half the cookie.
- C. Surprised (angry that) Ernie didn't return the cookie after demonstration.
- D. Happy (etc.) he got half (when he wasn't expecting any.)
- E. Thinks (angry) that Ernie tricked (conned) him (again).
- F. Confused (doesn't understand, dumbfounded).

Definitions. These alternatives refer to Bert's state as he is staring at the remainder of his cookie. Alternative A (like A for question 13) refers to Bert's state of mind which is not concerned about Ernie.

Alternatives B to E are partially ordered. In B, Bert is angry (sad etc.) that Ernie took half the cookie. In C, Bert may (or may not) be angry about (B) but he is also reacting to the fact that he expected to get the cookie back. Alternative D is the opposite of B

and C and includes the simple idea that Bert is happy as well as the more complex idea that Bert had been expecting less. In E he may or may not be surprised (angry etc.) because he expected to get the cookie back but is reacting to Ernie having tricked (etc.) him. In E Bert (thinks he) understands the trick but in F he is confused (etc.) about what happened.

Procedures. A is used only if Bert is not thinking about Ernie. Alternatives A to E are exclusive of each other but F can go with any of them.

Location in the interview: Questions 3.4.1 and 3.4.2 ask about Bert's thoughts and feelings.

(16) In particular, Bert is confused about:

Alternatives

1. How (why) Ernie got (ended up with) half the cookie when it wasn't his (or Bert got only half when he wanted all.)
2. The demonstration.
3. Why he doesn't get the cookie back if Ernie was only demonstrating.
4. How it ended up being Ernie's cookie.
5. Why Ernie thanked him.
6. How he was tricked (conned) by Ernie (again).

Definitions. These alternatives refer to specific ways or reasons that Bert is confused.

Procedures. This question is coded only if alternative E is selected for question 15. It may be necessary to use more than one alternative if the subject mentions more than one reason for Bert's being confused.

Location in the interview: Information about why Bert is confused at the end may come from questions 3.4.1 and 3.4.2. Questions 3.4.3 and 3.4.4 may also provide information about Bert.

(17) How was the cookie divided?

Alternatives

- A. Ernie got more.
- B. Bert got more.
- C. They both got (approximately) the same.

Definitions. These alternatives refer to the subject's perception of how the cookie was broken. The perception may be based on the subject's assumption about how the cookie probably was broken.

Procedures. Location in the interview: This question is specifically asked in 3.4.5.

(18) Does the subject think Ernie is fair?

Alternatives

- A. Ernie is fair.
- B. Ernie is unfair.
- C. Partly fair, partly unfair.
- D. Ernie doesn't know any better.

Definitions. See the General Rules section. Alternative D has Ernie as naive about what is fair in that situation.

Procedures. Alternative D may be used alone or in combination with any of the other three. Location in the interview: This is specifically asked in question 3.4.8. Question 3.4.9 may also be relevant. The question about fairness of the demonstration (3.3.4) is

not considered in coding this question.

(21) Does Ernie think it's fair.

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.
- D. Ernie doesn't know any better.

Definitions. See General Rules section.

Procedures. See question 18.

(24) Does Bert think its fair?

Alternatives

- A. Fair.
- B. Unfair.
- C. Partly fair, partly unfair.
- D. Ernie doesn't know any better.
- E. Bert doesn't think about fairness.

Definitions. See General Rules section.

Procedures. See question 18.

(19, 22 and 25) Justification for fair.

Alternatives

- 1. Both Bert and Ernie have a piece (half, same size).
- 2. Bert was being selfish (and Ernie was showing him how to act.)

Definitions. These alternatives are not further defined.

Procedures. These questions are answered if A or C are chosen for any of the fairness questions. Location in the interview: The justification follows the answer to the fairness question.

(20, 23 and 26) Justification for unfair.

Alternatives

1. Ernie took the cookie.
2. Ernie got some when Bert wanted the whole thing.
3. Ernie should have given the whole cookie back.
4. Ernie just wanted to get a piece of the cookie.
5. Ernie wouldn't share (golden rule).
6. Ernie tricked (misled, conned) Bert.
7. The cookie was divided unevenly.
8. It was Bert's cookie.

Definitions. See General Rules section.

Procedures. See questions 19, 22 and 25.

(27) Was Ernie trying to get Bert confused (mixed up)?

Alternatives

- A. Yes
- B. No

Definitions. The coding must distinguish between Ernie confusing Bert by what he did and trying to get Bert confused by doing it. For this question the intentionality must be clear (otherwise code Not clear.) "Ernie is getting Bert confused" is ambiguous.

Procedures. Simpling answering "yes" with no other indication of Ernie's intent is coded not clear.

Location in the interview: This question is asked specifically in 3.4.3.

(28) Ernie was getting Bert confused about:

Alternatives

1. What he was doing (the demonstration) (but not necessarily after the demonstration).
2. Whether Ernie had done him a favor (had good motives, acted friend.
3. Whether the cookie belonged to Ernie.

Definitions: The first alternative refers to Ernie's plan to get Bert confused about what he was doing in the course of the demonstration. Here Bert's confusion is used only so long as the demonstration is going on. The confusion was not necessarily intended to extend to after the demonstration even though Bert is confused after the demonstration.

The second alternative is essentially the same as alternative 4 on question 8.

The third alternative is essentially the same as alternative 5 on question 8.

Procedures. This question is coded only if alternative A is chosen on question 27. If the subject says both 2 and 3 only code 3 since 3 implies 2. Location in the interview: This question is coded on the basis of the discussion of Bert's confusion surrounding interview question 3.4.3.

Final Questions: Coding Categories and Criteria

(1) Who do you like better?

Alternatives

- A. Ernie
- B. Bert.
- C. Both Bert and Ernie (answer 2 & 3)
- D. No favorite

Definitions. Alternative C would be chosen when the subject likes both B and E for different reasons. This differs from D, in that D refers to subjects who like neither B nor E, or they have no opinion one way or the other.

Procedures. Location in the interview: Question 4.3.

(2) Justification for liking Ernie better.

Alternatives

- 1. Funny (silly, amusing).
- 2. More aware, in control, etc.
- 3. Ernie's a joker, trickster, etc.
- 4. Ernie is cute.

Definitions. Alternative 1 refers to E being entertaining or amusing to view. 1 would also include any references to E having an amusing or funny appearance. Alternative 2 would be chosen when the subject refers to E being admired or liked for his manipulatory abilities, or his cleverness in controlling situations. Alternative 3 is appropriate for those subjects who refer to E's activities as a joker or tricker. This differs from 2 in that E is seen more as a fun type person in 3 as opposed to a manipulator in 2.

Procedures. Location in the interview: Question 4.3 justification.

(3) Justification for liking Bert better.

Alternatives

1. Funny (silly, amusing)
2. Nicer than Ernie
3. More trustworthy than Ernie.

Definitions. For alternative 1 see definition for alternative 1 under justification for liking Ernie better. Alternative 2 refers to the idea of B being a nicer person in comparison to E, however it also is appropriate for cases where the subject doesn't compare and simply comments on B's niceness. Alternative 3 refers to the idea of B not tricking or joking as E does.

Procedures. Location in the interview: Question 4.3 justification.

(4) More likely to be friends with?

Alternatives

- A. Bert
- B. Ernie.
- C. Both A and B.
- D. Neither.

Definitions. Alternative C is chosen when the subjects likes both B & E equally for the same or different reasons. Questions 5 and 6 are coded when alternative C is chosen.

Procedures. Location in the interview: Question 4.4 asks this question.

(5) Justification for friends with Bert.

Alternatives

1. Bert's a nice person
2. Doesn't joke (trick, play around) as much as Ernie.
3. Bert wouldn't (doesn't) trick (pull a joke on) me.

Definitions. Alternative 1 refers in general to the positive side of B's character; it may or may not be in comparison to E. Alternative 2 is used when in comparison to E, the idea of B NOT tricking or playing around is referred to. Alternative 3 differs from 2 in that in 3 the subject is concerned with E's effect on the subject, and thus the reason for preferring B. The idea of personal effect is important for this alternative to be chosen.

Procedures. Location in the interview: Question 4.4 justification.

(6) Justification for friends with Ernie.

Alternatives

1. Ernie is silly (funny, amusing, laughing).
2. Ernie jokes around, pulls tricks.
3. Ernie is a fun person.
4. More aware of the world, in control, etc.

Definitions. Alternative 1 refers positively to E's personality. Alternative 2 is chosen when the subject talks about E's activities. Alternative 3 refers to in general the combination of both personality and activities making E a fun type of person. Alternative 4 is chosen

when the subject refers to E as having the ability to manipulate or be aware of his environment.

Procedures. Location in the interview: Question 4.4 justification.

(7) Who is older?

Alternatives

- A. Bert
- B. Ernie.
- C. Same Age.
- D. Doesn't matter, just puppets, etc.

Definitions. Alternative D is chosen when the subject refuses to estimate the ages of B & E, stating such reasons as it doesn't matter or that they are just puppets with no ages.

Procedures. Location in the interview: Question 4.5 asks this directly.

(8) Bert's Age.

Alternatives

- A. preschool
- B. 5 to 10
- C. adolescent (10 to 14)
- D. teenager (15 to 20)
- E. adult (20 and up)

Definitions. B's age is coded when the subject refers to an exact age or an age classification such as adult, adolescent, etc.

Procedures. Location in the interview: Question 4.5 justification. This question is usually asked immediately following "Who is

older?"

(9) Ernie's Age.

Alternatives

- A. preschool
- B. 5 to 10
- C. adolescent (10 to 14)
- D. teenager (15 to 20)
- E. adult (20 and above)

Definitions. See explanation under B's age.

Procedures. Location in the interview:

(10) Who is smarter?

Alternatives

- A. Bert
- B. Ernie.
- C. Both are smart.
- D. Neither smarter.

Definitions.

Procedures. Location in the interview:

(11) Justification for Bert being smarter.

Alternatives

- 1. Doesn't lie, trick, etc.
- 2. More intelligent, better in school, etc.

Definitions. Alternative 1 refers to the idea of B being more honest than E as a demonstration of B's smartness. The idea of NOT lying or tricking is important for 1. Alternative 2 is used for sub-

jects who believe B is more "intelligent" than E as demonstrated by his dilligence in school or his well mannered behavior.

Procedures. Location in the interview: Question 4.6 justification.

(12) Justification for Ernie being smarter.

Alternatives

1. Trickier (joke player, clever, quick thinker, etc.)
2. More in control, able to manipulate.

Definitions. Alternative 1 refers to the idea of E's cleverness and joke playing making him smart. Alternative 2 refers to E's manipulatory ability or ability to take advantage of situations as defining smartness.

Procedures. Location in the interview: Question 4.6 justification.

(13) Are these good skits to show to children?

Alternatives

- A. Yes
- B. No.
- C. Good and Bad.

Definitions. Alternative C is used for subjects who believe the skits are good for some reasons and bad for others. Both 14 and 15 are coded when this alternative is chosen. If the subject believes the skits are okay for older children but not for younger, the opinion concerning it's value for younger children is what should be coded.

Procedures. Location in the interview: Question 4.7.

(14) Justification for good for children.

Alternatives

1. Teaches children (children learn to) share, be friends, tell truth, etc.
2. It's funny, entertaining.
3. Teaches children through Bert's reactions, etc.
4. Puts children on guard against tricks, etc.

Definitions. Alternative 1 refers to the positive things that are taught or learned by children. Alternative 2 is used for subjects who refer to the entertainment value of the skits, regardless of lessons learned. Alternative 3 implies 1 but in 3 the subject specifically refers to the lesson being learned as a result of the effect of E's tricks or jokes on B. The same things are believed to be taught as in 1, but the way they are learned is seen as different in 3. Alternative 4 refers to the skits' ability to make children aware of possible situations. The idea of protection against practical jokers or trick-ers being learned would also be included in 4.

Procedures. Location in the interview: Question 4.7.

(15) Justification for bad for children.

Alternatives

1. Just bad shows, (boring, etc.)
2. Teaches children (learn to) cheat, be devious, etc.
3. Children use Bert and Ernie as role models,

Definitions. Alternative 1 refers to subjects who believe regardless of what's learned, the skits are just bad or boring. Alternative

2 refers to the negative things that can be learned or are taught in the skits. Alternative 3 deals with the activity of children duplicating the negative behavior demonstrated in the skits. 3 differs from 2 in that 3 may or may not mention the specific negative behavior imitated. It may refer just to the negativeness of the duplication or role modeling. The important criteria for alternative 3 is the mentioning of the child's future behavior as a result of the skit.

Procedures. Location in the interview: Question 4.7.

APPENDIX 4: INTERACTING PLANS NOTATION

This appendix presents a notation system for modelling the interactions between the plans of two characters. This document appears independently (Newman & Bruce, 1980). The system is a revision of the one presented in Bruce & Newman (1978a), which was developed for the analysis of folktales such as "Hansel and Gretel" (Bruce & Newman, 1978b) and "The Fox and the Rooster" (Bruce, 1980) and of actual social interactions recorded on audiotape. The present version contains clarifications as well as some expansions made necessary by the analyses of the Bert and Ernie skits presented in this dissertation.

The representation of interacting plans makes use of a set of symbols within a Space which represents one character's model of the interactive situation. The plans that are represented in such a model are those of the target character and those that the target character believes that the other character is carrying out or intending to carry out. Interacting plans are represented in terms of past, present and future States which are brought into being and eliminated by various processes. Except for Actions of the characters, processes which change States are not explicitly represented. Also, the process of planning is not represented. In what follows we begin by detailing the basic nodes and relations which are arranged to represent plans. We then discuss Belief Spaces in which these plans reside.

Basic Nodes of the Representation System

The description of interacting plans rests upon two basic types of entities, States and Actions and the relations among them. Each of these entities or nodes can be either Simple or Complex (internally structured). Tags are used to mark the temporal status of the nodes. Arrows represent the relations.

States

States are represented by ovals variously embedded in one another. Figure 11 shows a simple State and three kinds of Mental States. The Mental States show only one level of embedding but may be embedded indefinitely within one another.

Simple States (unembedded) represent either facts of the physical (non-mental) world or of the social world which exist by virtue of the character's agreement to them (cf. Newman & Gearhart, 1980). Since representations are always modelled from the point of view of one character or another, Simple States which are indicated in representation ultimately can be considered to be a Belief of the character.

Mental States can be distinguished from Simple States because the characters themselves presumably take the latter to have an "objective" reality. Mental States represent relations between the characters and States. There are two basic kinds of Mental States in the system: Intentions and Beliefs.³⁶ Intentions are of two kinds: Achieve and

36. A full catalog of mental states would include many others. We have chosen only those which are necessary and sufficient for representing interacting plans. "Wants" for example, might be a third kind of men-

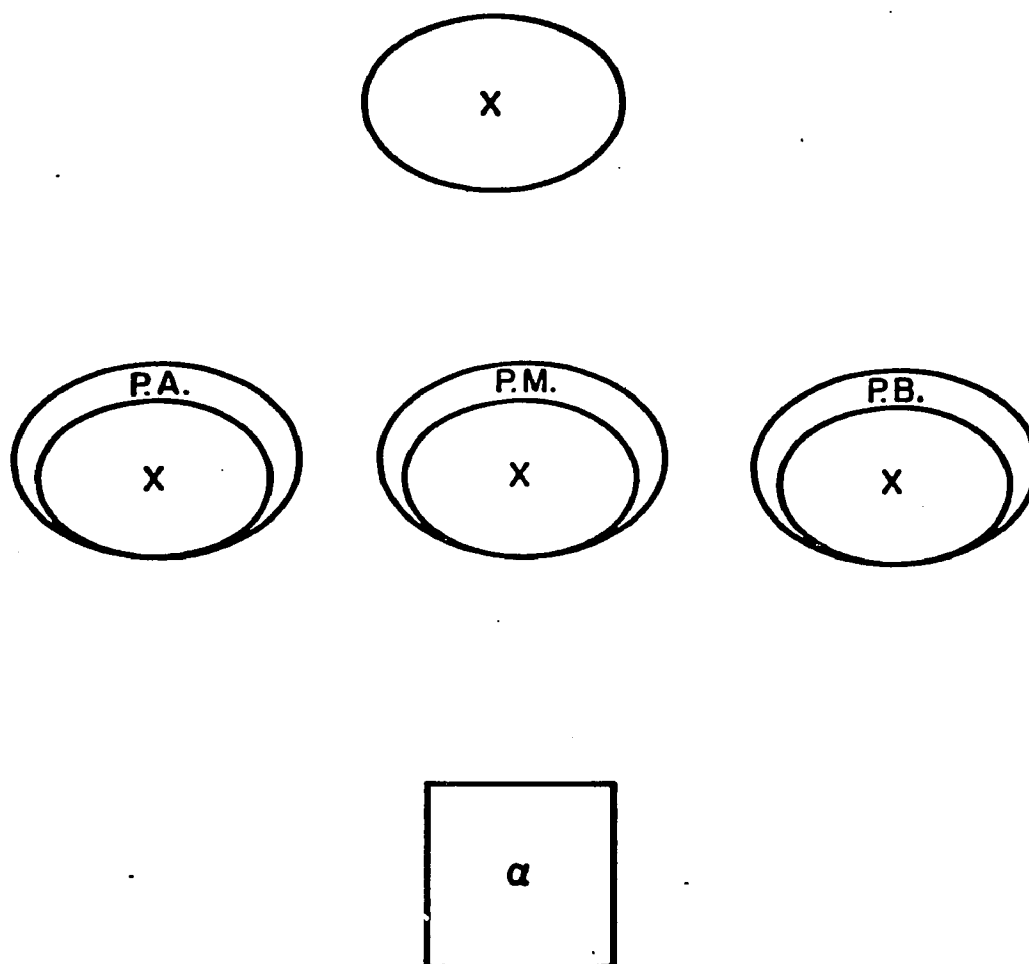


Figure 11. Nodes: a simple State, Mental States and an Action

tal state but we have not found it necessary to introduce them. Also we have not reduced Intentions to Wants since it is clearly possible to want a State without intending to bring the State into existence. Only when the want is turned into an intention is it relevant.

Maintain. A Single Intention may be both to Achieve and Maintain a State.

The first kind of Mental State, Achieve Intention, is the State of a character when he or she intends to bring about a State of affairs that is not presently in existence. The State to be achieved may itself be a Mental State. For example, one character may intend to create an Intention or a Belief in another character.

The second class of Mental States, Maintain Intention, differs from an Achieve Intention in that the object State is already in existence and the character's goal is to maintain its existence (cf. Newman & Gearhart, 1980). While an Achieve Intention is Satisfied as soon as the object State comes into existence, a Maintain Intention is not Satisfied until the time period during which the State was supposed to be maintained is over. A Maintain Intention can be viewed as a critic (Sacerdoti, 1977) in modifying plans as they are being formed so as to eliminate, introduce, or modify Actions in order to avoid States in conflict with the State specified.

The third class of Mental States is used to represent explicitly Belief States of a character. As we will see later (see Belief Space Configurations) a Belief Space is actually a Mental State of one of the characters. Since within this model of one character's view of the situation all States are contained within a Belief State (or Space) we usually need not indicate explicitly that the character believes each specific State, but simply that the representation is of that character's Belief Space. In general, any State represented is in fact

a Belief State, and considerations of clarity in presentation determine whether the believes relation is shown explicitly. One case, however, requires that the belief status of the State be indicated. This is the case where, for example, one character (P) informs the other (Q) of some State. The effect of his Action is not to bring the State itself into being (P already believes it exists) but only to produce a Belief of Q's.

Actions

An Action is something a character does or can do. It is Enabled by certain States, and in turn causes other States to occur. Actions are always related to Intentional States which represent the goal of the Action at various levels of specificity.

For a Simple Action, as for a Simple State, no attempt is made to specify an internal structure. While Simple States and Actions are represented as primitive we are not assuming that they would be primitive for a character, rather we are choosing a level of representation which is sufficient for explicating the interaction between the characters. Furthermore, the amount of details chosen for the representation of a story is not always at the same "level of detail" between stories or even within stories. Stories are represented at whatever level is needed for explicating the interactions between the characters.

A Complex Action is a nameable collection of other Actions. The various kinds of Complex Actions and alternative formats for their representation will be presented below in the section on configurations.

Temporal Representation

The nodes (States and Actions) can be marked for their relative temporal status. Any representation of an interacting plan is considered to be capturing a moment in time and indicates what has already occurred (or has been intended or believed), what is currently being done or intended and what is expected to be done or to be the case in the future. Although a single representation shows very little of the process The tags permit some indication of the temporal sequence of the unfolding interaction. For convenience, time is also represented on the vertical dimension of the page. Until States are eliminated by some process, they are assumed to endure "down the page".

States that existed (but no longer exist) and Actions that took place in the past are indicated by the "P" tag. Alternatively a "t" with a subscript can be used to place the event at some particular time in relation to the other events. Where there are several single representations indicating a temporal unfolding of an interactive plan, the subscripts may appear first on a future Action or State, then on a current one and so on.

States or Actions that are currently being performed are indicated by the tag "C". Note that an Intentional State may be current while the Action that would result from the Intention may be indicated as future.

Future States and Actions are indicated by the "F" tag, or by "t" with a subscript.

Relations Among the Elements

Relations are the links between States and Actions of the interacting plans. They fall into three classes: planning relations, which indicate how the intended goal is to be accomplished; outcome relations, which indicate what States result from Actions or other processes; and precondition relations, which indicate what is needed for an Action to be performed. Markers, which are a representational convenience that bear a superficial resemblance to relations are introduced in the section on Belief Spaces.

Planning Relations

Planning relations provide links from general Intentions (or higher level Actions) to the more specific Actions (or Intentions) that lead toward actualizing the goal. See figure 12.

By Means Of. This is the relation between the Intentional State and the Action. That is, it indicates that the character uses a particular Action to achieve (or maintain) the goal State specified in the Intentional State.

Specifies. Where achieving State Y is a more specific way of achieving or maintaining State X the "Specifies" relation holds between the Intentions. State X is usually a more general characterization of State Y. In the case of a plan in which a higher level goal is achieved by means of (a sequence of) lower level goals several Specifies relations may lead from a single Intention. (See also section on Complex Actions.)

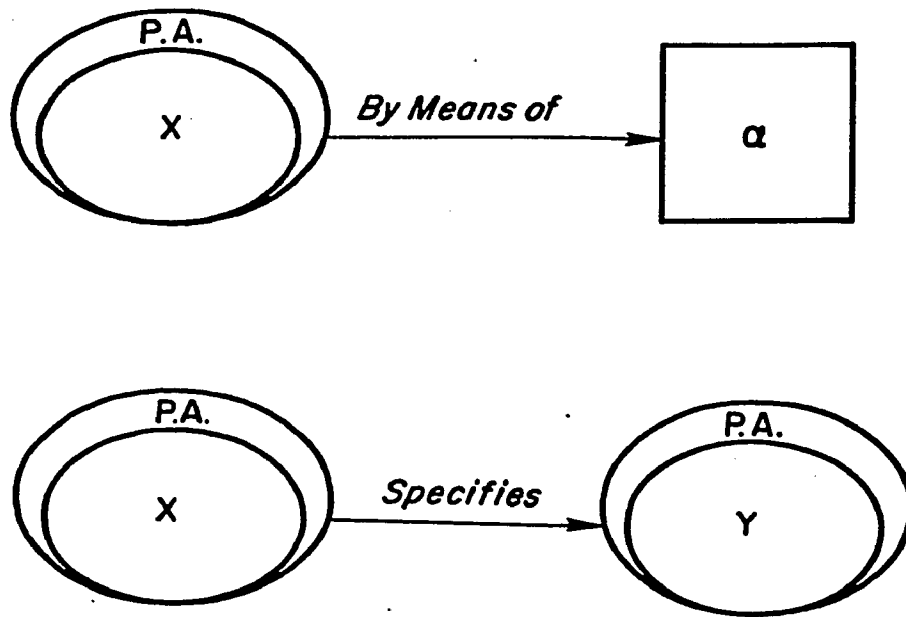


Figure 12. Planning Relations

Precondition Relations

These relations link an Action to the States which make the Action possible or reasonable. See figure 13.

Enables. This relation indicates that the State is necessary or required for performing the Action. An enabling State must be Satisfied before or as the Action is performed. (But see Newman and Gearhart, 1980).

Supports. This relation goes from a State to either an Action or an Intentional State. Here the State is not a necessary precondition for doing the act, but is a Belief that makes doing the Action reasonable or appropriate.

Outcome Relations

These relations indicate causal links between Actions and States or between two States. The causal mechanisms that are indicated by these relations are not explained in the interactive plans representations but it is assumed that the characters believe them to exist. See figure 14.

Has Effect. This relation links an Action to the State which is its intended consequence.

Has Side Effect. A side effect is a State produced by an Action that is neither the goal of an Intention to be achieved by means of the Action nor a precondition of another intended Action. (Side effects, however, may actually be intended in some other Belief Space of a

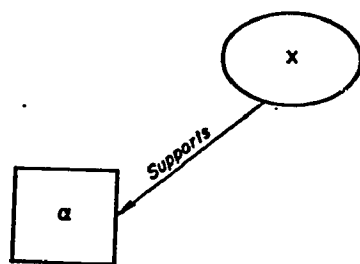
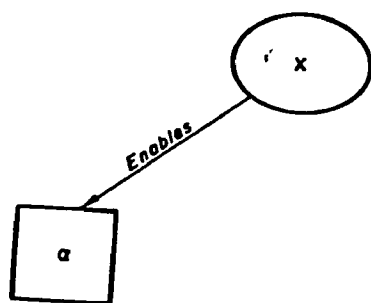


Figure 13. Precondition Relations .

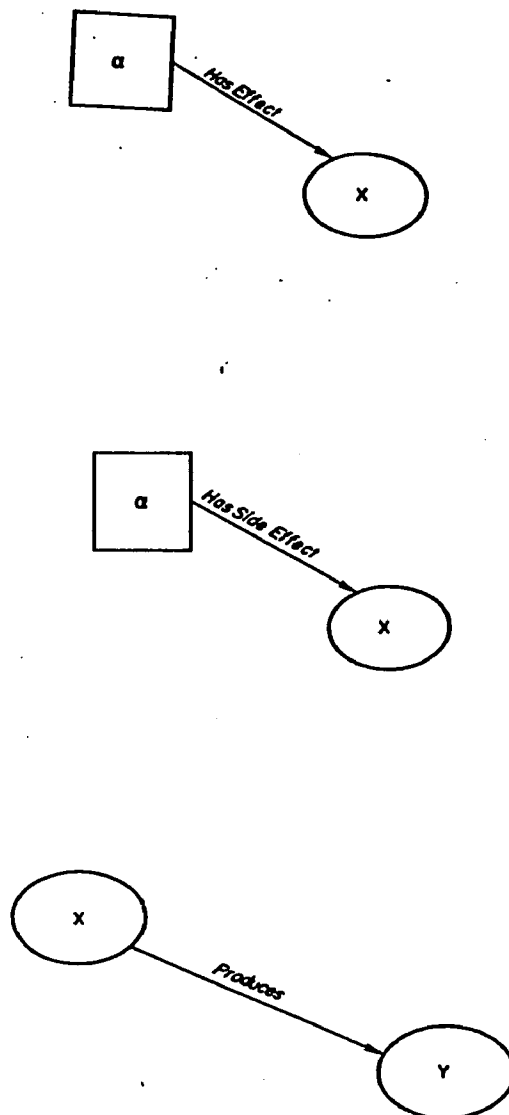


Figure 14. Outcome relations

deceptive plan.) Side effects are mentioned only when they are relevant to the interaction between the characters' plans.

Produces. One or more State(s) may result in another State without the intervention of a character. Where processes other than Actions are involved the processes are not represented explicitly. Rather the Produces relation directly links the "cause" and the "effect". These processes may be physical or mental but not under intentional control. The character, however, may cause a State on the basis of his or her Belief that another State would be produced. Thus an Intention to achieve a goal State may Specify another Intention to cause the State which will Produce the original goal State.

It is important to point out that the relations, Specifies, Produces, and Supports are intended to summarize, rather than to explain what are often complex relationships. That is, we do not say how a specific Intention is selected in a particular problem solving environment, nor how a collection of States Produces another State, nor how a State makes an Action reasonable. These questions are not at the core of the issue we are concerned with here, the interconnections among the plans of different characters.

Markers

At this point three markers must be introduced and distinguished from Relations. Markers do not add new information but are used as a convenience for representation. Figure 15 shows the following three markers:

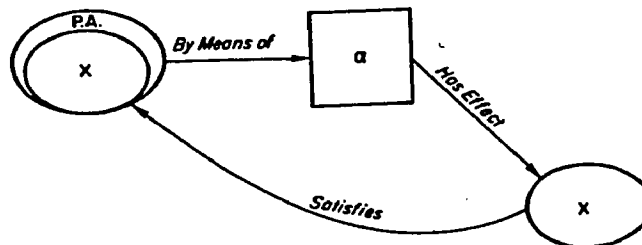
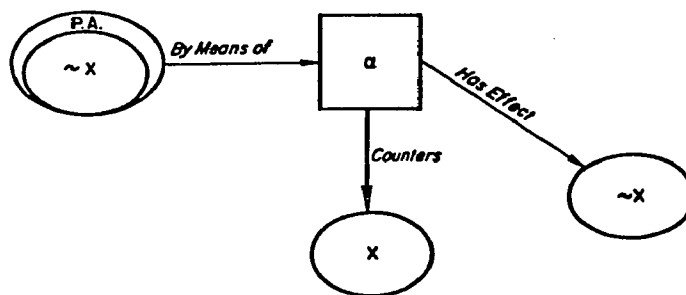
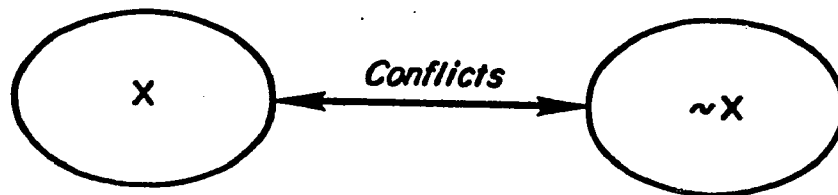


Figure 15. Markers: Conflicts, Counters and Satisfies.

Conflicts indicates that two States are in some way contradictory or incompatible. It is used most often to indicate that an Intention that Q thinks P has is not the Intention P actually has. As explained below, within one Belief Space, a Hypothetical State may Conflict with an Intention.

Counters. This relation indicates that the Action was done in order to eliminate (or preempt the occurrence of) some State.

Satisfies. A fourth marker shows the relation between a State and a previous Intention. When a State occurs which is the object of an Achieve Intention, then the Satisfaction of the object State can be indicated. For Maintain Intention States, the object State must not only occur but it must endure for the time period indicated by the Intention.

Common Configurations of Nodes and Relations

Configurations are structures built out of the nodes and relations defined in the previous sections. Each configuration is a generalization taken from analyses done on social interactions in stories. The complex of nodes and relations defined in a configuration, rather than just the specific elements (e.g, Has Effect), expresses some assertion about the form of social interaction. In this section we present a few of the most important configurations.

Satisfaction of Intentions

Figure 16 shows two basic configurations: the Satisfaction of Intentions, and a Request. In the first, an Achieve Intention has

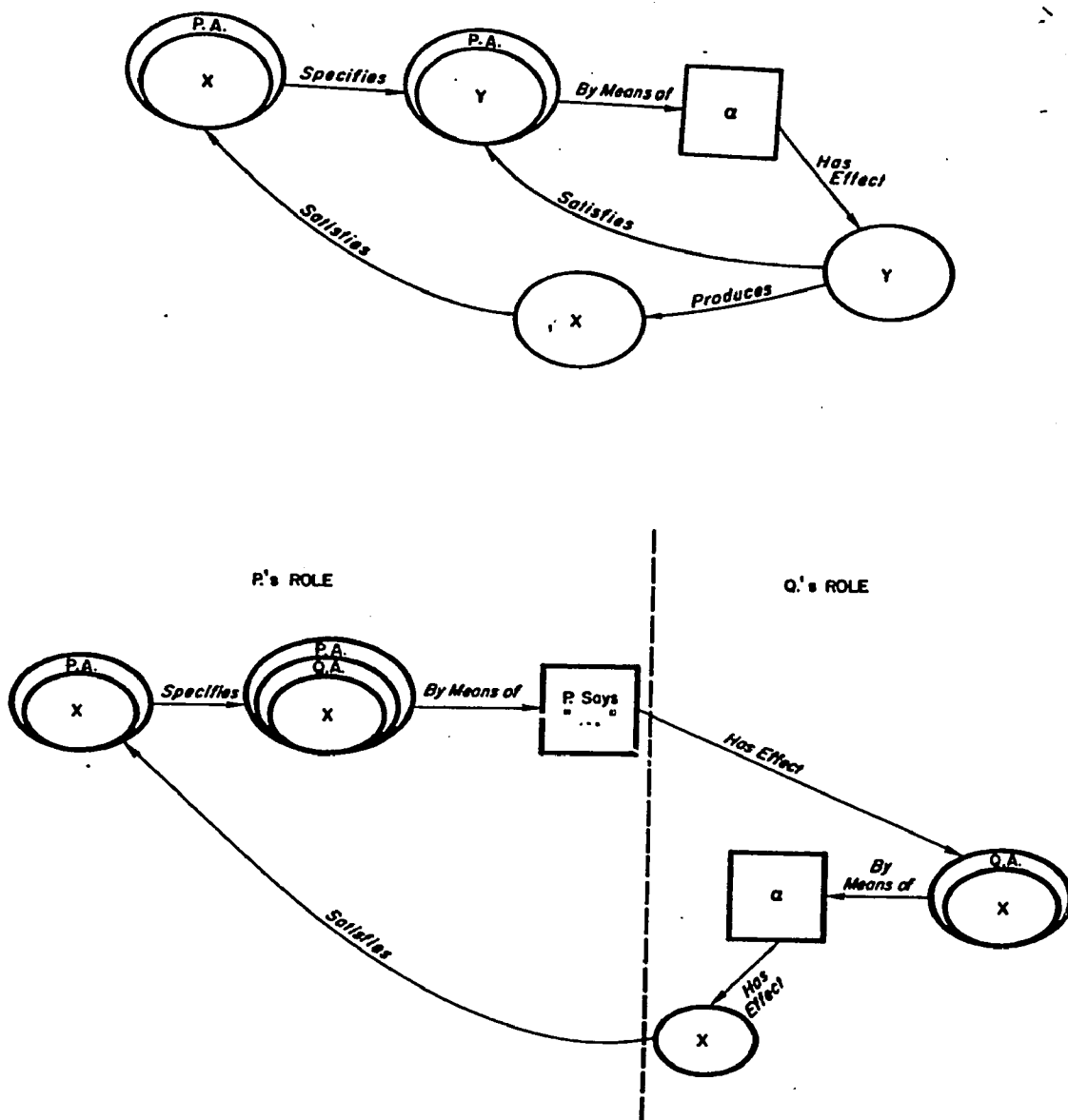


Figure 16. Configurations: Satisfaction of Intentions; Request

specified another Achieve Intention which is carried out by means of an Action. The effect of the Action Satisfies the second Achieve Intention, and Produces a State that Satisfies the first. Note that a Maintain Intention is Satisfied only by the State remaining in existence until the end of the time specified (often implicitly) for the Maintain Intention.

Request

One frequently encountered configuration is the "request", as shown in Figure 16. It occurs when a character attempts to achieve a goal by engaging another, and thus represents one of the simpler cases of interaction among plans. (Note that when two characters interact their respective Intentions and Actions are usually placed on different sides of the page for easier visual interpretation and are separated by a dashed line.) In the figure, character P has the Intention to achieve X. Instead of acting directly to bring about X, P forms a new Intention, to achieve the State of Q's having the Intention to achieve X. This new Intention is achieved By Means Of a speech act, which has the effect of a new Intention for Q (to achieve X). Note that we have deliberately left out any representation of the usual preconditions and outcomes of the request (see Searle, 1969; Bruce, 1975). These preconditions and outcomes operate on the Beliefs shown in the figure, but we are concerned here primarily with the transfer of Intentions.

It should also be pointed out that the figure summarizes a dynamic event, that the Intentions, Actions and States do not necessarily exist contemporaneously. The reader should see Cohen and Perrault (1979) for

a formalism in which these events might be represented.

Resolution of Conflict

Another common configuration is the "resolution of Conflict", as shown in Figure 17. This occurs in various forms, but typically originates as illustrated in the first phase, when a Hypothetical side effect of an Action Conflicts with some Maintain Intention. (As explained below, Hypothetical States are indicated by dotted lines.) The Maintain Intention is in a sense awakened by the Hypothetical State and induced to specify an Achieve Intention in the second phase. The Achieve Intention generates an Action which Counters the Hypothetical State.

The resolution of Conflicts can occur within simple plans (as in the two previous figures), but also plays an important role in interacting plans. For example, one way to resolve a Conflict is to transfer the burden of responsibility, e.g., to use a request to create in another a Maintain Intention that will be awakened by the same Hypothetical State. This strategy, when successful, will result in the other having to resolve the Conflict at a later time.

Complex Action Configurations

The Complex Action representation is used when a character believes that the effects of a set of Simple Actions or other Complex Actions in combination Produce the effect of the Complex Action. The representation of an Action as "Complex", with its decomposition into "Simple" Actions, is used when the effects (or preconditions or other

aspects) of the component Actions are relevant to representing interacting plans. The component Actions within a Complex Action can be related in many possible ways, two of which we identify here.

Enabling sub-Actions. Figure 18 shows that in an action like "starting a fire" (ALPHA), one needs to gather combustible materials together (BETA) before lighting them (GAMMA). The Action of "gathering" has an effect (Has Effect) --- the State of "materials together" (Y) which makes possible (Enables) the act of "lighting". In this case the State Z (enabled by Y) produces the effect of the Complex Action. Not all Has Effect - Enables chains are characterized as Complex Actions. Complex Action representation is used when the sequence of actions is considered to be a coherent unit by the character.

Independent sub-Actions. Not all Complex Action need to contain enabling relations. In an action like "setting a table" (ALPHA), one could set glasses (BETA) before or after setting plates (GAMMA). In this case the conjunction of the two States Y and Z produces the effect of the Complex Action. A representation of this kind of Complex Action would be the same as Figure 18 except that there would be no Enables relation.

By Doing. The relation shown in Figure 19 provides a way of abbreviating Complex Actions. While the Complex Action representation shows the Intentional States which lead to doing the component Actions, the By Doing relation allows for a direct link between the Complex Action and its component Actions. Whenever this relation is used, it can be assumed to be expandable into one of the types of Complex Action

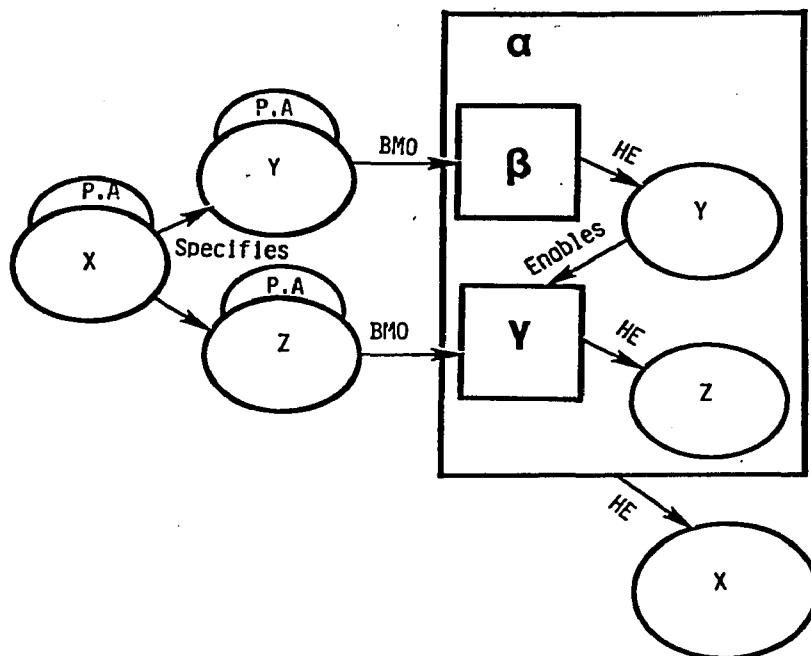


Figure 18. Enabling Sub-Actions in a Complex Action.

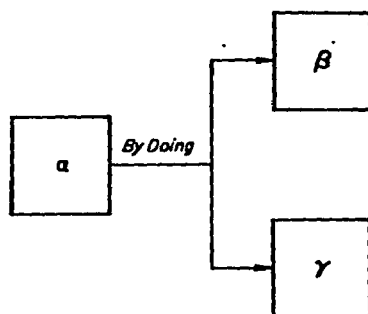


Figure 19. The By Doing Abbreviation.

representations.

Belief Space Configurations and Indicators.

The nodes and their relations exist within a Space which represents a portion of the mental state of one of the two characters. The notation system is limited to two character stories. The notation we use for Belief Spaces resemble enlarged Belief States. Like a Belief State, the character whose belief it is, is indicated in the "partial oval" at the top of the Space.

Two separate Belief Spaces are used when representing the separate points of view of two characters. That is, for any two character story, each of the perspectives on the interactive situation are modelled separately. But within a character's (P's) Belief Space there may be the other character's (Q's) Belief Space (labelled QB but implying PB QB) representing what P believes that Q believes. Figure 20 shows two separate Belief Spaces each with another Belief Space embedded in it. These separate models of a single interactive situation indicate that P's Belief about Q's Belief does not match Q's actual Belief. It also shows that Q has a true belief about P's Belief Space. When the situation being represented is one that is being observed by an outsider (e.g., a story), both these spaces could be enclosed in a Space (labelled O.B. or R.B for observer or reader believes) which would represent the perspective of the observer.

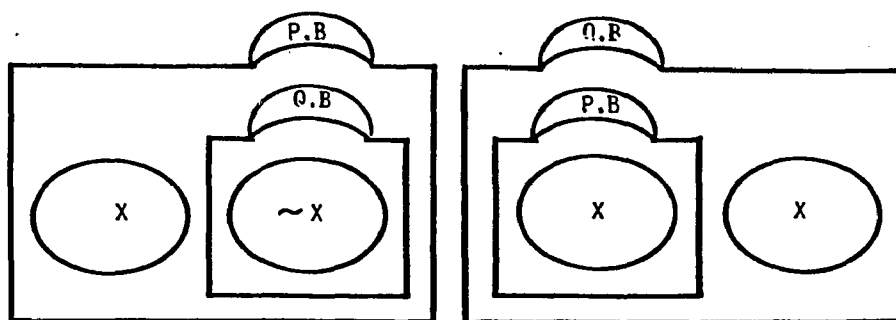


Figure 20. Belief Spaces.

Mutual Belief Space

Within a character's model of the situation there is often a situation in which the following state of affairs occurs with respect to some State or configuration of States (X).

PB X
 PB QB X
 PB QB PB X
 and so on.

In such a case where P believes X and also believes that Q believes X and furthermore that Q believes that P believes it (and so on indefinitely), then we say that P believes that both P and Q mutually believe X. ³⁷ Cohen (1978) discusses Mutual Belief Spaces further and gives a finite representation scheme for the indefinite recursion they imply. Cohen uses the notation "MB(P,Q,X)" to refer to this state of affairs. When naming the Belief Space in which X is believed we say "MB(P,Q)".

Figure 21 shows a Mutual Belief Space from P's point of view. This indicates that P believes that Q believes that P and Q mutually believe that X obtains but that P believes that Q is mistaken in believing they share Mutual Belief in X. Note that the embedded Mutual

37. Mutual knowledge as defined by Schiffer (1972) consists of the following list of States:

PB X
 QB X
 PB QB X
 QB PB X
 PB QB PB X
 QB PB QB X
 and so on.

When modelling the Beliefs of one (target) character (e.g., P, as in the next figure) a Mutual Belief Space within P's Belief Space implies only the States contained within that character's Belief Space.

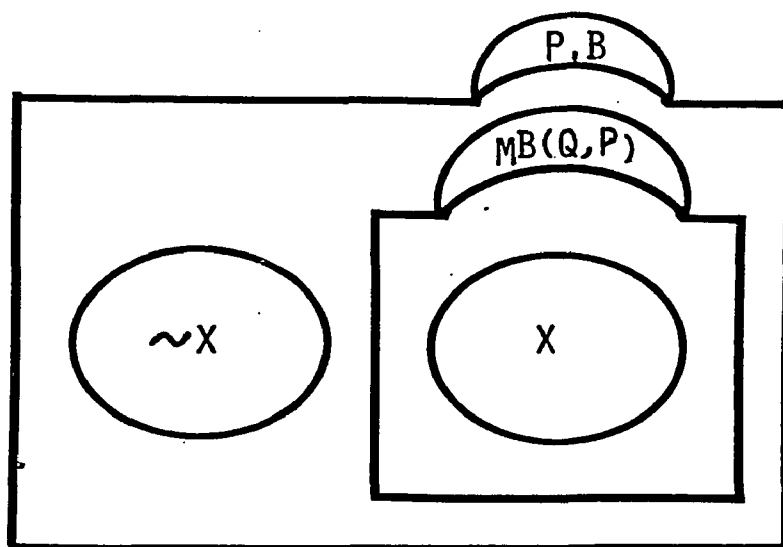


Figure 21. Mutual Belief Space from P's Point of View.

Belief Space is always that of the other character from the one whose Belief Space it is immediately embedded within. That is, within PB the MB Space is always $MB(Q,P)$ since PB is implied by $MB(P,Q)$ and would be redundant. That is, under ordinary conditions, we assume that PB PB X is the same as PB X.

The Mental States which are represented within the Mutual Belief Space are "public" Mental States in the following sense. The Intentions and Beliefs are inferable from the Actions which are carried out. For example, within $MB(P,Q)$, P believes that Q is able to infer P's Intentions and Beliefs on the basis of P's Actions and on the basis of the assumption that they are both acting cooperatively. In addition, P believes that both P and Q mutually believe that those Intentions are inferable and will be inferred by Q. If P has private Beliefs or Intentions which are not inferable from his actions (and which are relevant to Q's understanding of what is in his own interest) then these thoughts would be represented outside the MB Space. (If the private thoughts are irrelevant to the character's presumed to be shared concerns, then they are not represented at all).

A Mutual Belief Space is usually used in representing some cooperative Social Episode between two characters. In the representation of a story that consists of a cooperative Episode (where there are no conflicting Intentions) both characters' models of the situation may entirely consist of a Mutual Belief Space. Where conflicting goals and deception are involved, part of at least one character's model of the situation will fall outside of the Mutual Belief Space but within an enclosing Belief Space.

Social Episodes

A Social Episode, shown in figure 22 is a cooperative course of action which takes place within a Mutual Belief Space. In the Space are included the Intentions and Actions which constitute the roles of the two characters. We are using "role" in a restricted sense to mean the Actions that the particular character (say P) expects to perform, and which P believes that the other character (Q) expects P to perform in the Episode. Role also includes the Intentions that Q could reasonably infer from P's Actions given the assumption that they are cooperating. When it is character P's model of the interactive situation that is being represented, character Q's Intentions are, of course, inferred, while character P's own Intentions are known directly.

The roles of the two characters are differentiated by a dashed line dividing the Belief Space. Actions of both characters (the system is only adequate for representing two characters) are represented toward the center and their higher level goals toward the outside. Simple States, unlike Mental States, may appear on either side of the role line since the characters view these as "objective" facts not attached to the Mental States or roles of either of them.

Initiation of a Social Episode

An important configuration of nodes which can now be explicated is the initiation of a Social Episode, as shown in Figure 23. . Often, to achieve certain goals one must engage in an activity. The activity can

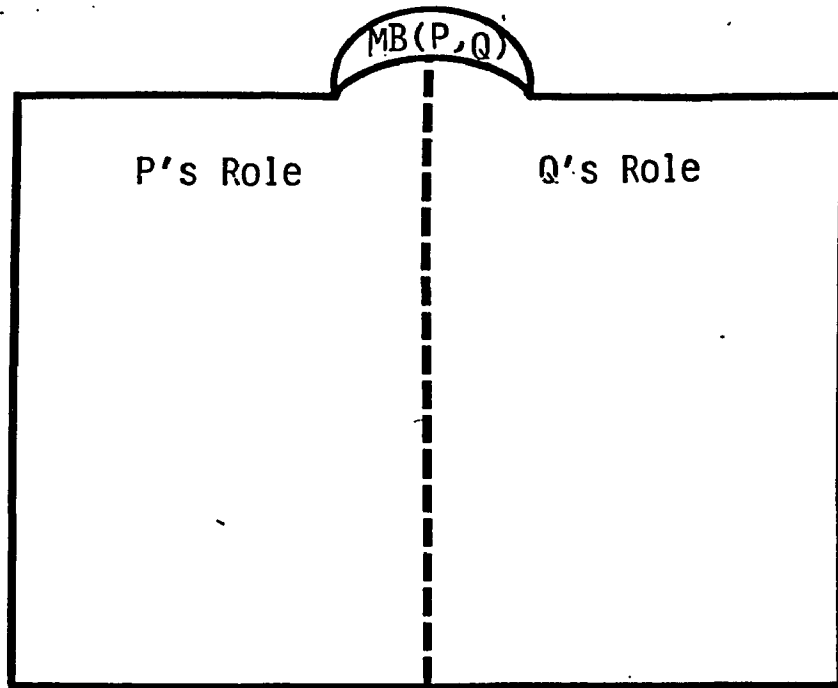


Figure 22. A Social Episode.

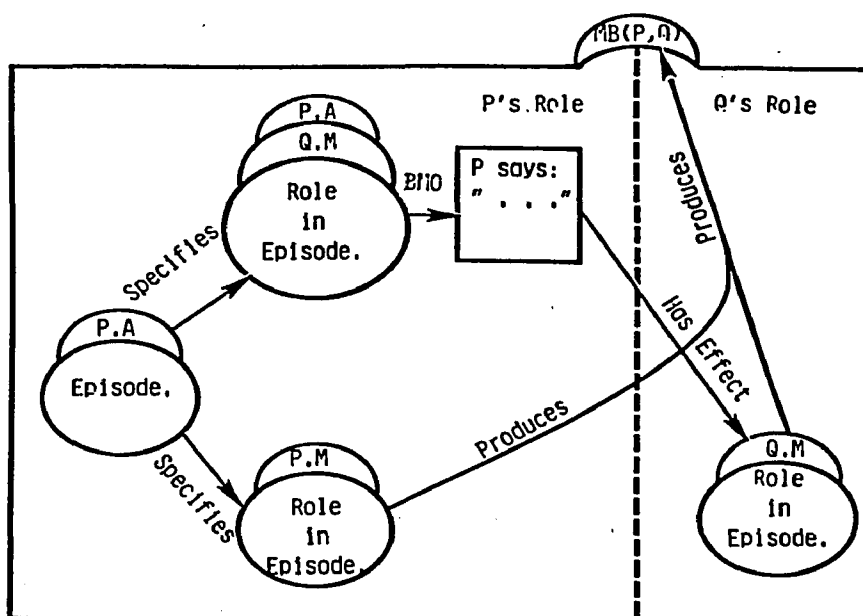


Figure 23. Initiation of a Social Episode.

be said to commence when the two (or more) participants each have the Intention to maintain the activity, and these Intentions are mutually believed. Typically an Episode is initiated By Means Of a speech act. e.g.. "Let's do....". When successful, the initiation Produces a Maintain Intention in the second participant. This, plus the Maintain Intention of the first participant, Produces the Belief Space of the Episode. One of these Beliefs is that the initiation Action is precisely that: an Action to create the Belief Space in which it resides.

Multiple Embeddings

Belief Spaces may be embedded within each other any number of levels deep. (But here is some practical limit beyond which the situation would be incomprehensible.) Usually a Mutual Belief Space is the most deeply embedded Space. Figure 24 shows a Mutual Belief Space embedded a step further than in Figure 21. The situation is different but the overall model is still of P's beliefs. Here P believes that Q has a belief that Q mistakenly believes he has kept a secret from P. The beliefs that P thinks are unavailable to Q are placed in the outermost Space (PB). PB QB contains the beliefs Q mistakenly thinks are unavailable to P. PB QB MB(P,Q) contains the beliefs that P thinks Q thinks P believes both P and Q mutually believe. ³⁸

Belief States and Belief Spaces may both refer to more deeply embedded nodes. Belief States, however, contain only single facts While Spaces may contain configurations of nodes and relations. Both

38. This is the form of Hansel's plan as analysed by Bruce & Newman (1978) if P = Hansel, Q = Parents and X = Parents are intending to go on an ordinary wood fetching expedition.

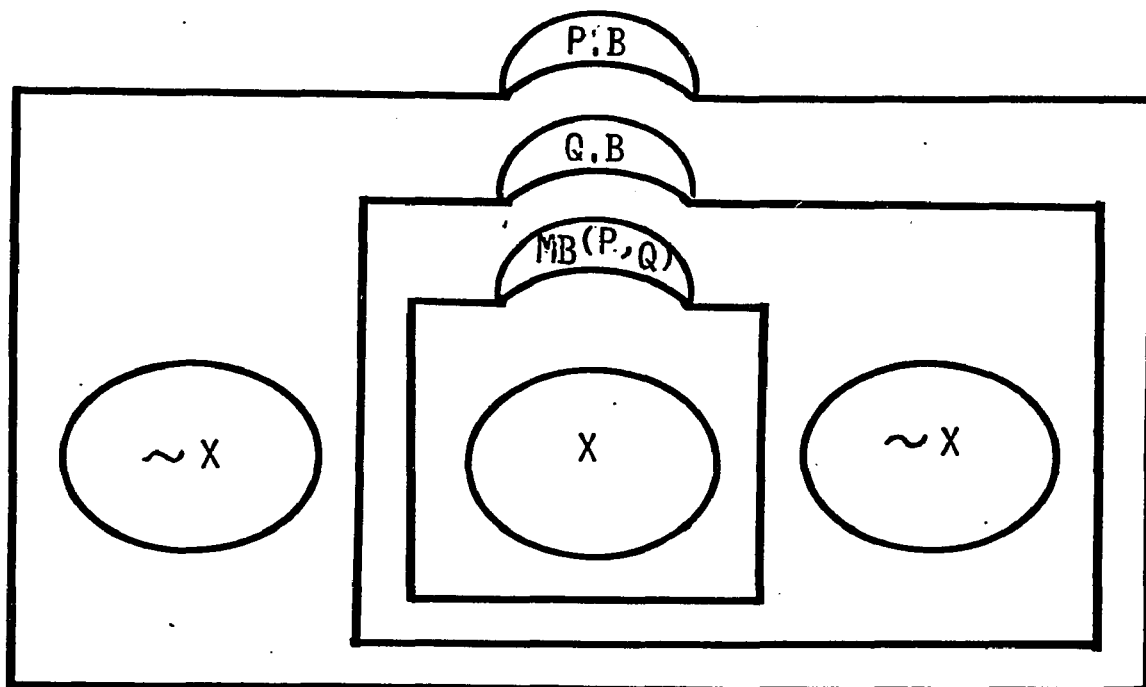


Figure 24. P believes that Q believes that P believes that both P and Q mutually believe X.

Belief Spaces and States refer to more deeply embedded spaces than the space containing them (except where a Belief State redundantly refers to a State at the same level.)

Actions and States in Embedded Belief Spaces.

A state may exist simultaneously at several levels of belief. For example, P may believe it and so it is in PB; and P may think that Q also believes it, so it is in PB QB (i.e., Q's Belief Space within P's Belief Space). If it is also true that P believes that P and Q believe that each other believe it (etc.) then it could also be in MB(P,Q). In general, States are represented only at the most deeply embedded Space that is possible. They appear in less deeply embedded Spaces only for reasons of clarity.

markers. Three markers are used to indicate that the same State or conflicting States exist in two different Belief Spaces within one character's model of the situation. They are shown in figure 25. Markers do not add new information but are used as a convenience for representation.

Virtual Plans. One important reason that it is necessary to represent Beliefs outside of a Mutual Belief Space is that one of the characters may be deceiving the other. Q may believe something about the world or about P's plans which is known by P to be false. We call these false Beliefs "Virtual". While ordinary, States and Actions are represented by solid lines, Virtual States and Actions are marked by dashed lines. Whenever a Social Episode contains Virtual elements, the Episode can be considered as a Virtual plan (Bruce, 1980).

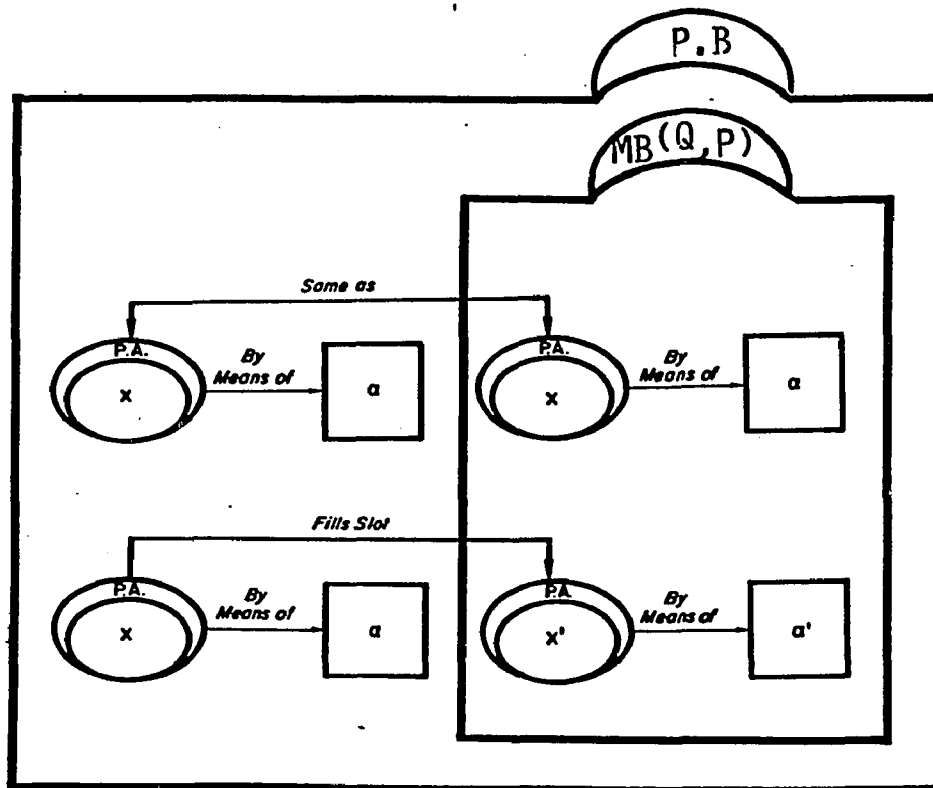


Figure 25. Belief Space Markers: Virtual nodes; Same As; Fills Slot.

Same As is used to mark that two States (often Intentions) are actually identical.

Fills Slot is used to mark the relation between a specific Intention in P's real plan with a more general or unspecified Intention in the plan Q thinks P is carrying out. While they are the same Intention, they are understood differently by the two characters.

Relations and Markers Crossing Boundaries

While markers (Conflicts, Same As, Fills Slot) may cross Belief Space boundaries freely. Relations connect nodes only within a particular Belief Space. Where an effect (a new State) is relevant to more than one Belief Space, the State may simply be duplicated in the second Belief Space and marked by a Same As marker. In other words, processes which produce changes in States are shown as operating within particular Belief spaces.

Hypothetical or Pretend Spaces and Nodes.

At times a character may assume a State is the case in order to trace out what may Hypothetically occur if the State did exist. Also characters may agree to pretend that certain States obtain. If the Hypothetical or pretend State is isolated then it may be represented within a Belief Space as a State with a dotted line.

Where the Hypothetical situation is more complex than a single State or where a pretend episode is involved, the nodes and relations may be enclosed in a Hypothetical Space represented as a Belief Space except that the border is a dotted line. As we saw above (resolution

of conflict) these States are used to represent a State that a character can predict would be the result of a future action or State of affairs but which he or she plans to avoid by modifying the future Action or doing some other Action to Counter the Action's expected effect. Hypothetical States show an aspect of the character's planning (rather than the final plan) in that they indicate how various plans may be coordinated.

Pretend. Pretend States are created by Actions of the characters which either enact the pretended events or describe them. The pretended events may be represented within a Pretend Space. Figure 26 shows a configuration of nodes and relations within a Pretend space. Two Actions occur in the Pretend Space. Alpha is enacted from outside the Space and Beta is described.

Hypothetical Modification of Relation and Markers. Whenever a Hypothetical State is being considered in planning an Action sequence, certain of the relations and markers also become Hypothetical. This is indicated by adding "would" to the name of the relation. This modification applies to outcome relations and some of the markers. Thus the following relations and markers are generated:

Would Have Effect
 Would Have Side Effect
 Would Produce
 Would Conflict
 Would Satisfy

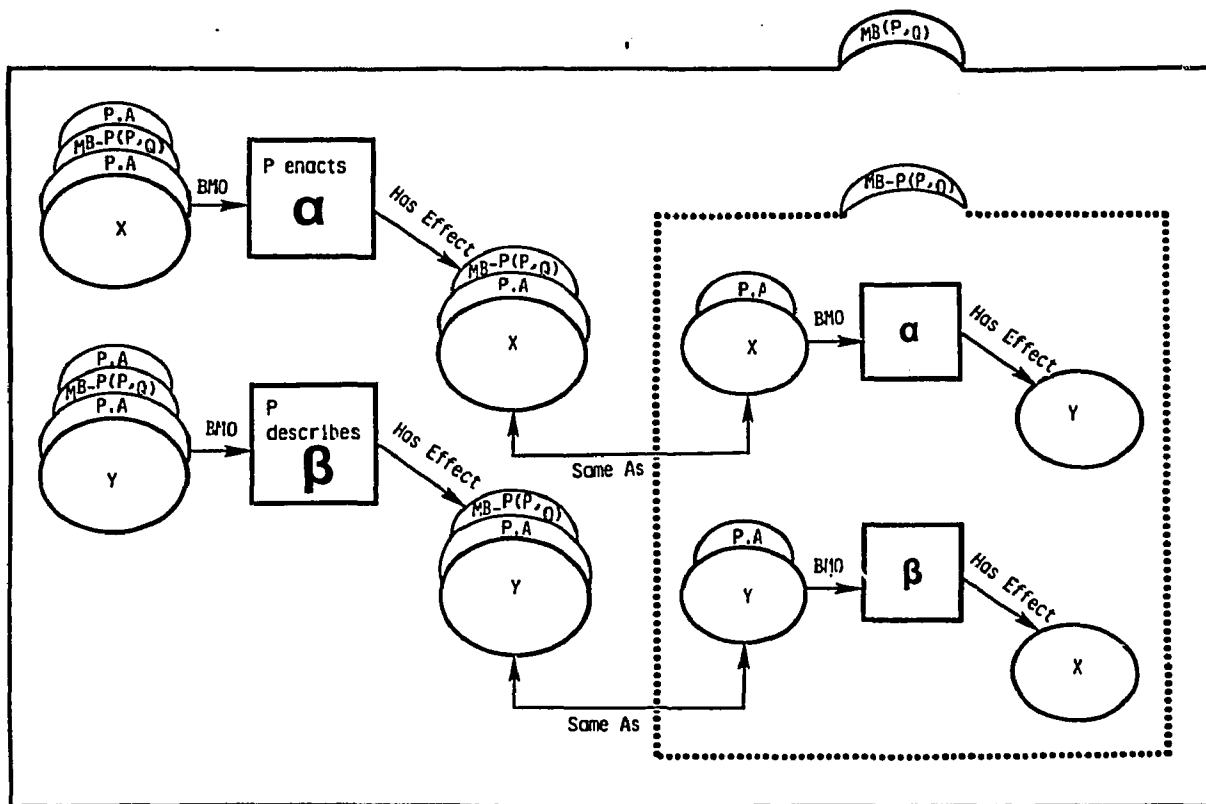


Figure 26. Describing and Enacting a Pretend Sequence.

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