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The Shift in Roles in the Expert-Novice Dyad

by

Gess LeBlanc

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

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Date

Chair of Examining Committee

4/20/98
Date

Executive Officer

Colette Daiute

Joseph Glick

Katherine Nelson

Bruce Dorval

Supervisory Committee

THE CITY UNIVERISITY OF NEW YORK

Abstract

THE SHIFT IN ROLES IN THE EXPERT-NOVICE DYAD

by

Gess LeBlanc

Advisor: Professor David J. Bearison

In this research, expert-novice kinds of interactions between same-aged peers in first, third and fifth grades were observed and analyzed. One subject (referred to as the expert) within each dyad was asked to teach a board game that he or she had previously created with a partner to a new subject (referred to as the novice). Microgenetic analyses of expert-novice peer interactions were conducted in an attempt to determine the strategies and methods used by children to instruct their same-aged peers. Of particular focus was the development of a system of coding that served as a conceptual tool for discussing the transmission of information necessary for task success and the interpersonal skills utilized to maintain roles in dyadic interactions between peers. Findings suggest qualitative differences in the kinds of strategies used by children to provide and gain information. Additionally, results indicate developmental differences in the strategies used to maintain or challenge a position of power with respect to a peer. Fifth grade subjects provide greater instructional clarity, ask fewer task-relevant questions, and maintain their position of power with greater consistency than third or first grade subjects. Findings suggest that qualitative shifts exist in the nature of the interactions between experts and novices. As the dyadic interaction proceeds, the relationship between partners shifts from one reflecting instructional properties to one reflecting collaborative properties. Factors contributing to such shifts in roles as well as the implications such shifts have on the

dyadic activity are discussed.

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INTRODUCTION

Learning is defined as a relatively permanent change in an organism's behavior due to experience. Experience is defined as knowledge gained from participation in an event. Learning, therefore, has its foundation in participation. Such participation in the activity of learning can take place in several ways. One can participate in learning while collaborating with others, one can participate in learning while under the tutelage of others, and one can participate in learning by actively engaging their environment in isolation. While a myriad of contexts for learning exist, each is influenced not only by the nature of the event but by characteristics of the individual that make certain contexts more beneficial.

When I was a kindergarten and preschool teacher, I often observed children asking adults questions that adults often admitted that they couldn't answer. Others, however, would not be so forthcoming and would tell children things that they knew were incorrect rather than admit that they didn't know. I began to wonder what would happen to children when they solicited information from an adult and the adult knowingly gave them erroneous information rather than admit that they didn't know the answer. Would these children still seek that adult out for information, would they seek out someone else, or would they "go it alone."

These kinds of early questions led me to design a study to look more closely at interactions between adults and children while they were engaged in a joint task. What I thought would be the answer to a question only led to further questions. If children engaged adults in certain ways, how would they engage their peers? What kinds of

questions would they pose and how would they respond to peer generated inquiries? This research, therefore, is an investigation of the strategies and methods used by children to instruct their same-aged peers as well as an analysis of the kinds of inquiries that children pose in an attempt to gain information from their peers.

This work also provides me with the perfect platform for doing two things: for investigating learning in a less classroom structured and more spontaneously generated sense, and for investigating interactions between peers where the roles of teacher and learner are both played by children.

I heard a gentleman once state that "nothing is taught until something is learned." If we think about the ramifications of this statement than we begin to appreciate the task that someone in the role of "teacher" faces. The ability of children to serve as teachers rests in their ability to understand and assess the informational needs of others and to coordinate these needs with their own ways of interpreting a task and the ability to be an effective learner rests in an ability to effectively gain task-related information.

For children to be effective teachers they must be able to put themselves in their partner's place in order to provide their partner with the most task-relevant information. They must, additionally, maintain their role as teacher with respect to their partner throughout the teaching interaction.

What is at issue, is whether there are developmental differences in the types of strategies that children use to provide information to a same-aged peer and the types of strategies children use to gain information from a same-aged peer. It is the intent of this research to address these and other issues related to peer-based instruction and sociocognitive growth.

LITERATURE REVIEW

The Relevance of the Social System

There has been increasing support for the view that the social system provides the context for social interactions that promote children's cognitive development. (Azmitia, 1988; Tudge, 1992; Goncu, 1993, Rogoff, 1993, Fagot & Gauvain, 1997). As a result, studies of children's cognitive development have become increasingly focused on investigating development not from the perspective of an individual child but from the perspective of a child interacting with another. Throughout childhood, learning takes place in a variety of contexts and in the presence of a variety of audiences. Much of children's problem-solving efforts take place while under the guidance and supervision of their parents (Rogoff, 1990). Both cognitive and social development reflect the child's engagement with others. From the development of pre-linguistic babbling to the development of word usage to the development of communicative skills, children's development is the result of prior culturally prescribed interactional experiences with both objects and individuals in their environment. As a result, cognitive development is the product of the evolving relationship between the individual and the social world.

Piaget has argued that the development of the child is an adaptation as much to the social as to the physical milieu (Bearison, 1982; Tudge, & Rogoff, 1989). While much of Piaget's work reflects a focus on cognitive development arising from individual actions on the physical environment, his work also emphasizes the role of the social world in the development of knowledge. As a result, the development of the individual is inextricably linked to the position of that individual within a social setting. "There are no more such

things as societies qua beings than there are isolated individuals. There are only relations....and the combinations formed by them, always incomplete, cannot be taken as permanent substances" (Piaget, 1932).

A crucial aspect of Piaget's theory is that equilibration is the primary factor in cognitive development (Piaget, 1970). Children are forced to reconcile the discrepancies between their own view of the world and alternative views that are presented to them. As a result, they are forced to reform their ways of thinking to provide a better fit with the alternatives. When their view is altered so that the alternative views fit more easily, equilibrium is re-established at a higher level (Selman, 1980).

Much of the work of Piaget focused on the "cognitive conflict" brought about by disequilibrium which occurs as an individual acts on the physical and logical environment (Bearison, 1982; Tudge & Rogoff, 1989). However, in early work, "Piaget argued that cognitive conflict could arise in the course of social interaction, in discussions between children who hold different views on an intellectual or moral issue. Such logical discussion allows the child to see that there is a different perspective which may not easily fit into his or her own pre-existing perspective" (Tudge & Rogoff, 1989). As a result, cognitive development can be described as the process of dis-equilibration from a previously established state of equilibrium and the subsequent re-equilibration at a more advanced state.

Research from the Piagetian perspective has investigated the notion of cognitive conflict through studies of peer collaboration (Bearison, Magzamen & Filardo; 1986, Mugny & Doise, 1978; Weinstein & Bearison, 1985; Zakharova, & Shakenova, 1990; Zimmerman, & Blom, 1983). Through the process of collaboration, individuals are forced

to reconcile perspectival differences between themselves and others. The process of reconciliation, therefore, serves as the mechanism by which cognitive development proceeds.

Others have sought to investigate social interaction from the perspective of the work of Vygotsky. Investigators who support this position view dyadic interaction as a process by which knowledge is socially constructed (Mugny, 1978; Wertsch, 1989; Levine, 1993). Leont'ev (1981), for example, stated that "human psychology is concerned with the activity of concrete individuals, which takes place either in a collective – i.e., jointly with other people – or in a situation in which the subject deals directly with the surrounding world of objects – e.g., at the potter's wheel or the writer's desk", (p. 47). Extensions of the dyadic interaction paradigm have provided numerous perspectives on the impact of the social system on children's cognitive growth (Garton, 1992, Zakharova, 1990). One such extension has been an analysis of expert-novice interactions. According to this perspective, a stronger indicator of mental development in the child is not what he or she can do alone but, rather, what he or she can do with the guided assistance of others (Wertsch, 1984). Vygotsky presented the notion of the zone of proximal development as the means by which knowledge is socially constructed. It is defined as "the distance between the actual developmental level as determined by independent problem-solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1962).

As a means of operationalizing the zone of proximal development, researchers have studied adult-child interactions in reference to a problem-solving system (Perlmutter

et. al., 1989; Wertsch et. al., 1984). According to Wertsch (1984), prior to independent problem solving in the child is problem-solving that is regulated, planned, and reflected upon by an adult within the adult-child dyad. He refers to such an attainment of independence as a shift from "other-regulation" to "self-regulation".

According to Vygotskian accounts, cognitive development is the product of social exchange. As discussed by Wertsch (1984), development takes place on two separate planes: the inter-psychological (in which social interaction precedes development) and the intra-psychological (where the product of the social exchange becomes internalized). Consequently, cognitive development first takes place between individuals and later takes place within individuals. As a result, the intersubjective understanding gained through collaboration becomes the child's own (though socially derived) subjective understanding; an understanding that incorporates the shared understanding previously achieved (Forman, 1992; Tudge, 1987).

Interpersonal negotiation with respect to a shared task requires that the goal of the task be defined, the procedure for achieving the goal be clear, and the role of the "other" as a mediational tool to achieving the goal be understood. While it is the adult who initially serves as the " strategic gatekeeper", it is the child who internalizes the strategies and uses them to guide his or her own behavior. It is not simply a directional model in which strategies shift from adult to child in their intact form. It is instead, a dialectical system in which the adult's strategies for problem solving are transformed through the process of the interaction so that they become the child's strategies for problem solving which are then internalized by the child (Wood & Middleton, 1975; Wertsch et al 1980, Pacifici & Bearison, 1991). At the same time, adults must be guided by the needs of the

child which change as a function of the contributions of the adult. As a result, it is the process of transformation that is the focal point of the dialectical system.

Interactions Between Peers

Piaget believed that discourse between peers is more valuable than discourse between an adult and a child (Piaget, 1950). He suggested that the interaction between a child and an adult is essentially unequal and asymmetrical. Given that the adult has power over the child, the resultant discrepancy disrupts the condition of reciprocity for achieving equilibrium in thinking. He added, that it is despite adult authority, and not because of it, that the child learns. When a peer interacts with a peer no discrepancy in power exists and differences of perspectives are more likely to be encountered, "Criticism is born of discussion, and discussion is only possible among equals: cooperation alone will therefore accomplish what intellectual constraint [caused by unquestioning belief in the adult's omniscience] failed to bring about" (Piaget, 1950, p. 151). Vygotsky, in contrast, emphasized interaction with a more skilled partner as an essential component of the "zone of proximal development". He suggested that such interaction served as the means by which children became enculturated in the intellectual tools of their society (Wertsch, 1984). The agent of socialization must, therefore, be someone who knows more about the tools than the child does (Vygotsky, 1962).

The concept of the "zone of proximal development" requires not only a difference in level of expertise but an understanding on the part of the more advanced partner of the requirements of the less advanced child, for information presented at a level too far in advance of the child would not be helpful. Vygotsky's theory thus requires that the relation between the two partners be one of intersubjectivity, in which some measure of

joint understanding of the task is obtained (Wertsch, 1984). Therefore for Vygotsky, ideal partners are not equal, although their inequality should reside in understanding rather than power (Tudge & Rogoff, 1989).

Thus, both Piaget and Vygotsky imply that the more salient the disparity in power becomes, the greater the negative impact on the successful functioning of the dyad as a problem solving system in that the resolution of conflicting perspectives becomes less likely as the child simply concedes to the more clearly formulated perspective of the adult. It is critical, however, that the term "power" be discussed and operationally defined. With respect to both the Piagetian and Vygotskian perspectives, power refers to an unchallenged task-related expertise. It is not simply that one member of the dyad knows more task-related information than the other, but that this knowledge goes unchallenged. Whether it is from the perspective of the child in adult-child interactions within the Piagetian framework or the perspective of the novice in expert-novice interactions within the Vygotskian framework, a disparity in power reflects the less knowledgeable persons' yielding to the perspective of his or her more knowledgeable partner. As a result, in interactions where large power disparities exist, neither collaboration nor interactions within the "zone of proximal development" are productive.

"The width of the zone of proximal development – or the extent of the difference between what a child can do individually and under ideal support conditions – depends in part on various characteristics of the child" (Daiute & Dalton, 1993, p. 289). As a result, additional factors that may impact upon the productiveness of dyadic relations will be addressed.

The Role of Shared Experience

"[W]e live from birth to death in a world of persons and things which is in large measure what it is because of what has been done and transmitted from previous human activities. When this fact is ignored, experience is treated as if it were something which goes on exclusively inside an individual's body and mind. It ought not to be necessary to say that experience does not occur in a vacuum. There are sources outside an individual which give rise to experience (Dewey, 1938/1963, p. 39)."

Research within the zone of proximal development often seeks to determine immediate situational factors, such as contingency of responses of mothers to their children while engaging in joint problem solving tasks, while attempting to determine the relationship that the immediate situation has to the society and culture at large. What role does the contingency of a mother's verbal response to her child's failed attempt at problem solving play in her child's ability to develop perspective taking skills? Why are these skills important? These kinds of questions suggest that the importance of research conducted within the zone of proximal development is not to determine the immediate overt relationships between partners but to examine how these relationships reflect a social and cultural history that researchers are seldom privy to. It is, therefore, as important to investigate dyadic relationships at the point of the "experimental setting" as it is to determine the prior experiences that participants bring to their dyadic activity.

Interactions within the zone of proximal development are predicated on the maintenance of roles and, in turn, on past social experiences and cultural practices. For example, if we think of an expert-novice paradigm as being comprised of strangers, then we may view expertise as simply displayed competence in a particular culturally valued

realm. As a result, as long as differences in competency exist, role maintenance is assured. If we think of an expert-novice paradigm as being comprised of individuals who enjoy a shared social history, however, expertise is not simply defined in terms of competence in a particular realm but past displays of competency in a variety of realms. It is far easier for someone who knows you to accept or question your competence based on past experiences with you than someone who has no prior experience with your displays of competence.

If we think of interactions within the zone of proximal development as reflecting "immediate situational factors" (Fagot & Gauvain, 1997), then we may conclude that the strength of such a dyadic activity rests in its responsiveness to the ever-changing informational needs of the learner. Learning through expert-novice kinds of interactions is immediately effected by the way in which participants structure their task, provide task-relevant information, and seek information necessary for task success. However, if we think of "sociocognitive transactions" (Fagot & Gauvain, 1997) as not only reflecting immediate, situationally specific competencies and potential but also the culmination of prior socio-cultural experiences, then we may conclude that the dyadic activity under observation reflects a social history that directly impacts upon the nature of interactions that exist within the zone of proximal development (Ellis & Gauvain, 1992). The manner by which an adult provides information to a child is influenced by his or her perception of the child's cognitive abilities. This perception, however, is directly influenced by the prior interactions that have existed between that adult and child. As a result, interactions observed and analyzed in the present are inextricably linked to past interactions. Research conducted within a Vygotskian framework is limited because of its failure to acknowledge

the impact of such prior encounters (Fagot & Gauvain, 1997).

Investigations of interactions between peers must be equally cognizant of the role of shared experiences. When research regarding peer interactions is conducted, participants are generally selected from the same school and often from the same classroom. This, undoubtedly, will have an impact upon the quality of interactions that result. Through prior "non-experimental" interactions, (in class, during free play, at home, etc.) children develop an understanding of the competencies of their peers. When children are observed in experimental settings, these past interactions are often assumed to have a lessor impact on the quality of interactions than factors such as age or gender. However, the age and gender of the children impacts upon the quality of their past interactions and, therefore, factors such as age, gender, and passed shared experiences are inseparable when discussing their impact upon patterns of social interactions. As a result, differences in patterns of interacting may reflect not only developmental differences but also differences in the quality of past interactions. As suggested by Ellis & Gauvain, (1992), "relationships between people, in terms of affection and duration, may play a critical role in the process and outcome of cognitive interaction" (p. 160). For example, Forman and Cazden (1985) noted that consistent patterns of interaction between partners were not achieved by the participants in their study until several dyadic interactions had taken place. Such an example illustrates that not only do patterns of interaction emerge as a result of specific developmental markers such as age or the ability to coordinate self-other perspectives, but that patterns of interaction themselves develop as a function of past shared experiences. For example, while friendship is not the sole ingredient necessary to ensure interactions that promote cognitive growth (Bearison, et al, 1986), Azmitia and Perlmutter (1989)

noted that issues of control and discussions regarding the division of labor more frequently emerged in dyads composed of children who were not friends. As a result, past shared experiences such as those that exist between friends directly impact not only upon the quality of immediate interactions but upon the quality of subsequent interactions between the participants.

The Impact of Gender

Gender differences are apparent in the way boys and girls use language in social interaction. "When interacting in same sex groups, boys tend to talk longer and more frequently, interrupt more, attempt to "top" another's story, provide information, and exert control over the topic of conversation more than girls, whereas girls simultaneously attempt to gain their own way and sustain the interaction by agreeing with points others have made, pausing to give others a chance to speak, and offering gentle directives, as opposed to commands, to their partners" (Ellis & Gauvain, 1992, p. 163).

In an examination of gender patterns in peer problem solving, Gauvain & Ellis (1988) found sex differences in how boys and girls in same-sex dyads exchanged information. "Boys were more likely than girls to provide task-relevant information that logically followed from and built upon their partner's prior statement and to discuss the task with one another. Girls provided useful information, but it was independent of and less coordinated with their partner's contributions. However, when the overall provision of task-relevant information was compared, there were no differences across the dyads in the amount of information provided. Nor were there any differences in the effectiveness of their performances" (Ellis & Gauvain, 1992, p. 163). Such differences in patterns of interaction between boys and girls in same-sex dyads suggest that the roles each

participant plays is inextricably linked to gender and, therefore, gender must be considered an essential component in any analysis of interaction styles (Ellis & Gauvain, 1992).

Collaboration versus Guidance: The Impact of Activity Goals

The ability of the dyadic participants to maintain their expert and novice roles is directly related to the goal of the dyadic activity. When the goal of the interaction is achieved through the collaborative efforts of the participants, a disparity in the level of task-related expertise must develop toward greater equity, if the interaction is to successfully proceed. However, when the goal of the interaction is achieved through guidance/tutoring (Lave & Wenger, 1991), a disparity in the level of task-related expertise is an essential component of the interaction.

The impact of expertise on collaborative interactions has been investigated (Kaplan, 1990; Rogoff, 1990). Ellis & Gauvain (1992), for example, found that children's collaborative interactions were influenced by both social and cultural factors. Their investigation of the problem-solving interactions of Navajo and Euro-American children indicated that age, gender, culture, and expertise impacted upon the manner in which collaborative interactions between children proceeded. From their work, it is clear that both a disparate and equitable distribution of task-related expertise impact upon the manner in which the interaction will proceed. Furthermore, it is apparent that a shift in the role of either expert or novice (with the expert gradually relinquishing control and the novice exerting greater control over the interaction) is the result of the inability of either to maintain their prescribed roles.

Consequently, while some have suggested that a disparity in task-related expertise may be detrimental to dyadic interactions when the goal is collaboration, a disparity in

task-related expertise may be essential when the goal is guidance or instruction. As a result, an analysis of dyadic interactions between peers in which a disparity in task-related expertise is salient may provide useful information regarding the impact of such a disparity on the ability of the dyad to effectively serve as a system of interpersonal negotiation.

Expert-Novice Interactions: A Retrospective

Dyadic interactions between adult and child have been termed "expert-novice" interactions and have traditionally placed the adult in the role of expert and the child in the role of novice (Moore et. al., 1986; Pacifici & Bearison, 1991; Radziszewska, & Rogoff, 1988). Others, however, have sought to vary the paradigm by switching the roles of expert and novice (Ellis & Gauvain, 1992); while others have placed children of differing ages in the expert and novice roles (Valsiner, 1988; Ajila, 1992). Ellis & Gauvain (1992) caution, however, that "expertise on particular tasks should not be assumed to be correlated with age, especially ages that are somewhat close developmentally, for example, 5- and 7- year olds" (p. 161). Nevertheless, the primary point of inquiry has been the manner in which information is transmitted and transformed through the course of the interaction.

Of importance, however, is the form that such information takes. Damon (1991) discussed the distinction between the acquisition of skills and the acquisition of knowledge. Skills refer to specific task-related tools whose function and meaning are derived solely from the context within which they are utilized. Knowledge, in contrast, refers to generalizeable principles that are applicable within a variety of contexts.

Traditional approaches to investigating expert/novice interactions generally have been in reference to issues of task mastery and skill acquisition (Meltzer, et. al., 1989;

Solomon, & Lee, 1991). Task mastery requires specific strategies for skill acquisition that are utilized by the expert and, consequently, absent in the approach of the novice. As a result, the emphasis in such paradigms has been on attempts to "make the novice more like the expert" in terms of their use of particular skills necessary for task mastery (Blaye, et. al., 1991; Galbo, 1989).

In discussing the relationship between roles within the expert-novice dyad, it is imperative to clearly define what is meant by "expert" and "novice". The terms, expert and novice, have been used primarily with respect to how different approaches to tasks and problem-solving procedures impact on the participants' ability to achieve task-related success. Generally, experts are believed to make use of prior knowledge to apply to current problem solving tasks and, thereby, are differentiated from novices whose approach to tasks is believed to lack problem solving strategy.

In the current paradigm, the terms "expert" and "novice" are used to categorize participants within a dyad in which one partner, who possess information, must teach that information to the other. The one who is instructing is considered the expert, while the one who is instructed is considered the novice. Of particular interest are the cognitive tools that experts use, with respect to their instructional responsibilities, that prove effective in transmitting information to the novice. Additionally, particular characteristics of the novice will be discussed in reference to the instructional interaction.

Traditionally, the functioning of the expert-novice dyadic problem solving system rests on the maintenance of roles. Both the roles of expert and novice must be clearly defined in order for the system to proceed. The expert must serve as the source of information and the novice must perceive the expert as such. If either partner seeks to step

outside of their role, or their role grows less clearly defined, the expert-novice system will no longer exhibit the characteristics of guidance/tutoring. Traditional approaches to expert-novice problem solving systems, whether adult-child or older and younger children, have been aided by large age disparities as a means of distinguishing between the skills and responsibilities of the dyadic participants; the older member of the dyad is assumed to possess more skills and task related information than the younger (Moore, 1986). While the paradigm has been manipulated to switch the assignment of roles, the dyad remained comprised of participants of clearly differentiated age groups. Additionally, traditional approaches have been primarily concerned with methods or strategies for solving logical problems which have a finite set of solutions. Hence, dyadic interactions within this tradition have been termed "problem-solving systems" (Wertsch, 1984).

Some researchers have suggested that an investigation of expert-novice interactions among peers provides a wrinkle in the fabric of the traditional expert-novice paradigm (Phelps, & Damon, 1991; Tudge, 1992). However, the proposed research will show that within naturalistic settings, the expert-novice dyad proceeds as a system of interpersonal negotiation. Naturalistic settings model the natural form of how children share ideas and they provide a context for the investigation of cognitive development rather than solely an investigation of skill acquisition. Additionally, such settings provide the context for an investigation of the manner in which knowledge is transmitted and shared through expert-novice interactions. As a result, the current paradigm provides an opportunity to examine the shift of roles with respect to dyadic interactions among peers.

The Components of Interpersonal Negotiation

Traditional approaches to the expert-novice dyadic interaction have focused

primarily on the transmission of information as the primary criteria for judging the effectiveness of the dyad as a problem solving system. If we accept the view that there is more to the instructional task than just the transmission of information, we must then consider what the other responsibilities of the expert are. Ellis and Rogoff (1992) have suggested that the problems that the child teachers in their study had in providing good instruction may have been due to the numerous demands placed on the child by the teaching interaction (such as demands for clarity of communication and a coordination of perspectives). Cazden et al. (1989) have noted that teaching involves more than just the transmission of information; teaching also requires the management of interpersonal relations and roles. As a result, in dyadic interactions among peers in which one is assigned the role of expert, the responsibility for transmitting information to the other is one of many responsibilities that may impact upon the functioning of the dyadic system.

In traditional experimental settings, power reflects unchallenged, task-related expertise. In the present study, the term "power" referred to the maintenance of both the role of "conveyor of the knowledge" and the role of "director of activity". Same aged peers were placed in dyadic interactions where their roles were initially defined. One subject was identified as knowing something that the other subject needed to know. As a result, one subject was assigned the role of expert and thereby assumed the position of power within the system. Through the course of the interaction, however, this position of power can be either maintained, shared, or relinquished. Given that both expert and novice co-exist within a dialectical system, it was of interest: (1) to investigate the manner by which power is maintained, shared, or relinquished from the perspective of the expert and the perspective of the novice, (2) to investigate how such roles change as knowledge

is shared, and (3) to discuss the impact of co-constructing knowledge on the location of power with respect to the dyadic participants. Thus, the process by which knowledge is shared was the focus of the present study and with respect to Damon's distinction between skill acquisition and knowledge, investigated the movement from the acquisition of skills to the sharing of knowledge.

Interpersonal Negotiation: Methodological Advancements

Wertsch (1985) described the establishment of intersubjectivity as a stage in the transition from other- to self- regulation as the novice moves toward an understanding of, and approach to the task in the manner of the expert. The dyadic interaction, therefore, can be described as the necessary movement toward the unnecessary. As the novice moves toward approaching the task in the manner of the expert, the expert becomes less and less relevant to the successful functioning of the system of interpersonal negotiation. If, however, the goal of the dyadic activity should change in the midst of the interaction, then the relationship between the participants must follow suit. As Gauvain, 1991 suggested, "different individual and joint goals may influence how an interaction proceeds. Social processes and task goals may range from increasing a partner's motivation to challenging one another's ideas to providing a conceptualization of the problem".

The context within which the expert-novice dyad is investigated influences the relationship of its participants (Gallimore, 1986; Tiberghein, 1986; Shotter, 1989). Generally the paradigm has been one in which participants functioned with respect to solving a particular task, i.e., the problem-solving system (Wertsch, 1989). Experimental settings such as these, while informative, provide only a partial picture of the dynamics of the interactive process between expert and novice. In the present paradigm, however,

participants interacted with respect to playing a board game. Such a setting provides insight into the natural form of how children share ideas. Additionally, the naturalistic setting of the present paradigm places the dyad within a context that can be viewed as competitive (Cegola, 1984; Taal, & Oppenheimer, 1989). The participants move beyond the point of an expert-like approach to a given task and must compete against each other. The system, therefore, shifts from one with a goal that is cooperatively attained to one which is attained by the excelling of one participant over the other. Regulatory behaviors develop, therefore, as a result of the novice learning more about the rules and goals of the expert's game through active participation and competition. As Leont'ev suggested (1981), "the concept of activity is necessarily connected with the concept of motive. There can be no activity without a motive. 'Unmotivated' activity is not activity devoid of a motive: it is activity with a motive that is subjectively and objectively concealed" (p. 59). The competitive and motivational nature of the interaction in the present study yielded an additional form of regulation that can be referred to as joint-regulation. Joint- regulation exists when the novice not only regulates his or her own behavior in terms of the appropriate methods of play but, additionally, regulates the behavior of his or her competitor (noting whether or not they abide by the established rules of the game). Furthermore, both participants are challenged to coordinate their perspectives with those of their competitor if they are to excel. Taal & Oppenheimer (1989) noted that "the resolution of socio-cognitive conflict and the occurrence of coordination was higher in competitive conditions (where partners were pitted against each other to see who would be the first to finish a given problem) than in [collaborations] between children." (p. 59). The present paradigm, therefore, brings the additional component of joint regulation to the

study of self and other regulations in collaborative rather than purely instructional contexts.

The Development of Intersubjectivity

The effectiveness of any system of interpersonal negotiation rests in the development of shared understanding (Wertsch,1984). Interpersonal relationships are very important both for the transmission of knowledge and the display of competence (Benjamin, 1990; Goncu, 1993; Grossen, & Perret-Clermont, 1983; Schubauer-Leoni, et. al., 1992). Shared understanding is achieved when the novice understands the task in the manner of the expert. Within the present context, shared understanding is achieved when the novice utilizes the game playing skills previously displayed by the expert.

Shared understanding must be viewed as a process rather than an outcome. It is of little consequence to discuss that it has been obtained because it is at this point that the power of the interaction diminishes. It is the movement toward shared understanding that provides the crucial object of inquiry.

The work of Piaget and Vygotsky "share an emphasis on the importance of partners' understanding of each other" (Rogoff, 1990). Wertsch (1984) discussed the use of "directives" as a means of establishing shared understanding and discussed the various levels at which different directives operated . He suggested that the form of directive may indicate the level of shared understanding established, but noted that the directive itself was an attempt at negotiation by one partner. It is the response of the "other" that ultimately determines the established level of shared understanding. From this perspective of the expert, the introduction of particular task-related information can be viewed as an attempt to establish a shared level of understanding as well as an attempt to ascertain the

level of task-related information that the novice possesses. From the perspective of the novice, the deployment of particular task-related information can be viewed as an attempt to gain task-related information as well as display to the expert the task-related information that the novice possesses. In this way, the instructional information presented by the expert is a direct reflection of both the instructional requests presented by the novice and the expert's perceptions of the instructional needs of the novice. It is at the point that the novice begins to function in the manner of the expert (with respect to the task) that shared understanding is achieved.

Shared understanding reflects the bi-directional nature of dyadic interactions. Within such a context of mutual reciprocity, the role of the dyad supercedes the role of the individual. Analyzing the moves of a chess player without regard for the moves of his or her opponent reveals little regarding the strategy or intended goal of any actions. If we are concerned with the strategies that children use to pose questions and to respond to inquiries while engaged in dyadic interactions, then we must accept that neither action is done in isolation.

The Co-construction of Expert and Novice Roles

Mediational Tools Within Context

Discussions of the development of shared understanding often reside within discussions regarding the use of language in relation to particular contexts (Wertsch, 1989; Schegloff, 1992). Bakhtin's (1981) discussions of "dialogicality" suggested that a speech act has at least two voices, the speaker and the person being spoken to. As a result, both must be noted if we are to understand not only the use of language but the function of that language. If language is the vehicle by which knowledge is shared, then

we must understand the context within which such language is immersed, and, in turn, understand the impact that such contexts have on the use of language.

The present paradigm provided an opportunity for children to serve as active participants in their own learning. Through dyadic interaction, both expert and novice enhanced the role of the other. Within the present paradigm, children were required to obtain a certain level of knowledge that must be subsequently deployed within the context of competition. As a result, the acquired knowledge was associated with task-related value. The amount of knowledge acquired and the ability to effectively deploy the knowledge impacted on the role of the novice and consequently on the role of the expert. While other studies involving expert-novice kinds of interactions have focused primarily on skill acquisition within experimental settings (Martin, 1983; Wertsch, 1989), the present study provided a naturalistic setting that more closely resembled the kinds of interactions that children more frequently have with their peers and, in turn, more closely resembled the forum within which children share ideas. Within this setting, the present study introduced a system of coding that captured the reciprocal roles of both expert and novice through a turn by turn analysis of their discourse. In this sequential manner, the dialectical nature of the interaction was captured.

Social Microgenesis

In discussing the effectiveness of particular experts we must understand that the functioning of the dyad is as much influenced by the ability of the expert to perform in the way that an "ideal expert would" as it is influenced by the ability of the novice to perform in the way that an "ideal novice would".

Traditional approaches to expert-novice interactions have characterized the expert

and the novice as "one who has knowledge" and "one who requires knowledge" respectively. While dyadic interactions from this perspective may result in novices who appear to be "expert-like" with respect to a given task, the expert remains the source of knowledge. Given that one member of the dyad possess information that he or she must impart on the other, what are the mechanisms that he or she uses to maintain his or her instructional role? An analysis of the functional use of language reveals the manner by which language is used to maintain roles. It is expected that by placing individuals in the role of instructor, they understand that their role and responsibility is to provide their partner with the information necessary for skill acquisition. If, however, individuals placed in the role of instructor do not function in a manner that facilitates skill acquisition, from the perspective of novices, what impact does this have on the role of novices within the interaction. If we accept that the dyadic interaction can be described as a dialectical process whose goal is the achievement of a specific product, we must consider what impact the failure to attain a product will have on the process of the interaction. If the relationship between experts and novices changes so that the distinction between "the one who knows information" and "the one who requires information" becomes unclear, what is the impact on their process of interpersonal negotiation? Additionally, how will the experts and novices reflect this lack of clarity in terms of their transmission, acquisition, and subsequent deployment of information? In regard to these questions, the present study investigated the compensatory procedures that dyadic participants engaged in to maintain their system of interpersonal negotiation.

Research on adult guidance of children's problem solving suggests that effective instruction is characterized not only by the provision of critical information, but also by

sensitive support of the learner's efforts at problem solving (Rogoff, 1990). Research on child guidance, however, finds that children are less willing to provide learners with opportunities for full participation in problem solving activities (Ellis & Rogoff, 1986).

Some adult teachers who are not familiar with a particular content area may not allow students to pose questions for fear of displaying ignorance publicly and, as a result, do not allow students full participation in the learning exercise. In the case of children, however, not allowing a partner full participation in the dyadic activity may not always reflect a lack of instructional skill. By not allowing a partner's full participation one is ensuring that he or she remains in control of the activity. As a result, instructional strategies and power maintenance strategies are inextricably linked.

Coding of Instructional and Power Maintenance Strategies

The present study used a system of coding which served as a means of not only capturing the particular strategies that experts utilized to instruct their same-aged peers but served as a means of capturing the tools that experts utilized to maintain their instructional role within the dyad. It is difficult to discuss the function that language takes without discussing the levels at which language operates. Within the context of the expert-novice dyad, language functions at two distinct levels. At one level, language serves as the tool by which information is mediated between peers, and at a second level, serves as the medium through which power (the maintenance of both the role of "conveyor of the knowledge" and the role of "director of the activity") is maintained. As a result, an adequate coding system must capture both levels at which language operates if it is to successfully reflect the interaction at hand.

The present study is an extension of ongoing work regarding collaboration

between peers (Bearison, 1996). A system of coding has been developed that reflected the contributions of dyadic partners to an evolving collaborative activity. Specifically, pairs of subjects were shown a variety of game boards and game materials and were asked to collaboratively construct a board game. An analysis of activity-related discourse was conducted to determine the role that each conversational turn of talk played in the collaborative construction of game rules and goals.

Dyadic sessions were divided into episodes of interpersonal negotiation regarding proposed game rules and goals. These negotiation episodes were analyzed, conversational turn by conversational turn, as a means of capturing the evolving nature of collaborative game construction. The interactional coding system developed for the former study served as the foundation for the system of coding employed in the present study.

The interaction codes are presented with respect to both their 1) regulatory function and 2) their perspective (which member of the dyad exhibits the coded unit). The coded unit, referred to as the conversational turn, is defined as an uninterrupted stream of discourse. All conversational turns were coded in reference to the proposed coding system.

The Foundations of the Coding System

Instructional Properties

Prior studies of expert-novice interactions have addressed certain markers of instructional expertise (Schenider, 1993; Gallagher, 1994). Among them are the initiation of activity, the discussion of the objective of the activity, the ability to reflect upon questions (Daiute & Dalton, 1993) and the ability to provide contingent responses (Rogoff et al, 1993). Accordingly, the present system of coding reflected the expert's use of

initiations (discussion of game pieces and materials) and clarifications (attempts at establishing shared understanding before proceeding), and the expert's explicit statements of objective (announcement of the goal of the activity).

Regulatory Properties

Investigations of the role of regulatory behaviors in social interactions have noted certain indices of attempts at regulation that were incorporated into the present coding system (Pacifici & Bearison, 1991; Raziszewska & Rogoff, 1991). Among them were the use of directives (Werstch, 1984) and the setting of parameters. The current coding system addressed the use of directives (commands regarding the allocation of materials and the movement of game pieces) on the part of both experts and novices and their attempts at regulating the behavior of their partners' through regulatory statements (regarding appropriate and inappropriate methods of play).

Collaborative Properties

Studies of collaborative interactions between children have yielded a wealth of information regarding the manner in which ideas are introduced, accepted or rejected, and subsequently incorporated into an evolving cognitive product (Azmitia, 1988; Phelps, 1989; Schegloff, 1992; Tudge, 1992). The present coding system incorporated conversational turn codes that marked the introduction of new ideas by the novice into the existing game and their subsequent acceptance or rejection by the expert.

The conversational turns of the expert were coded in terms of the kinds of statements that he or she used to teach his or her game to a partner: 1) initiation, 2) maintenance, 3) shaping, 4) clarification, 5) elicitation, 6) explanation, and 7) construction. Additionally, the kinds of statements that he or she used to maintain his or

her position of power by regulating the activity were coded: 8) contribution, 9) directive, 10) regulation, 11) rejection, 12) acceptance, and 13) commentary. The conversational turns of the novice were coded in terms of the kinds of statements that he or she used to gain information from his or her partner: 1) requests, 2) elucidation, 3) elicitation, and 4) acceptance. Additionally, the kinds of statements that he or she used to gain power by regulating the activity of an expert were coded: 6) construction, 7) contribution, 8) directive, 9) regulation, 10) rejection, and 11) commentary.

The occurrence of particular expert function codes indicated that the novice was other-regulated within the system. The occurrence of particular codes from the perspective of the novice indicated that the novice was becoming more self-regulated. The occurrence of particular codes that indicated regulatory practices on the part of the novice marked the shift from expert/novice to other- /self-regulation to joint regulation between the participants.

As a result, while the novice was initially peripheral to the activity, the novice "increased gradually in engagement and activity and moves toward full participation in the practice of the activity" (Lave & Wenger, 1991). Therefore, as the interaction proceeded, the relationship between expert and novice moved from one of guidance to one of collaboration.

Perspective Coordination

The ability of children to serve as a facilitator of interpersonal negotiation rests in their ability to understand and assess the needs of others and to coordinate them with their instructional tools. As a result, the ability to coordinate self-other perspectives, on the part of both dyadic participants, serves as the cornerstone of the system of interpersonal

negotiation. Selman (1980) provided a measure of perspective coordination that reflects the increasing cognitive complexity of coded responses to a selection of questions regarding interpersonal conflict resolution. Cognitive complexity is measured with respect to five distinct and developmentally ordered levels which range from egocentrism (where there is no differentiation between the perspectives of self and other's) at level 0, to a coordination and reconciliation of both individual and social world perspectives at level 4 (Selman, 1980). Selman's measure has high inter-coder reliability and is associated with interpersonal behaviors (Selman, & Schultz, 1988). It serves as a more sensitive developmental marker than age.

Research Questions to be Addressed

This research addressed the following kinds of questions regarding the relationship between same-aged peers when engaged in expert-novice kinds of interactions:

1. What are the kinds of strategies that children use to provide information to and gain information from their peers?

2. How do the roles of the experts and novices change as a function of age, and ability to coordinate self-other perspectives?

3. Is there a relationship between the kinds of information provided in the initial interactional phase and the subsequent maintenance of roles in later interactional phases?

4. What are the indices of a shift from other- to self- to joint- regulation? How does the relationship between partners change as a function of interactional phase?

METHODS

Participants

The present study is the second stage of an investigation of the characteristics of peer interaction that promote and inhibit children's cognitive development. In the first stage, pairs of subjects were shown a variety of game boards and game materials and were asked to collaboratively create a board game. One subject from each pair was then randomly selected to serve as the expert in the current study.

One hundred and forty-four children, 48 each from grades one (M age = 6 yrs., 8 mos.), three (M age = 8 yrs., 10 mos.), and five (M age = 10 yrs., 8 mos.) participated in the present study. All participants, 72 boys and 72 girls, were selected from six schools in a large urban city. Of the six schools, five were public and one was a religious-affiliated private school. The sample of children was ethnically diverse: 59.4% of the children were White, 19.6% were African American, 14.0% were Latino, 4.2% were Asian American, and 2.8% were classified as "other ethnicity".

Prior to randomly placing participants into same gender dyads (a total of 72 with 12 male and 12 female dyads per grade) classroom teachers were asked to identify those children who were very close friends and those children who did not get along. While such incidences were few, some changes in pairs were made to eliminate these kinds of pairings.

Procedures

All participants took part in two measures; a measure of perspective coordination abilities and a dyadic measure. The dyadic measure was comprised of eighteen interaction codes that reflected qualitative differences in the conversational turns of the participants.

Perspective coordination measure. All children were individually interviewed by an experimenter in a room in their school other than their classroom for approximately fifteen minutes. Each interview consisted of the experimenter reading the children's version of "The Friends Dilemma" (Selman, 1980) to the child. The experimenter said to each child, "I'm going to read a story to you and then ask you a few question." The story involved a child who had to make a decision either to spend time engaging in an activity with an "old friend" or spend time engaging in an activity with a "new friend" at the expense of "old friend." Character names in the story were switched to match the gender of the child being interviewed. Upon completion of the story (see Appendix A), the child was then asked to respond to a series of eleven open-ended probes that related to the various dimensions of interpersonal understanding as described by Selman (1980). Each response was given a perspective coordination score ranging from 0 to 4, which reflected different levels of perspective coordination abilities. Level 0 reflected undifferentiated and egocentric perspective taking, level 1 reflected differentiated and subjective perspective taking, level 2 reflected self-reflective/second-person and reciprocal perspective taking, level 3 reflected third-person and mutual perspective taking, and level 4 reflected in depth and societal-symbolic perspective taking. Mean perspective coordination scores for all subjects were obtained.

Dyadic interaction. After the perspective coordination measure was administered, subjects were randomly paired with a same gender, same aged peer and brought to a separate room in their school. They were asked to sit behind a table upon which a game board and game materials were placed. Participants referred to as experts were asked to teach a game that they had previously created with a partner to participants referred to as

novices. Participants were then asked to "teach the game that you made up with (a prior partner) to (a current partner)". The dyadic session lasted 25 minutes.

All dyadic interactions were recorded with a video camera. The camera was placed in front of the children and approximately eight feet in front of the table upon which the children were working. The camera was placed at an angle so that both the subjects and the game board and materials were in full view. When the dyadic interaction began, the experimenter removed himself or herself from the view of the subjects.

Transcribing and Coding The Data

Upon completion of videotaping, all videotapes were transcribed. Transcriptions were divided into conversational turns. Each conversational turn reflected an uninterrupted stream of discourse made by either participant. In some cases parenthetical descriptions of nonverbal activity were added to clarify discourse that was not fully comprehensible. The videotape transcriptions were coded, conversational turn by conversational turn according to the following criteria:

Conversational Turn Codes

Each conversational turn was coded to reflect its function and its source (whether it was expressed by the expert or the novice). Each conversational turn was first identified as either:

1. Instruction - A statement regarding the rules of the game and the uses of materials (e.g., "You have to avoid the odd numbers and only get the even numbers").

2. Shaping - A statement regarding the object of the game (e.g., "the object of the game is to get to the gold") or one that redirects the focus back to the playing the game (e.g., "Let's get back to the game")

3. Request – A request for information regarding the rules and/or goals of the game (e.g., "Can I move over here?" or "Which way should I go from here?").

4. Elicitation – A statement by which one partner seeks information from the other regarding the use and allocation of materials (e.g., "Which piece do you want?").

5. Explanation - A response to a request for information that provides information regarding the method of play (rules, goals, materials).

6. Clarification – A statement by one partner which questions the other's comprehension (e.g., " So you know what you have to do?").

7. Elucidation – A restatement or paraphrase of the rules, goals, and procedures as a means of establishing clarification (e.g., " So you mean that I can go like this" or "So this is supposed to be the card, right?").

8. Repetition - A restatement of one's own or one's partner's previously expressed turn of talk.

9. Rejection - A statement or indication by gesture of displeasure with the rules, goals, or method of play proposed (e.g., "I think that's stupid," "This is a boring game" or "I don't think we should do that").

10. Acceptance - A statement or indication by gesture of acceptance of rules, goals, or method of play proposed (e.g., "Yeah" or "OK").

11. Enactment - A demonstration of a previously expressed rule or goal (collecting money when the player reaches a certain space on the board).

12. Directive – A statement by which one partner directs the activity of the other (e.g., "Move this piece over there").

13. Regulation – A statement by which one partner regulates the activity of the other

according to what is either appropriate or inappropriate in terms of methods of play. (e.g., "Hey, you can't do that," "You can move that piece over there," or "That's not allowed").

14. Contribution – A statement which introduces new rules, goals, materials, or methods of play into an existing game. (e.g., "Let's use the square instead of the spinner" or "I have a new idea").

15. Commentary - A statement that provides a generalized description of the state/form of the game (e.g., "OK, so the game is tied," "She's leading by two," or "OK , so I have blue").

16. Remarks –Discourse not pertaining to the activity. Responses to Remarks are coded as Remarks.

Each conversational turn was further coded according to whether it was made by either the expert or the novice.

Inter-Rater Reliabilities

Perspective Coordination Scores

A 20% random sample (n = 14) of Selman's (1980) "The Friendship Dilemma" interviews were scored independently by two raters. Initial inter-rater reliability was established at 82% prior to independent coding. Subsequently, every fifth interview (n = 14) was scored by two independent raters to ensure ongoing reliability of greater than 80%.

Interaction Codes

Pilot data was randomly selected and utilized to train raters in the coding of interactions. An inter-rater reliability of 88% (Cohen's Kappa, K = .74) was obtained on a

sample of 20% of the data (n = 14) prior to independent coding of the actual transcripts. If disagreements between raters occurred, Cohen's Kappa statistic was used to establish the exact nature of the disagreements. Subsequently, every fifth transcript (n = 14) was scored by two independent raters to ensure ongoing inter-rater reliability of greater than 80%. Inter-rater reliabilities for the coding of transcripts ranged from 82% to 94% ($\underline{M}$ = 89%).

RESULTS

The results are presented in four sections. In the first section, the findings of a multivariate analysis are presented as a means of ascertaining the impact such variables as age, gender, and role had on the kinds of talk generated by experts and novices during their dyadic activity. In the second section, results of a correlation analysis are presented as a means of determining the interrelationships that existed between the various conversational turn codes. In the third section, findings from a factor analysis serve to establish specific thematic relationships (instructional, regulatory, and collaborative) that existed among the conversational turn codes. In the final section, sequential analyses were employed to determine the temporal relationship that existed between turns of talk. For example, given that an expert generated talk of a particular category what was the most likely novice-generated response?

Part I: Differential Analyses

In this section significant differences between the proportion scores of each dyadic interaction code are presented as a function of grade, gender, and role (produced by either the expert of the novice). Mean differences between perspective coordination scores are also presented as a function of grade and gender. Additionally, dyadic variables reflecting balanced and unbalanced perspective coordination abilities between partners were analyzed with respect to the proportion scores of the interaction codes.

Proportion scores were computed by calculating the total number of occurrences of a particular code relative to the total number of occurrences of all other codes. For example, if codes A, B, and C were produced within a given dyad, the proportion of code A was the total number of occurrences of A divided by the total number of occurrences of

codes A, B, and C. Perspective coordination balance scores were determined via a ratio score. Ratio scores were computed by dividing the smaller perspective coordination score of either of the dyadic participants by the larger score. As a result, the higher the ratio score, the greater the balance between the members of the dyad. Arcsin transformations were used on all of the analyses of proportion scores. Unless otherwise noted, there were no main or interaction effects involving grade, gender, or role. All post-hoc analyses were done using the Neuman-Keuls statistic at the .05 level of significance.

Perspective Coordination Measure

Responses to each of eleven probes included in Selman's (1980) "Friends dilemna" were scored from 0 - 4 to reflect the child's level of perspective coordination skill. The average score of the eleven scores was obtained and a mean score on the Selman measure was used as a variable in subsequent analyses. A 3 (grade) X 2 (gender) X 2 (role) analysis of variance was performed on the mean Selman perspective coordination scores of each subject. This analysis yielded a significant main effect in mean perspective coordination scores as a function of grade, $F(2,420) = 27.60$. $p < .01$. Post hoc analyses indicated that fifth grade subjects had significantly higher mean perspective coordination scores than third or first grade subjects (M's = 1.13 vs. .93 and .64). Additionally, third grade subjects had a significantly higher perspective coordination score than first grade subjects (M's = .93 vs. .64).

A significant main effect for gender was obtained for mean perspective coordination scores, $F(1,420) = 4.94$, $p < .05$. Girls had significantly higher mean perspective coordination scores than boys (M's = .96 and .84).

Length of Interaction

The mean number of conversational turns per dyad was 76.83 (SD = 59.46; range = 13 – 166). A 3 (grade) X 2 (gender) analysis of variance was performed on the mean number of conversational turns. This analysis yielded a significant main effect for the mean number of conversational turns per dyad as a function of grade, $F(2,420) = 65.39$, $p < .01$. First graders had a significantly higher mean number of conversational turns per dyad than fifth or third graders (M's = 87.02 vs. 73.90 & 69.22). Additionally, fifth graders had a significantly higher mean number of conversational turns per dyad than third graders (M's = 73.90 vs. 69.22). Table 1 lists the mean number of conversational turns by grade and by grade and gender.

A significant main effect for gender was obtained for the mean number of conversational turns per dyad $F(1,420) = 44.69$, $p < .01$. Girls had a significantly higher mean number of conversational turns per dyad than boys (M's = 81.23 vs. 72.19).

Code Occurrences

Due to the low proportion of occurrences of the following conversational turn function codes: objectives, maintenance, and planning, they were collapsed and subsequently referred to collectively as shaping. The mean proportions of conversational turn function codes were analyzed by a 3 (grade) X 2 (gender) X 18 (function code, repeated measure) MANOVA. There was a significant main effect for conversation turn function codes, $F(15, 731) = 2.31$, $p < .01$. There was a significantly greater proportion of conversational turns coded as commentary (24.7) than all other conversational turn functions. With the exception of commentary, the proportion of remarks (20.2) was significantly greater than all remaining function codes. The proportion of acceptances

Table 1

Mean number of conversational turns by grade and by grade and gender

	Grade					
	1		3		5	
Mean # of turns per dyad	M	SD	M	SD	M	SD
Total	87.02[a]	72.69	69.22[bc]	48.46	73.90[b]	52.43
Boys	77.61	61.49	64.19	42.94	74.80	53.88
Girls	94.95	80.10	74.09	52.82	72.96	50.86

Note: a>b>c

(9.2) was significantly greater than all other function codes except explanations (6.7), instructions (5.11), requests (5.1), and regulations (4.4). The proportion of requests and regulations were significantly greater than the proportion of shaping (1.41). There were no other significant differences between the proportions of the remaining conversational turn function codes.

Multivariate Analyses

Given that a primary goal of the present study was to explore ways in which the roles of both experts and novices were transformed through the course of their dyadic interaction, the kinds of talk that they generated were analyzed to reflect temporally based shifts in their respective roles. The interaction was segmented into three equal parts representing interactional phases. Conversational turn level analyses were conducted with respect to each phase. The decision to segment the interaction in three parts was made in light of the three interactional properties, instructional, regulatory, and collaborative, that are reflected within the coding system. How were the roles of experts and novices characterized in the early phases of their dyadic interaction? Were there differences in roles at later phases, and how did these differences develop?

More specifically, were experts or novices more likely to use certain kinds of conversational turn functions earlier (phase 1) rather than later (phases 2 or 3) in their dyadic interactions and were there significant differences between experts' and novices' use of conversational turn functions at various phases of their interaction?

As a means of addressing these questions a 3 (grade) X 2 (gender) X 2(role) X 3 (phase) MANOVA was performed on the proportion of each conversational turn function code. Tables 2 through 7 list significant main and interaction effects for the mean

Table 2

Significant conversational turn by grade main effects

	Grade					
	1		3		5	
Function	M	SD	M	SD	M	SD
Elicitation	2.24[a]	3.48	1.31[b]	2.12	1.72	2.61
Acceptance	4.06[b]	4.38	3.87[b]	3.98	5.26[a]	4.66
Regulation	2.76[a]	3.77	1.69[b]	2.47	1.85[b]	2.54
Contribution	1.32	3.06	1.89[a]	3.62	0.76[b]	2.42
Commentary	0.31[a]	1.01	0.15	0.65	0.06[b]	0.40
Remarks	12.58[a]	8.00	12.83[a]	7.76	8.93[b]	7.57

Note: a>b

Table 3

Significant conversational turn by gender main effects

	Gender			
	Boys		Girls	
Function	M	SD	M	SD
Explanation	2.97[b]	4.39	3.82[a]	5.00
Regulation	2.49[a]	3.51	1.71[b]	2.37

Note: a>b

Table 4

Significant main effects for conversational turn functions X role

	Role			
	Expert (n=72)		Novice (n=72)	
Function	M	SD	M	SD
Instruction	5.43[a]	6.38	0.00[b]	0.00
Shaping	0.61[a]	1.82	0.02[b]	0.19
Request	0.56[b]	1.48	4.66[a]	4.78
Explanation	5.46[a]	5.35	1.33[b]	2.73
Elucidation	0.17[b]	0.74	3.95[a]	5.00
Enactment	0.20[b]	0.90	1.75[a]	3.74
Directive	3.01[a]	3.82	1.26[b]	2.23
Regulation	2.82[a]	3.47	1.39[b]	2.28

Note: a>b

Table 5

Significant conversational turn by phase main effects

	Phase					
	1		2		3	
Function	M	SD	M	SD	M	SD
Instruction	5.78[a]	7.17	1.65[b]	3.66	0.72[b]	2.04
Shaping	0.53	1.76	0.18	0.89	0.22	1.16
Elicitation	2.27[a]	3.52	1.42[b]	2.20	1.58[b]	2.49
Explanation	4.60[a]	5.51	2.76[b]	4.17	2.83[b]	4.15
Elucidation	3.30[a]	4.96	2.06[b]	4.13	.83[bc]	2.11
Rejection	1.16[b]	2.90	1.69[b]	2.71	2.70[a]	3.69
Acceptance	5.45[a]	4.97	3.94[b]	4.01	3.81[b]	3.93
Enactment	1.44	3.60	0.79	2.26	0.69	2.37
Regulation	1.42[b]	2.74	2.37[a]	2.98	2.51[a]	3.22
Contribution	0.50[b]	1.56	1.34[a]	3.55	2.12[a]	3.55
Remarks	7.69[b]	6.11	12.60[a]	8.06	14.06[a]	8.14

Note: a>b

Table 6

Significant role by grade interaction effects on the mean proportion of conversational turn codes

	Grade											
	1				3				5			
	Expert		Novice		Expert		Novice		Expert		Novice	
Function	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Elicitation	1.58[b]	3.53	2.89[a]	3.33	1.18	1.73	1.44	2.45	2.03	2.86	1.40	2.31
Regulation	4.06[a]	4.52	1.47[b]	2.19	2.04	2.54	1.33	2.37	2.35[a]	2.68	1.36[b]	2.30

Note: a>b

Table 7

Significant role by phase interaction effects on the mean proportion of conversational turn codes

	Phase											
	1				2				3			
	Expert		Novice		Expert		Novice		Expert		Novice	
Function	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Instruction	11.56[a]	5.98	0.00[b]	0.00	3.29[a]	4.63	0.00[b]	0.00	1.40[a]	2.70	0.00[b]	0.00
Shaping	1.07[a]	2.38	0.00[b]	0.00	0.36[a]	1.24	0.00[b]	0.00	0.39[a]	1.59	0.06[b]	0.33
Request	0.46[b]	1.39	5.76[a]	4.91	0.40[b]	1.34	4.15[a]	4.45	0.81[b]	1.68	4.07[a]	4.83
Explanation	7.33[a]	5.55	1.86[b]	3.88	4.81[a]	4.99	0.72[b]	1.31	4.24[a]	5.05	1.42[b]	2.26
Elucidation	0.26[b]	0.98	6.33[a]	5.47	0.11[b]	0.64	4.00[a]	5.12	0.14[b]	0.54	1.53[a]	2.77
Acceptance	4.24[b]	4.13	6.67[a]	5.46	4.13	3.87	3.75	4.17	3.64	3.96	3.97	3.91
Enactment	0.06[b]	0.47	2.82[a]	4.70	0.29[b]	1.23	1.29[a]	2.87	0.25[b]	0.80	1.14[a]	3.21
Directive	3.76[a]	4.47	0.67[b]	1.53	2.86[a]	3.83	1.61[b]	2.67	2.40[a]	2.92	1.51[b]	2.26
Remarks	6.83	5.77	8.54	6.36	13.54	8.47	11.65	7.58	15.49[a]	7.76	12.63[b]	8.31

Note: a>b

proportions of each conversational turn code. Figure 1 illustrates a stacked comparison of significant conversational turn by role and by phase interactions.

Variables Influencing The Distribution Of Talk Reflecting Instructional Properties

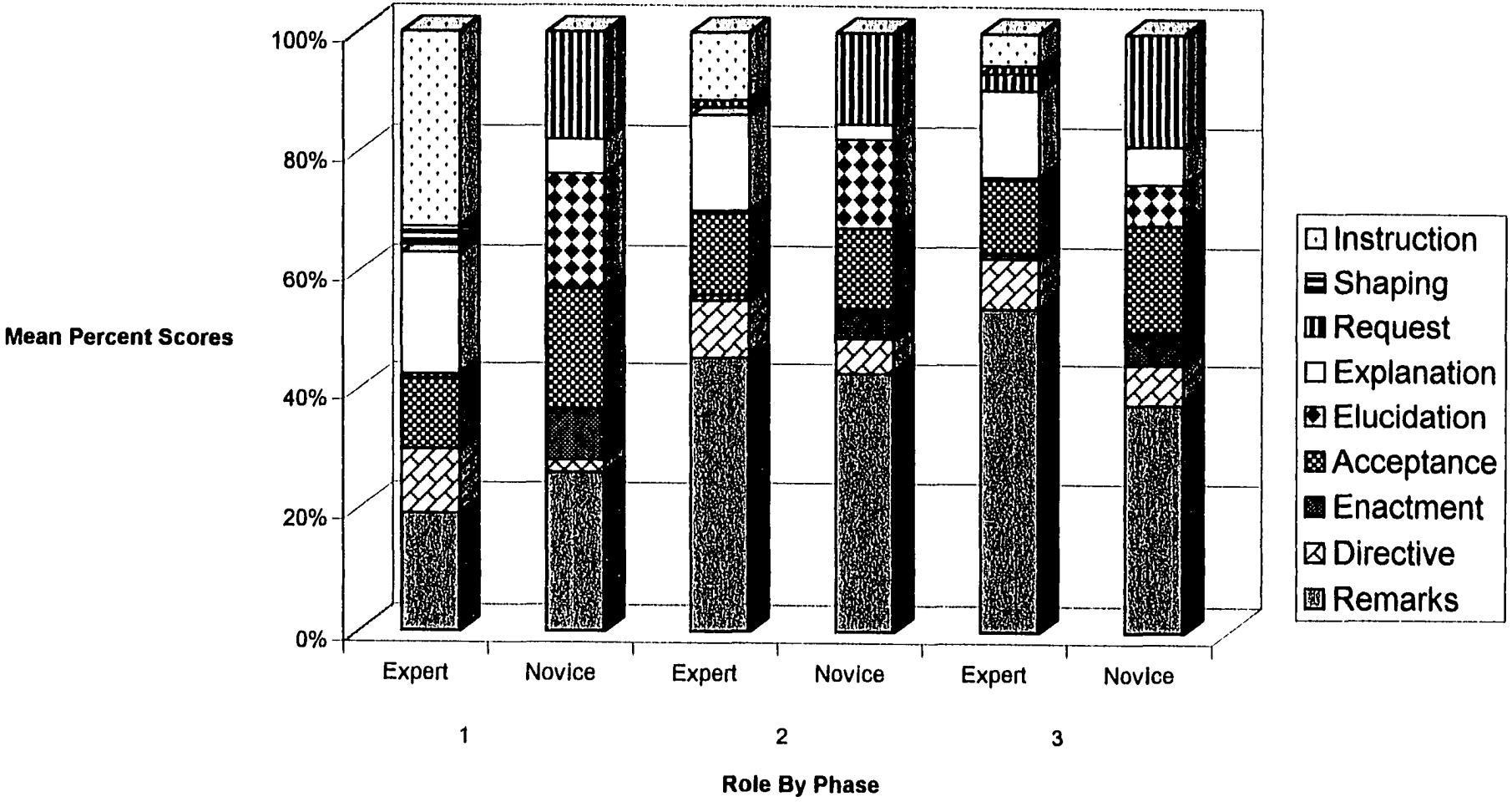
Instruction. A significant main effect for role was obtained for the mean proportion of conversational turns coded as instruction, $F(1,396) = 291.68$, $p < .001$. Experts produced a significantly greater mean proportion of conversational turns coded as instruction than novices (M's = 5.43 vs. 0.00).

Additionally, a significant main effect for phase was obtained for the mean proportion of conversational turns coded as instruction, $F(2,396) = 95.58$, $p < .001$. The proportion of conversational turns coded as instruction in phase was one was significantly greater than that of phases two or three (M's = 5.78 vs. 1.65 & .72).

Role and phase main effects were qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was obtained for novices' productions of instructions, a significant main effect for phase was obtained for experts' mean proportions of conversational turns coded as instruction $F(2,213) = 97.06$, $p < .001$. Experts produced a significantly greater proportion of turns coded as instruction in phase one than in phases two or three (M's = 11.56 vs. 3.29 & 1.44). Additionally, a significant difference in the production of instructions was also found between phases two and three (M's = 3.29 vs. 1.44).

Finally, a significant role X phase interaction effect was obtained for the mean proportion of conversational turns coded as instruction, $F(2,396) = 95.58$, $p < .001$. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, experts generated a

Fig. 1 Stacked Proportion Scores of Conversational Turns X Role X Phase



significantly greater proportion of instructions than novices (M's = 11.56 vs. 0.00 at phase one, 3.29 vs. 0.00, at phase two, and 1.40 vs. 0.00, at phase three). (See Figure 2 for an illustration of this role X phase interaction effect)

Shaping. A significant main effect for role was obtained for the mean proportion of conversational turns coded as shaping, $F(1,396) = 22.35$, $p < .001$. Experts produced a significantly greater mean proportion of conversational turns coded as shaping than novices (M's = .61 vs. .02).

Additionally, a significant main effect for phase was obtained for the mean proportion of conversational turns coded as shaping, $F(2,396) = 3.23$, $p < .001$. Post hoc tests, however, revealed no significant differences between any two phases at the .05 level.

Role and phase main effects were qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was obtained for novices' productions of shaping, a significant main effect for phase was obtained for experts mean proportions of conversational turns coded as shaping $F(2,213) = 3.58$, $p < .05$. Post hoc tests, however, revealed no significant differences at the .05 level.

A significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as shaping, $F(2,396) = 3.75$, $p < .001$. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, experts generated a significantly greater proportion of instructions than novices (M's = 1.07 vs. 0.00 at phase one, .36 vs. 0.00, at phase two, and .39 vs. .06, at phase three). (See Figure 3 for an illustration of this role X phase interaction effect)

Fig. 2: Mean Proportion of Instructions X Role X Phase

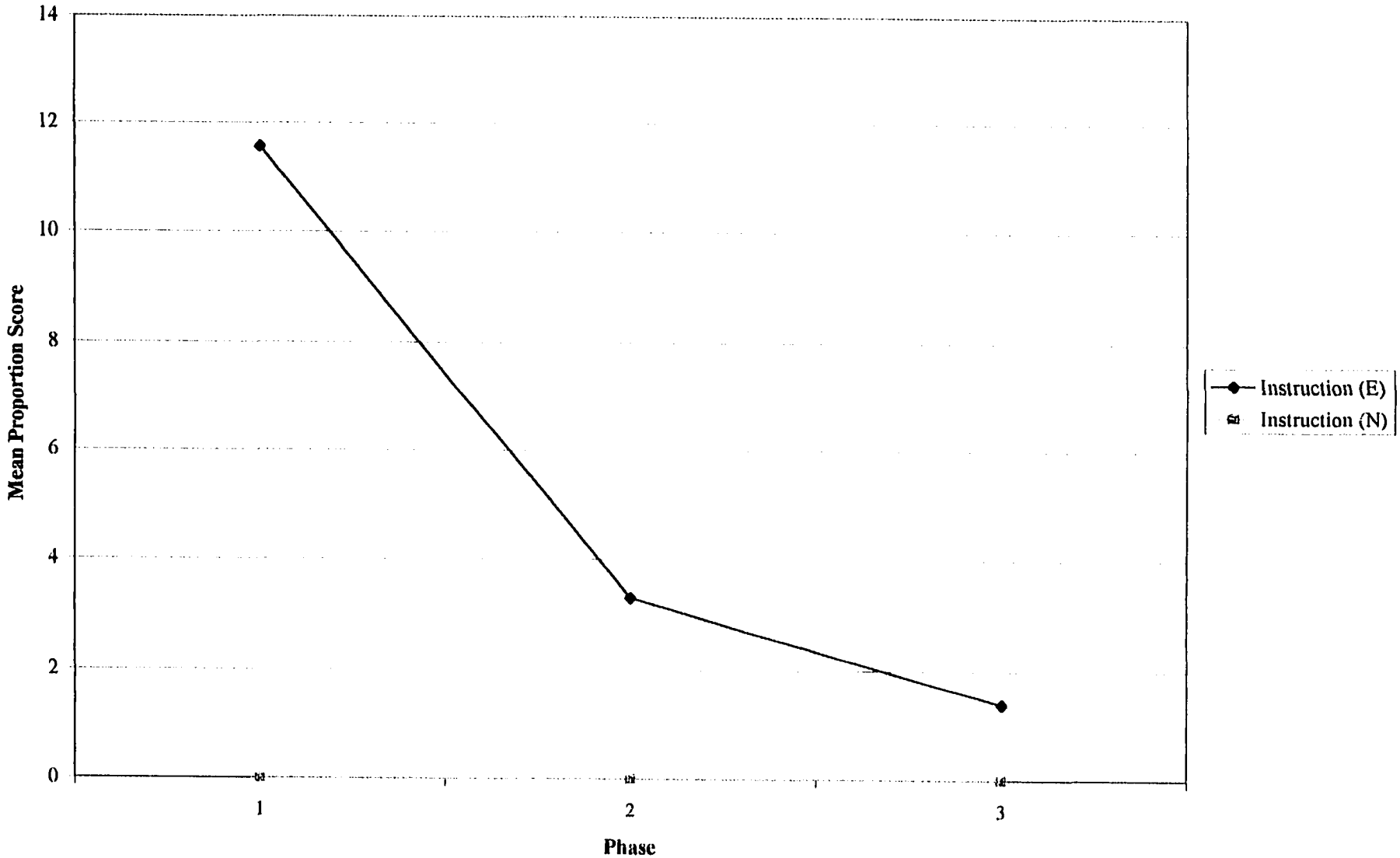
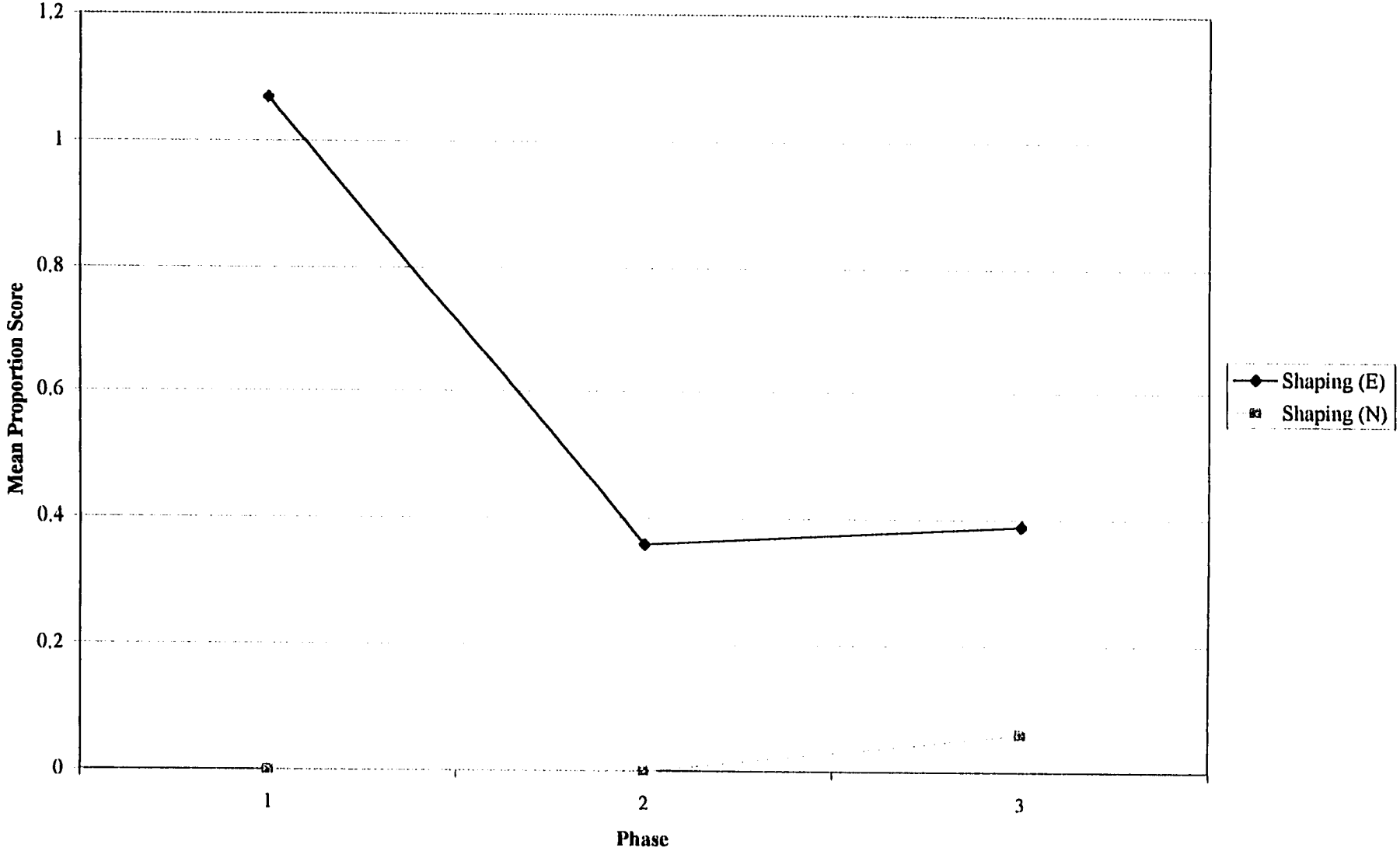


Fig. 3: Mean Proportion of Shaping X Role X Phase



Request. A significant main effect for role was obtained for the mean proportion of conversational turns coded as request, F (1,396) = 149.59, $p < .001$. Novices produced a significantly greater mean proportion of conversational turns coded as request than experts (M's = 4.66 vs. .56).

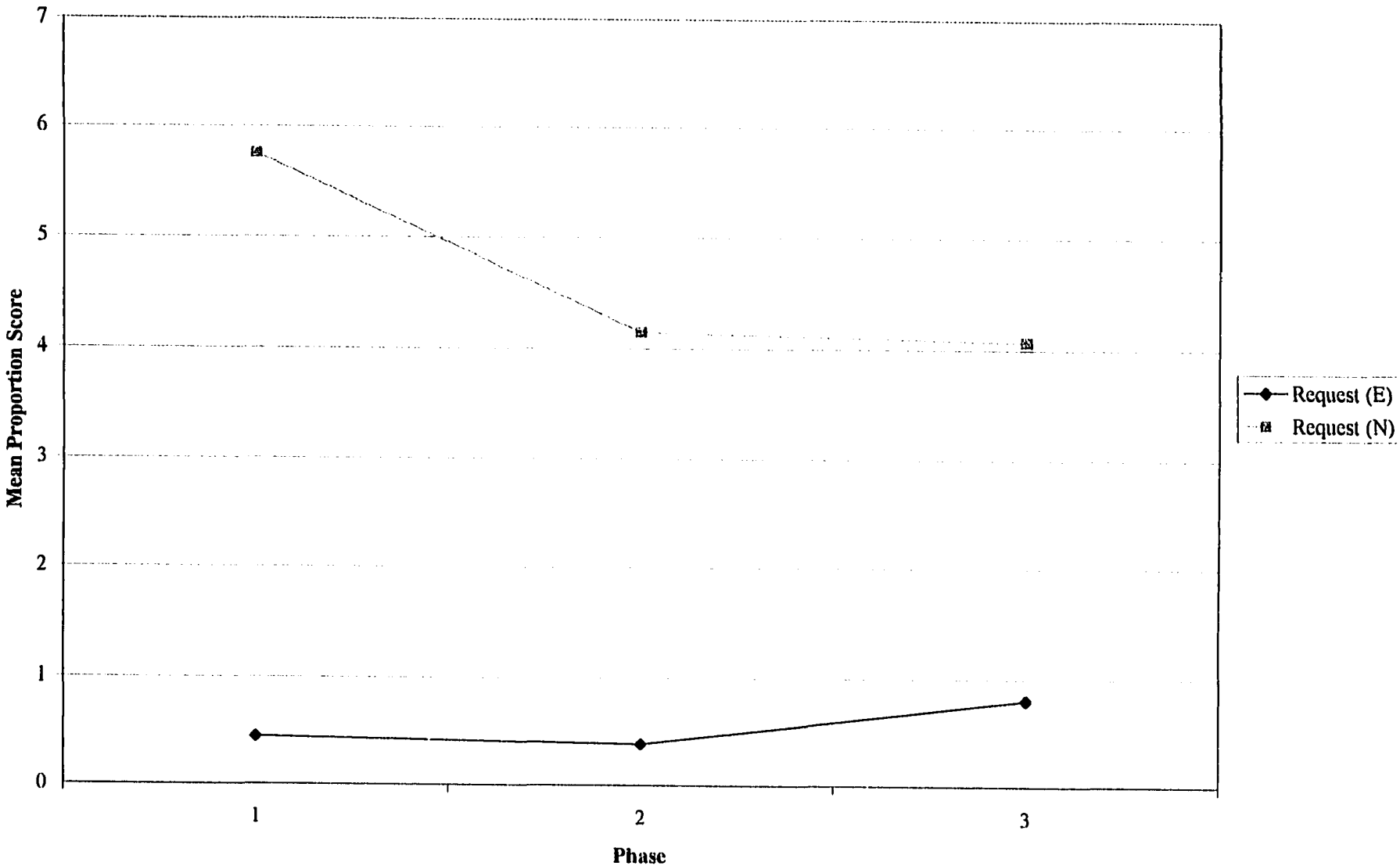
Additionally, a significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as request, F (2,396) = 3.36, $p < .001$. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, novices generated a significantly greater proportion of requests than experts (M's = 5.76 vs. .46 at phase one, 4.15 vs. .40, at phase two, and 4.07 vs. .81, at phase three). The role main effect was qualified through a series of one-way ANOVA's performed by phase separately for experts and novices. However, no significant main effects for experts or novices were obtained. (See Figure 4 for an illustration of this role X phase interaction effect)

Elicitation. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as elicitation, F (2,396) = 3.88, $p < .05$. The mean proportion of conversational turns coded as elicitation was significantly greater in phase one than in phases two and three (M's = 2.27 vs. 1.42 & 1.58).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as elicitation, F (2,396) = 4.03, $p < .05$. While fifth graders (M = 1.72) were not significantly different from first or third graders in terms of their production of elicitations, first graders mean proportion of conversational turns coded as elicitation was significantly greater third graders (M's = 2.24 vs. 1.31).

Finally, a significant role X grade interaction effect was also obtained for the mean

Fig. 4: Mean Proportion of Requests X Role X Phase



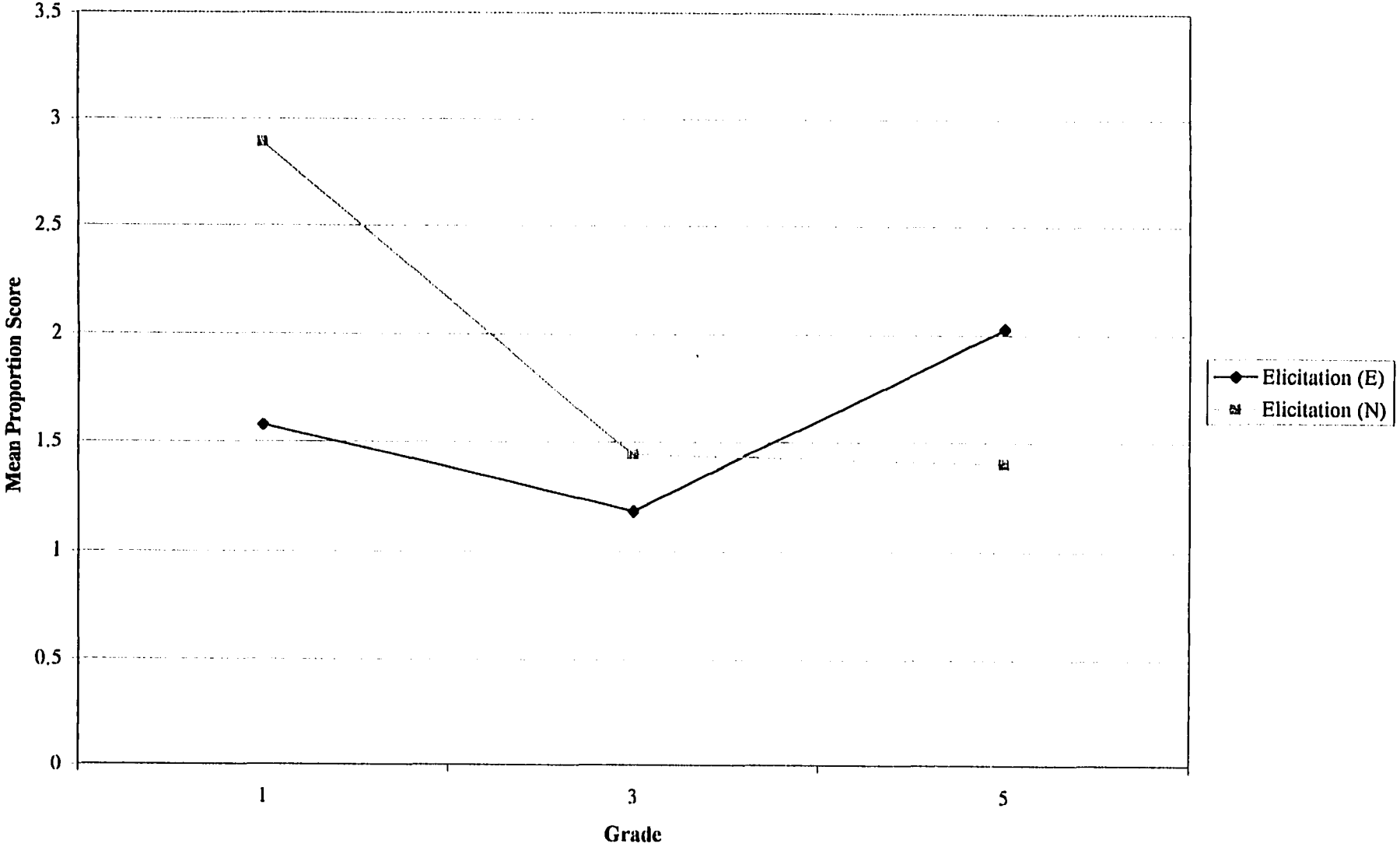
proportion of conversational turns coded as elicitation, F (2,396) = 4.39, p < .05. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each grade separately. Findings indicated that, only for first graders, novices produced a significantly greater proportion of conversational turns coded as elicitation across all phases than experts (M's = 2.89 vs. 1.58). (See Figure 5 for an illustration of this role X grade interaction effect)

Explanation. A significant main effect for role was also obtained for the mean proportion of conversational turns coded as explanation, F (1,396) = 104.94, p < .001. Experts had a significantly greater mean proportion of conversational turns coded as explanation than novices (M's = 5.46 vs. 1.33).

A significant main effect for phase was obtained for the mean proportion of conversational turns coded as explanation, F (2,396) = 8.91, p < .001. The mean proportion of conversational turns coded as explanation was significantly greater in phase one than in phases two or three (M's = 4.60 vs. 2.76 & 2.83).

Role and phase main effects were qualified through a series of one-way ANOVA's performed separately for experts and novices. A significant main effect for phase was obtained for experts' mean proportions of conversational turns coded as explanation F (2,213) = 7.22, p < .001. Experts produced a significantly greater proportion of turns coded as explanation in phase one than in phases two or three (M's = 7.33 vs. 4.81 & 4.24. A significant main effect for phase also was obtained for novices' mean proportions of conversational turns coded as explanation F (2,213) = 3.25, p < .05. Novices produced a significantly greater proportion of turns coded as explanation in phase one than in phase two (M's = 1.86 vs. .72).

Fig 5: Mean Proportion of Elicitation X Role X Grade



A significant main effect for gender was obtained for the mean proportion of conversational turns coded as explanation, F (1,396) = 4.52, $p < .05$. Girls had a significantly greater mean proportion of conversational turns coded as explanation than boys (M's = 3.82 vs. 2.97).

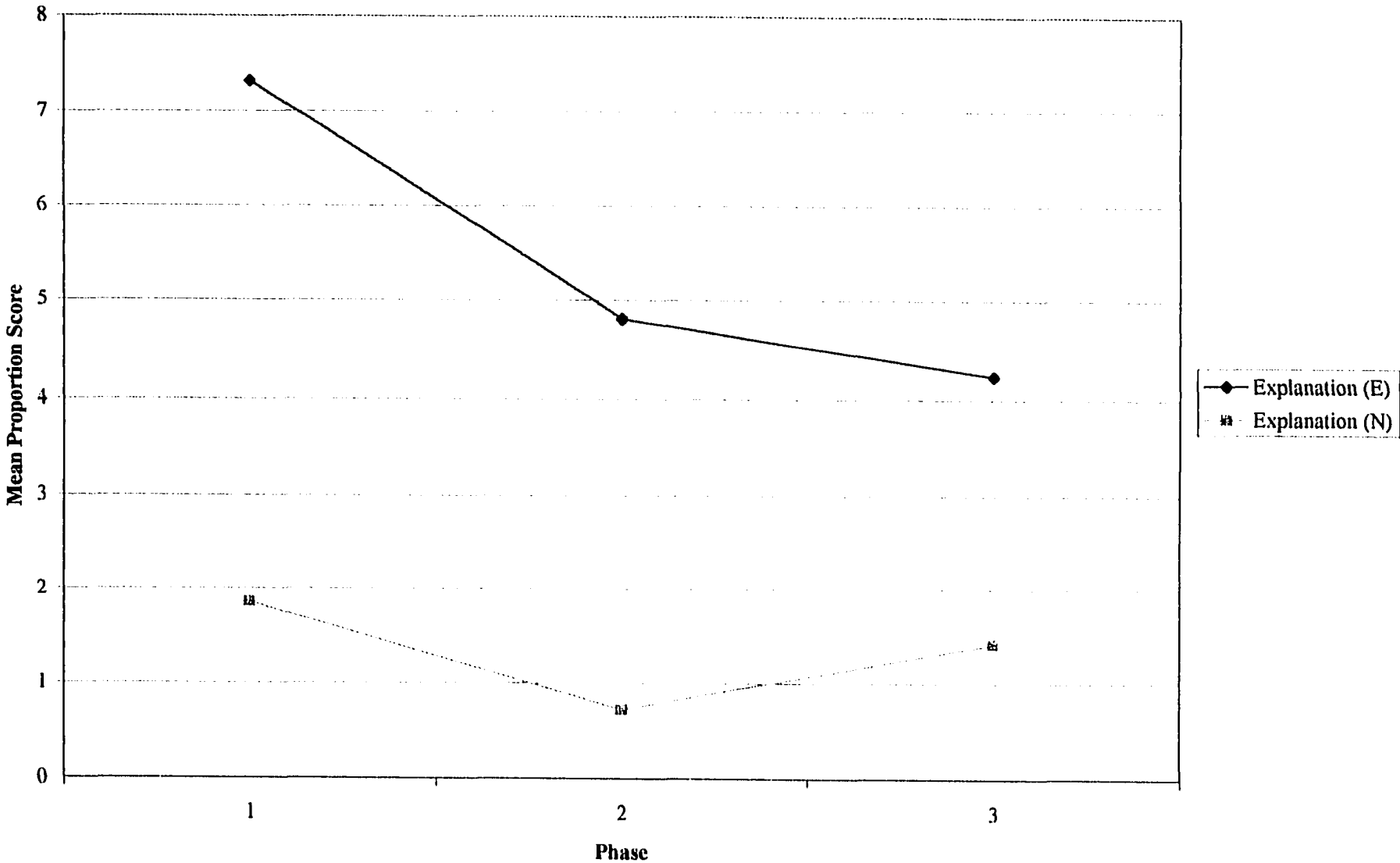
Additionally, a significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as explanation, F (2,396) = 3.62, $p < .05$. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, experts generated a significantly greater proportion of explanations than novices (M's = 7.33 vs. 1.86 at phase one, 4.81 vs. .72, at phase two, and 4.24 vs. 1.42, at phase three). (See Figure 6 for an illustration of this role X phase interaction effect)

Elucidation. A significant main effect for role was also obtained for the mean proportion of conversational turns coded as elucidation, F (1,396) = 140.46, $p < .001$. Novices had a significantly greater mean proportion of conversational turns coded as elucidation than experts (M's = 3.95 vs. .17).

A significant main effect for phase was also obtained for the mean proportion of conversational turns coded as elucidation, F (2,396) = 19.89, $p < .001$. The mean proportion of conversational turns coded as elucidation was significantly greater in phase one than in phases two or three (M's = 3.30 vs. 2.06 & .83). Additionally, the proportion of elucidation in phase two was significantly greater than in phase three (M's = 2.06 vs. .83).

Role and phase main effects were qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was

Fig. 6: Mean Proportion of Explanations X Role X Phase



obtained for experts' productions of elucidations, a significant main effect for phase was obtained for novices' mean proportions of conversational turns coded as elucidation F (2,213) = 19.53, p < .001. Novices produced a significantly greater proportion of turns coded as elucidation in phase one than in phases two or three (M's = 6.33 vs. 4.00 & 1.53). Additionally, a significant difference in the production of elucidations was also found between phases two and three (M's = 4.00 vs. 1.53).

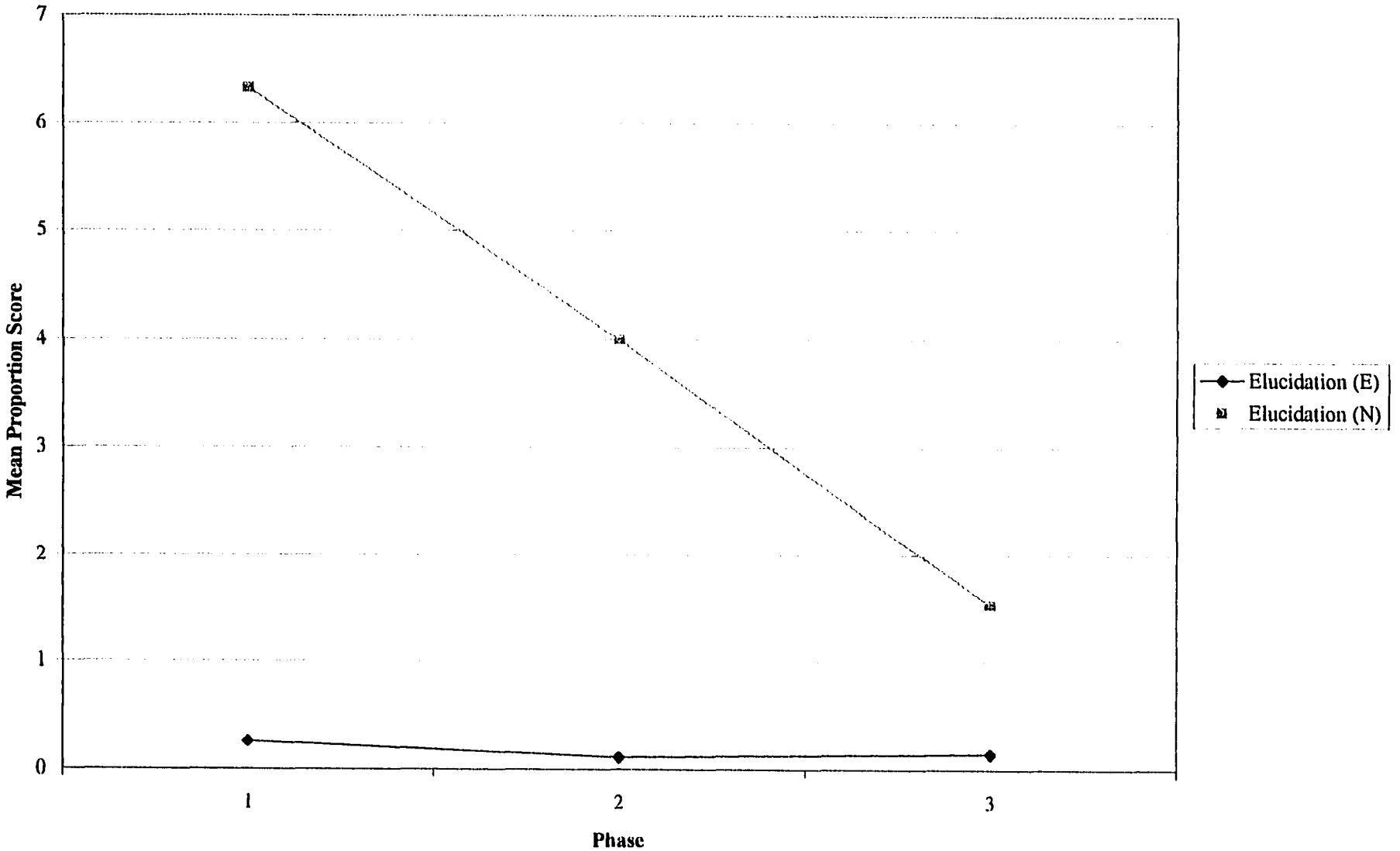
Finally, a significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as elucidation, F (2,396) = 17.95, p < .001. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, novices generated a significantly greater proportion of elucidations than experts (M's = 6.33 vs. .26 at phase one, 4.00 vs. .11, at phase two, and 1.53 vs. .14, at phase three). (See Figure 7 for an illustration of this role X phase interaction effect)

Summary of findings. What, then, do these findings tell us regarding the impact of role, phase, and grade on the kinds of talk generated by the dyad? The findings indicated that talk reflecting instructional qualities, such as instructions, explanations, and elucidations was more typically generated by expert than novices. Furthermore, talk reflecting inquiry, such as requests and elicitations, was more typically generated by novices. Additionally, when such talk took place, it usually occurred within the first phase of the interaction.

Variables Influencing The Distribution Of Talk Reflecting Regulatory Properties

Rejection. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as rejection, F (2,396) = 9.05, p < .001. The

Fig. 7: Mean Proportion of Elucidations X Role X Phase



mean proportion of conversational turns coded as rejection was significantly greater in phase three than in phases two and one (M's = 2.70 vs. 1.69 & 1.16).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as rejection, F (2,396) = 3.21, p < .05. Neuman-Kuels tests via the one-way procedure, however, did not reveal any significant differences by grade at the .05 level of significance.

Acceptance. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as acceptance, F (2,396) = 6.55, p < .05. The mean proportion of conversational turns coded as acceptance was significantly greater in phase one than in phases two and three (M's = 5.45 vs. 3.94 & 3.81).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as acceptance, F (2,396) = 4.40, p < .05. Fifth graders mean proportion of conversational turns coded as acceptance was significantly greater than third and first graders (M's = 5.26 vs. 3.87 & 4.06).

The phase main effect was qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was obtained for experts' productions of acceptances, a significant main effect for phase was obtained for novices' mean proportions of conversational turns coded as acceptance F (2,213) = 9.11, p < .001. Novices produced a significantly greater proportion of turns coded as acceptance in phase one than in phases two or three (M's = 6.67 vs. 3.75 & 3.97).

Finally, a significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as acceptance, F (2,396) = 4.17, p < .05. This

two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that, only at phase one, novices generated a significantly greater proportion of acceptance than experts (M's = 6.67 vs. 4.24). (See Figure 8 for an illustration of this role X phase interaction effect)

Enactment. A significant main effect for role was also obtained for the mean proportion of conversational turns coded as enactment, F (1,396) = 35.37, p < .001. Novices had a significantly greater mean proportion of conversational turns coded as enactment than experts (M's = 1.75 vs. .20).

A significant main effect for phase was obtained for the mean proportion of conversational turns coded as enactment, F (2,396) = 3.20, p < .05. Neuman-Kuels tests via the one-way procedure, however, did not reveal any significant differences by phase at the .05 level of significance.

Role and phase main effects were qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was obtained for experts' productions of enactments, a significant main effect for phase was obtained for novices' mean proportions of conversational turns coded as enactment F (2,213) = 4.59, p < .05. Novices produced a significantly greater proportion of turns coded as enactment in phase one than in phases two or three (M's = 2.82 vs. 1.29 & 1.14).

Finally, a significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as enactment, F (2,396) = 5.42, p < .05. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, novices generated a

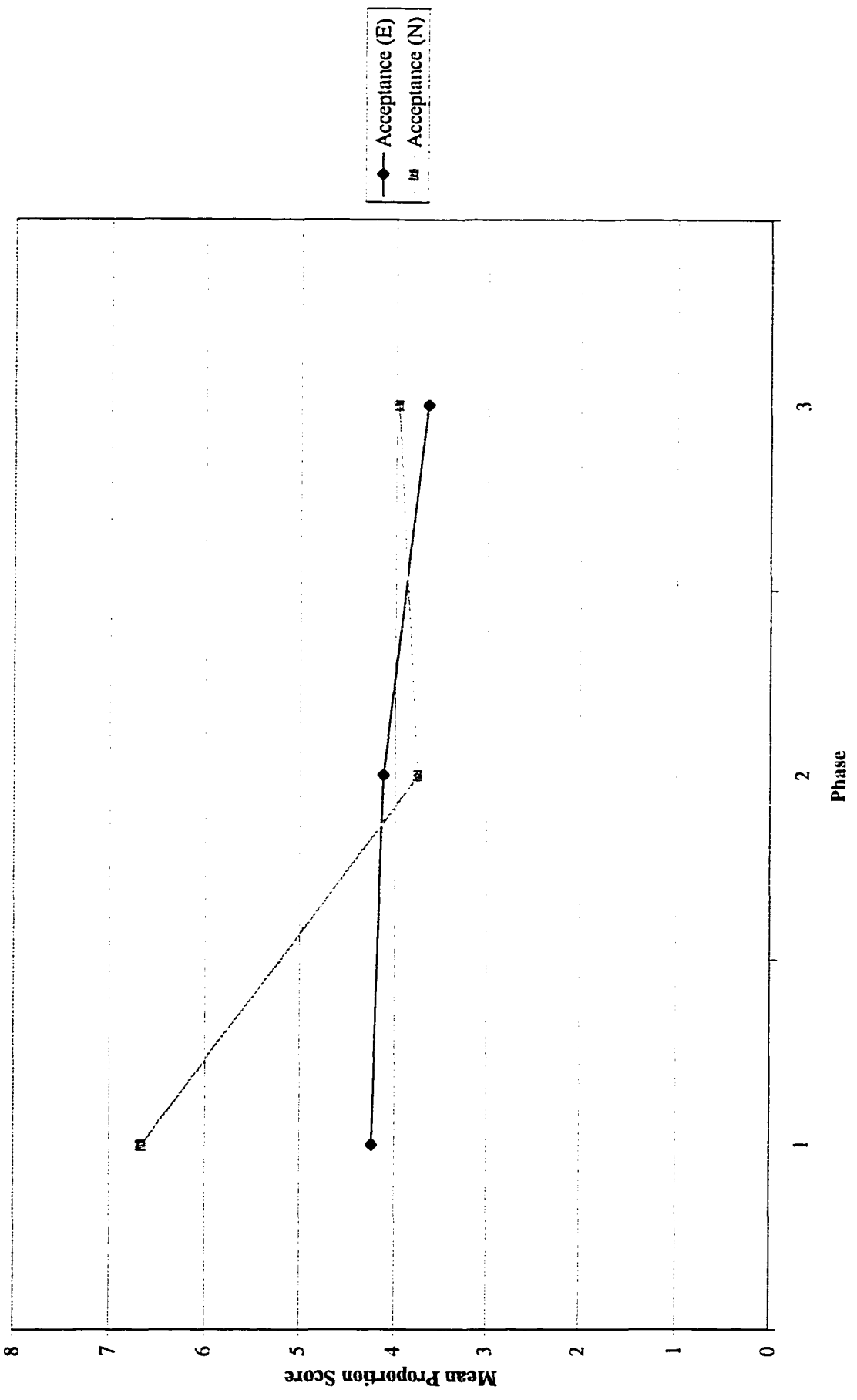


Fig. 8: Mean Proportion of Acceptance X Role X Phase

significantly greater proportion of enactments than experts (M's = 2.82 vs. .06 at phase one, 1.29 vs. .29, at phase two, and 1.14 vs. .25, at phase three). (See Figure 9 for an illustration of this role X phase interaction effect)

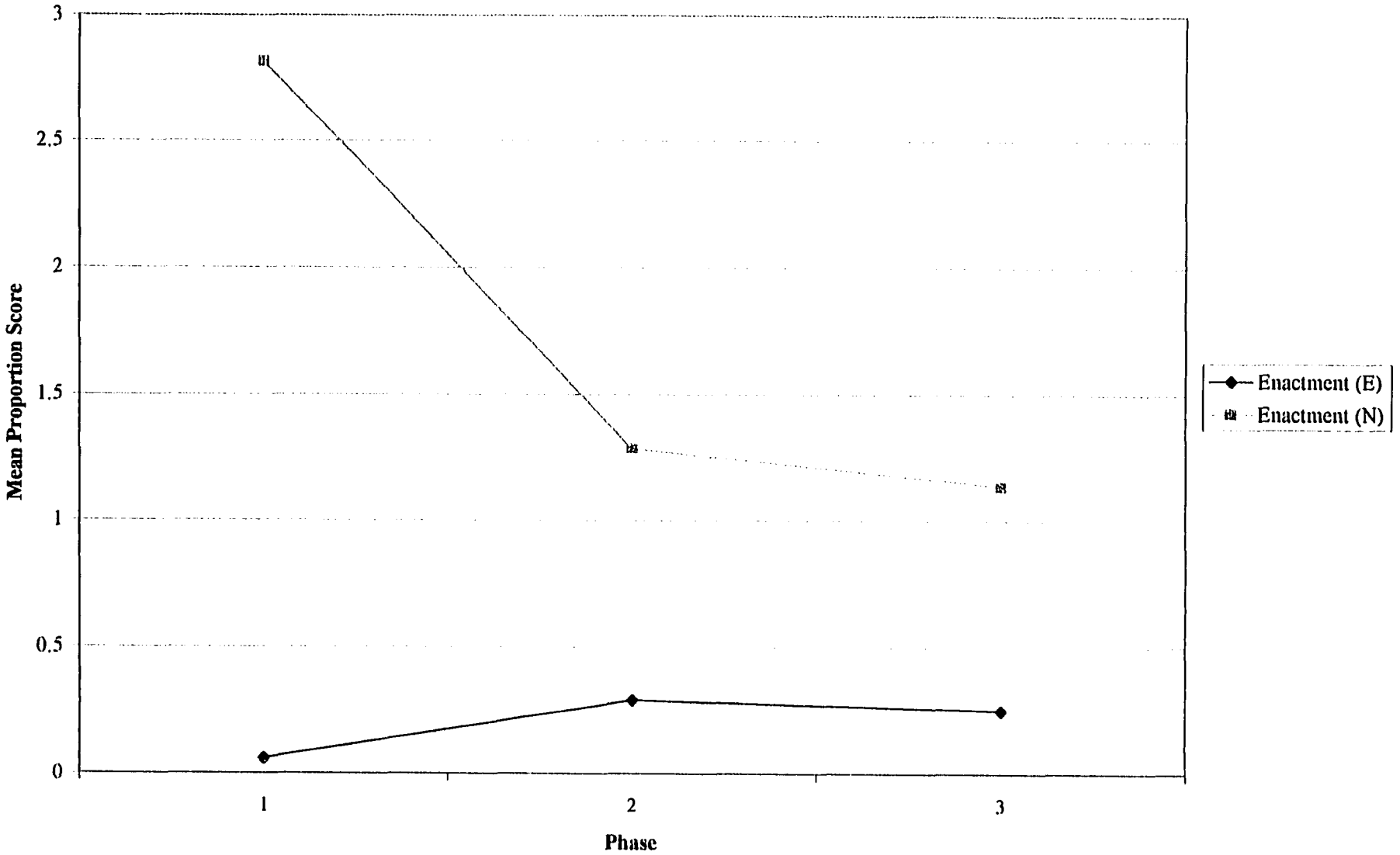
Directive. A significant main effect for role was also obtained for the mean proportion of conversational turns coded as directive, F (1,396) = 27.68, p < .001. Experts had a significantly greater mean proportion of conversational turns coded as directive than novices (M's = 3.01 vs. 1.26).

The role main effect was qualified through a series of one-way ANOVA's performed by phase separately for experts and novices. While no significant main effect was obtained for experts' productions of directives, a significant main effect for phase was obtained for novices' mean proportions of conversational turns coded as directive F (2,213) = 4.01, p <.05. Novices produced a significantly greater proportion of turns coded as directive in phases two and three than in phase one (M's = 1.61 & 1.51 vs. .67).

A significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as directive, F (2,396) = 5.14, p < .05. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each phase separately. Findings indicated that at each phase, experts generated a significantly greater proportion of directives than novices (M's = 3.76 vs. .67 at phase one, 2.86 vs. 1.61, at phase two, and 2.40 vs. 1.51, at phase three). (See Figure 10 for an illustration of this role X phase interaction effect)

Regulation. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as regulation, F (2,396) = 6.48, p < .05. The mean proportion of conversational turns coded as regulation was significantly greater in

Fig. 9: Mean Proportion of Enactments X Role X Phase



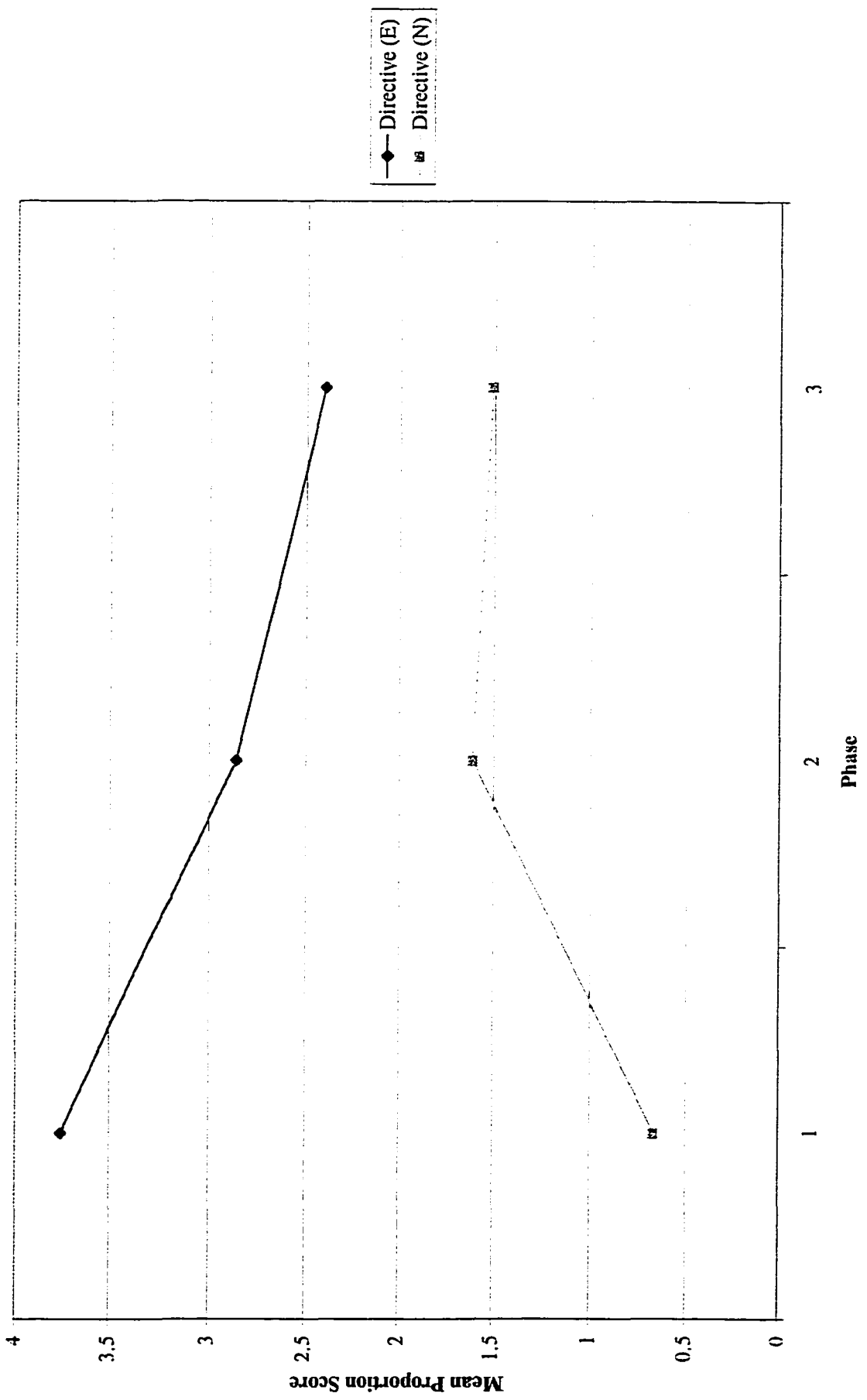


Fig. 10: Mean Proportion of Directives X Role X Phase

phases three and two than in phase one (M's = 2.51 & 2.37 vs. 1.42).

A significant main effect for role was also obtained for the mean proportion of conversational turns coded as regulation, F (1,396) = 27.68, p < .001. Experts had a significantly greater mean proportion of conversational turns coded as regulation than novices (M's = 2.81 vs. 1.39).

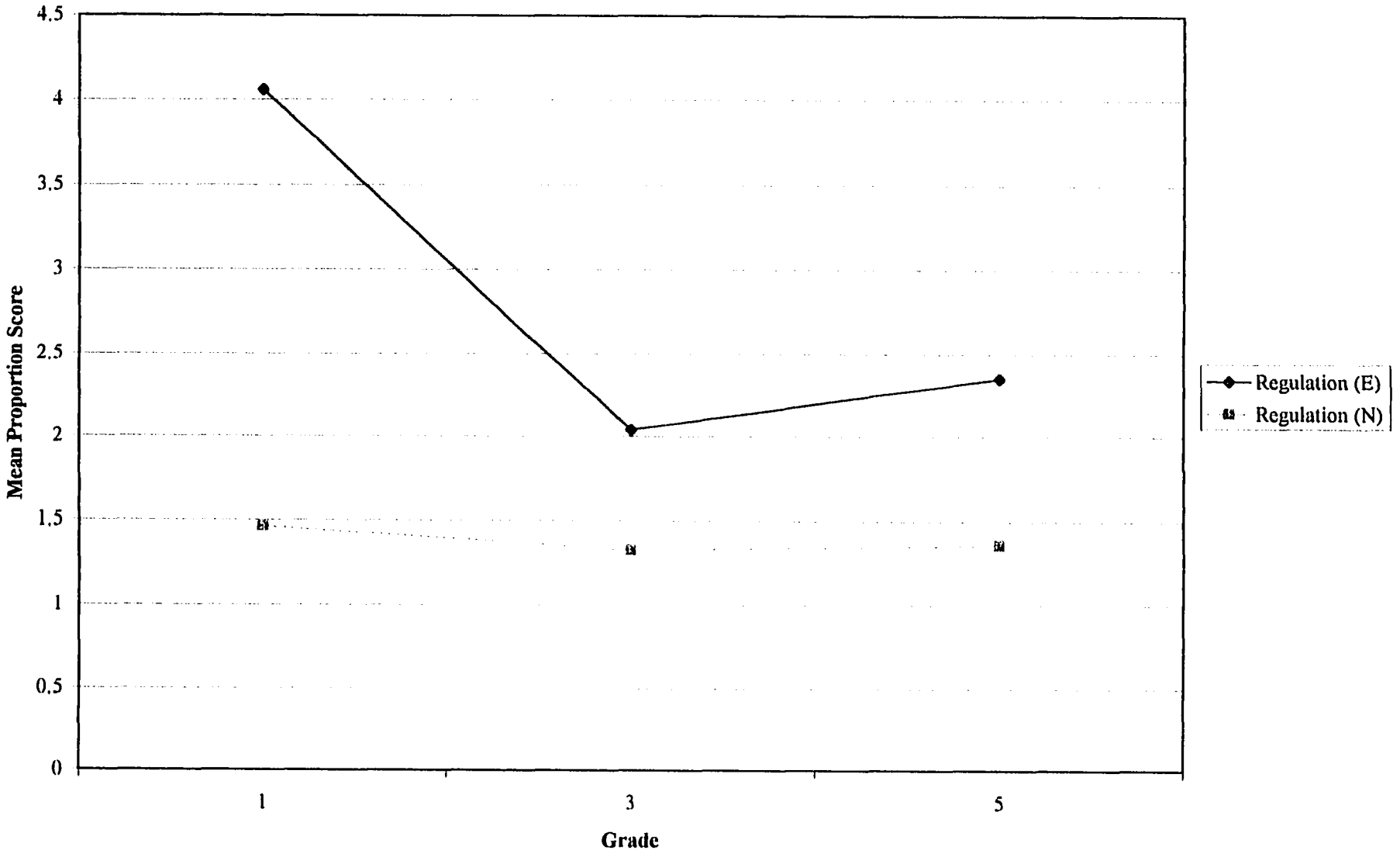
A significant main effect for gender was obtained for the mean proportion of conversational turns coded as regulation, F (1,396) = 8.23, p < .05. Boys had a significantly greater mean proportion of conversational turns coded as regulation than girls (M's = 2.49 vs. 1.71).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as regulation, F (2,396) = 4.40, p < .05. First graders mean proportion of conversational turns coded as regulation was significantly greater than third or fifth graders (M's = 2.76 vs. 1.69 & 1.85).

A significant role X grade interaction effect was also obtained for the mean proportion of conversational turns coded as regulation, F (2,396) = 4.64, p < .05. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each grade separately. Findings indicated that for first and fifth but not third graders, experts produced a significantly greater proportion of conversational turns coded as regulation than novices (M's = 4.06 vs. 1.47, for first graders, and 2.35 vs. 1.36, for fifth graders). (See Figure 11 for an illustration of this role X grade interaction effect)

A significant role X gender interaction effect was also obtained for the mean proportion of conversational turns coded as regulation, F (2,396) = 4.39, p < .05. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on

Fig 11: Mean Proportion of Regulations X Role X Grade



each gender separately. Findings indicated that for both boys and girls, experts produced a significantly greater proportion of conversational turns coded as regulation than novices (M's = 3.53 vs. 1.45, for boys, and 2.10 vs. 1.32, for girls). (See Figure 12 for an illustration of this role X gender interaction effect)

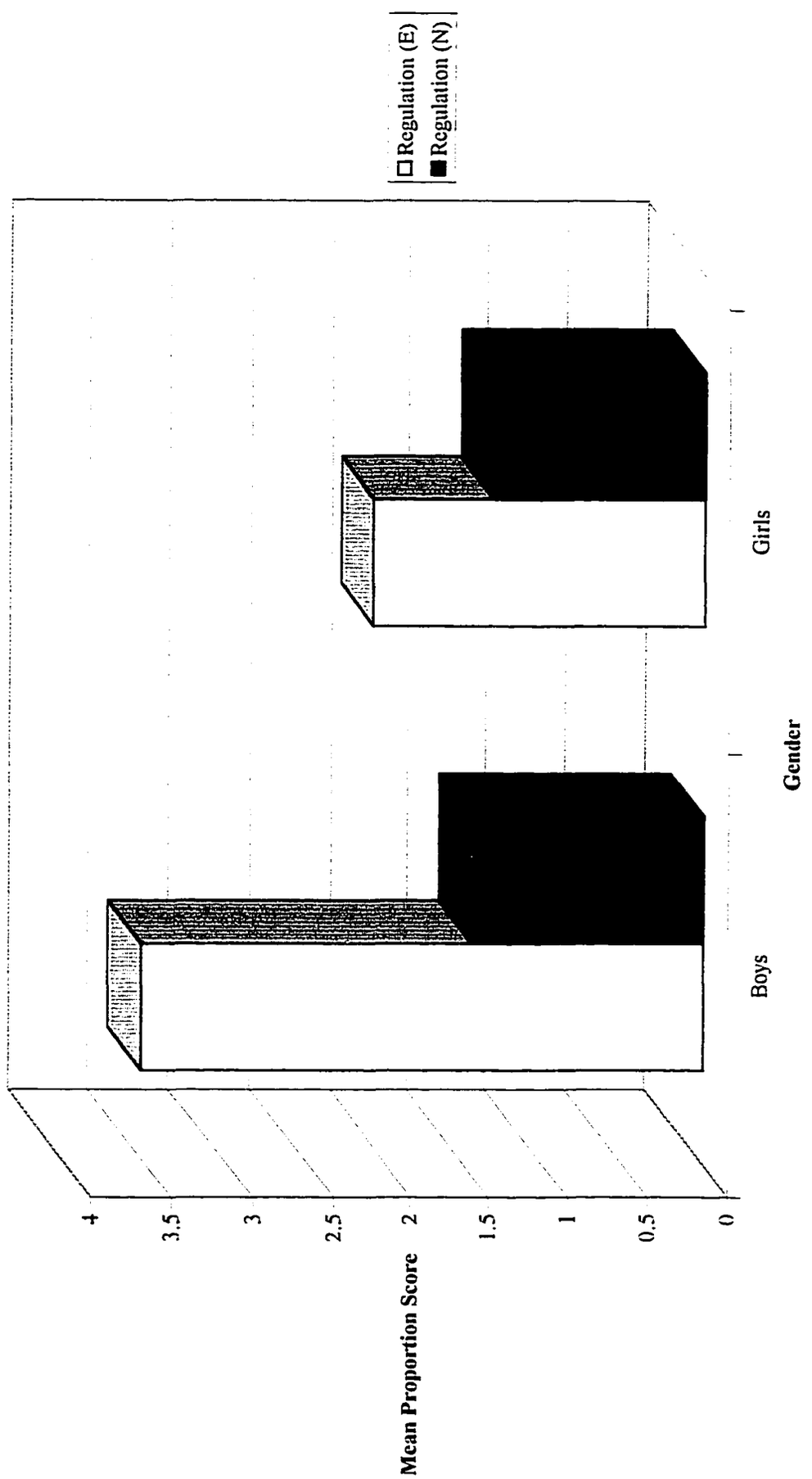
Summary of findings. Conversational turns coded as regulation and directive were more typically generated by experts than novices with regulations occurring more in the later rather than earlier phases and occurring more among first graders than third or fifth graders. Enactments were generated by novices more than experts at each phase and generated significantly more in phase one than phases two or three. Acceptance was greater among novices than experts only during the first phase of their interactions with novice-generated acceptances occurring significantly more in phase one than in phases two or three.

Variables Influencing The Distribution Of Talk Reflecting Collaborative Properties

Contribution. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as contribution, $F(2,396) = 10.39$, $p < .001$. The mean proportion of conversational turns coded as contribution was significantly greater in phases three and two than in phase one (M's = 2.12 & 1.34 vs. .50). Additionally, the proportion of contributions in phase three was found to be significantly greater than that in phase two (M's = 2.12 vs. 1.34).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as contribution, $F(2,396) = 5.04$, $p < .05$. While first graders were not found to be significantly different from third or fifth graders, the mean proportion of conversational turns coded as contribution for third graders was significantly

Fig. 12: Mean Proportion of Regulation X Role X Gender



greater than that for fifth graders (M's = 1.89 vs. .76).

Commentary. A significant main effect for grade was obtained for the mean proportion of conversational turns coded as commentary, $F(2,396) = 5.04$, $p < .05$. While third graders were not found to be significantly different from first or fifth graders, the mean proportion of conversational turns coded as commentary for first graders was significantly greater than that for fifth graders (M's = .31 vs. .06).

Remarks. A significant main effect for phase was obtained for the mean proportion of conversational turns coded as remarks, $F(2,396) = 29.94$, $p < .001$. The mean proportion of conversational turns coded as remarks was significantly greater in phases three and two than in phase one (M's = 14.06 & 12.60 vs. 7.69).

The phase main effect was qualified through a series of one-way ANOVA's performed separately for experts and novices. While no significant main effect was obtained for novices' productions of remarks, a significant main effect for phase was obtained for experts' mean proportions of conversational turns coded as remarks $F(2,213) = 6.22$ $p < .05$. Experts produced a significantly greater proportion of turns coded as remarks in phases three and two than in phase one (M's = 11.19 & 10.71 vs. 6.67).

A significant main effect for grade was obtained for the mean proportion of conversational turns coded as remarks, $F(2,396) = 12.82$, $p < .001$. First and third graders mean proportion of conversational turns coded as remarks was significantly greater than fifth graders (M's = 12.58 & 12.83 vs. 8.93).

A significant role X phase interaction effect was also obtained for the mean proportion of conversational turns coded as remarks, $F(2,396) = 3.90$, $p < .05$. This two-way interaction was then analyzed via a series of one-way ANOVA's performed on each

phase separately. Findings indicated that, only at phase three, experts generated a significantly greater proportion of remarks than novices (M's = 15.49 vs. 12.63). (See Figure 13 for an illustration of this role X phase interaction effect)

Summary of findings. These findings indicate that contributions and remarks (talk unrelated to the activity) were more likely to occur in phases two and three than in phase one. Furthermore, remarks were more associated with first and third graders than fifth graders. Additionally, remarks were more often expert-generated and more likely to occur in phases two and three than in phase one.

The Impact of Prior Contributions

What role did the expert play in the original construction of the game that he or she was teaching? How did this impact upon his or her instructional strategies? As has been discussed, one child in each dyad was previously involved in a study investigating children's collaborative interactions in which children were asked to collaboratively construct a board game. The interaction was videotaped, transcribed and coded to reflect rules (as well as methods of play) proposed by each partner. Each proposed rule was negotiated and subsequently rejected or incorporated into the co-constructed game. At the end of that interaction, one partner from each dyad was randomly selected to serve as the expert in the present study.

It was of interest to determine the role that experts played in the original construction of the game that they were responsible for teaching because children responsible for teaching a game that was not primarily of their own making may have difficulty maintaining their expert role. One way of determining the prior role that the expert played was to discuss that role in terms of dyadic balance and imbalance. If

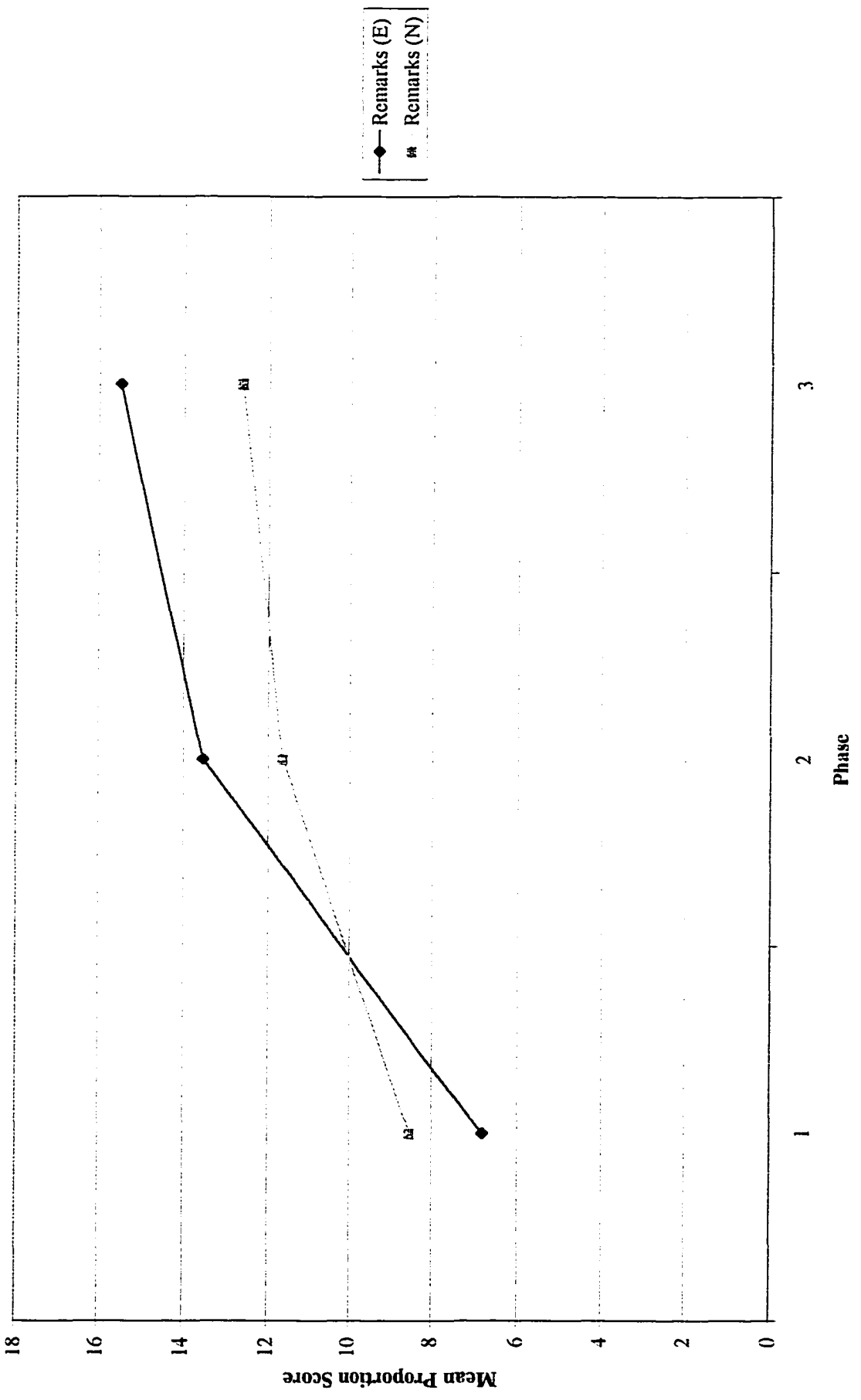


Fig. 13: Mean Proportion of Remarks X Role X Phase

between 40 to 60 percent of the rules incorporated into the original game co-construction were proposed by the child serving as the expert in the present study, that expert was considered to be in dyadic balance with his or her previous partner. Contributions by the expert of less than 40 percent or greater than 60 percent reflected dyadic imbalance. The category of dyadic imbalance was further divided into two subcategories. Experts who had contributed less that 40 percent of the rules incorporated into the original game were referred to as passive while those who had contributed greater than 60 percent were referred to as assertive. Given that the conversational turn codes reflected instructional, regulatory, and collaborative strategies, such categorizations allowed for certain kinds of questions to be posed. In particular, do the instructional strategies utilized by experts differ as a function of whether they were classified as passive, assertive, or balanced relative to their previous partner? Did the strategies utilized by novices in the present study differ as a function of the kind of expert they had been paired with?

A 3 (grade) X 2 (gender) X 2 (role) X 3 (prior contributions of expert) MANOVA was performed on the mean proportion of each of the conversation turn codes. Findings indicated that experts who originally participated in balanced dyads had a significantly lower proportion of their conversational turns coded as directive $\underline{F}$ (2,27) = 4.18, $\underline{p} < .05$, than those whose original role was either categorized as passive or assertive ($\underline{M}$'s = 39.18, vs. 78.11, & 74.65). Consequently, novices paired with expert's who originally participated in balanced dyads had a significantly higher proportion of their conversational turns coded as directive $\underline{F}$ (2,27) = 3.62, $\underline{p} < .05$, than those paired with experts who were categorized as either active or passive ($\underline{M}$'s = 52.87, vs. 28.56, & 23.35).

Part II: Correlational Analyses

Pearson correlation coefficients were calculated to determine relationships between all conversational turn codes. There were several significant relationships. Table 8 reports correlations between the various factors reflecting the impact of perspective coordination balance, inquiry and response, understanding and performance, role maintenance, and the impact of prior contributions.

Impact of Perspective Coordination

A significant positive correlation was found between perspective coordination balance scores and requests for information by novices, $r = .37$, $p < .01$. A significant positive correlation was also found between perspective coordination balance scores and occurrences of expert-generated explanations, $r = .24$, $p < .05$. Furthermore, a significant positive correlation was found between perspective coordination balance scores and enactments by novices, $r = .29$, $p < .05$.

A significant positive correlation was also found between the mean perspective coordination scores of experts and occurrences of expert-generated shaping, $r = .36$, $p < .05$. Additionally, a significant negative correlation was found between the mean perspective coordination scores of novices and occurrences of novice-generated rejections, $r = -.27$, $p < .05$.

Inquiry and Response

A significant positive correlation was found between requests for information by novices and explanations by experts, $r = .57$, $p < .01$. Furthermore, occurrences of elicitations by novices were associated with occurrences of explanations by experts, $r = .36$, $p < .05$. A significant positive correlation was found between requests for

Table 8

Significant intercorrelations between sociometric scores, perspective coordination scores, and conversational turn functions X role

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Selman Balance		.37	.24	.29	------	------	------	------	------	------	------	------	------	------	------	------	------
2. Requests (N)			.57	------	------	.71	------	------	------	------	.40	------	------	------	------	------	------
3. Explanations (E)				.53	------	------	------	------	------	.36	.44	------	------	------	------	------	------
4. Enactments (N)						------	-----	------	------	------	.39	.28	.30	------	------	------	------
5. Selman (E)						.36	------	------	------	------	------	------	------	------	------	------	------
6. Shaping (E)							------	------	------	------	------	------	------	.44	------	------	------
7. Selman (N)								- .27	------	------	------	------	------	------	------	------	------
8. Rejections (N)									------	------	------	------	------	------	------	-----	------
9. Clarification (N)										------	------	-----	------	------	------	------	------
10. Elicitation (N)											------	------	------	------	------	------	------
11. Elucidations (N)												.28	------	------	.31	------	------
12. Directives (E)													.32	.30	------	- .35	------
13. Acceptance (N)														------	.26	------	------
14. Remarks (N)															------	------	------
15. Regulations (E)																------	------
16. Contributions (N)																	.33
17. Rejections (E)																	

Pearson correlation coefficients reported at the .05 level of significance

(E) = Expert-generated (N) = Novice-generated

information by novices and the use of shaping by experts, $r = .71$, $p < .01$. A significant positive correlation was also found between the use of elucidations by novices and occurrences of both expert-generated explanations, $r = .44$, $p < .01$, and occurrences of enactments by novices, $r = .39$, $p < .05$.

Understanding and Performance

Occurrences of directives produced by experts were associated with occurrences of elucidations produced by novices, $r = .28$ $p < .05$, enactments by novices, $r = .28$, $p < .05$, acceptance by novices, $r = .32$, $p < .01$, and statements by novices, $r = .30$, $p < .05$. Additionally, occurrences of regulations produced by experts were associated with occurrences of elucidations produced by novices, $r = .31$. $p < .05$. Furthermore, occurrences of explanations produced by experts were associated with occurrences of enactments produced by novices, $r = .53$. $p < .05$.

A significant positive correlation was found between requests for information by novices and occurrences of elucidations made by novices, $r = .40$, $p < .01$. A significant positive correlation was also found between shaping by experts and statements by novices, $r = .44$, $p < .05$. Furthermore, occurrences of acceptance by novices were associated with occurrences of regulations by experts, $r = .26$, $p < .05$ and enactments by novices, $r = .30$, $p < .05$.

Role Maintenance

A significant negative correlation was found that indicates that as the occurrences of directives by experts increased, the occurrences of contributions by novices decreased, $r = -.35$, $p < .05$.

Additionally, occurrences of contributions produced by novices were associated with occurrences of rejections produced by experts, $r = .33$. $p < .05$.

The findings reflect the instructional, regulatory, and collaborative properties of the children's game-related conversations. The significant positive correlation between requests and elucidations on the part of novices and explanations on the part of experts highlights the instructional properties of the conversations. The significant positive correlation between novice-generated contributions and expert-generated rejections indicates a challenge to the power of the expert via the introduction of new information on the part of novices and attempts at power maintenance, through the use of rejections, on the part of experts. In this way, such talk reflects the regulatory properties of the game-related conversations. This relationship between conversational turns, however, also reflects the collaborative properties of game-related conversation as novices attempt to restructure the game play activity.

Prior Contributions

A significant positive correlation was found between the contributions of experts to the original construction of the game they were responsible for teaching and the occurrences of expert-generated shaping during their instructional session, $r = .44$, $p < .01$. The greater the role that the expert played in the construction of the game they were teaching, the greater their use of shaping as an instructional strategy. Additionally, a significant negative correlation was found between game complexity level and occurrences of novice-generated contributions, $r = -.32$, $p < .05$. Novices who were taught games of higher complexity were less likely to introduce their own rules into the game. Game complexity scores reflected the cognitive complexity of rules incorporated into the original

game. As a result, each proposed rule was assigned a complexity score and the overall game complexity score was equal to the highest score assigned to any rule incorporated into the game. For example, rules such as those for assigning value to game pieces ("The red piece is worth 20 dollars") were considered to be of less cognitive complexity than those requiring that conditions be met prior to their deployment ("To get 20 dollars, you must first land on a gold square").

The Variables Associated With Collaboration

Collaboration was operationally defined as the introduction of a new rule on the part of the novice that is subsequently accepted and adhered to by the expert. Given that all dyadic interactions reflected collaborative properties, it was of interest to determine how certain kinds of talk influenced how long expert and novice roles were maintained and how certain kinds of talk in the initial phases related to collaboration in the final phase.

As a result, the total number of conversational turns prior to the first introduction of a new rule by the novice (i.e. collaboration) was calculated and a collaboration ratio score was determined. The ratio score was calculated by dividing the number of turns prior to collaboration by the total number of conversational turns generated by the dyad. As a result, the higher the ratio score the greater the number of conversational turns that took place prior to collaboration. The ratio score was then entered as a variable into subsequent correlational analyses. Furthermore, an additional correlational analysis was employed to determine the relationship between talk generated by experts and novices in phases one and two and novice-generated contributions in phase three.

What variables impact upon how many conversational turns were generated before collaboration occurred? Expert-generated acceptances were significantly negatively

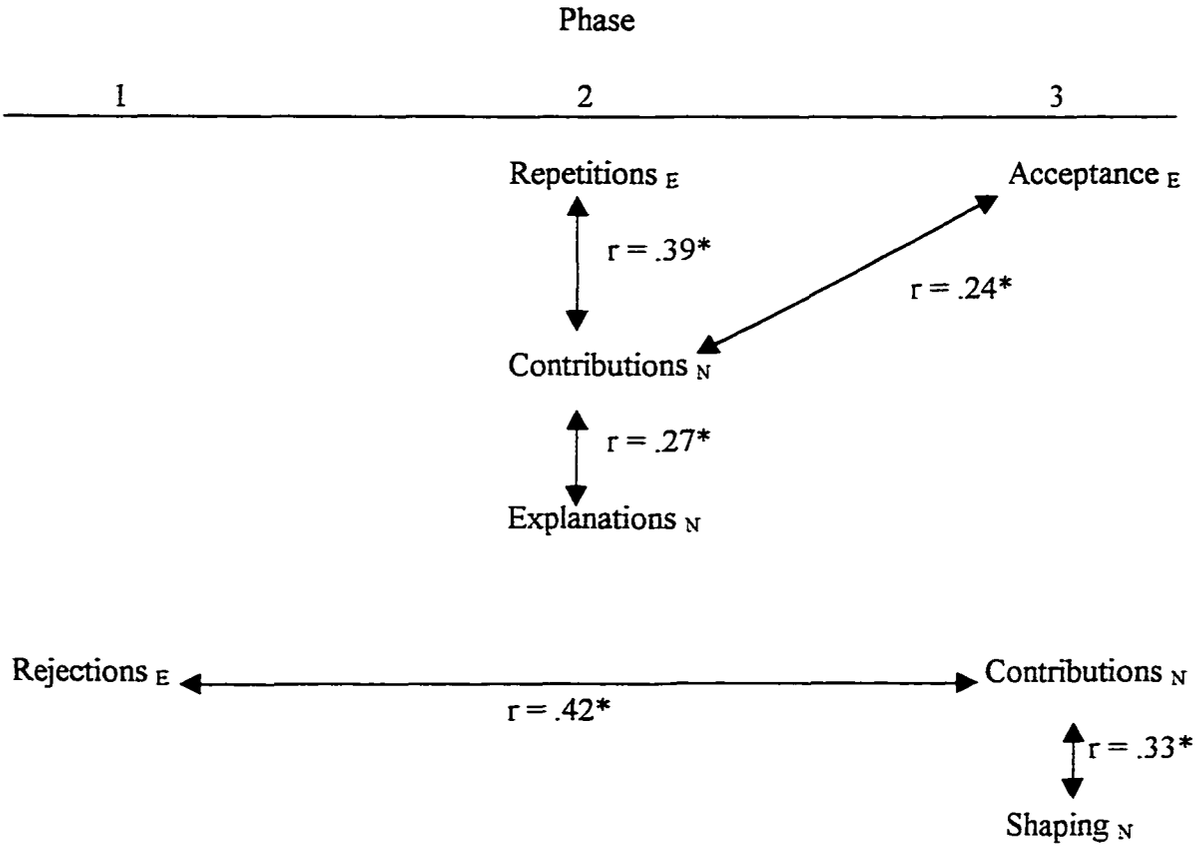
correlated with the collaboration ratio score $r = -.23$, $p < .05$. As the proportion of expert-generated acceptances increased, the number of turns prior to collaboration decreased and the earlier collaboration occurred.

What variables in the early phases were related to collaboration in later phases? A significant correlation was found between the proportion of novice-generated contributions in phase two and expert-generated repetitions in phase two, $r = .39$, $p < .05$, expert-generated acceptances in phase three, $r = .24$, $p < .05$, and novice-generated explanation in phase two, $r = .27$, $p < .05$. A significant positive correlation was found between novice-generated contributions in phase three and expert-generated rejection in phase one, $r = .39$, $p < .05$. A significant positive correlation was also found between novice-generated contributions in phase three and novice-generated shaping in phase three, $r = .27$, $p < .05$ (see Figure 13 for an illustration of these significant correlations).

While a causal explanation is not possible via this analysis, a correlational analysis of this sort clearly establishes the temporal relationship between certain conversational turns generated by the dyad. Rejections, on the part of experts, may indicate an attempt to maintain control when faced with novice-initiated challenges to that control. The collaboration that is evident by phase three suggests an inability by the expert to fend off such challenges.

Figure 13

Significant phase X function X role intercorrelations



E = Expert-generated
N = Novice-generated
* $p < .05$

Part III: Factor Analysis

Given the large number of significant intercorrelations obtained through the correlational analysis discussed in the preceding section, data reduction techniques were employed as a means of capturing underlying associations between variables that were not readily apparent through an inspection of the intercorrelational matrices. The correlational matrix previously generated, therefore, served as the initial stage of a factor analysis that clustered the variables into three underlying factors that accounted for 76.1% of the total variance inherent within the set of variables entered into the analysis.

As is discussed by Kachigan (1986), "the analyst must often use personal judgement as to what constitutes a meaningfully high loading, based on the distribution of loadings within a factor and across factors, as well as the absolute magnitudes of the loadings. In practice, loadings of .30, .40, or .50 are most often used as lower bounds for meaningful loadings" (p. 393). Given the distributions of the present study, a criterion value of .50 was utilized. In addition, a factor rotation was utilized to eliminate as many medium sized loadings as possible.

Expert-generated conversational turn function codes such as instruction, explanation, and acceptance and novice-generated turns such as request and acceptance were high loading variables on the factor referred to as instruction. Expert-generated conversational turn function codes such as enactment and directive and novice-generated turns such as directive and regulation were high loading variables on the factor referred to as regulation. Finally, expert-generated conversational turn function codes such as rejection and contribution and novice-generated turns such as elicitation, clarification, and contribution were high loading variables on the factor referred to as collaboration. A

second factor analysis was performed separately for each phase, however, no differences in loadings as a function of phase were obtained. As a result, the findings of the factor analysis reinforce and refine the thematic relationships between the conversational turns that were implied through the results of the correlational analysis. (See Table 9 for a list of loadings that define each factor)

The correlational analysis established the relationship between two events; one turn of talk by experts and one by novices. The relationship that exists between these turns reflects such qualities as instruction, regulation, and collaboration. For example, the correlation between novice-generated requests and expert-generated explanations is indicative of instruction. However, two correlated turns of talk may also be associated with other turns of talk. For example, as the incidence of expert-generated explanations and novice-generated requests increase, the incidence of novice-generated acceptances may increase as well. The factor analysis establishes groups, or clusters, of interrelated variables. While these clusters are qualitatively distinct from each other, the variables that comprise these clusters show qualitative similarities. As a result, the factor analysis serves as a more sensitive way of capturing the thematic relationships that exist between several variables simultaneously.

Table 9

Summary of conversational turn factor analysis by source

Source	Factor 1: Instruction	Loadings	Factor 2: Regulation	Loadings	Factor 3: Collaboration	Loadings
Expert	Instruction	.86	Request	.68	Rejection	.84
	Elicitation	.77	Enactment	.93	Contribution	.69
	Explanation	.93	Directive	.83		
	Clarification	.48	Regulation	.67		
	Repetition	.46				
	Acceptance	.85				
	Commentary	.91				
Novice	Request	.85	Rejection	.43	Elicitation	.76
	Elucidation	.91	Directive	.74	Clarification	.69
	Rejection	-.71	Regulation	.62	Repetition	.63
	Regulation	-.91			Contribution	.68
					Commentary	.41

Part IV: Sequential Analyses

What is the importance of studying sequences of conversation? One of the concerns of this research was determining a means of capturing roles that, while initially defined, grew less clear through the course of the dyadic activity. While the roles of experts and novices were assigned to children in each dyad, the manner in which they fulfilled these roles impacted upon the role played by their partners. As a result, it was of interest to identify certain patterns of engagement that helped to identify the ways in which experts and novices fulfilled their roles. These patterns of engagement were identified via an analysis of the sequential nature of their conversations.

When observing and recording sequential, linear, events, a "lag sequential" (Sackett, 1979) design is preferable. It allows one to determine sequential relationships between events that cannot be obtained through simple correlational analyses. Lag sequential analysis was developed specifically to address the problem of identifying distant (as well as immediate) effects within behavioral sequences. As a result, lag analysis provides a means for revealing and studying constraint and contingency patterns that may not be apparent when the scope of the analysis is limited to immediate effects (Lichtenberg and Heck, 1986).

A lag sequential analysis begins with the assumption of dyadic interaction as a discrete stochastic process made up of a sequence of discrete events, with each event coded in terms of a finite number of mutually exclusive and exhaustive categories. Analysis of the process becomes an analysis of the events as they occur sequentially (Bakeman, Adamson, & Strisik, 1989).

What is the probability that given a particular event, certain events will follow or precede it? The term lag is used to reflect differences that exist between the occurrences of events. An event of interest is termed "lag 0". Given any event, an event that immediately follows (one event away) is termed lag +1 (with two events away represented by lag +2, and so forth).

Significant conversational turn sequences, based on adjusted residuals, are presented in Tables 10 and 11. Positive adjusted residuals indicated that a target conversational turn category was likely to follow a given conversational turn category while negative ones indicated that a target was unlikely to follow a given conversational turn category. Significant adjusted residuals are reported only in cases where both the target and the given conversational turns had frequencies of at least 20 occurrences. Assuming approximately 30 degrees of freedom, adjusted residuals across all of the analyses exceeding 3.23 were significant at the .001 level, those exceeding 2.40, at the .01 level, and those exceeding 1.67, at the .05 level. Due to the possibility of Type 1 errors when computing multiple post-hoc tests on a single data set, a bonferroni correction was used.

Given that conversational turn function codes have been described as exhibiting qualitatively different interactional functions, significant conversational turn sequences reflecting instruction, regulation, and collaboration are presented.

Expert to Novice Lag +1 Sequences of Conversational Turns

How were the turns of talk of experts responded to by novices? Table 10 lists the significant lag +1 sequences of expert-generated conversational turn function codes as determined via adjusted residuals.

Table 10

Significant[+] expert to novice lag+1 sequences of conversational turn function codes

Given	Followed By				
Instruction	Request 4.44***	Acceptance 6.23***	Enactment 6.74***	Commentary -6.42***	Statement -4.96***
Request	Explanation 29.99***				
Elicitation	Explanation 28.12***	Acceptance 2.58**			
Explanation	Request 7.00***	Elucidation 7.15***	Acceptance 2.93**	Commentary -3.43***	Statement -4.25***
Clarification	Acceptance 10.07***				
Rejection	Rejection 10.46***	Commentary -2.99**	Statement -1.97*		
Acceptance	Elicitation 2.36**	Acceptance -1.71*	Contribution 2.76**		
Directive	Enactment 15.56***				
Regulation	Acceptance 4.14***	Commentary -1.76*	Statement -3.02**		
Commentary	Elucidation -6.08***	Acceptance -6.91***	Regulation 1.95*	Commentary 12.75***	
Remark	Request -3.41***	Elucidation -3.35***	Directive 1.78*	Remark 18.36***	

*p < .05
** p < .01
*** p < .001

positive values (+) indicate codes most likely to precede the given
negative values (-) indicate codes least likely to precede the given

[+]Significance determined via adjusted residual scores

Instructional Properties. The most likely kinds of responses made by novices to turns of talk by experts coded as instruction were enactments, acceptances, and requests. Additionally, the most likely kinds of responses made by novices to turns of talk by experts coded as explanations were elucidations, requests, and acceptances. Furthermore, expert-generated clarifications were most likely followed by novice-generated acceptances and expert-generated directives were most likely followed by novice-generated enactments.

Regulatory Properties. It can be seen in Table 10 that the most likely kind of conversational turn to follow experts rejections was further rejections by novices. Acceptances were most likely followed by contributions and elicitations and regulations were most likely followed by novice-generated acceptances. It appears, therefore, that attempts at maintaining control, on the part of experts, can result in several possible responses by novices. While expert-generated regulation resulted in novice-generated acceptance, expert-generated rejection resulted in further rejection on the part of novices. In this way, experts either reinforced their control over the activity (through regulations) or provided novices with opportunities to contest that control (through acceptances).

Collaborative Properties. Requests for information on the part of experts was most likely followed by novice-generated explanations, while expert-generated elicitations were most likely followed by explanations and acceptances on the part of novices. As a result, when experts sought information from novices regarding game play, they were relinquishing the control that they had over the activity. As this power was relinquished, the possibility for collaboration increased as novices took a more active role in directing game play.

Novice to Expert Lag +1 Sequences of Conversational Turns

How were turns of talk by novices responded to by experts? Table 11 lists the significant lag +1 sequences of novice-generated conversational turn function codes as determined via adjusted residuals.

Instructional Properties. Requests for information made by novices were most likely followed by expert-generated explanations. Additionally, novice-generated elicitations were also most likely followed by expert-generated explanations. Novice-generated elucidations were most likely followed by acceptance and rejection on the part of experts, while enactments of rules on the part of novices were most likely followed by further expert-generated instructions.

Regulatory Properties. Rejection on the part of novices was most likely followed by rejection on the part of experts. Novice-generated acceptances were most likely followed by expert-generated instructions and directives. Attempts at regulation on the part of novices were most often followed by acceptances on the part of experts. One additional indicator of regulatory properties was the finding that statements (discourse not pertaining to the activity) on the part of novices were most likely followed by expert-generated statements and regulations. It appears as though the production of discourse not pertinent to the dyadic activity was guided by the experts. In some cases when novices generated non-pertinent discourse, experts responded by stating that the action was inappropriate (in the forms of regulations) while in other cases the experts reciprocated with non-pertinent discourse of their own.

Collaborative Properties. Novice-generated contributions were most likely followed by contributions, rejections, and acceptances on the part of experts. As a result,

Table 11

Significant[+] novice to expert lag+1 sequences of conversational turn function codes

Given	Followed By			
Request	Explanation 39.40***			
Elicitation	Explanation 20.68***			
Elucidation	Rejection 3.59***	Acceptance 21.12***	Commentary -7.36***	
Rejection	Rejection 12.58***			
Acceptance	Instruction 11.15***	Directive 1.68*	Statements -1.81*	
Enactment	Instruction 5.49***			
Regulation	Acceptance 3.27**			
Contribution	Rejection 6.78***	Acceptance 4.79***	Contribution 11.21***	Commentary -3.07**
Commentary	Rejection -1.89*	Acceptance -3.20**	Commentary 13.75***	
Remark	Regulation 2.20*	Remark 20.96***		

*p < .05
** p < .01
*** p < .001

positive values (+) indicate codes most likely to precede the given
negative values (-) indicate codes least likely to precede the given

[+]Significance determined via adjusted residual scores

attempts at collaboration by novices reflected a challenge to the power of the expert as the director of the activity and the source of game-related information. Such challenges were either refuted by experts, in the form of rejections, or confirmed, in the form of acceptances or further contributions.

As a result, attempts at collaboration by novices reflected a challenge to the power of the expert as director of the activity and source of game-related information. Such challenges were either refuted by experts (in the form of rejections) or confirmed (in the form of acceptances or further contributions).

Log-Linear Analysis

Given that particular sequences have been identified as more likely to occur then chance, how do the occurrences of these sequences differ as a function of grade, or gender?

In keeping with the manner in which previous results have been presented, only selected sequences reflecting instructional, regulatory, and collaborative properties were analyzed with respect to grade and gender. Significant two turn sequences were analyzed by a 3 (grade) X 2 (gender) X 2 (role) X 6(sequence) log linear analysis. Log linear analyses were assessed with Q-square and, as is suggested by Bakeman & Robinson, (1994), only effects of greater than .10 were interpreted. As a result, only the grade X sequence (Q-square = .48) interactions are reported. Table 12 lists the distribution of the significant two turn sequences by grade.

There were five significant adjusted residuals indicating significant differences in the distribution of these sequences across grades. These significant adjusted residuals were replaced, post hoc, with structural zeros and the chi square (i.e., G^2) for the overall

Table 12

Significant[+] conversational turn sequences x grade

Sequence		Grade 1	3	5
Expert-generated:				
Instruction - Request	Frequency	16	20	25
	Conditional Prob.	.10	.14	.20
	Adjusted Residual	1.57[b]	2.58[a]**	3.40[a]***
Explanation - Request	Frequency	15	26	35
	Conditional Prob.	.10	.18	.22
	Adjusted Residual	1.37[b]	4.34[a]***	4.93[a]***
Explanation - Acceptance	Frequency	11	20	28
	Conditional Prob.	.08	.14	.17
	Adjusted Residual	-.34[b]	2.62[a]**	2.56[a]**
Directive – Commentary	Frequency	31	9	14
	Conditional Prob.	.22	.40	.19
	Adjusted Residual	-1.84[b]*	2.79[a]**	-.13[b]
Novice-generated:				
Rejection - Rejection	Frequency	20	20	3
	Conditional Prob.	.25	.27	.08
	Adjusted Residual	8.47[a]***	9.03[a]***	1.50[b]

*p < .05
** p < .01
*** p < .001
a>b

[+]Significance determined via adjusted residual scores

matrix of residuals recomputed. This resulted in a X^2 of 12.0 ($df = 7$, $p < .05$) which accounted for 96% of the variance (i.e., Q^2) of the two-way interaction.

Significant Sequences by Grade

Third and fifth grade participants were significantly more likely to produce instructions followed by requests (n=60) conversational turn sequences than first graders. Additionally, third and fifth grade participants were also significantly more likely to produce explanations followed by requests (n=76) conversational turn sequences than first graders. Again, third and fifth grade participants were significantly more likely to produce explanations followed by acceptances (n=59) conversational turn sequences than first graders. Finally, third graders were significantly more likely to produce directives followed by commentary (n=54) conversational turn sequences than first or fifth graders. Findings indicate, therefore, that significant differences across grades exist in the production of conversational turn sequences that reflect instructional properties. Additionally, first and third grade participants were significantly more likely to produce rejections followed by rejections (n=43) conversational turn sequences than fifth graders.

These findings indicate, therefore, that while the talk of older children reflected both attempts to provide and gain information (through instruction-request and explanation-request sequences, the talk of younger children reflected the contesting of control over the game activity (through rejection-rejection sequences).

Significant Three Turn Sequences

In order to determine the likelihood with which significant two turn sequences would be followed by a third turn, all significant two turn sequences previously discussed were transformed into a new "chained" variable. The two turn "chains" were then

sequentially analyzed at lag 1. For purposes of clarity, all sequences in which the first of the three conversational turns was produced by experts are termed expert-generated and all those in which the first of the three conversational turns was produced by novices are termed novice-generated. Table 13 lists significant expert and novice-generated three turn sequences.

Significant Expert-generated Sequences

When all significant two turn sequences were entered into the analysis, three sequences of three turns were found to be significant. Interestingly, all three significant sequences reflect the instructional properties of the discourse. The most likely kind of conversational turn to follow an expert-generated instruction - novice-generated request two turn sequence was an expert-generated explanation. Additionally, the most likely kind of conversational turn to follow an expert-generated explanation - novice-generated request two turn sequence was an expert-generated explanation. Furthermore, the most likely kind of conversational turn to follow an expert-generated explanation - novice-generated elucidation two turn sequence was an expert-generated acceptance.

Significant Novice-generated Sequences

The most likely kinds of conversational turns to follow novice-generated request - expert-generated explanation two turn sequences were novice-generated requests and novice-generated acceptances. As a result, requests for information regarding game rules and/or goals that were responded to productively led to further requests for information.

A 3(grade) X 2 (gender) X 5 (sequence) log linear analysis was performed on the significant expert and novice-generated three turn sequences. No effects of greater than .10 were obtained and, as a result, no significant three turn sequences were further

Table 13

Significant[+] lag +1 conversational turn chain sequences

Chain Sequence	**Followed By**		
Expert Initiated:			
Instruction - Request	Explanation	Frequency	48
		Conditional Prob.	.80
		Adjusted Residual	17.64***
Explanation - Request	Explanation	Frequency	35
		Conditional Prob.	.58
		Adjusted Residual	13.65***
Explanation - Elucidation	Acceptance	Frequency	29
		Conditional Prob.	.43
		Adjusted Residual	9.58***
Novice Initiated:			
Request - Explanation	Elucidation	Frequency	47
		Conditional Prob.	.22
		Adjusted Residual	8.17***
Request - Explanation	Acceptance	Frequency	31
		Conditional Prob.	.15
		Adjusted Residual	2.20*

*$p < .05$
**$p < .01$
***$p < .001$
[+]Significance determined via adjusted residual scores

analyzed.

How can the finding that significant three-turn sequences of conversational turns are not differentiated by grade be interpreted? While some conversational turns are significantly sequentially related to several others, other codes may have fewer significant sequential relationships. For example, while expert-generated instructions are significantly followed by novice-generated requests, elicitations, rejections, or enactments, novice-generated requests are significantly followed only by expert-generated explanations. As a result, while the turn following an expert-generated instruction may differ as a function of grade (with expert-generated instructions followed by novice-generated requests significantly occurring only among third and fifth graders), the response to a novice-generated request is far more constrained. Therefore, when an expert provides an instruction, the novice is open to respond in ways that may be associated with his or her particular grade, but when an instruction is followed by a novice-generated request, the only response by experts, to occur significantly regardless of grade, is an explanation. In this way, each turn of talk in a sequence of turns constrains the kinds of turns that may follow it.

What, then, does an analysis of three turn sequences tell us about the interactional strategies used by both experts and novices? Talk initiated by experts was then responded to by novices. As a result of the novice's response, the expert was required to assess the informational needs of the novice and then proceed. The results of the analyses of the three turn sequences further qualify the relationship that existed between experts and novices. Since all of the significant sequences reflected instruction and inquiry, the three

turn sequences served to highlight the instructional properties present in the children's conversations.

Summary of Significant Findings

Age. First graders generated a significantly greater proportion of conversational turns coded as elicitations than third graders. Additionally, first graders generated a significantly greater proportion of conversational turns coded as regulations than third or fifth graders

Role. Conversational turns coded as instructions, explanations, directives, and regulations were significantly more likely to be generated by experts than novices. Furthermore, conversational turns coded as requests, elucidations, and enactments were significantly more likely to be generated by novices.

Phase. Conversational turns coded as instruction, on the part of experts, was significantly more likely to occur in phase one than phases two or three. Additionally, directives, on the part of novices, were more likely to occur in phases two and three than in phase one. Finally, both expert- and novice-generated rejections were significantly more likely to occur in phase three versus phases one and two.

Productive and Unproductive Teaching and Learning Strategies. Expert-generated instructions and explanations were significantly responded to by novices with further requests for information, acceptance, or elucidations. Expert-generated directives and regulations, however, were responded to by novices with enactment or acceptance. Novice-generated requests, elicitations, and elucidations were responded to by experts with further explanation. Novice-generated regulations and rejections, however, resulted in either acceptance or further rejection on the part of experts.

DISCUSSION

When children are placed in the position of having to teach their peers, how do they perform? Are they capable of performing such a task? Do they understand the task? Are they constrained by their prior teaching experiences or lack thereof? Are older children more effective than younger children at performing the task?

The present study is an investigation of the kinds of strategies that children use to both provide information to and gain information from a peer. While such interactions between less and more knowledgeable individuals have traditionally been termed expert-novice interactions (Valsiner, 1988; Meltzer, et. Al., 1989; Ellis & Gauvain, 1992), the present study marks a shift from the established paradigm. The primary paradigmatic shift is in the conceptualization of knowledge and the criteria for expertise. The traditional object of inquiry has been a task where expertise is determined by a particular level of task performance. In this sense, those with greater knowledge are those who perform with greater proficiency. Experts and novices, within this paradigm, are compared and contrasted with respect to their strategic approaches to tasks and subsequent task performance. In the present study, however, the relationship that exists between experts and novices is more akin to that which exists between teachers and students. In most interactions of this sort, however, issues of control are less salient as large disparities in age help not only to differentiate the teacher from the student but also to establish the location of control.

Given that learning experiences can be classified in a myriad of ways; from unilateral or teacher directed, to more egalitarian, cooperative forms, so to can the relationships that exist between teachers and students. As social interactionist

perspectives suggest (Tudge, 1992; Rogoff, 1997), dyadic interactions of this sort enhance not only the learner but the teacher as well. As a result, a critical point of interest is how individual roles develop and influence the learning experiences of both members of the dyad.

As a means of capturing this relationship, a detailed, micro-genetic, analysis was performed to isolate and identify the ways in which children engaged their peers with respect to the teaching of a board game. A conversational turn level analysis was instituted to highlight the contributions made by each partner to the evolution of the expert and novice roles that they separately assumed. The naturalistic context within which these roles were performed more closely reflected the kinds of interactions that children spontaneously have with their peers and, as a result, provided a more sensitive context for capturing the dynamism inherent in dyadic interactions.

As transactional theories of development suggest, the interactions between teachers and students evolve from unrehearsed to more choreographed modes of engagement. As teachers develop their skills they are better able not only to provide information as they deem fit but are also better able to assess the instructional needs of those they are responsible for teaching (Ellis & Gauvain, 1992).

Given that the relationship between teachers and students is dynamic, what factors impact upon a teacher's ability to effectively engage his or her students? As has been suggested by Rogoff (1986), discussions of dyadic interactions must take into account the characteristics of the individuals taking part in the interaction "such as age, expertise, or the status of the developing learner or of the partner, or the kind of technique used by the partner in influencing the learner" (p. 54). For example, counter to the findings of Ellis

and Gauvain (1988), girls in this study provided more explanation to their peers than boys. An acknowledgement of each of these characteristics highlights the complexity inherent in dyadic interactions. As a means of clarity, significant findings will be discussed with respect to the research questions previously presented.

What Are the Kinds of Strategies That Children Use to Provide Information to and Gain Information from Their Peers?

How Kinds Of Talk Reflect Roles Played

The children participating in the dyad were responsible for performing different roles, and these differences were evident in the conversational turns that they generated. Given that the primary responsibility of the expert was to serve as teacher, it was expected that, in comparison to novices, he or she would generate a significantly greater proportion of conversational turns that reflect instructional properties. Consistent with this expectation is the finding that experts generated greater numbers of conversational turns coded as instruction, explanation, and directive. In turn, consistent with the role of learner, novices generated greater proportions of conversational turns that reflected inquiry and attempts at understanding; turns such as requests, elucidations, and enactment.

As part of their role as teacher, experts also were responsible for directing the dyadic activity. That is, in order for experts to effectively teach their novice partners, they had to regulate both the quality and quantity of the information presented to the novice. Consequently they were expected to display a greater proportion of conversational turns reflecting regulatory properties than novices. The findings confirmed this. Experts generated a significantly greater proportion of their conversational turns coded as regulation than novices.

Productive versus Unproductive Teaching and Learning Strategies

If we accept the position that a child's development is influenced by his or her opportunities to engage in activities deemed culturally relevant, then we must conclude that the lack of such opportunities would negatively impact upon the child's ability to perform these roles. From this perspective it would be expected that younger children would engage their peers in less productive ways than older children. This, however, presupposes that criteria for judging productive means of engagement exist.

One way of evaluating the productivity of engagements is by determining which strategies proved more generative, that is, which methods of providing information led to further inquiry and, therefore, further presentation of information. Such issues can be addressed through a sequential analysis of the discourse produced by the dyads.

Sequences of conversational turns reflected the use of both instructional and power maintenance strategies. While certain kinds of talk on the part of experts' resulted in further inquiry or acceptance on the part of novices, other kinds of talk resulted in the maintenance of the power discrepancy that existed between experts and novices. For example, expert-generated instructions and explanations often were responded to by novices with further requests for information, the acceptance of the idea being presented, or by the restatement of the idea as a means of clarity. In essence, these instructional methods can be considered generative because they serve as the starting point from which the presentation of further information is based. In contrast, conversational turns such as directives and regulations are used to control and not to inform. This was evident in the finding that conversational turns such as directive and regulation on the part of experts were responded to by novices solely with enactment or acceptance.

If the conversational turns of the novice serve as the point of reference, a similar pattern emerges. Conversational turns of talk on the part of novices that served to gain information, such as requests, elicitations, and elucidations were responded to by experts with explanation. Thus, inquiry yielded greater information. Challenges to power on the part of novices, such as regulations and rejections, resulted in either acceptance or further rejection. It is evident, therefore, as Cazden (1988) suggests that two distinct strategies are operating simultaneously- one to provide game related information and the other to maintain roles. Given that turns of talk could be used to both inform and control, one possible question is whether certain kinds of talk are associated with certain ages.

An additional finding regarding the instructional nature of the conversational turn sequences is that the use of these generative instructional strategies differed as a function of age. Expert initiated instruction - request and explanation - request sequences, while not significantly occurring among first graders, occurred with significance among third and fifth grade dyads. This suggests that older children engaged in talk that yielded further inquiry at a rate greater than that of younger children.

With regard to the use of power maintenance strategies, it was found that novice initiated rejection - rejection sequences occurred among first and third graders but not fifth graders. In other words, rejection on the part of novices led significantly to rejection on the part of experts for younger children but not for older children. Given that rejection on the part of novices to the ideas expressed by the experts served as a means of challenging the position of power that the expert held within the dyad, this finding suggests that challenges to power in this form occurred with greater frequency among younger versus older children.

Teaching Strategies Reflect Prior Experiences

While students, even as early as the first grade, have had ample experience assuming the role of learner, their opportunities to act in the role of teacher may be quite varied and limited. As a result, the quality of their prior experiences, those shaping the way that they spontaneously engage their peers, pale in comparison to their "learner" experiences.

As has been discussed, the children serving as experts in this study were in the position of having to teach a game that they had jointly created with a partner to a new peer. One question may be what part did this expert play in the original co-construction of the game that he or she was now responsible for teaching and how did this influence his or her use of instructional strategies?

Children, in the role of expert, who originally participated in dyads where they and their partners had contributed equally to the construction of the game they were then responsible for teaching used significantly fewer directives than children who either dominated or were dominated by their partners during the original game co-construction. It appears, therefore, that in interactions where power became salient, due to its uneven distribution, directives provided a critical regulatory function. As a result, experts who had either been dominated by a partner or who dominated a partner used talk that reflected their heightened sensitivity to establishing and maintaining control over the activity that they were responsible for directing.

Directives serve as the instructional method that provides the least amount of task-related information. Directives provide instruction without explanation and, therefore, provide limited instructional power ("Move here," vs. "When we get to the red we move

two spaces"). While differences in experts' use of directives was not related to differences in their grade or gender, differences in the occurrence of directives was related to differences in the expert's contribution to the game that he or she was responsible for teaching. Directives may also serve the function of maintaining or challenging power. While directives serve a limited role in providing information, they play a more significant role in maintaining the location of power. Therefore, for experts, directives serve to direct the activity not so much in terms of providing task-relevant information, but in terms of maintaining control of the activity.

How Do the Roles of the Experts and Novices Change as a Function of Age, and Ability to Coordinate Self-Other Perspectives?

The Impact of Age

As has been discussed, the dyadic interaction was analyzed via a coding system designed to capture the kinds of conversation generated regarding the teaching and learning of a game. The purpose of this was to investigate: 1) methods used by children to instruct their same-aged peers, 2) methods used to gain information from their peers, and 3) methods used to maintain a position of power with respect to their peers. It was hypothesized that differences in the occurrences of conversational turn codes that reflect instruction (via instructions, shaping, and explanations on the part of experts), inquiry (via requests, elicitations, and elucidations on the part of novices), and power maintenance (via regulations and directives on the part of experts and rejections, regulations and directives on the part of novices) would be related to differences in age and in the ability to coordinate self-other perspectives.

While no significant findings associated with the ability to coordinate self-other perspectives were obtained, two interesting findings regarding both inquiry and control are worth noting. First graders generated a significantly greater proportion of conversational turns coded as elicitation and regulation than third graders. First graders also had a significantly greater proportion of conversational turns coded as elicitation than fifth graders.

Elicitations

In the present study, the term elicitation referred to the seeking of information regarding the use and/or allocation of game-related materials. If a child asked his or her partner, "Which piece would you like to be?" this turn of talk was coded as an elicitation. Given that the child was soliciting information from a partner, it would appear, at first glance, that the partner, the one from whom information was sought, was in control of the activity. However, a more careful inspection of the conversation indicated that elicitations served as an attempt to gain power from a partner. The partner who posed questions regarding the use and allocation of materials was, in essence, moving the activity forward. In many instances the partner whose talk was coded as elicitation was in physical possession of the materials in question. In other words, when children posed questions of their partners regarding what piece they wanted to be, they often held pieces in hand simultaneously or handed the piece in question to their partner upon their partners reply to the elicitation. As a result, elicitations signaled not only a need for vital game-related information, but a negotiation of power as well.

Regulation

The term regulation referred to a statement regarding the appropriateness of a partner's method of play. It served not only as a challenge to a partner's task-related expertise but a challenge to the location of power as well. A child must know the rules well enough to know when they have been broken because the competitive context demands not only proficiency but superiority. It is not simply that a child must learn the rules of a game but, rather, that the child learns them well enough to know when their partner is violating them, either intentionally or unintentionally. Regulations, therefore, served not only as a mechanism for negotiating the location of power but also as a mechanism for the deployment of task-related information. As a result, the display of knowledge was the display of power.

The higher proportion of conversational turns coded as regulation and elicitation among first graders suggests that for first graders, the role of expert was less clearly defined as negotiations of power became more salient than instruction or inquiry. This was further supported by the finding that challenges to expertise (in the form of contributions) were met with regulations or rejections. Several issues, however, must still be addressed in an effort to gain further clarity.

I overheard a mother and her child on the train and found their interaction to be quite informative. The child, apparently her daughter, attempted to pick up a small plastic wrapper from the floor of the train. The mother instructed her child not to pick it up. "Don't pick that up because it's dirty", she said. The young girl attempted to pick up the wrapper and again her mother warned, "Don't pick that up because it's dirty". The child again reached down to grab the wrapper on the floor. "Don't pick it up, I said", her mother responded with a decidedly more angry tone. As her daughter reached to touch

the wrapper, her mother responded, "Go ahead and pick it up. Go ahead." Her daughter backed away from the wrapper and sat in her seat.

This example illustrates how language can sometimes have a meaning inherently different from how an "outsider" perceives it. I as an "outsider", standing outside of the "culture" within which the language between mother and daughter operated, heard the mother saying one thing- "Go ahead and pick it up", but observed her daughter respond as if she heard "Pick it up and you'll face the consequences". The tone of her mother's voice as well as her shared history of past interactions led the daughter to conclude that "I can only push mommy so far before I push her too far". This insider-outsider perspectival discrepancy in how language operates may help to explain how language which appears to serve one function may, upon closer inspection, serve several functions.

Is There a Relationship Between the Kinds of Information Provided in the Initial Phase and the Subsequent Maintenance of Roles in Later Phases?

Phases of Interacting

The present study was not just an analysis of the ways in which children perform when placed in the roles of expert and novice, but an analysis of the ways in which the roles of expert and novice evolve through the course of expert-novice interactions. As a means of capturing the evolution of roles, interactions were divided into phases and the distribution of proportions of conversational turns were then analyzed with respect to these phases. At each phase, experts generated a greater proportion of conversational turns coded as instruction, shaping, explanation, and directive than novices. Additionally, instruction and shaping, on the part of experts, were significantly more likely to occur in phase one than phases two or three. Given that these codes primarily reflect instructional

properties, these finding highlight the teaching component inherent in the expert role and serves to situate teaching in the first phase. Consequently, at each phase, novices generated a greater proportion of conversational turns coded as request, elucidation, and enactment. Interestingly, these codes reflect three distinct characteristics of the novice role: inquiry, comprehension, and submissiveness. Since these codes are significantly novice-generated, a level of consistency across phases in the novice role is apparent. However, the use of directives, on the part of novices, was more likely to occur in phases two and three than in phase one. This indicates that as the interaction proceeds, novices attempts at controlling the activity increase. These findings, therefore, suggest that the regulatory properties of the conversations arise after the first phase. An analysis of the distribution of turns coded as acceptance further emphasizes the qualitative differences in the phases. While no significant differences were found between expert's and novice's mean proportion of turns coded as acceptance in phases two and three, significant differences existed in phase one. This finding was consistent with the characterization of the introductory phase as one in which experts primarily provided information and novices either accepted or responded with inquiries. Given that the majority of instruction takes place in the initial phase of the interaction, it would follow that differences in the proportion of acceptances would diminish during the course of the interaction.

As has been found in previous research (Daiute & Dalton, 1993), rejections are a common feature of conversations among peers and reflect "intense engagement on the part of learners" (p. 325). An interesting finding, in this study, was the lack of rejection that took place over the course of the interactions. This difference, however, may be accounted for by distinguishing between collaborative activities and expert-novice kinds of

interactions between peers. Rejecting (or contesting) the views of a partner is an integral feature of collaborative interactions (Azmitia, 1993; Bearison, 1982; Rogoff, 1997). With respect to expert-novice interactions comprised of peers, however, the findings of the present study imply that a better question may not be whether or not rejections occur but, rather, if rejections occur when do they occur. A significantly greater proportion of rejections occurred in phase three versus phases one and two. This would indicate that as these children proceeded in their interactions the interactions appeared more like collaborative interactions and less like expert - novice kinds of interactions.

Phase Characteristics

As has been discussed, children's conversations were analyzed with respect to three phases. How, then, were these phases related to the instructional, regulatory, and collaborative properties reflected in the conversations produced by the dyads?

Findings from this study indicate that the first phase of the dyadic interaction was characterized by the transfer of knowledge from the expert to the novice and was marked by such conversational turn codes as instruction, requests, and explanations. Game play, within this phase, was initiated, regulated, and directed by the expert and the novice, therefore, could be viewed as being regulated by the expert or "other-regulated". This phase was distinguished by expert-generated turns of talk characterized as instructions, explanations, and clarifications and statements by the novice characterized as requests, and elucidations.

The second phase was marked by activity of game play that proceeded in a more egalitarian manner with a more equal distribution of directive and regulatory statements. This phase was characterized by the deployment of information by the novice. Such

deployment gave rise to joint-regulation as the competitive context of the game demanded that partners not only regulate their own behavior, but the behavior of their partner if they wish to win the game. This phase was distinguished by statements by the expert characterized as directives, regulations, and enactments, and statements of the novice characterized as directives, rejections, and regulations.

The third phase was marked by the introduction of new rules and goals that were the result of the collaboration of both participants. As the roles of expert and novice became less clearly defined, the interaction evolved from one of guidance/tutoring to one of joint collaboration. As a result, talk within this phase reflected collaborative properties. This phase was distinguished by expert-generated statements characterized as rejections and contributions, and by novice-generated statements characterized as elicitation, clarification, and contribution.

Factors Influencing the Move to Collaboration

Given that the majority of dyads completed their interactions by collaborating, it was of interest to identify the factors that led to collaboration. For example, one possible question may be what kinds of talk took place in phases one or two that related to the novice's introduction of a new rule (i.e., collaboration) in phases two or three? An examination of the significant correlations indicates that the use of rejections by experts in phase one was significantly related to the introduction of new rules by novices in phase three. Expert rejections in phase one indicate an early challenge by the novice to the expertise or "power" of the expert. Collaboration in phase three, as a result of this challenge to power, indicates that the expert was unable to fend off this challenge.

The use of repetitions by experts in phase two also was significantly correlated

with contributions made by novices in phase two. This may indicate that as a result of an expert's inability to effectively provide information (resulting in an increased use of repetitions) the novice attempts to alter the activity by introducing new rules into the existing game thereby shifting the location of control.

What Are the Indices of a Shift From Other- to Self- to Joint- Regulation and How Does the Relationship Between Partners Change as a Function of Phase?

A critical finding was that the ways by which children engaged their peers in expert - novice kinds of interactions reflected qualitatively different properties (e.g. instructional, regulatory, and collaborative). A closer look at each of these interactive properties is possible by examining streams of conversation that will illustrate the components that comprise each property. In the following verbatim examples, child A serves as expert and child B as novice. Each conversational turn is followed (in italics) by its conversational turn code. Two first grade boys begin their interaction in this way.

A: One (small robot) goes here (in the center of the board), then you put this (a second small robot) here (also in the center). *(instruction)*

B: So this (robot) is one player and that's (robot) the other? *(elucidation)*

A: Yeah *(acceptance)*

B: So you have to spin this (spinner)? *(elucidation)*

A: No you don't. That's not the way you do it. *(regulation)*

B: Ok *(acceptance)*

A: You use these (dice) *(explanation)*

Two first grade girls begin their game in a similar manner.

A: You need this (spinner) and whatever color you get, you move to the closest one

(color on the board that matches the one that the spinner stopped on). *(instruction)*

B: You mean you have to go all the way around (the board) and whoever gets back to the yellow spot (spot in the center of the board from where both players begin their game play) wins? *(elucidation)*

A: The other spot (silver) first wins (game play begins from the yellow spot in the center of the board and ends when player lands on the silver spot also in the center of the board). *(shaping)*

B: Ok, I'll spin first (spins the spinner, a disc-shaped object divided into six pieces of similar size but different color. A small pencil-like obeject is attatched to the disc at its center. The object is spun to indicate what color on the board the player should move to) *(acceptance)*

A: It landed on yellow so you move to the closest yellow. *(instruction)*

B: Ok. *(acceptance)*

The essential component of the instructional property is the presentation of information on the part of experts and attempts at gaining further information on the part of novices. In both examples, Child A begins by providing information about the game in the form of an instruction. Child B immediately responds by attempting to restate the information as a means of establishing an understanding of the game rule (coded as an elucidation). Child A then responds by either affirming B's position (as in the first example) or providing further information regarding the game rules (coded as shaping in the second example).

Findings of the factor analysis of expert- and novice-generated conversational turns indicated that while instruction and explanation on the part of experts and requests

and elucidations on the part of novices were highly associated with the factor referred to as instruction, rejection and regulation on the part of novices were not. This indicates that the instructional properties of the discourse reflect unchallenged game-related expertise on the part of the experts. While the novice may pose questions to the expert regarding the manner in which certain rules should operate, no disputes regarding the rules ("I don't wanna do it like that") or challenges to the view of the expert as the director of the activity ("We'll do it my way instead of your way") occur.

To regulate is to direct, manage, or control according to certain rules or principles. As a result, the regulatory properties evident in the conversations regarding the playing of a game reflect not simply disagreements but ruled-based objections. Such rule-based objections, whether made by the expert or the novice, reflect both control and understanding. When experts regulate the behavior of novices, they not only disagree with the novices' method of play but they provide additional instruction regarding the appropriateness of game play. When novices regulate the behavior of experts they are displaying their understanding of game rules while challenging the control that the expert has over the activity.

The following example illustrates these regulatory properties in the conversation of two fifth grade boys.

A: You have to go around the board. Going on each thing (colored space). You can go right there (space near the center of the board). *(instruction)*

B: But I don't wanna do it that way. *(rejection)*

A: I know, but you only do it when you go back (return to the center of the board). 'Cause the green's here (green space is between center space and the space B is currently

on). You can't skip this (green space) and go directly to that (center space). *(regulation)*

B: So I can go here, right? *(elucidation)*

A: Yeah. *(acceptance)*

Child A began by providing information regarding game play. Child B responded with an implied disagreement that was justified by his statement of how a certain rule should operate, essentially saying, "I don't agree with what you said. The rules state that I can take this action (get the pig)." Child A then regulated Child B's behavior by providing a rule-based objection that took into account Child B's point ("I know...") but provided information regarding how the rules should operate.

Regulatory statements on the part of novices imply a challenge to expertise. This can be seen in the following conversation between two third grade boys.

A: (Spins the spinner) It landed on the line (black line between colors) so I go again. *(instruction)*

B: You cheated! You're not supposed to do that. You lose a turn. *(regulation)*

A: It was on the line. *(repetition)*

B: The rule is that you lose a turn. *(repetition)*

A: Alright, it's your go. *(acceptance)*

In this example, Child B (the novice) responded to the expert's method of play with disagreement ("You cheated!"). The novice justified his disagreement by restating the appropriate way that this situation (landing on the line) is to be rectified ("You lose a turn"). When the expert continued his objection, the novice once again regulated the expert by restating the rule. The expert subsequently acquiesced.

As a result, regulation implies understanding. While the games and conversations

regarding them may differ considerably, the context within which they take place is essentially the same. The competitive nature of the activity requires that both partners understand the rules of the game well enough to know when they have been violated.

The collaborative properties of the conversation reflect the novices introduction of new rules into the existing game. Since the role of the expert was to teach a game that he or she had previously constructed to the novice, the introduction of new information on the part of the novice indicated not only a displeasure with the preexisting game but a shifting of the location of control over the activity. One way that the expert maintains his or her position of power over the activity is by serving as the source of game-related information. Questions regarding the rules or goals of the game are addressed to the expert by the novice with the expectation that they will be answered. If the novice views the expert as not being able to answer these question, then the novice inevitably views the expert as less "expert-like" and a shift in power is precipitated. The following examples illustrate how this shift of power evolves. In the first example, a conversation between two third grade girls, the girl in the role of novice poses a question to the expert that the expert in turn cannot answer.

B: You never told me how the game ends. How does it end? *(request)*

A: I don't know *(explanation)*

B: What? *(remarks)*

A: I don't know! *(repetition)*

Later in the same interaction it is clear that the position of power has shifted and the child directing the activity is no longer the expert, as evidenced by the following exchange.

B: If you get gold (land on the gold space) you have to give back all the chips (pieces symbolizing money). *(instruction)*

A: Ok. *(acceptance)*

B: Brown is give back all of your chips and gold is take all the chips. And then you can get them back. *(instruction)*

A: Yeah, if you go on brown. *(elucidation)*

B: Take one chip if you go on brown, if you go on yellow you lose all your chips and if you go on gold you take the chip. *(instruction)*

A: All the chips *(regulation)*

B: No, one chip. *(regulation)*

A: All *(repetition)*

B: No *(rejection)*

A: Ok, one. *(acceptance)*

By the end of this exchange, the expert acquiesced to the novice's demands and the novice was clearly the director of game play. The dramatic shift in the location of power appears to be the result of the expert's inability to answer a question regarding a fundamental feature of game play- how the activity ends. If the child responsible for teaching the game cannot explain basic and fundamental procedures of game play, then his or her role as expert is questioned.

Conclusion

How, then, do the findings of this study relate to previous work in the field regarding dyadic interactions between peers? Piaget believed that interactions between child peers were more valuable than those between adults and children because of the

inherent discrepancies in authority that exist between adults and children (Piaget, 1934). Since discrepancies in authority, or power, are less salient, children are afforded the opportunities to fully explore the discrepancies between their and their peer's perspective and, thereby, achieve equilibrium in their thinking. In contrast, Vygotsky viewed discrepancies as an essential component of the zone of proximal development (Vygotsky, 1962). Such discrepancies, however, should be in terms of knowledge rather than power.

At the surface, therefore, the paradigm employed in this study appears to capture the perspectives of both theorists. From a Piagetian perspective, the participation of child peers is ideal while from a Vygotskian perspective the characteristic that differentiates these peers is their activity-related knowledge. What is evident from this study, however, is that knowledge and power are not mutually exclusive categories. Further, it is evident that when investigating peers within this context, game-related knowledge is the foundation of the power discrepancies that exist between experts and novices.

The expert and novice roles assigned to the children reflect, in some ways, the relationship that exists between teachers and students. The typical teacher–student relationship, however, is characterized by age disparities that help to enhance the maintenance of roles. Piaget suggests that when children interact with adults, they are likely to simply concede to the more well formed ideas of adults. The ability to maintain roles, therefore, in traditional teacher-student relationships is enhanced by both age and knowledge discrepancies.

Findings of the present study suggest that the simultaneous responsibilities of teaching and managing interpersonal roles that teachers encounter, as discussed by Cazden (1988), are quite difficult for young children to fulfill. Additionally, these findings indicate

that, for young children, one responsibility takes precedence over the other during the first phase of their interaction. For example, first grader experts appear to focus more of their talk on the management of interpersonal roles in the first phase while fifth graders focus more of their talk on the teaching aspects of their role.

The relationship that exists between one who is skilled and one who is an apprentice is characterized by a gradual exchange of knowledge that results in the apprentice becoming one who is skilled. That which was initially defined by skill discrepancies is then defined by similarities in skill. In this way, a relationship between a teacher and a learner transforms into one between collaborators.

Interactions within the zone of proximal development result in the transformation of an individual from one whose learning is regulated by another to one whose learning is regulated by oneself (Rogoff, 1997; Vygotsky, 1962; Wertsch, 1984). In this way, the point of reference is always an individual's development within the context of others who help to influence that development. This research investigates the development of two individuals within a context that helps to shape their development simultaneously. In this way, individual development is marked by a transformation of roles from those defined as expert-novice to those reflecting collaboration.

Collaboration is generally viewed as being the result of the sharing of knowledge that is marked by a more egalitarian form of discourse than that which occurs between teachers and learners (Piaget, 1934). The essential element, therefore, is that knowledge be shared prior to collaboration. Collaboration, however, can be the result of both productive engagement (via the sharing of knowledge) and unproductive engagement (via the dispute of power). While the goal of teacher-learner or expert-novice kinds of

interactions is to establish shared knowledge, this can only be accomplished through the initial maintenance of roles.

Within the context of this study, game-related knowledge initially resided within the expert. That knowledge was then presented to the novice who then internalized and subsequently deployed it. Given the competitive context of the game, the relevance of knowledge gained was immediately realized. Novices had to learn the game as well as experts did because if they did not they would not know when rule violations occurred and would, therefore, be at a competitive disadvantage. In order to acquire the necessary game-related knowledge, novices had to allow experts to be experts. This is, novices had to allow experts to perform their instructional role. Role maintenance was particularly essential in the first phase because this phase was associated with instruction.

In the same manner that experts were faced with the dual roles of instructor and activity director, novices were faced with the roles of learner and competitor. When learners transformed into competitors, collaboration was the result of shared knowledge. When power assertion took precedence over inquiry, collaboration also occurred. In these instances, however, collaboration was not the result of knowledge equity but the result of the relinquishing of power on the part of experts.

As a result, while collaboration is generally viewed as the result of successful interactions between teachers and learners marked by the sharing of knowledge, collaboration can also be the result of an inability to successfully maintain interpersonal roles. With the current acceptance of cooperative learning and peer tutoring as techniques for enhancing children's classroom-based learning (Rogoff, 1997), the practical relevance of this study is magnified. While few contest the value of such techniques the ways in

which children engage their peers in this manner has been inadequately explored. If the technique employed is cooperative learning, an emphasis on power maintenance is not essential, but if the technique employed is characterized as peer tutoring, it is essential that children be skilled in maintaining their expert "teacher" and novice "learner" roles. Furthermore, this research suggests that the sharing of knowledge between teachers and students or between peers (via peer tutoring) results in cooperative learning. By exploring the strategies that children use both to provide information to and gain information from their peers in settings that reflect the ways in which they more naturally engage their peers, we are better able to enhance the learning that can be acquired via these techniques.

IMPLICATIONS FOR FURTHER RESEARCH

The purpose of this study was to investigate: 1) the methods used by children to instruct their same-aged peers, 2) the methods used to gain information from their peers, and 3) the methods used to maintain a position of power with respect to their peers. With any system of coding that relies solely on language, certain limitations arise. Some researchers (Church & Goldin-Meadow, 1986; Garber, et al, 1998) suggest that when attempting to capture instructional interactions in particular, a reliance solely on verbal exchanges results in a limited picture of instructional exchanges. These researchers suggest, therefore, that an important component required when attempting to capture the nuances associated with instructional interactions is the impact of gestures as a communicative tool.

As has been alluded to previously, turns of talk were often accompanied by gestures or physical manipulations of materials that provided a clearer picture of the strategies used by children to both provide information to and gain information from a peer. While these gestures and physical manipulations were in some ways captured through the coding system utilized in this study (as in the criteria for coding disagreements) in many ways gestural communication was not adequately accounted for within the coding system employed. Given that strategies imply a preferred method of engagement, it is possible that some children prefer gestures to verbal communication for a myriad of reasons such as language deficiencies or lack of language proficiency. As a result, as a means of more closely capturing the role of gesture in communicating both teaching and learning strategies may help to further reflect the more natural ways in which children engage their peers and further enhance what can be learned through an analysis of

children's teaching and learning strategies.

A further limitation of this research is the structure imposed by the paradigm. While the paradigm used in this study reflected the more natural ways in which children spontaneously engaged their peers the paradigm was still artificially structured. The expert role was assigned to students, thereby establishing a discrepancy in power at the onset of the activity. Structured in this way, the goal of the research was to investigate the manner in which these roles changed across phases of interaction. Some suggest, however, that spontaneous and unstructured conversation is marked by shifts in topic that are linked to shifts in the location of expertise. As a result, changes in expertise would not be investigated by phases, comprised of several turns of talk, but rather by changes in the topic of conversation, which may be comprised of only a single turn of talk. If the kinds of talk that children use when instructing their peers in informal settings is similar in form to their spontaneous and unstructured conversations, an acknowledgement of such topic-based expertise may provide greater accuracy in characterizing both the expert and novice roles.

The challenge of future research, therefore, is to better capture the means by which individuals communicate knowledge and establish relationships with respect to others. The simultaneous implementation of multiple coding systems may serve as a means of capturing and interpreting the ambiguities inherent in interpersonal interactions. Such approaches, while initially providing greater complexity, will ultimately result in greater understanding and clarity.

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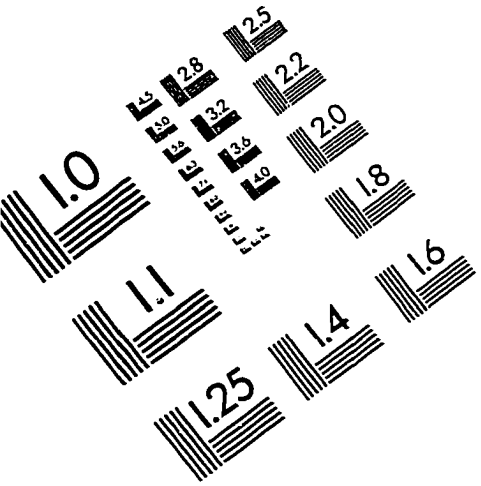
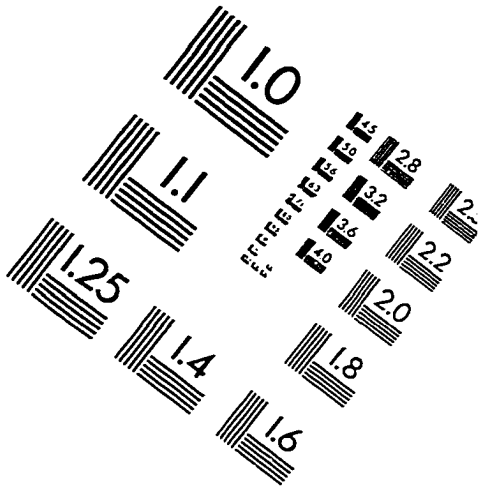
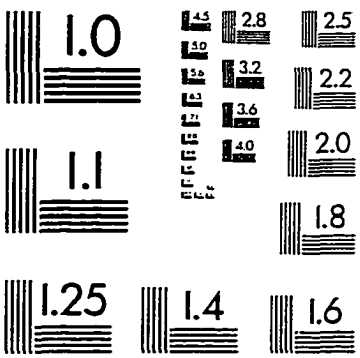
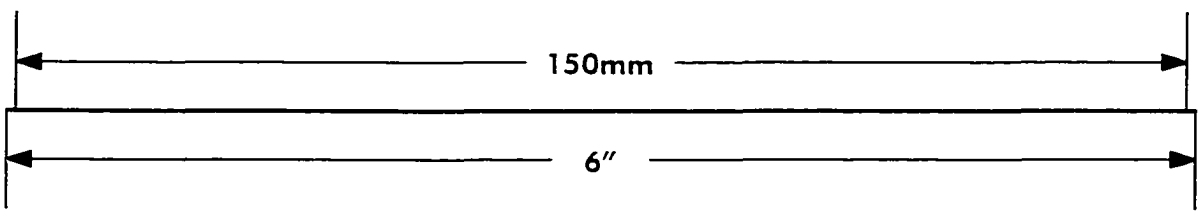
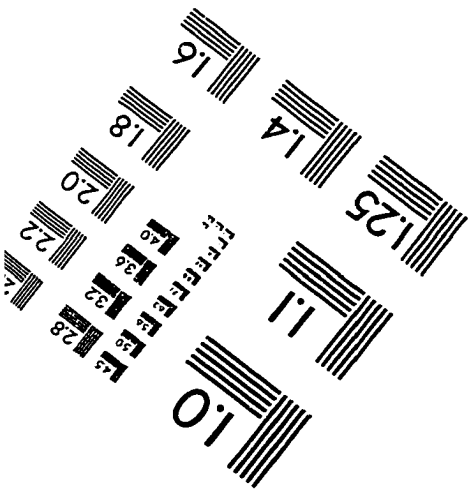
IMAGE EVALUATION TEST TARGET (QA-3)

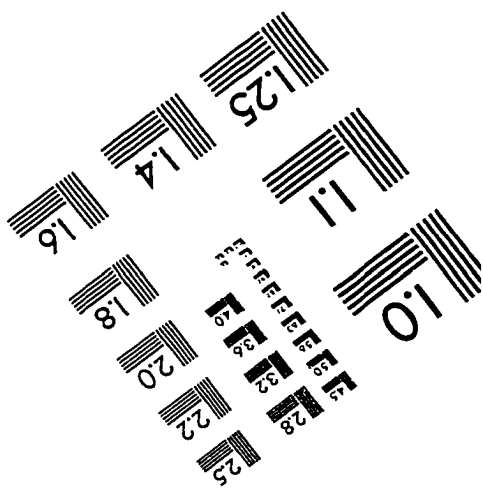












APPLIED IMAGE, Inc
1653 East Main Street
Rochester, NY 14609 USA
Phone: 716/482-0300
Fax: 716/288-5989