PLAY AS THE ZONE OF PROXIMAL DEVELOPMENT:

COLLABORATIVE CONSTRUCTIVE BLOCK PLAY

By

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(ABSTRACT)

Based on Vygotsky's theoretical construct that play creates the zone of proximal development, this study was designed to examine the processes and outcomes involved in collaboration among dyads of 4-year-olds (matched for equal and unequal levels of play) in the context of constructive play with blocks. During the first phase of data collection, 100 4-year-olds were observed in naturalistic settings using the Play Observation Scale (Rubin, 1989). Play level, gender, and unfamiliarity were used to select 48 children to play with a peer in a laboratory setting. Play sessions were videotaped and coded for block play (Reifel & Greenfield, 1982), peer interaction (Rubin, 1989), and communication (Farver, 1992). Results of an overall multivariate analysis of variance (MANOVA) conducted for boys and girls found a significant interaction between treatment (play level) and gender. A follow-up MANOVA for girls was also significant. Subsequent univariate tests found significant differences in block play complexity.
of girls in treatment groups. A separate pairwise MANOVA found that less-skilled girls engage in more-complex play when paired with more-skilled peers. Block play complexity and communication contributed to the differences among the groups. Results of a second pairwise MANOVA established that more-skilled girls display less-complex play behavior during play with less-skilled playmates. When considered separately, none of the dependent variables were responsible for the variance. Rather, all three contributed simultaneously to the significant overall multivariate. For boys, an overall multivariate analysis of variance was conducted but was not statistically significant. Boys do not alter their play during play with other four-year-old boys who display different levels of play complexity. Based on these findings, play actualizes the zone of proximal development for girls, not boys. Additional scholarship is needed in this area.
Dedicated to
my loving husband
Roger
and
our dear son
James
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CHAPTER I

INTRODUCTION

The concept that children learn from others, either with adult assistance or with the help of a more competent peer, is basic to Vygotsky's theory (Vygotsky, 1930/1978). This is reflected in his construct of the zone of proximal development (ZPD) which Vygotsky defined as the distance between what a child can do unassisted and what a child can do with the assistance of an adult or more competent peer (Vygotsky, 1930/1978). The zone of proximal development is created during instruction or play when knowledge is first constructed on a social plane (interpsychological) and then internalized or "appropriated" on an individual level (intrapsychological) (Moll, 1994; van Geert, 1994; Vygotsky, 1930/1978). Play, as the zone of proximal development, creates a situation in which, "the child always behaves beyond his [sic] average age, above his [sic] daily behavior; in play it as though he [sic] were a head taller than himself [sic]" (p.102). If play creates the zone of proximal development and more capable peers serve as mediators in assisting performance; then, observations of peer collaboration among children of different levels should provide a unique vantage point for viewing the relationship
Play as the Zone of Proximal Development

between social context and cognitive development. Further, understanding the role of more skilled peers during play is essential for understanding how individuals develop higher level thinking skills.

Few Vygotskian-based studies have examined interactions among peers in the context of play. The focus has been on adult/child interactions during problem solving or play activities (Fiese, 1990; Wertsch, Minick, & Arms, 1984; Wood, Bruner, & Ross, 1976). Studies of adult/child interaction during play provided support for Vygotsky's contention that more competent others have a facilitating effect on cognitive development during play (Ellis & Rogoff, 1982; Fiese, 1990; Radziszewska & Rogoff, 1988, 1991; Rogoff, 1990). However, few studies examined cognitive consequences of social interactions among children during play, and even fewer documented interaction among peers who display different play levels. One study was completed by Howes and Farver (1987) who observed changes in structural levels of representation (that is, social pretense, among dyads). Vygotsky, however, focused on the interactive processes involved in socially transmitting information. Consequently, there is a need for studies that examine the dynamic processes of peer collaboration during play.

Past studies of play have typically focused on symbolic play during sociodramatic play (Howes, 1985; Howes, Unger, &
Matheson, 1992). Few studies have examined specifically the processes of constructive play with blocks (Christie & Johnson, 1987; Reifel & Yeatman, 1991). This study was designed to fill this void by examining the processes of collaboration or co-construction that occur among preschool peers within the context of constructive play with blocks. Further, it will begin to address the question, do four-year-olds play differently with peers who display varying levels of play behaviors.
CHAPTER II

REVIEW OF LITERATURE

Vygotsky's theory, which provides the conceptual framework for this study, will be explored in the first section of this review. Empirical studies that examine social interactions of peers, play, and peer play in the context of constructive play will then be discussed. Finally, a critical synthesis of the literature will provide support for the question and hypotheses of the study.

Vygotsky's Sociocultural Theory

At the core of Vygotsky's theory is the notion that there is a dynamic, interactive relationship between the social world and developing mental processes (Bidel, 1988; Vygotsky, 1930/1978, 1930/1988). For Vygotsky, social influences play a major part in development itself and social relations or interactions among people form the basis for higher level mental functions. Major components of his thesis include (a) internalization, (b) mediation, and (c) the zone of proximal development (Moll, 1994; Wertsch, 1991). These components and the interrelationship among these are discussed in the section that follows.

Internalization

Internalization occurs when knowledge construction
moves from a social level (interpsychological plane) to an individual level (intrapsychological plane), that is, from a state of knowing with the assistance of others to a state of knowing for oneself. The idea that mental growth occurs as a result of social interactions without simultaneous physiological or biological changes forms the nucleus of Vygotsky's theory (1930/1978, 1934/1990). His view of higher level thinking was influenced by both Marx and Kohler (Wertsch, 1991) and was discussed by Moll (1994) in the following statement.

... only human beings qua species have the capacity to operate with sophisticated linguistic signs (speech) in memory, voluntary attention, and other psychological functions. Even the sophisticated chimpanzee is naturally (that is, materially) distinct from humans in 'the independence of [its] ...actions from speech.' (p. 340)

Vygotsky believed that higher level thinking skills allow individuals to use abstract or decontextualized reasoning processes of self-questioning, recall, reflection, planning, and remembering. He distinguished four criteria in differentiating lower and higher level thinking. These include (a) voluntary self-regulation, (b) conscious
realization, (c) social origins of higher level cognitive
abilities, and (d) use of signs for mediation (Vygotsky,

He maintained that the development of higher level
skills radically changes the psychological functioning of
the child and evolves from social processes with more
capable peers or adults (Stremmel & Fu, 1993; Vygotsky,
that the mechanism of individual change is rooted in culture
and culture is ultimately the product of social activity
(Vygotsky, 1934/1991; Wertsch, 1979; Wertsch & Tulviste,
1992). Understanding these changes requires an examination
of interactions or processes. For this reason, interaction
is not only the focus but also the unit of analysis in
Vygotskian based research studies.

**Mediation**

Mediation is the second component of Vygotsky's
sociocultural theory and is considered essential for
internalization. Higher level mental functioning is
"mediated" by tools and signs (Vygotsky, 1930/1978,
1930/1988). Through mediation, changes in higher level
thinking skills occur as the individual is assisted (through
the use of technical and psychological tools) in moving
through the process of internalization. Gal'perin (1977)
maintained that internalization occurs in three stages: (a) awareness and observation of the action, (b) movement from an interpsychological plane to an intrapsychological plane, and (c) inner understanding of the event. Mediation has the potential to affect internalization. The value of mediation was observed by the author in a primary school that was converting to computer assisted instruction (CAI). Adults typically read manuals and worked on class assignments on their own while the children played computer games with each other. Adults who wanted to use the library system would read the directions and attempt to follow them. If they became frustrated, they would stop and state that they would return later when they had more time. Children would typically go to the library terminal in groups and assist each other in getting on-line. At the end of the first year, many of the adults indicated that they were frustrated and would never use the library computer system to find materials. The children, however, were computer literate—using the computer to check out library books, write books, and complete research reports. In this setting, adults attempted to learn by using the manual as a tool for mediation. For some, this was successful. For others, it was not. Children used other children as mediators with more capable peers providing assistive scaffolding. In this setting, interactions with other children in the context of
play provided more effective mediation than individualized self-paced instruction. Conversations between children (semiotic mediation) served as a psychological tool to mediate activity. Although this was an informal observation, it illustrates the value of mediation. Investigating the role of mediation in the process of internalization is crucial for understanding how children think and learn.

**Zone of Proximal Development**

The zone of proximal development is the third major component of his theory and combines internalization with mediation. The child who is in the zone is assisted (through the use of language and other communicative strategies) in moving from a state of knowing with the assistance of others to a state of knowing for oneself (internalization) (Vygotsky, 1930/1978). This occurs during instruction or play. During play, children enter an "...imaginary, illusory world" in which they can achieve with assistance what they can not master alone (Vygotsky, 1930/1978, p. 93). Peers who create the zone during play scaffold their playmates to a higher level of cognition. In the computer scenario described in the previous passage, children created the zone during interactions with each other. When they reached a point of not knowing what to do,
they typically found another more-capable peer to answer their questions, thus creating new zones. When adults reached this point, however, they ended the session, thereby ending the zone. Examination of the processes of mediation and internalization within the zone of proximal development provides insight into how individuals think and learn and will be discussed in the context of peer play in the next section.

**The Context of Peer Play**

**Peers**

From a sociocultural perspective, knowledge is transmitted socially in the zone of proximal development. Understanding how peers use language to mediate mental functioning and action is crucial for understanding development. Therefore, the role of the peer as mediator will be examined in this section.

**Peer interactions.** Vygotsky's notion regarding the dynamic relationship between the social world and the developing individual has implications for examining the process of peer interaction. Past studies of interactions among peers did not typically focus on the relationship between peer interaction and cognitive development. (See Hartup, 1983, and Ladd & Coleman, 1993, for a full review). Rather, early scholars of peer interaction focused on
sociometry and social interaction (Goodenough, 1928; Moreno, 1934; Thomas, 1929). This trend influenced studies of peer interaction throughout this century.

With the popularity of Piaget's theory, the focus moved from an examination of group processes to an emphasis on the individual's construction of knowledge during peer cooperation. Using this perspective, scholars viewed the social domain as a setting for cognitive development. Piagetians and neo-Piagetians believed that peer collaboration augments movement from non-rational to rational thought, thus, Piagetians and neo-Piagetians considered peer interaction, which involves cognitive conflict, essential for intellectual development. (Murray, 1982). Early Piagetian findings indicated that the benefits of peer interaction were optimal for children in the concrete operation stage. In his later work, Piaget maintained that young children benefit from peer interaction (Donaldson, 1978; Piaget, 1962b). Even though he acknowledged the value of peer interaction, scholars either directly or indirectly influenced by Piaget continued to focus on peer interaction among school-age children rather than preschool children (Perret-Clermont, 1980). These factors influenced scholars throughout the seventies and eighties and led to the sparse number of studies on peer interaction among preschool children.
Peers as mediators. Studies of peer interaction among older children found that peers serve as mediators for cognitive development (Bruner, 1974; Fiese, 1990; Rogoff, Ellis, & Gardner, 1984; Tharp & Gallimore, 1988; Wertsch, 1979; Wood, Bruner, & Ross, 1976). Azmitia (1988) found that preschool children could also benefit from peer collaboration during problem solving activities and that this behavior was generalizable to other problems in different contextual settings.

Recent empirical studies by Rogoff (1990), Tudge (1992), and Foreman and McPhail (1993) have examined the relationship between mediation and higher level thinking skills in a sociocultural framework. Rogoff (1990, 1993) examined assisted learning and the movement of knowledge from an interpsychological to an intrapsychological plane. In one study (1990), she investigated the effects of mediation on cognitive development and found that, in both Mayan and American communities', adults provide assistance to children as they problem solve. Later, she compared adult/child interactions with child/child interactions. Adults were able to assist children by using strategies that were much more beneficial than those used by more capable peers during problem-solving activities. The adult was also capable of altering strategies so that the child could achieve success. Not only did Rogoff validate the concept
of assisted performance in the zone of proximal development, she also differentiated between variations in the strategies used in successful mediation.

To understand more clearly the effects of peer collaboration on cognitive development, Tudge (1992) investigated both the processes and outcomes of interactions. Using Vygotsky's theory as a basis for examining the relationship between social interactions and higher level thinking skills, he studied the effects of mediation on movement within the zone of proximal development. In one study (1992), he examined a sample of 162 children whose ages ranged from 5- to 9-year-olds. He used a pretest, treatment, posttest design to examine children's problem-solving skills on a mathematical balance beam task designed by Siegler (1981). During the pretest, children were tested individually to assess their competency in the use of Siegler's rules. This task was used because the design of the balance beam required children to use different levels of ability to solve the problems. During the treatment, children of different levels of competency were randomly assigned to work together to solve a set of problems using the balance beam. The pair did not receive any adult feedback during the process. After the treatment the individuals were tested separately to determine their skill level. Results indicated that some children were, in
fact, adversely affected. Tudge (1992) found that

...children do assist each other's thinking in the course of collaborative problem solving, as predicted by both Piagetian and Vygotskian theory. However, in contradiction to the typically beneficial results reported (particularly by Piagetian scholars), these data indicate that there are circumstances in which children can adversely affect each other's thinking...the intersubjective understanding attained in the course of discussion was as likely to be in a regressive as in a progressive direction, with both regression (at least in the absence of disconfirming evidence) and development proving stable phenomena. (pp. 1376-1377)

Tudge reported that regression occurred among those children who were paired with a more confident, less competent peer. Vygotsky never alluded to bidirectional movement in his discussion of peer collaboration or cognitive development. Consequently, Tudge suggests that the current definition of the zone of proximal development does not fully explain this phenomenon. Either the conceptualization of the zone needs to be extended to incorporate bidirectional movement or another way of thinking about how social factors influence
cognitive development needs to be considered. On the basis of these studies, there is a real need to examine changes in cognitive development that result from social interactions with peers who display varying levels of cognitive ability.

The effects of sociohistorical factors on peer mediation during problem solving were investigated by Forman and McPhail (1993). In their study, two adolescents were first given several problems to solve. Afterwards, the impact of sociohistorical factors on the pretest-to-posttest changes was examined. In this way, their "...goals, attitudes, and understandings were established, negotiated, and modified before and during collaboration" (Forman & McPhail, 1993, p.225). They found that the individual history of each participant influenced how they solved problems together. Forman and McPhail purported that understanding the way in which peers achieve a shared consensus is vital for understanding how they collaborate and, in turn, is essential for understanding how higher level thinking skills develop through mediation.

Given that peer interaction facilitates cognitive development and peer competence affects interaction (Azmitia, 1988; Forman & McPhail, 1993; Perret-Clermont, 1980; Rogoff, 1990; Tudge, 1992), scholars have had a tendency to focus on outcomes, especially among older children (Forman & McPhail, 1993; Rogoff, 1990; Tudge,
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1992). A challenge must be extended to examine not only outcomes but also the processes of interactions among young children and to find alternative ways to observe developmental changes. Play among preschool children presents one possible alternative and is presented in the next section.

Play

The study of play from a sociocultural perspective provides a unique framework for examining the interaction of social context and cognitive development. This will be discussed in the section below.

**Play as the zone of proximal development.** From a sociocultural perspective, play is a social activity. For Vygotsky (1930/1978), play creates the zone of proximal development. Children who play with more capable peers are viewed as being assisted to higher levels of mental functioning. Even the child who plays alone is not engaged in a "lone venture" but is in an intrapsychological state that reflects the culture of both society and family (Bruner, 1983; Stremmel & Fu, 1993). This was observed by the author in a preschool classroom during a set of interactions between two five-year-olds who were engaged in social pretense involving a pirate theme. One child verbalized the need for a treasure map. The less-skilled
player questioned the need since they could not make a map. The more-skilled child attempted to convince the other child of the need for the treasure map and began drawing the map. Still, the other child did not understand the concept. The more capable partner walked over to a floor map of a make-believe neighborhood; showed the less skilled partner the map; and proceeded to explain how to draw a map to his house (where the treasure was buried). After the explanation, they both engaged in drawing treasure maps. After school, the less-skilled child continued to create treasure maps. Even though the child played alone, he used schemes that had been constructed in a social situation. This is typical of how children move from a state of knowing with the help of others to a state of knowing for oneself. In this way, play served as a vehicle for developing higher mental functions. When the less-skilled child drew maps alone, he demonstrated that he had internalized the process of map drawing that he had engaged in earlier with a more-skilled peer. In this way, play actualized the "zone of proximal development" (Nicolopoulou, 1993; Vygotsky, 1930/1978).

Although the study of play has a long history (See Rubin, Fein, & Vandenberg [1983] and Pellegrini & Boyd [1993] for a full review), research on play has generally been influenced by the way individual scholars view development. For example, followers of Piaget base their
studies of play on Piaget's theory of cognitive development as well as his subsequent play studies (Bretherton, 1984; Piaget, 1923/1959, 1952/1974). Piaget's focus was on objects within the social context of play and the child's interaction with physical objects in the development of higher modes of thinking. The reason the effect of social context on play has not been examined more widely is because Piaget's focus was on objects within the social context of play while Vygotsky saw children's actions on objects as beneficial but secondary to the importance of peers who mediated play through communicative interaction. For Piaget, it was the peer who was of secondary importance. Peers served only to create cognitive dissonance but were not integral to the learning process (Piaget, 1923/1959).

Those who subscribe to Erikson's (1950/1963) theory examine play from a psychosocial perspective. Through play, tensions are alleviated and reality mastered. Interpretation of the earlier scenario of pirate play from a psychosocial perspective would focus on the more-skilled child's need to draw a map of his home. Given the vastness of play research, it is, indeed, unusual that the effects of the social context on play have not been more thoroughly examined. Vygotsky's theory may provide an impetus for change.

A sociocultural perspective of play views play as a
social activity which leads development and has two defining characteristics: decontextualization and rule usage. Decontextualization occurs when the child acts independently of what he/she sees in reality. The play of the very young child is guided by the object, whereas older children are capable of transforming objects. In this way, play provides the stage for a transformation from an emphasis on the object to an emphasis on the action, thus creating the imaginary situation.

Rules also define and guide play. During play, rules are used overtly. For example, the child might say, "This [block] is the lid of the treasure chest. Don't touch it!". The use of rules by the child reflect the child's self-control. In fact, Vygotsky stated that children display the most self-control during play. That is, rules serve as boundaries for action in the imaginary play world. Examination of decontextualization and rule usage does not, however, constitute the essence of play. To understand play from a Vygotskian perspective requires an understanding of the way in which his major theoretical tenets are reflected in his view of play. Specifically, the study of play cannot be examined using reductionist techniques but must be examined as a process. This requires a focus on the interactive social processes that occur within the context of play and presents a new way of thinking about play. That
is, language and tool usage during play lead to higher level thinking and can only be facilitated by peers (objects used in play are of secondary importance). A discussion of this perspective follows.

Peer Play

Peer play will be examined in the section that follows and will be followed by an in-depth look at the effects of peer variance on play.

Peer interaction during play. The use of a sociocultural lens alters the study of peer play. A look at past studies that have used other perspectives will illustrate this point. Initial attempts to understand peer play can be traced to studies completed during the early part of this century (See Hartup [1976, 1983] for a full review). Early scholars noted the value of peer interactions during play but focused on group dynamics and sociometric properties (Goodenough, 1928; Moreno, 1934; Thomas, 1929). A now classic study completed by Parten (1932) represented the first attempt to look at the relationship between social interaction and play. The effect of age difference on social interaction was examined by using a time-sampling method. One minute observations of the child's interactions during play were made on a daily basis. These observations continued until sixty
observations were collected on each child. Categories used to classify social participation during play included unoccupied, solitary, onlooker, parallel, associative, and organized supplementary play. Rogers and Sawyers (1988) described these as

1. Unoccupied--Children watch others at play but do not enter the play. Unoccupied children may just stand around or move about the area.

2. Onlooker--Children watch others play, may talk to them or ask questions, and seem to move closer to a group, rather than watching what ever momentarily catches their attention.

3. Solitary independent play--A child plays alone with objects. Even if the child is within speaking distance of others, the child does not alter her or his play, or interact with others.

4. Parallel activity--A child plays with toys like those used by nearby children. The child does not try to influence the other children's activities. "He plays beside rather than with the other children" (Parten, 1932, p.250)

5. Associative play--Common activities occur between children. They may exchange toys and/or follow one another. Although all the children in the group are doing similar activities, specific roles are not defined, and there is no organized goal (such as building or playing a game with
rules).

6. Cooperative or organized supplementary play—Children cooperate with others to construct something, hold competitions, produce dramas with coordinated roles, or play games with formal rules. Group membership is defined, usually by one or two powerful leaders. (p. 20)

The degree of leadership fell into five categories: (a) following, (b) independent pursuit, (c) following some and directing others, (d) sharing leadership with another, and (e) directing alone. Results of the study revealed that social participation increases with age. Specifically, Parten (1932) found that three-year-old children engage in more solitary play, four-year-old children display more non-interactive parallel play, and five-year-olds are involved in more reciprocal play.

The results obtained by Parten have not remained untouched by criticism (Rubin, Maioni, & Hornung, 1976; Rogers & Sawyers, 1988). The idea that solitary play is a less mature form of play than parallel play has been questioned. Rogers and Sawyers (1988) noted that "...researchers are now questioning whether Parten's levels actually constitute a continuum, however, and have proposed alternate views of solitary and parallel play instead " (p. 33). Children who play alone may be choosing not to participate and may be engrossed in their own agenda whereas
children engaged in parallel play may not have the social skills to enter play. In fact, Bakeman and Brownlee (1980) have suggested that parallel play may serve as a bridge to cooperative play rather than a separate stage. Although Parten (1932) examined the frequencies of social interaction, she did not examine the processes involved in social interaction or collaboration. For example, her comments concerning social interactions during block play were limited to the following statements, "Blocks afforded all degrees of social participation. They were played with by boys 71 percent of the time they were used" (p. 94).

In spite of the criticism, Partens' scale is considered a classic and continues to be used as the standard for other instruments. Recently, the caliber of Parten's measure was acknowledged in a study by Odum and Ogawa (1992). They examined 51 studies that utilized methods of direct observation. Every study included in the analysis had been reviewed and published in referred journals. Odum and Ogawa (1992) concluded:

Perhaps ironically, the Parten scale, developed at the beginning of this research movement, continues to serve as the system upon which many researchers build their observational instruments. It may be the best example of a standard system for assessing social play that
The continued reliance on Parten's scale is a testimony to the caliber of her work. Parten's scale has enabled researchers to collect a remarkable amount of information about how children spend their time in preschool classrooms (Odum & Ogawa, 1992; Pelligrini & Boyd, 1993). Even though the Parten scale provides information about the frequency of play encounters, it fails to provide information about how peers collaborate during play. Understanding more about how children play together will add to our knowledge of the process as well as the frequency of play.

Interest in the study of social participation was stimulated by Smilansky's (1968) study. In 1976, Rubin, Maioni, and Hornung combined Piaget's (1962a) classification system of play with Parten's (1932) scale for measuring social participation. Rubin used Smilansky's elaboration of Piaget's classification system to create the Parten/Piaget hierarchical scale for measuring social participation and cognitive development during play. Smilansky's (1968) system included:

1. Functional play – simple repetitive muscle movements with or without objects.

2. Constructive play – manipulation of objects to construct or to "create" something.
3. Dramatic play – the substitution of an imaginary situation to satisfy the child's personal wishes and needs.

4. Games with rules – the acceptance of prearranged rules and the adjustment to these rules (p. 414).

Rubin combined Smilansky's categories (See previous list) with Parten's (1932) work which follows


3. Associative-functional, associative-constructive, and associative-dramatic,

4. Cooperative-constructive, cooperative-dramatic, and cooperative-games. (p.416)

Using this multiple classification scheme, Rubin, Maioni, & Hornung (1976) created a new play observation scale. Rubin updated the Play Observation Scale (POS) in 1989. The findings of Rubin et al. (1976) supported the work of Parten (1932) and Barnes (1971) (even though the replication by Barnes (1971) contradicted some of Parten's (1932) result). Rubin surmised that differences between Barne's (1971) and Parten's findings could be found in the social class of the sample. Parten used a middle- and upper-class group and Rubin used a sample composed of children from lower-, middle-, and upper-class homes.
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Barnes, however, failed to report the SES of his sample. When examining children from middle- and upper-class homes, Rubin found that approximately 40% of the 3- and 4-year-olds engaged in associative and cooperative play. These results were consistent with those obtained by Parten. In contrast, Rubin's results with lower socioeconomic levels matched the results reported by Barnes. Barnes reported that only 25% of the 3- and 4-year-olds engaged in associative and cooperative play. Rubin proposed that perhaps Barnes' had worked with a lower socioeconomic group. The failure by Barnes to include information concerning the SES of his sample limits the knowledge that can be gained from his study.

The Play Observation Scale (POS) which nests Piaget's stages with Parten's classification has also received criticism. Takhvar and Smith (1990) reviewed Rubin's scale for measuring peer play interactions and noted several areas of concern. First, they contend that the use of the "classificatory device" as a hierarchical model is not justified. While many notable scholars have labored under the assumption that these scales provide a hierarchical classification scheme (Campbell & Frost, 1985; Mounts & Roopnarine, 1987; Pelligrini, 1982), little attention has been paid to the validity of the scale. Further, Takhvar and Smith (1990) noted that (a) the category definitions
were imprecise, (b) the classification categories were too limited, and (c) differentiation between symbolic and non-symbolic play was too problematic. They do, however, acknowledge the value of the classification scheme and note that, regardless of its fallacies, it can be used reliably. To strengthen the information obtained from the scale, they recommend the use of interviews with children to supplement direct observation.

Obviously, to observe and attempt to measure peer interactions during play is to enter an area fraught with controversy. The problem may lie in the use of only one measure to examine peer interactions during play. To adequately assess social interactions during play, multiple measures may be needed.

**Play variance.** Previous studies of peers have followed the path of play studies which relied on one measure to assess social interactions during play. If, as Vygotsky maintained, peers serve as mediators during play; then examining the effect of peer variance among playmates is necessary for a complete understanding of peer play. In past studies, peers have been viewed as a monolithic entity. That is, a peer has been defined as anyone who is within twelve (plus or minus) months of the target child's age and the assumption has persisted that all children in one age group are similar. Even though four-year-olds do tend to
share particular developmental characteristics, variations within the age group still exist; therefore, chronological age can not be substituted for developmental level.

The assumption that all four-year-olds are alike has guided past research. Studies of the same age group constitute 88% of the literature (Mounts & Roopnarine, 1987). Few studies have examined the effect of peer variations on play and those that have done so have relied on chronological age as a descriptor (Katz, Evangelou, & Hartman, 1990). In a review of literature, Katz et al., (1990) found only four studies of mixed-age play even though most children spend the majority of their play time with older or younger children. In limiting the study to same-age peers, scholars may believe that they are placing parameters on the developmental levels that exist in a group. This is not completely accurate. Even though same-age peers are viewed as homogenous when selected for studies, varying developmental levels exist. For this reason, developmental differences should be considered when examining peer interactions. Age should not serve as the sole assessment for developmental level; other criteria for identifying developmental levels must be considered.

Although the only studies that examine the effects of peer variations on play use age as the differentiating criteria, these studies still serve to inform us of the
effects of peer variability on play. Results of a small number of studies on mixed-age play, however, provide conflictual findings. For example, Goldman (1981) and Mounts and Roopnarine (1987) examined social participation in same- and mixed-age classrooms. Goldman adapted Parten's (1932) scale and used time sampling procedures to observe three classes of 3-year-olds, three classes of 4-year-olds and three mixed-age classes. The results revealed that children in mixed-age groups (1) spend more time socializing with each other, (2) less time socializing with the teacher and, (3) 3-year-olds spent less time in parallel play. Overall, she found that mixed-age groupings facilitated social participation for all age groups and that age did not influence the choice of playmates.

The advantages of mixed age grouping were also affirmed by Mounts and Roopnarine (1987). They found that mixed-age groupings facilitate social play but found no evidence of age or gender preference in playmate selection. Like Goldman (1981), Mounts et al., (1987) observed three-, four-, and five-year-old children in mixed-age classrooms. In contrast to Goldman, they used a scale developed by Rubin, Maioni, and Hornung (1976) which combined Parten's social categories with Smilansky's cognitive play categories. The researchers found that in mixed-age 3's and 4's rooms (1) 3-year-olds engaged in more complex play and
(2) developmental differences were more evident. They theorized that this was a result of the three-year-olds imitation of the four-year-olds in the mixed-age classroom. Although these studies were not in complete agreement, both studies support the view that younger children benefit from playing with peers who display higher developmental levels.

In addition, the effects of age on social interaction have been examined by Howes and Farver (1987). Whereas Goldman (1981) and Mounts and Roopnarine (1987) studied children in naturalistic settings, Howes and Farver (1987) looked at interactions among dyads in a laboratory setting. The effects of mediation on less capable peers were examined in an attempt to investigate Bruner's concept of how experienced partners serve as scaffolds for those less experienced (Howes & Farver, 1987). To accomplish this goal, they examined the dyadic interactions of pairs of two-year-olds, five-year-olds, and mixed-age children during play with a fifteen piece camping set. The complexity of social pretense was analyzed by using a scale developed by Howes (1985) which rated social pretense as either simple or cooperative. Results of repetitive t-tests confirmed that when two- and five-year-old children play together, (1) two-year-olds participate in more cooperative social pretense, (2) five-year-olds use more verbalization and, (3) two-year-olds use more imitation. When children play with same-age
peers, however, they use more verbal metacommunication, directing, and teaching behaviors.

Howes and Farver (1987) found evidence to support their hypothesis that more capable children assist less capable children during play. They did not, however, examine the processes used by the more capable child. Moreover, the wide difference in the ages of five- and two-year-olds served as a limitation. Would the same results be obtained with children who are closer in age? How do children play with peers who display different levels of competencies during play? To answer these questions, more scholarship is needed on peer collaboration among children who display different levels of play.

Peer Play in the Context of Constructive Block Play

Constructive Play

In the same way that different developmental levels affect play behaviors, different contextual settings also affect play. Constructive play offers a distinctive context for play and will be discussed in this section. Constructive play has been defined as play that occurs when children use materials to create something (Christie & Johnson, 1987). Understanding constructive play, however, has presented a challenge to play scholars (Christie et al., 1987). In an attempt to clarify constructive play, a
Theoretical framework will be set forth below. This will be followed by an investigation of constructive block play and, more specifically, collaborative constructive play with blocks. Finally, the effects of peers who display different play levels on children will be examined in the context of block play.

**Theoretical perspectives.** Though peer play has been examined in both classroom and laboratory settings, the context has typically been restricted to social pretense in the dramatic play area. This limits our understanding of how children interact in different contextual settings found within the parameters of the classroom. Studies of collaborative play in different contextual settings, though sparse, have added to our knowledge of how children think and learn during play (Caldera, Alvarez, & Truglio, 1987). For this reason, continuing investigations of constructive play are valuable, particularly those that are theory driven. Several theoretical interpretations of constructive play are discussed in the following section.

**Piaget.** Piaget's view of constructive play has served as the basis for many studies of constructive play. He postulated that constructive play was located on the continuum between play and adaptive intelligence. In fact, Piaget (1962b) stated that
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Making a house with plasticine or bricks involves both sensory-motor skills and symbolic representation, and, like drawing a house, is a move away from play, in the strictest sense, towards spontaneous intelligent actions. (p. 109)

Piaget did not view constructive play as a stage of play. He developed the stages of play (functional, dramatic, games with rules) by juxtaposing the stages of intelligence (sensorimotor, pre-operational, concrete operational) on play. In his view, "constructive games constitute the transition from all three [practice games, symbolic games, and games with rules] to adapted behaviors" (Piaget, 1962b, p.110). Piaget's work in the area of constructive play provided the basis for the work of early play scholars and continues to influence studies of constructive play (Christie & Johnson, 1987; Forman, 1982; Rubin, Fein, & Vandenberg, 1983).

Smilansky. The view of constructive play as a separate stage of play evolved from Smilansky's (1968) work with disadvantaged children. She viewed constructive play as a separate stage and wrote

....at this stage he [she] learns the various uses of play material; he [she] moves from functional
activities to activities that results in a "creation"...Development from functional play to constructive play is progression from manipulation of the form to formation...The next stage in play development is symbolic play, which appears in the dramatic play of the child. (p. 6)

Smilansky's definition of constructive play has been deemed problematic and has received criticism from several scholars in the field (Rogers & Sawyers, 1988; Takhvar & Smith, 1990). The concept that play is hierarchical and sequential and that constructive play serves as a precursor to dramatic play has been questioned. Takhvar and Smith (1990) noted that there is little evidence to justify the classification of constructive play as a less mature form of behavior. Rather than viewing constructive play as a separate stage that occurs prior to dramatic play, there appears to be justification for a return to the conceptualization of constructive play proposed by Piaget. Consideration of constructive play as an intersection of the domains of play with adaptive intelligence alters the way constructive play is perceived and is consistent with the definition of play espoused by Vygotsky (1930/1978), Christie and Johnson (1987), and Rubin, Fein and Vandenberg (1983).

Vygotsky. Vygotsky believed that play could be defined
as an imaginary situation bounded by rules. This might appear to serve as a stimulus for the multiplicity of studies on social pretense (See Rubin, Fein, & Vandenberg, 1983) and would seem especially relevant given the surplus of social pretense studies that developed from an emphasis on nonliterality (Bretherton, 1984; Pelligrini & Boyd, 1993). Indeed, Vygotskian scholars have joined other play scholars in examining social pretense (Howes, Unger, & Matheson, 1992). Nonetheless, Vygotsky's sociocultural theory should provide an impetus for the study of constructive play. Past studies of peer variations were influenced by stage definitions. Vygotsky's view of play as an imaginary situation removes these barriers. In this way, constructive play provides a way to examine social pretense. For example, Vygotsky (1930/1978) posited that, "Play provides a transitional stage in this direction whenever an object (for example, a stick) becomes a pivot for severing the meaning of horse from the real horse" (p. 97). The child may see one thing, but act as though he/she sees something else. This provides an excellent rationale for block play since the child who plays with blocks sees an object but pretends as though he/she sees something quite different. Whether purposeful or not, materials in dramatic play centers affect the play and themes used in social pretense. Blocks, however, would seem to be more in line
with what Vygotsky envisioned since they are open ended. When the child sees a block and uses it as a vehicle, he/she is required to separate the meaning from the object. Playing with prop boxes that reflect reality (Pizza Hut) may not require the cognitive leap that pretending a block is a car necessitates. This is not to deny the value of social pretense but rather to suggest that the study of social pretense might be better served by studying social pretense in the block area instead of the sociodramatic play area.

Although there are an overwhelming number of studies on social pretense, few studies have examined social pretense in the context of constructive play (See Rubin, Fein, & Vandenberg, 1983, for a full review). This is not consistent with Vygotsky's view of play (an imaginary situation bounded by rules). Vygotsky (1930/1978) did not favor the use of the term "symbolic" to describe play behaviors, "First, if play is understood as symbolic, there is the danger that it might come to be viewed as an activity akin to algebra" (p.94). Further, it is not consistent with either past or current views of play (Christie & Johnson, 1987; Nicolopoulou, 1991b). Play occurs "in a variety of contexts" and, in fact, children spend over half of their play time, 51%, engaged in constructive play (Christie & Johnson, 1987; Guanella, 1934; Pratt, 1924; Rubin & Krasnor, 1986). Clearly, there is a need to refocus our view of
play; to examine constructive play as rigorously as we have examined social pretense in the past.

**Constructive Play With Blocks**

**Overview.** Constructive play has been defined as play that occurs when children use materials to create something (Christie & Johnson, 1987). This can occur through different media which may include - but are not limited to - play dough, blocks, and legos. For this study, constructive play was operationally defined as using blocks to create something during play.

In contrast with the current state of block play studies (Christie & Johnson, 1987), play scholars during the early part of this century focused on constructive play with blocks (Guanella, 1934; Johnson, 1933/1984). They maintained that block play was important for growth and development. For example, Johnson (1933/1984) noted three positive effects of block play: (a) the child is empowered to deal with the environment, that is, the child controls the setting, (b) there are unlimited ways in which the child can express "rhythm, pattern, and design", and (c) children can use the materials to "review, rehearse, and play out their past experiences" (pp 183-189). Advantages cited by early scholars (Guanella, 1934; Johnson, 1933/1984; Pratt, 1924) are beginning to resurface in more recent reviews of
block play (Hirsch, 1984).

**Dimensions.** Differentiations among children during block play were first noted by Johnson (1933/1984). She identified and described different dimensions of block play as repetition, vertical towers, horizontal rows, bridges, enclosures, patterns, and representations. She believed that these developed in a progressive sequence and described the progressive developmental sequence in her studies of block play. Hirsch (1984) distinguished seven distinct stages of block play in Johnson's (1934/1984) study and described these as:

1. Blocks are carried around, not used for construction. This applies to the very young child.

2. Building begins. Children make mostly rows, either horizontal or vertical. There is much repetition in this early building pattern.

3. Bridging: two blocks with a space between them, connected by a third block.

4. Enclosures: blocks placed in such a way that they enclose a space. Bridging and enclosures are among the earliest technical building problems that children have to solve. They occur after a child begins to use blocks regularly.

5. When facility with blocks is acquired, decorative patterns appear. Much symmetry can be observed. Buildings,
generally, are not named.

6. Naming of structures for dramatic play begins. Before that, children may also have named their structures, but the names were not necessarily related to the function of the building.

7. Children's buildings often reproduce or symbolize actual structures they know, and there is a strong impulse toward dramatic play around the block structures. (p.103-109)

Developmental differences were also studied by Guanella (1934), a student of both Johnson (1933/1984) and Pratt (1924). Guanella's aim was to examine the developmental differences displayed in the context of block play. To this end, she studied the time, purpose, dominance of purpose, interest, and constructive ability of children when playing with blocks. The study which was conducted in both the classroom and laboratory included children who were 3-, 4-, 5-, and 6-year-olds. The results confirmed her hypothesis that each child develops differently and sequentially in a more mature and complex way and that developmental differences are reflected in block constructions.

Bailey (1933) also studied block play, but unlike her peers, she looked for a way to standardize the measurement of block constructions. Bailey (1933) designed a scale that could "be used as a measuring device to evaluate
constructive and manipulative abilities of children of
nursery school and kindergarten age" (p. 121). The
 Techniques she used were based on techniques pioneered by
Kelly (1916) and Thorndike (1910). Bailey (1933) examined
block play of children who ranged in age from two-years,
two-months to nine-years, eight-months, in a laboratory
setting. Children were invited to play with a regular set
of unit blocks alone. At the end of the thirty-minute
session, a picture was taken of their block construction.
Afterwards, photographs of the block constructions were
ranked on a ten-point scale by 109 adults who had expertise
in child development. To guard against the halo effect,
each rater made two passes. The results of the study
provided both a scale for rating block constructions as well
as knowledge about constructive play. She found two
distinct dimensions in block play. One dimension involved
planning and implementing the construction (symbolism) and
the other dimension involved the symmetry of design and
precise placement of blocks (spatial relationships).

Unfortunately, the popularity of studies of
constructive play with blocks pioneered by Bailey (1933),
Johnson (1933/1984), Guanella (1934) and Pratt (1924)
dissipated quickly. In 1983 Rubin, Fein, and Vandenberg
noted the scarcity of studies in this area and encouraged
investigators to explore this area. The authors suggested
that constructive play might be "viewed as belonging to some other coding schemes [other than the one used by Piaget/Parten]" (Rubin et al., 1983, p. 717). Although studies of block play have resurfaced and the knowledge base has improved (Christie & Johnson, 1987; Nicolopoulou, 1991a; Reifel & Yeatman, 1991; Rogers, 1982, 1985), these studies cannot begin to compare with the vast number of studies that have been conducted on social pretense. Certainly, there is a need to extend and expand our knowledge of constructive play with blocks.

**Collaborative Constructive Play**

**Peer variance in block play.** Many scholars today, like their predecessors, are interested in developmental differences and changes that can be observed in the block play of young children (Nicolopoulou, 1991a; Reifel & Greenfield, 1982). Building on past studies of constructive play, Reifel and Greenfield (1982) developed a scale for evaluating block constructions in laboratory studies. In an attempt to confirm the existence of variations in development, they studied 4- and 7-year-olds. They used a method that involved both story telling and block play. First, the investigators read a story to twenty 4-year-olds and twenty 7-year-olds. After reading the story, the children were asked to use a set of table blocks to, "Show
me the story of *Little Red Cap*" (Reifel & Greenfield, 1982, p. 208). Children built representations of their understanding of the story. These constructions were then coded for two dimensions of spatial relationships, that is, hierarchial integration and dimensionality. The results of the study indicated that developmental differences exist in the block constructions of 4- and 7-year-olds. The scale used in this study was devised by Reifel and Greenfield (1982) and based on prior research by Greenfield (1978), Guanella (1934), and Johnson (1933/1984). Reifel and Greenfield (1982) postulated that complexity in block constructions could be examined by looking at two areas of block play, hierarchal integration and dimensionally. Integration was defined as the ability to "tie together" other blocks. The levels of dimensionality were based on plane geometry. They also found that hierarchal complexity becomes more complex with age and thus reflects changes in cognitive structures (Greenfield, 1978). To measure the different levels of block play complexity, they used the categories described in Appendix D.

Developmental changes in the block play of 3-, 4-, and 5-year-olds were also observed by Nicolopoulou (1991a). She examined the integration of both spatial and symbolic relationships and postulated that understanding spatial relationships and symbolism used during block building were
crucial for understanding the child's view of the physical world. Spatial relationships reflect the child's knowledge of the world and the way in which the child manipulates materials to reflect that conceptualization. Symbolism reflects how the child uses abstract material to represent his/her understanding of the world. To examine both spatial relationships and symbolism, Nicolopoulou (1991a) created an original set of sixteen, colored, 1/4" thick, cardboard blocks. Twenty-four 3-, 4-, and 5-year-old children were observed while playing individually with the blocks. Children were invited to "make something" with the blocks and were then allowed to continue playing as long as they desired. When they finished, they were invited to talk about their construction. The results indicated that developmental differences exist between 3-, 4-, and 5-year-olds. The attention span of the 3-year-olds was very short and their creations typically reflected aesthetic principles of symmetry, harmony, repetition, and alternation. Older children had a longer attention span and could examine both general and specific patterns. Salient among the findings was the interdependence between spatial and symbolic expressions. Not only did she confirm the findings of previous block scholars (Bailey, 1933; Guanella, 1934; Johnson, 1933/1984; Pratt, 1924), but she plotted a course for future scientists when she recommended that
future studies of block play include both spatial and symbolic expressions.

**Contextual influences on block play.** Having previously conducted a study that found developmental differences in the block play of young children (Reifel & Greenfield, 1982), Reifel joined Yeatman to study how sociocultural factors impact the child's constructive play in the block area (Reifel & Yeatman, 1991). In addition, they wanted to fully understand the relationship between the signifier and signified. In essence, where do children get their ideas for block play and how do they represent these ideas in play? The study involved observations of sixteen children (8 girls) over a period of seven days. The procedure involved the placement of a tape recorder in the block area. This allowed the conversations of the play participants to be audiotaped. A total of four and one-half hours of tape recordings were collected and transcribed. The authors used qualitative coding techniques to discern themes. As themes began to emerge, it became apparent that materials, ideas, and people in the classroom influenced the child's play. However, contextual factors affected children differently. This was reflected in the children's talk and action. Among the most important findings of their study was the difficulty involved in separating the interaction of ideas, peers, and materials during collaborative block play. The
results of the study suggest that both action and talk must be analyzed in studies of block play. Since only one classroom was examined, generalizations of these findings to other situations may be limited. Nonetheless, this study does suggest the importance of understanding the relationship between action and talk during constructive play with blocks.

The impact of sociocultural factors on peer interaction during play has also been examined by Rogers (1982, 1985). In one study (1985), he examined the effect of different types of blocks, that is, hollow or unit, and gender on social relations among four- and five-year-old children. The study took place in a university laboratory school. The children in the class were divided into four groups in which there were two girls and two boys. Each group rotated in and out of the block center on a regular basis. This provided a context in which the effect of gender and block size (unit or hollow) on social interactions could be analyzed. Rogers (1985) measured social participation on the Rubin (1980) Piaget/Parten scale but designed a scale to measure verbal action or facial expressions and expressive vocabulary. He found that block type does affect the child's level of social interaction. Children who used unit blocks participated in more solitary and parallel play while children who used hollow blocks engaged in more group play.
He also found no gender differences in block play. The level of social participation with different types of block was the same for boys and girls. This study extends our knowledge of social participation during block play, but fails to enhance our understanding of the processes.

**Peer collaboration during block play.** To the writer's knowledge, there are no studies that investigate how children play with peers during self-selected play with blocks. Considering the limited number of studies on constructive play, it is not surprising that few are Vygotskian-based. A Vygotskian scholar of play should be especially cognizant of constructive play for, "It is during this period of "constructing" that problem finding is likely to occur" (Tegano, Lookabaugh, May, & Burdette, 1991, p.28). Subsequently, there is a need for Vygotskian-based studies of constructive play.

Perhaps Vygotsky's theory can provide a different way of thinking about the relationship between peer interactions and play with blocks. If, as Vygotsky stated, play creates the zone of proximal development and more capable peers serve as mediators in assisting performance, then, observing peer collaboration among children of different levels can provide a vantage point for viewing the relationship between social context and cognitive development. For these reasons, this study was designed to examine **how** children who
display different levels of play collaborate during play with blocks.

**Purpose and Hypotheses**

This study was designed to examine the processes and outcomes of collaboration or co-construction that occur among peers who display different levels of play during constructive play with blocks. The major research question was based on the premise that play creates the zone of proximal development and mediators in the zone facilitate development (Vygotsky, 1930/1978). It was also established that the level of complexity exhibited during constructive play with blocks is developmentally hierarchical (Reifel & Greenfield, 1982). Therefore, the question examined was, Do four-year-olds who display more complex skills during constructive block play provide assistance to less skilled partners?

Emanating from Vygotsky's conceptualization of the zone of proximal development and building on the work of Tudge (1992), this study examined movement within the zone. The first hypothesis examined movement to a higher level of understanding. Theoretically, when children are in the zone of proximal development, more capable peers assist less capable peers. This is actualized during play interactions (Goldman, 1981; Howes & Farver, 1987; Mounts & Roopnarine,
1987; Vygotsky, 1930/1978). Therefore, it is hypothesized that four-year-olds who display less-complex play behaviors attain higher levels when engaged in play with peers who display more-complex levels of play.

Finally, if play creates the zone of proximal development, does movement occur only in a positive direction? If bidirectional movement occurs as children adapt to the level of others in the zone, then it is hypothesized that four-year-olds who display more-complex behaviors adjust their play to meet the level of peers who display less-complex play behaviors? These questions and hypotheses will be investigated in the following chapters.
CHAPTER III

METHOD

This study was implemented in two distinct, sequential stages. Phase One involved naturalistic observations in preschool classrooms. One hundred preschool children were rated on their sociocognitive play competencies while playing in their own classrooms during free play time. In Phase Two, a quasi-experimental design with random assignment was used in a laboratory setting. Forty-eight children from Phase One were randomly selected to play in dyads with unfamiliar peers of the same gender. Dyads were examined for block play complexity, peer interactions, and communication during constructive play with blocks. The details of both stages are discussed in the following section.

Phase One

Sample

Subject selection. The sample was selected from the population of 4-year-olds in day care settings in a small rural town surrounding a major research university located in southwest Virginia. The population reflected the ethnicity and culture of the university population. Five centers were involved in the study. One center was located on the campus of the university and four other centers were located within two miles of the campus. Contact with the
administrators of nine child-care centers was initially made via phone calls. Appointments were scheduled and letters sent to the directors detailing the purpose and procedures involved in the study (See Appendix A). Classroom teachers were informed of the nature of the request and encouraged to attend a meeting with the principle investigator (See Appendix A). The center directors and teachers had previously participated in research studies on a regular basis and were familiar with research procedures. To protect the clientele, center directors placed specific restrictions on the investigator. First, no phone calls could be made to parents who were non-respondents. In addition, the number of times that observers could visit the classroom were restricted to two visits per child rather than daily observations as originally planned. After these conditions were met, five centers agreed to join the study. Three centers chose not to participate. Reasons for non-participation were based on their concern that the children had been disturbed by too many observers in the classroom. They indicated that the children had recently been observed by high-school students, community-college students and undergraduates from two major universities. The directors also shared their concerns that too many people had observed the preschool children and that the need was increasing rather than decreasing. (This phenomenon appears to be a
real concern among center directors and the subsequent effects on children and research may need to be addressed in future papers.)

After initial conferences were completed and paper work processed, five centers agreed to participate in the study. Letters informing the parents of the study and requesting parental consent were sent to each child's home (See Appendix B). Parental response to the request was not evenly distributed among the centers, that is, there were 26 children in two classrooms in Center A, 7 from center B, 17 from Center C, 16 from Center D, and 17 from Center E. In an attempt to ensure equitable distribution across the cells, a decision was made to identify the children by groups rather than centers or rooms. Five rooms had populations that allowed them to be included as intact groups. There were two classrooms, however, that did not have a population sufficient to warrant separate treatment. Since Center A contained one classroom with sixteen children and another with ten children, the second classroom in center A that contained ten children was combined with the classroom in center B which had seven children. These two classrooms from two different centers were collapsed together to form one group, Group B. This provided a relatively comparable number in each group so that random distribution across cells could be accomplished. That is,
Groups A and E were composed of sixteen children while there were seventeen children in Groups B, C, D, and F. Altogether, one hundred four-year-olds from five different centers were involved in the initial stage of the study.

**Subject characteristics.** The ages of the children ranged from four- to five- years old. The mean age of the children in the study was four-years, seven-months. The selection of the age range was based on findings of past research which indicate that constructive play first appears around the age of two and peaks at about age seven (Reifel & Greenfield, 1982). Although four-year-olds are just beginning to develop collaborative play skills, studies of peer play have typically examined younger children (Howes, Unger, & Matheson, 1992). Consequently, there is a need to examine how older preschoolers play with peers. Given that a peer is defined as a child within twelve (plus or minus) months of the target child (Hartup, 1983), the peer group included an age range that extended from 48 to 60 months of age.

Due to the cost of attendance, these centers served a middle-class population and reflected the ethic and cultural composition of the university and town population.

**Instrument**

**Play Observation Scale.** The child's play level was
assessed using the Play Observation Scale (POS) (Rubin, 1989). Rubin (1989) designed the POS to rate the frequency of play behaviors that reflect social and cognitive domains of play. Standardized measures of cognitive ability (that is, Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Sattler, 1992)) were not used since the goal of the study was to examine the effect of the child's play level on constructive block play. Scores on formal tests of cognition do not reflect the child's play level (Rubin, Fein, & Vandenbarg, 1983). As a result, the POS was used to assess the level of social interaction and cognitive development displayed by the children during play (Parten, 1932; Piaget, 1962a, 1962b; Rubin, 1989; Smilansky, 1968). Selection of this measure was also based on the frequency of use in past studies (See Pelligrini and Boyd, 1993). The POS subsumes the work of Parten (1932) and Piaget (1962a, 1962b). Their works have been described as "sequential, developmental hierarchies" which "have often been taken as normative" (Rubin & Krasnor, 1986, pp. 278, 281). Given that the Parten (1932) and Piaget (1962a, 1962b) scales have long distinguished research records, the combination of the two in the POS by Rubin seemed appropriate.

Creation of the POS involved an intersection of the social dimensions as measured by Parten (1932) with the cognitive dimensions as measured by Piaget (1962a, 1969b).
In Parten's (1932) work, she found that children used six different types of social participation categories. These sequential stages of social participation have been described by Rogers and Sawyers (1988, p. 20) as unoccupied behavior, onlooker behavior, solitary independent play, parallel play, associative play, and cooperative play (See Appendix E). Smilansky also constructed a scale to measure the cognitive dimension of play. Smilansky's (1968) scale was based on her own elaboration of Piaget's stages of play and included functional play, constructive play, dramatic play, and play with games. By nesting these two scales together, Rubin created a scale that measures both the social and cognitive dimensions of play. Rubin's categories include unoccupied and onlooker non-play behaviors, solitary-functional, solitary-constructive, solitary-dramatic, parallel-functional, parallel-constructive, parallel-dramatic, associative-functional, associative-constructive, associative-dramatic, cooperative-constructive, cooperative-dramatic, cooperative-games (See Appendix D).

To obtain a score on Rubin's scale, each child was observed during play on two different occasions. Details of the coding process are described in the measurement section.

**Setting**

The first phase of the study occurred in a
naturalistic setting in the child's classroom. All classrooms involved in the study were equipped with standard play equipment typically found in preschool classrooms (that is, blocks, sociodramatic materials, manipulatives, and art activities). All centers involved were licensed by appropriate state agencies.

Materials

Materials in the classrooms were typical of those found in licensed day care centers. Classrooms were equipped with blocks, sociodramatic materials, books, manipulatives, art materials and a variety of small toys.

Procedure

Observations. Each child who had permission to participate in the study was observed twice in vivo (that is, directly observing children as they interact). These observations were made by trained observers for a period of eight minutes on two separate days. Children were observed during a block of time commonly referred to as free play or center time. During this time period, play is considered an acceptable and appropriate behavior. Each observer watched each child for a period of thirty seconds prior to recording. After the initial thirty seconds, the observer observed ten seconds of play and then recorded for a period of five seconds, observed ten seconds, recorded five
seconds, etc. Each minute of recorded play required one minute and thirty seconds to complete. So, each five minute section required seven minutes and thirty seconds. When this time was added to the amount of time that the observer watched the child prior to observation (thirty seconds), each observer observed each child for eight minutes. A total of sixteen minutes of uncoded play (ten minutes of coded play) was tabulated on each child.

**Reliability.** Prior to data collection, two graduate students were trained to use the POS scale in the classroom. Both observers had completed the same graduate program in child development and were naive to the purpose of the study. Videotapes of children attending the university lab school but not included in the study were used to train the raters. Prior to data collection, reliability was established at $k = 92\%$. Kappa is an agreement statistic that controls for chance (See Cohen, 1960).

**Measurement**

**Data collection.** All coding was based on observations made in the classroom using the POS scale (Rubin, 1989). The unit of behavior measured included both the social and cognitive dimensions of play as described in the subscales previously listed (See Appendix D). Time-frame sampling was used to record the play behaviors. The play behaviors of
the target child were observed for a period of 10 seconds after which the dominant behavior was recorded during a five second interval. This resulted in six recorded observations per minute or a total of 60 per ten-minute session. These time intervals were tested prior to the study and provided a good reflection of the behavior under investigation.

**Data coding.** After the data were collected, raw scores were tabulated by calculating the average play behaviors for each child during ten minutes of play. This was accomplished by first counting the frequencies of specific play behaviors during ten minutes of play (See procedure section above). The frequencies were tallied in accordance with recommendations suggested by Rubin (1989)(See POS author, Rubin, 1989, for specific coding details)(See Appendix D for scale). Next, the frequency score was multiplied by a predetermined weight. The predetermined weights were based on the assumption that play develops in a hierarchical order (Parten, 1932). For this reason, a code of one was assigned to behaviors that were considered to be non-play, two was given to solitary play, parallel play received assigned three, and group play was assigned four. Each social category was further differentiated by the cognitive levels within each category. Within the non-play categories, the behaviors were coded as Transition 1, Unoccupied 2, Onlooker 3, Aggression 4, Teacher Conversation...
5, Peer Conversation 6. Within each level of play, behaviors were differentiated as Functional 1, Exploratory 2, Reading 3, Constructive 4, Dramatic 5, and Game 6. The same coding scheme was used for Solitary, Parallel, and Group play. An example of the calculation process can be seen in the following example. If a child engaged in solitary-constructive play for six intervals or one minute and thirty seconds, the child’s score would be calculated by first counting the frequencies, six, by the weight. The weight would be determined by multiplying the social domain times the cognitive domain, that is, solitary (2) - constructive (4) play would be tallied by multiplying two times four for a total of eight. This score, eight, would then be multiplied by the frequency, six. The score for one minute would be forty-eight. By adding the scores of the entire ten minutes together and dividing by two, an average score for five minutes was obtained for each child. By calculating the average of two, five-minute sessions, a mean score of social and cognitive play behaviors was obtained for each child in the study.

**Analyses**

The data from the first phase of the study were processed using SPSS statistical software (Norusis, 1990). Descriptive statistics were used to describe the data. Data
from all six groups were combined together for the analysis. The data were combined so that overall group quartiles could be established. The theoretical scores of the entire sample ranged from 0 to 288 whereas the actual scores ranged from 27 to 283. The mean of the entire sample was 117.33. Means and standard deviations for individual groups are listed in Table 1.

Children who scored above 218 were ranked one quartile above the median and placed in the more skilled category. Scores below 91 placed children one quartile below the median and in the less skilled play category. Those who scored between 91 and 218 were located in the middle two quartiles and were excluded from the study. Children who scored in either the upper or lower quartile were purposefully selected for the second stage of the study (See Appendix C) (See also Table 2).
Table 1

Mean Scores and Standard Deviations on the Play Observation Scale for All Groups

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>M</th>
<th>(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>16</td>
<td>94.74</td>
<td>(36.75)</td>
</tr>
<tr>
<td>Group B</td>
<td>17</td>
<td>98.82</td>
<td>(33.77)</td>
</tr>
<tr>
<td>Group C</td>
<td>17</td>
<td>133.25</td>
<td>(56.44)</td>
</tr>
<tr>
<td>Group D</td>
<td>17</td>
<td>132.12</td>
<td>(50.97)</td>
</tr>
<tr>
<td>Group E</td>
<td>16</td>
<td>131.55</td>
<td>(45.63)</td>
</tr>
<tr>
<td>Group F</td>
<td>17</td>
<td>113.18</td>
<td>(39.44)</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>117.33</td>
<td>(46.39)</td>
</tr>
</tbody>
</table>
### Table 2

**Range of Scores on the Play Observation Scale for Each Quartile**

<table>
<thead>
<tr>
<th>Quartile</th>
<th>n</th>
<th>Boundaries</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Lower</td>
<td>Upper</td>
</tr>
<tr>
<td>1</td>
<td>26</td>
<td>27</td>
<td>90</td>
</tr>
<tr>
<td>2</td>
<td>31</td>
<td>91</td>
<td>154</td>
</tr>
<tr>
<td>3</td>
<td>19</td>
<td>155</td>
<td>218</td>
</tr>
<tr>
<td>4</td>
<td>24</td>
<td>219</td>
<td>283</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Phase Two

Sample

Subject selection. The population for the second phase was composed of children who participated in the first phase of the study and whose scores fell in either the upper or lower quartiles on the continuum. Those who scored in the upper or lower quartiles were randomly assigned to dyads. Children who scored in the middle quartiles were eliminated from the study (See Phase One).

Parents of children who were eligible were notified of their child's selection for Phase 2 in a manner specified by center directors (See subject selection). Calls were made to inform parents and guardians of the qualifications of the principle investigator, purpose of the study, and the child's role in the study. Questions and concerns were also answered at that time. Parents and guardians who agreed to allow their child to participate in the study were given convenient appointments for play sessions. Participating parents were also given a choice of leaving the lab school or observing the child through a one way mirror. The day before each play session, parents were called to remind them that the play session would occur the next day.

The sample was composed of forty-eight children (24 females) selected from six groups. Using a group continuum constructed in Phase One, children were selected from each
group based on same gender, play level, and unfamiliarity. Even though a counterbalanced design was used to ensure equal distribution, the number of participants in each group was not equivalent (See Table 1), that is, the number of children selected from each group varied. For example, four children, two girls and two boys, were eligible for participation from Groups B and D. This situation did not exist in Groups A, C, E, and F. Two factors contributed to this situation. First, the number of children who were eligible, that is, whose scores fell within the parameters of the specifications of the study, were greater in some groups than others (See Table 2). Second, parental involvement varied across the groups. For example, in some groups, all parents who were invited to attend agreed to participate. In other groups, several parents who had initially agreed to participate in the second part of the study refused. Reasons for non-participation ranged from prior commitments to lack of parental custody during the time of the study. The major reason presented for non-participation was lack of time. (This may also be an issue that warrants further study.) In the final distribution, four eligible children from groups B and D agreed to participate in the study. The situation was different in Groups A, C, E, and F; one position in each group was affected. There were two additional individuals in Groups A.
and C who were qualified, but there were only seven individuals qualified in Groups E and F. By pairing the additional children in Groups A and C with the unpaired children in Groups E and F, the criteria of unfamiliarity was met. The selection distribution can be seen in Table 3 and is described in detail in Appendix C. Even though there were some variations in the number of children selected from each group, the integrity of the study was not compromised.

**Subject characteristics.** The mean age of the children selected for the second part of the study was four years and eight months. See above for a discussion of the characteristics of this age group.

The sample (48 children) was composed of equal numbers of males (24) and females. Studies have confirmed that gender affects natural selection of block play in the classroom, that is, girls tend not to select block play (Rogers, 1985). When given the opportunity, however, girls display equal levels of competence (Rogers, 1985). Variance due to gender was controlled by forming dyads of the same gender. Familiarity with playmates also affects play complexity (Doyle, Connolly, & Rivest, 1980). Children tend to display play behaviors that reflect a higher social and cognitive level when engaged with familiar peers (Doyle, et al, 1980). This effect was controlled by pairing children with unfamiliar peers.
Table 3

Number of Boys and Girls Selected From Each Group

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group A</td>
<td>5</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Group B</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Group C</td>
<td>4</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>Group D</td>
<td>4</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Group E</td>
<td>4</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Group F</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>
**Instruments**

**Peer collaboration.** The level of peer collaboration was measured by examining dyadic interactions during play using the POS (Rubin, 1989) (See Appendix D). See Phase One for a complete description of the POS. Though other instruments have been developed (Howes, 1980; Howes, Unger, & Matheson, 1992), there are two reasons why the POS was selected for this study. First, the POS (Rubin, Maioni, & Hornung, 1976) subsumes Parten's scale for measuring social participation and provides a reliable measure of social interaction. The rationale for this decision was based on several factors which were discussed in Phase One. In addition, since the coders had used the scale in Phase 1, the interrater reliability was high (See reliability).

A score on the POS was obtained by observing the video recordings of each child's play for a period of fifteen minutes. Details of the coding process are located in the measurement section.

**Block play complexity.** Block play complexity was operationalized by examining the spatial relationships and symbolism in block structures (Reifel & Greenfield, 1982). Spatial relationships were measured on a scale designed by Reifel and Greenfield (1982)(See Appendix G). The scale created by Reifel and Greenfield (1982) was an adaptation of studies and scales created by Greenfield (1978), Johnson
(1933/1984), Hirsch (1984), Reifel and Greenfield (1982) and Vereecken (1961). Symbolism was measured on an experimenter-designed scale based on the work of Vygotsky (1930/1978). (See also Appendix G).

Spatial relationships were operationally defined as the hierarchical integration (five levels) and dimensionality (four levels) of block constructions (Reifel & Greenfield, 1982). Levels of dimensionality were based on plane geometry. In their study, Reifel and Greenfield (1982) found that hierarchical complexity becomes more complex with age and thus reflects changes in cognitive structures (Greenfield, 1978). The subscales used for this study were first used by Reifel and Greenfield (1982) and are described in Appendix G.

The data were coded by recording the highest level of block construction used by the child during a fifteen minute play session. The entire fifteen minute session was observed and the type of construction was evaluated. If a question arose about the level of construction, the videotapes were reviewed and polaroid pictures were examined to confirm the evaluation. Specific details of the coding process are located in the measurement section. Symbolism, theoretically defined by Vygotsky (1930/1978) as occurring when a child "acts independently of what he [she] sees" (p. 96), was operationalized by a measure of the child's action
action during constructive play as described on a scale with ratings from 0 to 2 (See Appendix F for subscale). This measure was derived from an examination of the transcripts of the play script (Garvey, 1977) and the child's description of his/her creation when looking at a picture of their creation. Asking the child to discuss his/her use of blocks is consistent with the findings of Nicolopoulou (1991a). She maintains that the only way to really understand the child's play is to talk with the child. She found that constructions viewed as stacks of blocks to adults sometimes represented specific structures to young children.

There have been no known previous attempts to quantify Vygotsky's view of symbolic play. This study presents a first attempt to quantify this concept by using a multi-modal technique, that is, pictures, audio, and video.

**Communication.** The level of interactive communication that occurred between peers during constructive play was operationalized in seven levels by Farver (1992) (See Appendix F). Communication during play has been distinguished as play with noises and sounds, play with the linguistic system, and play communication (Farver, 1992; Garvey, 1977; Garvey & Kramer, 1989; Quay & Blaney, 1988).

Communication was examined by watching a tape recording of fifteen minutes of dyadic play. The entire fifteen
minute session was observed and the frequency of communication evaluated. When questions arose concerning communication, the videotapes, pictures, and transcripts were reviewed. A score for each child was calculated, coded, and combined with the play partner to form a mean score for each dyad. Specific details of the coding process are located in the measurement section.

**Setting**

The setting for Phase two was a classroom in the university child development laboratory. Though the room was usually occupied, the room was available because semester classes had not resumed after mid-semester break. The classroom in the child development laboratory was selected because it resembled a typical preschool classroom and was equipped with ceiling video cameras. One side of the classroom was equipped with a one way mirror through which parents could observe their children. Headphones were also available so parents and/or guardians could hear as well as see their children. The equipment and materials in the classroom were covered with brown paper which was unappealing and designed to focus attention on the block center. The blocks were located in one corner of the room. Unit and variety blocks were stored in a wood cabinet which measured four by eight feet. Hollow blocks were located on
an open shelf that was located across one end of the room. Prior to the entry of each dyad, four large hollow blocks, one large triangle hollow block, four small hollow blocks and four planks were placed around the edge of the block area. These materials served a twofold purpose. First, the display of blocks was designed to entice the children to enter the play area. Second, the blocks served as a boundary for play.

The setting provided one limitation of the study. Several children in the study were also enrolled in the program and generally met in the classroom selected for the study. Precautions were taken to minimize this effect by covering all other surfaces in the room with brown paper. In addition, when children usually enter the school, many familiar people are available. The children came into an environment that was vastly different, that is, the room was completely different since only blocks were available, staff members typically available were not visible, and friends usually accessible were absent. Considering these factors, the setting was considered sufficiently different so as to negate any effects of familiarity.

**Materials**

Wood blocks similar to those used in typical preschool classrooms, hollow and unit blocks, were used in the second
part of the study. The use of hollow and unit wood blocks in research dates back to early studies conducted by Guanella (1934) and Bailey (1933). Past studies suggest that the use of both hollow and unit blocks tend to stimulate all levels of social interaction (Rogers, 1985).

Wood blocks used for this study were sanded smooth and stained with a clear varnish. The dimensions of the standard hollow block was 24" x 12" x 6". The size of the standard unit lightweight block was 5 1/2" x 2 3/4" x 1 3/8". All together, there were 332 blocks available. The quantity and dimensions of the individual blocks are listed in Appendix F.

A polaroid camera was used to capture the block creation and a tape recorder was used to record each child's description of his/her play.

Procedure

Observations. Play sessions began as soon as both children arrived at the lab school. When one child arrived earlier than the other, the first child was informed that a playmate would soon arrive. When the other member of the dyad arrived, the children were invited to enter the classroom. The researcher welcomed the children, invited them to enter the room, accompanied them into the room, and stayed in the room throughout the session. The children in
each dyad had been purposefully selected and assigned so that both children were members of the same gender but were not familiar with one another. Each dyad consisted of two players both matched for more-complex play, less-complex play, or for more- and less-complex play. After the children had been in the room for a period of ten minutes, video recording began and continued for a period of fifteen minutes. The play session was recorded by an assistant using ceiling video cameras. To ensure the sanctity of play, the children were distracted by adults only if safety factors warranted an interruption. When twenty-five minutes had elapsed, the children were told, "It's almost time for clean-up but before you put the blocks away, I would like to take a picture of your block play. May I take a picture of your block play? After I take a picture of your block creation, I want to take a picture of you. May I take a picture of you? You can take this picture with you when you leave". After all the blocks and children were photographed, each child was invited to look at the picture. Since the goal was to talk with each child and yet not alienate them from the researcher, the children were told that each child would have the opportunity to talk and to play while the other child talked. They were encouraged to select the individual who would talk first and the individual who would play first.
The recording equipment was placed in a separate part of the room which was located away from the block center but within the parameters of safety. Each child was asked to talk about the picture. First, they examined the tape recorder and held the microphone if they chose to do so. Then each session began with the following statement, "Tell me about this picture. Tell me about your play. What do you see?" An audio recorder captured the ensuing conversation. Afterwards, both children were invited to assist in clean-up. After clean-up, the children were escorted out of the classroom where the parents had been instructed to meet them (See subject selection). The total time involved in the play session ranged from fifty to seventy minutes.

**Reliability**

The same graduate students who collected and coded data in Phase One also collected and coded data in Phase Two. For this reason, high reliability ($k = 92\%$) was established prior to beginning the data coding process. Accuracy was ensured by establishing high kappa levels for block play complexity (subscales are hierarchical integration $k = 90\%$, dimensionality $k = 90\%$, and symbolism $k = 91\%$), peer collaboration $k = 92\%$, and communication $k = 90\%$. Cohen's kappa is an agreement statistic that controls for chance
(See Cohen, 1960). Agreement was assessed at regular intervals throughout the study to guard against observer drift.

**Measurement**

**Data collection.** All data were collected on video tapes, audio tapes, and through photographs. Copies of the video and audio tapes were made prior to coding. In addition, complete transcriptions of the audio and videotapes were made. Photographs of the children were labeled and filed appropriately.

**Data coding.** Coding was based on observations stored on video and audiotapes. Photographs were also examined. Observers coded the videotapes separately for three different behaviors: sociocognitive play level, constructive play, and communication. Given that block complexity was composed of three subscales. That is, hierarchical integration, dimensionality, and symbolism, each rater made five separate passes. Data from audio tapes was combined with data from photographs and video transcripts to provide data for coding symbolism.

**Peer collaboration.** The coding system used to assess social interaction in Phase one was also used to assess peer collaboration in Phase two (See data coding in Phase One).

**Constructive play.** Coding for constructive play was
based on previously reported measures of Guanella (1934),
Johnson (1933/1984), and Reifel and Greenfield (1982).
Constructive play behaviors were coded using the scale for
block play (See Appendix E). The complexity of the block
construction was tabulated by examining the videotapes and
pictures for hierarchical integration and dimensionality.
Scores on structural complexity were combined with scores on
symbolism for a total score on block play complexity.
The theoretical range of scores for block play complexity
was 0 to 25. The actual range of scores on block play
complexity ranged from 5 to 25 with 5 considered a low score
and 25 a high score. Scores of individual children were
tabulated and combined with their partner to provide a mean
for each dyad.

**Communication.** Communication was coded by examining
both the video tapes and transcripts of the videotapes.
Frequency of communication was examined during the entire
fifteen minute play session. A communication score for each
child was calculated by multiplying the frequency of
communication during the fifteen minute play period by a
number reflecting the complexity of the communication.
Complexity was rated on a scale developed by Corsaro (1986),
and used by Farver (1991). See Appendix H. The seven
categories were rated hierarchically: paralinguistic cues 1,
description of action 2, repetition 3, semantic tying 4,
calls for attention 5, directives 6, tags 7. A child who
used two paralinguistic cues (1) during a fifteen minute
period would receive a score of 2 (the frequency, 2, was
multiplied by the category, 1). The theoretical range of
the scores ranged from 0 through 31 with 1 considered a low
score and 31 considered a high score. The scores for each
child were combined with the play partner's score to form a
mean score for the dyad. Even though there was no
validation information available, interrater reliability was
90%.

**Analyses**

A multivariate analysis of variance was used to analyze
the data. Play group, the independent variable, was
composed of three levels. Children were matched according
to skill status: equally matched for more-complex play,
equally matched for less-complex play, and unequally matched
levels of more- and less-complex play. Each child was
assigned to a level based on their score in Phase One,
gender, and unfamiliarity with the play partner. The
dependent variables included block play complexity (BPC),
peer collaboration (PC), and communication (C).

The SPSS (Norusis, 1990) statistical system for data
analysis was used in data analyses. The main effects were
examined at an alpha level of .05. When an interaction was
found significant, simple effects were computed.

Prior to analyzing the data, the possibility of interdependence among observations was considered. Since data was collected while two children played together, independence of data collection was a major concern. Stevens (1992, p.243) stated that "...whenever the treatment is individually administered, observations are independent. But where treatments involve interaction among persons, such as `discussion' method or group counseling, the observations may influence each other." To correct for this situation, the analysis was performed on the mean score of the dyad. Results obtained from the analyses are reported in the following chapter.
CHAPTER IV

RESULTS

Results of the statistical analyses of the data will be reported in this chapter. A description of the data will be reported first and will be followed by results of statistical tests. Findings will be presented through text, tables, and figures.

Data Analyses

Data collection in Phase I involved observation of the levels of play complexity displayed by one-hundred children in naturalistic settings. In Phase II, four-year-olds who scored in either the upper or lower quartiles in Phase I were purposefully selected to play with a peer in a laboratory setting. Children were placed in dyads on the basis of unfamiliarity, same gender, and play level as determined by prior observations. Dyad groupings were composed of two girls or boys who were (a) equally more-skilled, (b) equally less-skilled, or (c) unequally skilled (more- and less-) as determined by ratings on the Play Observation Scale (Rubin, 1989). Social interactions among equal and unequal dyads during play were observed, recorded, and tabulated.

To ensure independence of observation, scores of both members of the dyad were averaged together to form a single
dyad score. Twenty-four dyads (N=48) were divided into three groups. Each group was composed of dyads of two children who displayed play that was equally more-complex, equally less-complex, or unequally complex (more- and less-complex) as determined by measurements of play behaviors on the Play Observation Scale (Rubin, 1989). The dependent variables (peer collaboration, block complexity, and communication) were examined in terms of the independent variable, group and the control variable, gender.

Mean scores for dyad groups were examined for variations based on gender, dyad group, and an interaction of the two. Means and standard deviations for the dependent variables, peer collaboration, block complexity, and communication, are reported in Table 4 and described in the section that follows.

**Descriptive Statistics for Peer Collaboration**

Mean scores for peer collaboration by boys and girls in Groups One (equally more-complex), Group Two (unequally matched), and Group Three (equally less-complex) are reported in Table 4. Means are also displayed graphically in Figure 1. Differences between boys and girls in Group One (equally more-complex) on peer collaboration are minimal. That is, the mean score for girls in Group One (equally more-complex) is 1101.75 (SD = 86.48) and the mean
Play as the Zone of Proximal Development

Table 4

Means and Standard Deviations of Play Behaviors for Matched (Groups One and Three) and Unmatched Group Two Groups

<table>
<thead>
<tr>
<th></th>
<th>Group 1 (EM)</th>
<th>Group 2 (UN)</th>
<th>Group 3 (EL)</th>
<th>M</th>
<th>S</th>
<th>M</th>
<th>S</th>
<th>n</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEER COLLABORATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>1101.75</td>
<td>997.5</td>
<td>921.75</td>
<td>117.84</td>
<td>97.35</td>
<td>8</td>
<td>792-1221</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>1094.25</td>
<td>1202.25</td>
<td>807.75</td>
<td>266.28</td>
<td>325.03</td>
<td>221.03</td>
<td>8</td>
<td>504-1662</td>
<td></td>
</tr>
<tr>
<td>Boys/Girls</td>
<td>1098.00</td>
<td>1099.87</td>
<td>864.75</td>
<td>183.33</td>
<td>251.41</td>
<td>169.45</td>
<td>16</td>
<td>504-1662</td>
<td></td>
</tr>
<tr>
<td>BLOCK COMPLEXITY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>9.75</td>
<td>13.00</td>
<td>7.00</td>
<td>2.22</td>
<td>2.94</td>
<td>1.83</td>
<td>8</td>
<td>5-16</td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>11.5</td>
<td>15.75</td>
<td>11.8</td>
<td>2.08</td>
<td>2.87</td>
<td>2.38</td>
<td>8</td>
<td>8-18</td>
<td></td>
</tr>
<tr>
<td>Boys/Girls</td>
<td>10.63</td>
<td>14.38</td>
<td>9.25</td>
<td>2.2</td>
<td>3.07</td>
<td>3.11</td>
<td>16</td>
<td>5-18</td>
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</tr>
<tr>
<td>COMMUNICATION</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>47.25</td>
<td>60.75</td>
<td>30</td>
<td>13.45</td>
<td>21.39</td>
<td>13.69</td>
<td>8</td>
<td>10-89</td>
<td></td>
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<tr>
<td>Boys</td>
<td>35.5</td>
<td>36.25</td>
<td>11.5</td>
<td>23.79</td>
<td>25.71</td>
<td>5.57</td>
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<td>4-71</td>
<td></td>
</tr>
<tr>
<td>Boys/Girls</td>
<td>41.38</td>
<td>48.50</td>
<td>20.75</td>
<td>18.96</td>
<td>25.52</td>
<td>13.83</td>
<td>16</td>
<td>4-89</td>
<td></td>
</tr>
</tbody>
</table>

Group 1: Children are matched for equal levels of more complex play.

Group 2: Children have unequal play levels, that is, one displays more complex and one displays less complex play.

Group 3: Children are matched for equal levels of less complex levels of play.
score for boys is 1094.25 (SD = 266.28). The close proximity of these scores can be observed in Figure 1.

Differences in the mean scores of boys and girls in Group Two (unequal levels) on peer collaboration are larger than those observed in Group One (equally more-complex). Specifically, the mean score for girls is 997.5 (SD = 117.84) and the mean score for boys is 1202.25 (SD = 325.03). Group Two was composed of four-year-olds who were unequally matched, that is, a child who displayed more-complex play behavior was matched with a child who displayed less-complex play behaviors thus creating dyads of children with unequal skill levels. Boys in Group Two displayed behaviors that resulted in peer collaboration scores that were considerably higher than those of girls.

In contrast, the scores of boys in Group Three (equally less-complex) were lower than the scores of girls. The mean score for girls in Group Three (equally less-complex) was 921.75 (SD = 97.35) whereas the mean score for boys in this group was 807.75 (SD = 221.03). It is worth noting that scores for boys and girls were close in Group 1 (equally more-complex), far apart in Group 2 (unequally matched), and close again, but inverted, in Group 3 (equally less-complex). That is, boys score higher than girls in Group 2, but lower than girls in Group 3.

Looking at the overall change among the three groups
Mean Scores of Girls and Boys on the Play Observation Scale for Groups One, Two, and Three

Figure 1
for peer collaboration, the scores of girls were higher for Group 1 (equally more-complex), lower for Group 2 (unequally matched), and even lower for Group 3 (equally less-complex). In contrast, the scores of boys in Group 2 (unequally matched) were higher than the scores of boys in either Group 1 (equally more-complex) or Group 3 (equally less-complex).

**Descriptive Statistics for Block Play Complexity**

Scores on block play complexity were different for boys and girls in Group One (equally more-complex). The mean score was 9.75 (SD = 2.22) for girls and 11.5 (SD = 2.08) for boys. This pattern was also evident in Group Two (unequally matched), the means score of girls in Group Two was 13 (SD = 2.94) and the means score for boys was 15.75 (SD = 2.87). The boys in this group also scored higher than girls. A continuation of this pattern was found in Group Three (equally less-complex). The mean score for girls was 7 (SD = 1.83) and the mean score for boys was 11.5 (SD = 2.38). See also Table 4. Mean scores of boys were consistently higher than girls across all three groups. See Figure 2 for a graphic depiction of this pattern.

**Descriptive Statistics for Communication**

On communication measures, the scores of girls were higher than the scores of boys in Group One (equally
Mean Scores of Girls and Boys on Block Play Complexity for Groups One, Two, and Three

Figure 2
Mean Scores of Girls and Boys on Communication for Groups One, Two, and Three

Figure Three
more–complex). The mean score for girls in Group One was 47.25 (SD = 13.45) whereas the mean score for boys was 35.5 (SD = 23.79). In Group Two (unequally matched), the scores of girls were twice as high as the scores of boys. The mean score for girls was 60.75 (SD = 21.39) and the mean score for boys was 36.25 (SD = 25.71). Differences can be viewed in Figure 3. The same pattern can also be observed in Group 3 (equally less–complex). The mean score of girls was 30 (SD = 13.69) and the mean score of boys was 11.5 (SD = 5.37). Differences among the scores for Group Three (equally less–complex) are as great as the differences in Group Two (unequally matched). This is illustrated in Figure 3.

Descriptive statistics suggest gender and group differences on peer collaboration, block play, and communication. To examine these differences for statistically significance, hypotheses testing was conducted. The results are reported below.

**Hypotheses Testing**

Both hypotheses examined the effect of contextual factors on play behaviors. The first hypothesis that four–year–olds who display less–complex play behaviors attain higher levels when engaged in play with partners who display more–complex levels of play was examined first. To test this hypothesis, differences between Group Three
(equally less-complex) and Group Two (unequally matched) were examined for statistical significance. In order to control for gender differences, same sex dyads were created for all three groups (equally more-complex, unequally matched, and equally less-complex). Dependent variables, peer collaboration, block play, and communication, were examined in terms of group and gender.

The second hypothesis, that four-year-olds who display higher levels of play complexity adjust their play to meet the level of peers who display less-complex play behaviors, also involved observations of children in same gender dyads. Children were paired with equally more-capable peers (Group One) or with peers who displayed less-complex play behaviors (Group Two). Again, the dependent variables of peer collaboration, block play complexity, and communication were examined in terms of gender and group.

**Overall MANOVA for Boys and Girls**

Prior to conducting multivariate analysis of variance (MANOVA), the assumptions of independence, normality, and homogeneity were tested and found satisfactory. All statistical tests were conducted at the .05 level using SPSS MANOVA (Norusis, 1990). Observed differences in mean scores were examined by conducting a 3 X 2 factorial multivariate analysis of variance (MANOVA) with three levels of group,
One, (equally more-complex), Two (unequally matched), and Three (equally less-complex) and two levels of gender, boys and girls. The analyses revealed significant gender differences. Wilks' lambda was calculated to be .383. This is equivalent to an $F$ ratio of 8.58 with 3 and 16 degrees of freedom. The probability of obtaining an $F$ this large by chance is less than .01. See Table Five for complete results. Observed differences between the play of boys and girls play with peers who display different levels of ability are statistically significant, that is, chance alone can not explain these differences.

The multivariate analysis of variance for the effect of group was found to be statistically significant by the Wilks' Lambda Criterion. The Wilks' Lambda value of .313 was equivalent to an $F$ ratio of 4.20 with 6 and 32 degrees of freedom. The probability of obtaining an $F$ this large by chance was less than .03. Results are reported in Table Five. Observed differences among the groups are greater than would be expected. Group membership affects how the children play with peers who display different levels of play complexity.

Using the Wilks' Lambda Criterion, the multivariate analysis of variance for the effect of group by gender, $F(6, 32) = .465$, was found to be statistically significant, $F(6, 32) = 2.49, p < .04$. See Table 5. The significant group by
Table 5

Multivariate Analysis of Variance for the Effects of Gender, Group, and Gender by Group

<table>
<thead>
<tr>
<th>Source</th>
<th>Wilk's</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>.383</td>
<td>3,16</td>
<td>8.58</td>
<td>.011 **</td>
</tr>
<tr>
<td>Group</td>
<td>.313</td>
<td>6,32</td>
<td>4.20</td>
<td>.003 *</td>
</tr>
<tr>
<td>Gender by Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td>.465</td>
<td>6,32</td>
<td>2.49</td>
<td>.043 *</td>
</tr>
</tbody>
</table>

* p < .05  
** p < .01
gender interaction indicates that the effects of treatment were not uniform for boys and girls in all three groups. Additional follow-up was necessary.

**MANOVA for girls.** To understand the effect of treatment on gender, MANOVA was conducted on females using group membership (One, Two, Three) as an independent variable and peer collaboration, block complexity, and communication as dependent variables. The Wilk's Lambda, .067, for group membership for girls was found to be statistically significant, $F(6,14) = 6.67$, $p < .002$. The results are reported in Table 6. The analysis revealed that when differences among girls in all three groups are examined in terms of peer collaboration, block complexity, and communication simultaneously, there is a difference that is greater than would be expected to occur by chance.

An ANOVA was conducted on each of the dependent variables (peer collaboration, block play complexity, and communication). Differences in the ways girls in all three groups play with blocks were found to be statistically significant, $F(1, 2) = 6.40$, $p < .018$. Differences among groups were not significant for either peer collaboration, $F(1, 2) = 3.18$, $p < .090$ or communication $F(1, 2) = 3.45$, $p < .077$. See Table 6. Variations among the three groups of girls were the result of differences in how they played with blocks not in how they interacted with each other or
Table 6

Multivariate and Univariate Analysis of Variance for the Effects of Group on Peer Collaboration, Block Play Complexity, and Communication for Girls

<table>
<thead>
<tr>
<th>Source</th>
<th>Wilk's</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANOVA</td>
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<td></td>
</tr>
<tr>
<td>Group</td>
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<td>6.67</td>
<td>.002 **</td>
</tr>
<tr>
<td>ANOVA</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Peer coll. 65341.5</td>
<td>1,2</td>
<td>3.18</td>
<td>.090</td>
<td></td>
</tr>
<tr>
<td>Blocks</td>
<td>72.166</td>
<td>1,2</td>
<td>6.40</td>
<td>.018 **</td>
</tr>
<tr>
<td>Comm.</td>
<td>1900.5</td>
<td>1,2</td>
<td>3.45</td>
<td>.077</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
Hypothesis One for Girls

To test the first hypothesis for girls, differences in how girls play with peers who display different levels of play complexity were examined by conducting separate pairwise group comparisons. Multivariate ANOVA was conducted on girls in Groups One (equally more-complex) and Two (unequally matched) using peer collaboration, block play complexity, and communication as dependent variables. Differences between these two groups on overall multivariance for all three dependent variables were statistically significant at an .05 level of significance (See Table 7). The value of Wilk's lambda, .105, was equal to an $F$ ratio of 11.28 with three and four degrees of freedom and this was significant at a .020. level of probability. That is, there are differences in the way girls who display complex play behaviors play with peers of equal ability (Group 1) when overall variance on all three dependent variables of peer collaboration, block play, and communication are considered.

Differences between Group One and Group Two (described above) were observed for the dependent variables of peer collaboration, block play complexity, and communication when examined simultaneously for overall multivariance.
When considered individually, however, none of the variables were significant. Peer collaboration, $F(1, 6) = 2.03$, $p < .204$, was not significant. The sociocognitive play level of the child did not contribute significantly to the difference between the groups. Neither was block play significant, $F(1, 6) = 3.11$, $p < .128$. The contribution of block play complexity to the differences between the groups was not statistically significant. In the same way, communication was not significant, $F(1, 6) = 1.14$, $p < .326$. Even though none of the dependent variables, peer collaboration, block play complexity, and communication, were responsible for the differences between Groups One and Two, they were significant when considered simultaneously. These results support the rationale for the use of overall MANOVA in this study.

Overall differences between Groups One and Two in the areas of peer collaboration, block play complexity, and communication may, in fact, be the result of scaffolding by a more-skilled peer. Group One was composed of two children who displayed more-complex play behaviors. Whereas Group Two was composed of children who displayed a mixture of more- and less-complex play behaviors. In mixed groups, the more-skilled peer frequently directed the play. For example, in one play script, the more-skilled peer developed a pretense story about the block "cabin" she had built. She
Table 7

Pairwise Multivariate and Univariate Analysis of Variance of Groups One and Two for Peer Collaboration, Block Play Complexity, and Communication for Girls

<table>
<thead>
<tr>
<th>Source</th>
<th>Wilk's</th>
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<th>F</th>
<th>p</th>
</tr>
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<tbody>
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<td>MANOVA</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Groups 1,2</td>
<td>.105</td>
<td>3,4</td>
<td>11.28</td>
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</tr>
<tr>
<td>Peer Col</td>
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<td>2.03</td>
<td>.204</td>
</tr>
<tr>
<td>Blocks</td>
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<td>1,6</td>
<td>3.11</td>
<td>.128</td>
</tr>
<tr>
<td>Comm.</td>
<td>364.5</td>
<td>1,6</td>
<td>1.14</td>
<td>.326</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01

Group One: Matched equally for more-complex play behavior
Group Two: Unequally matched (more- and less-complex play)
then preceded to tell the less-skilled child to go hunting. At first, the less-skilled child responded by ignoring the director of the pretense, the more-skilled child continued to prompt and encourage the less-skilled child until she also began to engage in the play script. Although the less-skilled child could not initially follow the play script, she was able to enter the play script with the assistance of the more capable play partner. Even though the differences between the two groups were not great for the individual variables of peer collaboration, block play, and communication; there was significant overall multivariance.

**Hypothesis Two for Girls**

To test the second hypothesis for girls, a pairwise multivariate analysis of variance was conducted for girls in Group Two (unequally matched) and Three (equally less-complex). Differences between groups two and three on overall multivariance for all three dependent variables (peer collaboration, block play complexity, and communication) were significant at an .05 level of significance. The Wilk's Lambda value of .131 was equivalent to an $F$ ratio of 8.88 with three and four degrees of freedom. The probability of obtaining an $F$ ratio this large by chance is less than .031. Results are reported in Table 8. There are differences in the ways four-year-old
girls play with peers who display more-complex play behavior or with peers who display equally less-complex play behaviors.

In an attempt to understand the source of the variance between the groups, the dependent variables of peer collaboration, block play complexity, and communication were examined as separate entities. See Table 8. Peer collaboration was examined first. The univariate $F$ value of .98 with one and six degrees of freedom ($p < .359$) was not significant. Peer collaboration was not responsible for variations among the groups. See Table 8.

Block play complexity was also examined. Variations among girls in Group Two and Three on block play complexity were statistically significant, $F(1, 6) = 12.3, p < .013$. Differences exist in the way four-year-old girls play with blocks when paired with a peer who displays more-complex or equally less-complex play behaviors.

Communication was also found to be statistically significant, $F(1, 6) = 5.86, p < .052$. The level of play complexity displayed by peers affects how four-year-old girls communicate.

These findings provide support for the contention that four-year-old girls display play behaviors that are significantly different when they play with a peer who displays equally less-complex play or when they play with a
Table 8

Pairwise Multivariate and Univariate Analysis of Variance of Groups Two and Three for Peer Collaboration, Block Play Complexity, and Communication for Girls

<table>
<thead>
<tr>
<th></th>
<th>Wilk's</th>
<th>df</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANOVA</td>
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</tr>
<tr>
<td>Groups 2,3</td>
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<td>8.88</td>
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<tr>
<td>Peer C.</td>
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<td>.98</td>
<td>.359</td>
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<tr>
<td>Blocks</td>
<td>72.</td>
<td>1,6</td>
<td>12.</td>
<td>.013 *</td>
</tr>
<tr>
<td>Comm.</td>
<td>1891.13</td>
<td>1,6</td>
<td>5.86</td>
<td>.051 *</td>
</tr>
</tbody>
</table>

* p < .05  
** p < .01

Group Two: Unequally matched (more- and less-complex play).
Group Three: Matched equally for less-complex play.

Peer C. = Peer collaboration
Blocks = Block play complexity
Comm. = Communication
peer who displays more-complex play behavior. In addition, these differences stem from the simultaneous interaction of peer collaboration, block play complexity, and communication. In groups two and three, mean scores for peer collaboration did not vary significantly although there were difference in block play complexity and communication.

Explanations for these results may be found in the initial interactions between girls when they entered the room. For example, when they came in, they would frequently look at each other and after a period of two or three minutes, they would begin to play. It seemed as though the child with more-complex play behavior would frequently assume a leading role in the unequally matched dyads. However, there did not appear to be an obvious leader in the equally matched dyads.

To examine differences among girls paired with equally-complex peers, Groups One (equally more-complex) and Three (equally less-complex) were examined using pairwise MANOVA to examine peer collaboration, block play complexity, and communication simultaneously. Differences between these two groups on overall multivariance were not statistically significant at an alpha level of .05, $F(3, 4) = 2.24$, $p < .226$. (See Table 9). Peers who were paired with equally capable peers displayed the same play behaviors regardless of the skill level of the pair. Since overall tests were
Table 9

Pairwise Multivariate Analysis of Variance of Groups One and Three for Peer Collaboration, Block Play Complexity, and Communication for Girls

<table>
<thead>
<tr>
<th>Source</th>
<th>Wilk's</th>
<th>df</th>
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<th>p</th>
</tr>
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<tbody>
<tr>
<td>Groups 1,3</td>
<td>.373</td>
<td>3,4</td>
<td>2.24</td>
<td>.226</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01

Group One: Matched equally for more-complex play behavior
Group Three: Matched equally for less-complex play behavior
not significant, additional tests were not necessary.

The lack of statistical significance is a result of the way the girls played in different yet similar ways. For instance, two girls matched for equally more-complex play behaviors played with blocks on the tables and chairs but never once placed them on the floor even though there were blocks on the floor. They moved in synchrony as though they had a common goal of not creating clutter. When they talked to each other, they were very purposeful and used soft voices. Nonetheless, their neat creations were not very complex \((M = 47.25, \text{ SD } = 13.45)\) In contrast, two girls who were equally matched for less-complex play entered the room and instantly began to take ALL the blocks from the shelves as quickly as they could. They seemed to be using a signal system of communication that they both understood. But, since their goal was to remove all the blocks from the shelf, they engaged in very little block play and this was reflected in low means on block play complexity \((M = 30, \text{ SD } = 13.69)\). The block play that each dyad engaged in was different but the outcomes were similar. To examine variations requires a look at the process, not just the product.

**Hypotheses One and Two for Boys**

Hypotheses One and Two were tested on boys by
conducting an overall MANOVA on boys using group membership (One, Two, and Three) as an independent variable and peer collaboration, block complexity, and communication as dependent variables. The Wilks' Lambda value of .3056 was equivalent to an $F$ ratio of 1.89 with 6 and 14 degrees of freedom. The probability of obtaining an $F$ value this large by chance was less than .154. Results are reported in Table 10. Observed differences were not greater than would be expected to occur by chance. The results indicate that there are no significant differences in the way boys in different groups perform when the dependent variables, peer collaboration, block play, and communication are examined simultaneously. This fails to confirm either Hypothesis One or Two since the differences among the groups are not statistically significant.

**Findings**

A synopsis of the results of the statistical tests are reported in Table 11. The first hypothesis (that four-year-olds who display less-complex play behaviors attain higher levels when engaged in play with partners who display more-complex levels of play) was confirmed for girls, but not for boys. Results of an overall MANOVA and a separate pairwise multivariate test for girls in Groups Two (unequally matched) and Three (equally less-complex) confirmed the
Table 10

Multivariate Analysis of Variance for the Effects of Group on Peer Collaboration, Block Play Complexity, and Communication for Boys

<table>
<thead>
<tr>
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<th>p</th>
</tr>
</thead>
<tbody>
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<td>6,14</td>
<td>1.89</td>
<td>.154</td>
</tr>
</tbody>
</table>

* p < .05
** p < .01
first hypothesis for girls. Results of an overall MANOVA for boys found no significant variance among the groups. The second hypothesis (that four-year-olds who display higher levels of play complexity adjust their play to meet the level of peers who display less complex play behaviors) was also confirmed for girls, not boys. Results of an overall MANOVA and a separate pairwise multivariate analysis for girls in Groups One (equally more-complex) and Two (unequally matched) confirmed the second hypothesis for girls. Results of an overall MANOVA for boys in Group One (equally more-complex), Two (unequally matched), and Three (equally less-complex) found no significant variance among the groups. The findings confirmed both hypotheses for girls but failed to confirm either hypothesis for boys. The findings are discussed in the chapter that follows.
### Table 11

Summary Results of Overall, Pairwise, and Univariate MANOVA Tests for Girls and Boys in Groups One, Two, and Three for Peer Collaboration (PC), Block Play Complexity (BP), and Communication (C)

<table>
<thead>
<tr>
<th>Hypothesis I</th>
<th>Hypothesis II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groups 2 and 3</td>
<td>Groups 1 and 2</td>
</tr>
<tr>
<td>(unequally matched for more- and less-complex play) and (equally less-complex play)</td>
<td>(unequally matched for more- and less-complex play) and (equally more-complex)</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td><strong>Girls</strong></td>
</tr>
<tr>
<td>Overall MANOVA</td>
<td>Overall MANOVA</td>
</tr>
<tr>
<td>[ p &lt; .031 ]</td>
<td>[ p &lt; .020 ]</td>
</tr>
<tr>
<td>Dependent variables</td>
<td>Dependent variables</td>
</tr>
<tr>
<td>PC</td>
<td>NS [ .359 ]</td>
</tr>
<tr>
<td>BP</td>
<td>* [ .013 ]</td>
</tr>
<tr>
<td>C</td>
<td>* [ .051 ]</td>
</tr>
</tbody>
</table>

**NS** = Not Significant

* = Significant at .05 level

** = Significant at .01 level
CHAPTER V

DISCUSSION

This study was designed to address the question, Do four-year-olds who display more-complex skills during constructive block play provide assistance to less-skilled partners? To answer this question, two hypotheses were examined. The first hypothesis, that less capable four-year-olds attain higher levels when engaged in play with peers who display more-complex levels of play was confirmed for girls, but not for boys. Results of the pairwise multivariate tests between girls in Group Two (unequal play levels) and Group Three (equally less-complex play) support the first hypotheses for girls but not for boys.

The second hypothesis, that children who display higher levels of play complexity adapt to the level of the play partner was also confirmed for girls but not for boys. Results of the pairwise multivariate tests between girls in Groups One (equally more-complex play) and Two (unequal play levels) support the second hypothesis for girls but not for boys.

Support for the Vygotskian construct of play as the actualization of the zone of proximal development was provided for girls but not for boys. The way in which this information contributes to and extends literature will be examined in the following section. In addition,
limitations, recommendations, and conclusions will be discussed.

**Contributions**

This study contributes to the literature in several ways. First, this study adds to our understanding of how boys and girls collaborate with peers. The findings of this study suggest that there are differences in the ways boys and girls play with peers who display different levels of play complexity. The behaviors displayed by girls when interfacing with a peer who was matched equally or unequally for play complexity level were different in a statistically significant way. In contrast, the behaviors displayed by boys when interfacing with a peer who was matched equally or unequally for play complexity level was not significantly different. Awareness of these differences is valuable for not only for the researcher but also for the practitioner.

Second, this study adds to our understanding of play, especially constructive play. Examining play as the zone of proximal development provides a new way of thinking about the relationship between play and peer mediation. Past studies of play typically examined correlations between play and other variables in the environment. Nicolopoulos (1991b) suggests that play is valuable in and of itself and should be studied as a separate entity. This was
accomplished in this study. A different lens was used to examine play and the peer interactions that occurred during play.

In addition, this study joins other studies that have examined constructive play with blocks. Given the sparsity of studies on constructive play with blocks, this study adds to our understanding of constructive play with blocks. In the past, many factors, especially theoretical orientation, have affected the dearth of research on constructive play (Christie & Johnson, 1987). Using Vygotsky's definition of play gives value and legitimacy to the examination of constructive play with blocks.

Further, this study also provides an additional empirical test of Vygotsky's theory. Due to his illness, Vygotsky concentrated on developing new areas of study rather than testing theories. This has led some of his critics to suggest that Vygotsky's theory is not a theory but rather a set of postulates strung together (Bidel, 1988; Nicolopoulou, 1991b). His work on play is a good example. Even though he wrote only twelve pages on the topic of play, there is a tremendous amount of information contained within those pages. Empirical testing of Vygotsky's theory provides legitimacy for his views (Overton, 1984).

This study extends and enhances our knowledge of peer collaboration, constructive play, and Vygotsky's theory.
There are, however, several limitations in this study. These will be examined next.

**Limitations**

The first concern involves the setting. The classroom used in Phase Two was familiar to several children in the study. This concern was addressed previously in the methods section. Prior to the play sessions, precautions were made to limit the effects of the room. The decision to use the room was based on the needs of the study, that is, available videotaping equipment, easy access to parents, facilities that allow parents to observe their children, and a classroom that resembled other preschool classrooms. Covering play areas in the room drastically altered the appearance of the room so that all children were presented with an equally different situation. Still, there may have been some residual effects for some children and this must be acknowledged as a limitation.

In addition, the sample was problematic in two distinct ways. First, participation was voluntary. This eliminated children of parents who refused to participate in the study. Samples of volunteers always present the possibility of a biased sample. This situation was also mentioned in the methods section. Given the difficulty in obtaining members for the study (See Subject Selection), a choice was made to
use the sample and acknowledge the limitation of a sample composed of volunteers.

Second, due to the stipulations of participating centers in Phase I, the sample was selected on the basis of two observations in the classroom. The limitation of time and measuring instruments may have provided an inaccurate assessment of the child's play level and this could have affected the overall results.

Age and developmental level of the sample also served as limiting factors. Since only four-year-olds were used in the study, these findings cannot be generalized to children who vary chronologically and developmentally. See methods section. Another concern exist in the gender of the members of the research team. Since the principle investigator and research assistants were female; the possibility of gender bias must be acknowledged.

In addition, the way in which parents and guardians talked to their children prior to the laboratory observation may have affected subsequent play. To thoroughly understand sociocultural influences, the context that occurred prior to play should have been investigated. Certainly, a difference in how girls and boys play with each other was found in this study. Did parents prepare girls and boys for the play differently? Past studies of gender have found conflicting results. For example, Rogers (1985) did not find gender
differences in constructive play among boys and girls who were paired together in a naturalistic setting. Also, a study of play completed by Rubin, Lynch, Coplan, Rose-Krasnor, and Booth (1994) also found results that were similar to those found by Rogers (1985). Specifically, Rubin et al., (1994) found that when unfamiliar girls and boys were paired in same sex dyads, boys and girls did not play in significantly different ways. In contrast, several scholars have found differences in the way boys and girls play (Fagot, 1974; Maccoby, 1990; O'Brien & Huston, 1985). Significant differences in both pretend play and communication used by boys and girls were reported by Jones and Glenn (1991). Even though the current study was not designed to examine gender differences; the current study supports the existence of gender differences during play.

These concerns do not affect the strength of the findings but should be considered when interpreting the results. Based on the contributions and limitations of this study, recommendations for future research are proposed in the following text.

**Recommendations**

Several areas need to be examined in future studies. First, age and gender need to be considered differently in future studies. Specifically, sample selection, which was
based on developmental and chronological level, limited the generalizability of the study. Sample selection was based on observations in Phase I. The sample selection process may have influenced the play of the children who were invited to play and may have contributed to the reported variance for girls but not for boys. This needs to be investigated. In addition, this study suggests that real differences exist in the ways boys and girls play with same gender peers who display different skill levels. There is, however, no way of knowing if the differences displayed by girls who played with girls would also have been evident in play with boys. Is there a difference in how girls and boys play with members of a different gender? Do boys and girls use different collaborative procedures when playing with members of the same sex? Under what circumstances and at what age does play actualize the zone of proximal development for boys? To answer these questions, the initial selection process should include mixed dyads of both younger and older boys and girls.

The second recommendation involves reexamining the design of this study. The way in which the play level of the peer affects play was not completely addressed in this study. In an attempt to capture the essence of play through multiple measures, MANOVA was conducted. One assumption of MANOVA is that data are collected independently. To meet
this assumption, the scores of the dyads were averaged together. The focus of the study was on the collective interaction of the dyad rather than on individuals. Future studies may want to focus on individual contributions as well as the interaction.

Summary

Validating the construct of play as the zone of proximal development is a necessary step in providing empirical support for Vygotsky's theory and a necessary part of theory building (Overton, 1984). Vygotsky postulated that play leads development. Changing the view of how play is perceived has the potential to redirect the focus of not only the research world, but also the classroom. If peers affect play (and girls and boys differently), then how can practitioners alter play so that all children benefit? Replication and continued investigation are needed.

Vygotsky's theory admonishes scientists to use a holistic approach when studying human development. Can scientists use empirical methods to examine sociocultural influences? Are additional methods and instruments for measurement needed? Additional studies of peer play through a sociohistorical perspective will provide answers as the dialogue initially started by Lev Semenovich Vygotskii (Russian spelling) continues.
References


at the biennial meeting of the Society for the Research in Child Development, Baltimore, MD.


guided participation in planning imaging errands with skilled adults or peer partners. Developmental Psychology, 27, 381-389.


Play as the Zone of Proximal Development


Play as the Zone of Proximal Development


Footnotes

1 As an experienced kindergarten teacher who has worked with children in unfamiliar situations for over a decade, it seemed logical that past expertise in interacting with children would enhance the quality of the study.
Appendix A

Letter to Center Directors/Teachers
Dear Center Director/Teacher,

We are conducting a study on block play in the preschool classroom and would like to involve the children in your center in this project. For this reason, we are requesting permission to work with teachers, parents and children in your center.

If you agree to participate in the study, we will send informed consent letters home to the parent(s) of selected children requesting permission for their inclusion in the study. Only classrooms with four-year-olds will be involved in the study.

The study will involve two parts. During the first part, the children who agree to participate in the study will be observed twice during their regular play time in the center classroom. For the second part, the children will be invited to play at the Virginia Tech Child Development Laboratory. They will be videotaped while playing with another child in the block corner.

No child will be forced to participate against their will. All children will be free to withdraw from the study at any time with no negative consequences. The collected data will be coded to ensure confidentiality. After the data is collected and analyzed, the information gained in the study will be made available to the centers, teachers, and parents.

This study has been approved by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University.

If you have any questions or concerns about this study, please contact us. Thank you for your cooperation.

Sincerely,

Dorothy J. Sluss
(429-5469)

Dr. Andrew Stremmel
(231-4671)
Appendix B

Letter to Parents/Guardians
Virginia Polytechnic Institute & State University
Parent and Child Consent Form

Date

Dear ____________,

We are conducting a study on block play in the preschool classroom. We are requesting your permission to include your child in the study. In addition, we are requesting your child's permission to participate in the study.

The study will involve two parts. During the first part, the children who agree to participate in the study will be observed twice during their regular play time in the center classroom. For the second part, selected children will be invited to play at the Virginia Tech Child Development Laboratory for an hour. Not all children who participate in part one of the study will participate in the second stage.

No child will be forced to participate against their will. All children will be free to withdraw from the study at any time with no negative consequences. The collected data will be coded to ensure confidentiality. After the data is collected and analyzed, the information gained in the study will be made available to the centers, teachers, and parents.

This study has been approved by the Institutional Review Board for projects involving human subjects at Virginia Polytechnic Institute and State University. If you agree to participate in the study, please sign the form on the following page. We are also requesting that you explain the study to your child so that your child may consider whether or not they want to join the study. Please sign on the appropriate lines to indicate that both you and your child have agreed to participate in the study. After you have signed the form, please retain this first page for your records and return the consent form which is on second page.

If you have any questions or concerns about this study, please contact us. Thank you for your cooperation.

Sincerely,

Dorothy J. Sluss
(553-6319)

Dr. Andrew Stremmel
(231-4671)

KEEP THIS PAGE FOR YOUR FILES. THANK YOU
Consent Form

Block play and Preschoolers

#_______

I acknowledge that I have been informed of the nature of this study and I understand that my child may withdraw from the study at any time. It is understood that the information will be kept confidential. I give consent for my child to participate in this study.

Name of child: __________________________________________

Name of parent: _________________________________________

Signature of parent: ________________________________

Address: _____________________________________________

_______________________________________________

Phone: _____________________________________________

I also acknowledge that I have been informed of the nature of this study and I have explained the study to my child. My child realizes that she/he may withdraw from the study at any time and there will be no negative consequences. My child has agreed to participate in this study.

Signature of parent ____________________________________

Signature of child ____________________________________
(or Parent for child)

Please return to your child's teacher by ____________.

THANK YOU
Appendix C

Sample Selection Criteria
Sample Selection Criteria

<table>
<thead>
<tr>
<th>Group</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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<td>HM</td>
<td>HF</td>
<td>HM</td>
<td>HF</td>
<td>HM</td>
<td>HF</td>
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</tr>
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<td>HF</td>
<td>HM</td>
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<td>LM</td>
<td>LF</td>
<td>LM</td>
<td>LF</td>
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Group distribution

L= LOWER QUARTILE  
H= HIGHER QUARTILE  
F= FEMALE  
M= MALE

<table>
<thead>
<tr>
<th></th>
<th>MALE</th>
<th>FEMALE</th>
<th>TOTAL COUNT</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIGH/HIGH</td>
<td>4 DYADS</td>
<td>4 DYADS</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1HM/6HM</td>
<td>1HF/6HF</td>
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<tr>
<td></td>
<td>2HM/5HM</td>
<td>2HF/5HF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3HM/4HM</td>
<td>3HF/4HF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1HM/2HM</td>
<td>1HF/2HF</td>
<td></td>
</tr>
<tr>
<td>LOW/LOW</td>
<td>4 DYADS</td>
<td>4 DYADS</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1LM/6LM</td>
<td>1LF/6LF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2LM/5LM</td>
<td>2LF/5LF</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3LM/4LM</td>
<td>3LF/4LF</td>
<td></td>
</tr>
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<td>1LM/2LM</td>
<td>1LF/2LF</td>
<td></td>
</tr>
<tr>
<td>HIGH/LOW</td>
<td>3HM/6LM</td>
<td>3HF/6LF</td>
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</tr>
<tr>
<td></td>
<td>4HM/5LM</td>
<td>4HF/5LF</td>
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<td>5HF/4LF</td>
<td></td>
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<tr>
<td></td>
<td>6HM/3LM</td>
<td>6HF/3LF</td>
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<tr>
<td>TOTAL</td>
<td>24</td>
<td>24</td>
<td>48</td>
</tr>
</tbody>
</table>

Dyad assignment

Numbers 1,2,3,4,5,6 refer to the group  
L= LOWER QUARTILE  
H= HIGHER QUARTILE  
F= FEMALE  
M= MALE
Appendix D

Play-Observation Scale
Sociocognitive subscales used in Play Observation Scale
(Rogers & Sawyer, 1988, p.20; Rubin et al., 1976, p. 414;
Rubin, 1989)

(Definitions used in the study are listed below. The actual
instrument, the Play Observation Scale, may be obtained by
contacting the author, K. Rubin, at the University of
Waterloo, Waterloo, Canada.)

Non-play
1. Unoccupied— Children watch others at play
but do not enter the play. Unoccupied children
may just stand around or move about the area.

2. Onlooker— Children watch others play, may
talk to them or ask questions, and seem to move
closer to a group, rather than watching
whatever momentarily catches their attention.

Subscale for solitary play
(a) Solitary-functional: A child plays alone
with objects. Even if the child is within
speaking distance of others, the child does not
alter her of his play, or interact with the
others. The child uses simple repetitive muscle
movements with or without objects.

(b) Solitary-constructive: A child plays alone with
objects. Even if the child is within speaking distance
of others, the child does not alter her of his play, or
interact with the others. The child manipulates
objects to construct or to "create" something;

(c) Solitary-dramatic: A child plays alone with
objects. Even if the child is within speaking
distance of others, the child does not alter
their play, or interact with the others. The
child's play involves the substitution of an
imaginary situation to satisfy the child's
personal wishes and needs

Subscale for parallel play
(a) Parallel-functional: A child plays with
toys like those used by nearby children. The child
does not try to influence the other children's
activities. "He plays beside rather than with the other
children" (Parten, 1932, p. 250). The child uses
simple repetitive muscle movements with or without
objects.
(b) **Parallel-constructive:** A child plays with toys like those used by nearby children. The child does not try to influence the other children's activities. "He plays beside rather than with the other children" (Parten, 1932, p. 250). The child manipulates objects to construct or to 'create' something.

(c) **Parallel-dramatic:** A child plays with toys like those used by nearby children. The child does not try to influence the other children's activities. 'He plays beside rather than with the other children' (Parten, 1932, p. 250). The child engages in the substitution of an imaginary situation to satisfy their personal wishes and needs.

**Subscale for associative play**
(a) **Associative-functional:** Common activities occur between children. They may exchange toys and/or follow one another. Although all the children in the group are doing similar activities, specific roles are not defined, and there is no organized goal (such as building or playing a game with rules). The child uses simple repetitive muscle movements with or without objects.

(b) **associative-constructive:** Common activities occur between children. They may exchange toys and/or follow one another. Although all the children in the group are doing similar activities, specific roles are not defined, and there is no organized goal (such as building or playing a game with rules). The child manipulates objects to construct or to "create" something;

(c) **associative-dramatic:** Common activities occur between children. They may exchange toys and/or follow one another. Although all the children in the group are doing similar activities, specific roles are not defined, and there is no organized goal (such as building or playing a game with rules). The child substitutes an imaginary situation to satisfy his/her personal wishes and needs.

**Subscale for cooperative play**
(a) **Cooperative-constructive:** Children cooperate with others to construct something, hold competitions, produce dramas with coordinated roles, or play games with formal rules. Group membership is defined, usually by one or two powerful leaders. The child
manipulates objects to construct or to "create" something.

(b) **Cooperative-dramatic**: Children cooperate with others to construct something, hold competitions, produce dramas with coordinated roles, or play games with formal rules. Group membership is defined, usually by one or two powerful leaders. Substitution of an imaginary situation to satisfy the child's personal wishes and needs.

(c) **Cooperative-games**: Children cooperate with others to construct something, hold competitions, produce dramas with coordinated roles, or play games with formal rules. Group membership is defined, usually by one or two powerful leaders. During cooperative games, acceptance of prearranged rules and adjustment to these rules is observed.
Appendix E
Parten's Play Scale
Parten's scale of social participation (Rogers & Sawyers, 1988, p. 20).

1. **Unoccupied**—Children watch others at play but do not enter the play. Unoccupied children just stand around or move about the area.

2. **Onlooker**—Children watch others play, may talk to them or ask questions, and seem to move close to a group, rather than watching what ever momentarily catches their attention.

3. **Solitary independent play**—A child plays alone with objects. Even if the child is within speaking distance of others, the child does not alter her of his play, or interact with the others.

4. **Parallel activity**—A child plays with toys like those used by nearby children. The child does not try to influence the other children's activities. "He plays beside rather than with the other children" (Parten, 1932, p. 250)

5. **Associative play**—Common activities occur between children. They may exchange toys and/or follow one another. Although all the children in the group are doing similar activities, specific roles are not defined, and there is no organized goal (such as building or playing a game with rules).

6. **Cooperative or organized supplementary play**—Children cooperate with others to construct something, hold competitions, produce dramas with coordinated roles, or play games with formal rules. Group membership is defined, usually by one or two powerful leaders. (p.20)
Appendix F

Blocks used in Phase Two
Blocks

<table>
<thead>
<tr>
<th>Item</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nine large hollow blocks</td>
<td>24&quot; x 12&quot; x 6&quot;</td>
</tr>
<tr>
<td>Twelve medium hollow blocks</td>
<td>12&quot; x 12&quot; x 6&quot;</td>
</tr>
<tr>
<td>Six small hollow blocks</td>
<td>6&quot; x 12&quot; x 6&quot;</td>
</tr>
<tr>
<td>Two hollow triangle blocks</td>
<td>24&quot; x 12&quot;-4&quot; x 6&quot;</td>
</tr>
<tr>
<td>(Half of a large hollow block)</td>
<td></td>
</tr>
<tr>
<td>Sixteen cardboard cylinders</td>
<td>24&quot; x 6&quot;</td>
</tr>
<tr>
<td>Six wooden planks</td>
<td>24&quot; x 4&quot; x 1&quot;</td>
</tr>
<tr>
<td>Two wooden planks</td>
<td>6' x 4&quot; x 1&quot;</td>
</tr>
</tbody>
</table>

Sixteen quadruple unit blocks                    | 21" x 2 3/4" x 1 3/8"
Forty-seven double-unit blocks                   | 12" x 2 3/4" x 1 3/8"
Eighty-four unit blocks                          | 5 1/4" x 2 3/4" x 1 3/8"
Twenty-nine half-unit blocks                      | 2 1/2" x 2 3/4" x 1 3/8"

Five triangles (1/2 of a unit)                    |
Five triangles (1/2 of a half-unit)               |
Five triangles (1/2 of a block: 5 1/2 by 5 1/2)   |
Five large cylinders                              |
Five small cylinders                              |

One arch with 6" vertical archway                |
Six tracks                                       |
Three doors                                      |
Three windows                                    |
Two Ys                                          |
Two Xs                                          |
One small replica of person                      |
Two archways with inserts                         |
Two archs                                        |
Six archs                                        |

Nine wooden cylinders                            |
Three wooden cylinders                            |
Two wooden cylinders                              |

Twenty-three wooden blocks                        | 1" x 1" x 6"
Thirteen wooden blocks                           | 1" x 1" x 3"
Appendix G

Block Complexity Scale
I. Block Complexity
   A. Hierarchical integration (Reifel & Greenfield, 1982, p. 209)

   Level 0  No true integration
   Level 1  At least one block is used to tie together or span other blocks
   Level 1a. simple integrations arches or bridges on same plane, enclosures
   Level 1b. complexity increases arches or bridges may be on two nonparallel planes
   Level 2  At least two arches or bridges are joined together by one other block

B. Dimensionality (Reifel & Greenfield, 1982)
   Level 0 No dimensions  one block or geometric point
   Level 1 One dimension  Linear patterns that are either vertical or horizontal
   Level 2 Two dimensions  If at least three blocks are placed so that two lines or one plane exists. Bidirectional use of blocks.
   Level 3 Three dimensions  If the blocks are placed together to form at least one plane plus one line which is actually two planes

C. Symbolic play based on Vygotsky (Vygotsky, 1932, 1978; Sluss, 1996)

   Level 0. Presymbolism  The block is used as a block. The child carries or stacks the blocks. No symbolism is observed.

   Level 1. First level symbolism  Reproduction of reality. The child uses the blocks to reproduce a table in the room, a house, or a school bus.

   Level 2. Second level symbolism  The object is transformed. The child builds a space shuttle, a pirate ship, or a candy machine.
Appendix H

Communication Scale
COMMUNICATION SCALE

Subscales described by Corsaro (1986) and utilized by Farver (1991, p. 58).

1. **Paralinguistic cues**: Changes in intonation and pitch to mark fantasy and the animation of objects. For example, the "vroom vroom" sounds of toy rocket.

2. **Descriptions of action**: Declarative statements accompanying ongoing activity or describing past or future action. For example, the child says, "I'm riding on a bus," as they sit on a block.

3. **Repetition**: Repeating a partner's prior utterances.

4. **Semantic tying**: Adding new semantic elements to partner's previous contribution. For example, the child says, "It's a building." and the second child says, "It's a tall building."

5. **Calls for attention**: Utterances used to gain partner's attention. These include the partner's name, "Hey!"

6. **Directives**: Declarative used to control partner's action, for example, "Do this!"

7. **Tags**: Verbal devices placed at the end of a conversational turn to elicit a response or acknowledge. These include, "We're playing pirates, aren't we?"
VITA

Dorothy Justus Sluss, granddaughter of Mary Ramsey Justus and daughter of Monroe and Mildred Dotson Justus, was born in Hurley, Virginia, on August 2, 1951. Educated in the public schools of Buchanan county, she graduated from Hurley High School in 1969. Her college career began at Southwest Virginia Community College in Richlands, Virginia, and extended to Clinch Valley College at Wise, Virginia, where she obtained a Bachelor of Science degree in Elementary Education in 1978.

Professional employment began in 1978 in the public schools of Russell County and continued in Wise County until 1991. During this time, she completed a M. S. degree from the College of Education at Virginia polytechnic Institute and State University at Blacksburg, Virginia.

In 1990, she entered the doctoral program in the College of Department of Family and Child Development. In 1994, she accepted the position of Visiting Assistant Professor of Education at Emory & Henry College. The following year, she joined the faculty of East Tennessee State University as Assistant Professor of Early Childhood Education. She completed requirements for the Ph. D. degree in Child Development at Virginia Tech on December 13, 1995.

Dorothy is married to J. Roger Sluss, Sr. and they have one son, James R. Sluss II. Dorothy Louise Justus Sluss