INTER-SUBJECTIVITY AND COLLABORATIVE COMPLEXITY: EFFECTS OF PEER INTERACTION AND CONTEXT IN HEAD START CLASSROOMS

by

REBECCA R. GARTE

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

2010

Approval Page

This manuscript has been read and accepted for the
Graduate Faculty in Psychology in satisfaction of the
dissertation requirement for the degree of Doctor of Philosophy.

Anna Stetsenko

Date — Chair of Examining Committee

Maureen O'Connor

Date — Executive Officer

Deborah Veitze

Jaqueline Shannon

Joe Glick

Daisuke Akiba

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

INTER-SUBJECTIVITY AND COLLABORATIVE COMPLEXITY

by

Rebecca R. Garte

Adviser: Professor Anna Stetsenko

This study provides an assessment paradigm for examining the quality of children's experiences in preschool. In particular, it focused on peer interactions, as assessed by two measures: peer inter-subjectivity and collaborative complexity. To further understand the relationship between these measures peer interactions were analyzed as nested in activity areas through hierarchical linear modeling. Teacher interactions with the peer group and environmental flexibility of the activity area were also used to explain the relationship between the peer interaction measures.

Results showed that the construct of inter-subjectivity was multi-dimensional for this population and sensitive to the immediate social and material context. Higher levels of peer inter-subjectivity were found to predict longer play interactions and greater collaborative complexity. The HLM models also showed that peer interactions varied as a function of activity area, and that environmental flexibility explained some of these differences. In addition, it was found that teacher interactions moderated the relationship between inter-subjectivity and collaborative complexity. In the majority of cases teacher intervention weakened this relationship and had a negative effect on inter-subjectivity levels.

In conclusion these results show the theoretical concept of inter-subjectivity to be a valid and useful measurement construct for assessing preschool peer interactions. In addition, the results show that assessments of early childhood education may want to pay more attention to the micro-contexts of the preschool day in order to capture those aspects most salient for children's development. Given that this study was done with a low income sample, it is interesting to note that many of the same findings regarding middle class preschoolers in terms of peer interactions and play were replicated.

Future research may want to explore different populations of preschoolers to determine whether the same dimensions of inter-subjectivity are found. In addition, it would be useful to see whether the social skills assessed in this study are linked to concurrent or longitudinal outcomes in related domains of development.

Acknowledgments

I would like to thank my committee, especially my adviser, Dr. Anna Stetsenko and my committee member Dr. Deborah Vietze, for their extensive feedback on multiple drafts of this thesis. I would also like to thank my research assistants: Aisha Francis, Yamillette Hernandez, and Yubelky Rodriguez, without whom this would not have been remotely possible. I would especially like to thank all the children and teachers who participated in this study. I enjoyed every minute of being with you and sharing your daily experiences. I would also like to thank all my friends and colleagues in academia who offered me tremendous emotional and intellectual support. Finally, I would like to thank the children and families of PS 185 who gave me the initial inspiration, passion and determination to work on behalf of all brilliant and beautiful poor children and families. My memories of our time together will continue to spur me on throughout my career and I promise that I will never forget your struggles as I continue to strive on your behalf. And lastly I would like to thank my fiancée, Jocelyn Azandossessi, you always came through when it mattered the most, your support of me shockingly passionate and never taken fore granted.

List of Tables

List of Figures

Theoretical Framework of the Construct of Inter-subjectivity

The term inter-subjectivity denotes a psychological construct that bridges two foci of theory and research. Evidence supporting the socially situated nature of human development is implicated in the construct which describes an inter-psychological process, one that is shared between people. Similarly the topic of subjectivity; an individual's way of perceiving and interpreting the world, is addressed in the definition of inter-subjectivity as two or more people who are interpreting the world together from a shared perspective.

Socio-Cultural and Activity Based Approach to Cognition

Research in the socio-cultural approach to child development has provided much evidence of the primacy of the social in children's thinking and learning (Lucariello, Hudson, Fivush & Bauer, 2004; Rogoff, 2003). From a Vygotskian perspective, research has proceeded from the assumption that cognitive development begins with the external, social plane and is gradually internalized by the individual to form the basis of internal thought. Vygotsky's (1979/1986) theory seeks to explain the process by which language and other cultural tools, (provided by the social context) mediate learning and transform external social interaction into internal cognition over the course of development. Inter-subjectivity describes a certain type of social interaction in which the interacting partners are ideally in tune with each other. Therefore theorizing inter-subjectivity requires a focus on the social interaction as it unfolds between interacting partners, irrespective of the individual internalization that may occur as a result of the interaction.

Research in the socio-cultural approach to cognition has demonstrated how interactions between novices and experts provide gains in individual learning for both partners (Forman & McPhail, 1993). However, research on the individual subjectivities of young children, such as

their understanding of theory of mind, memory, information processing, perspective taking, and understanding of emotions, often ignores the role of social interaction in forming individual development and follows an individualistic, mentalist paradigm (Flavell, 2004). This perspective assumes that children's social-cognition, or understanding of themselves and others is based in their own individual theorizing, or in an intellectual comparison between themselves and others i.e., simulationist (see Flavell, 2004 for review). Such views consider young children to be constructing knowledge about the social world on their own, separated from the social interactions in which they participate. Contrary to this assumption, research on the developmental characteristics of young children shows that their development proceeds from direct experience with the social and material world and that their understanding of phenomena, especially of the social world, are constructed within the particular contexts in which they are experienced (Rogoff, 2003; Vygotsky, 1979).

Research in language development further demonstrates the functional basis of children's development during early childhood. This research shows that children's language development is best understood in the context of children's communicative intent. Rather than learning word meanings through an internal cognitive process, language is learned as children use it, within a social context (Bruner, 1996; Nelson and Fivush, 2004).

Although the socio-cultural perspective has demonstrated that social and linguistic development is best assessed within social contexts, these contexts are often limited to parent-child or teacher-child situations. Research on peer interactions in early childhood often starts with the assumption that each peer brings their own individual subjectivity to the interaction and these subjectivities are then negotiated to allow for an interaction. Such assumptions are clear in methodology assessing preschooler's and kindergartener's friendships (Hanish,

Barcelo, Martin, Fabes, Holmwell & Palermo, 2007; Howes, 1988; Lamb, Birch &Bus, 1999), and social competence (see review in Brown, Odom & Holcomb, 1996). Although the term inter-subjectivity implies a bridge between individual subjectivities that occurs when they are shared, it is up to debate whether inter-subjectivity is a unique phenomenon that emerges from the interactive process or is simply the sum of two or more subjectivities being negotiated. One of the main conceptualizations of inter-subjectivity mirrors this latter view. Trevarthen & Aiken's (2001) theory of inter-subjectivity considers it to be the result of infant capacities, which are supported by the parent. Rather than sharing a perspective, infants learn to match their attention to that of their parent. Studies which begin their investigation of peer interactions with assessments of individual children fall into the same theoretical paradigm (See review by Gifford-Smith & Brownell, 2003).

On the other hand, research based in a view of development as shared practice or mutual participation reflects the Vygotskian principle that cognitive development derives meaning through its use within a social context. In particular, social knowledge cannot be divorced from the psychological and emotional connection that develops between people over the course of an interaction. According to this premise inter-subjectivity is seen as emergent in the interaction and inseparable from the particular situation in which it is developing. With this definition, inter-subjectivity becomes the site of social knowledge within the ongoing interaction, dynamically related to and reflective of the interaction itself. Activity theory (Leontiev, 1978) further locates knowledge, including social knowledge, as external to the individual mind, by situating the interaction within and around the activity. The nature of the shared activity, including its meaning and value to the actors, serves to both define and be defined by the social interaction (Stetsenko, 2005). Empirical support for this view comes

from research that shows parent child interactions to vary significantly, in terms of emotion, collaboration and joint problem solving depending on the nature of the activity (Perez & Gauvain, 2009). Cultural historical activity theory adds to this idea by showing that the meanings of daily activities are determined by their use, which develops and is agreed upon through social interactions tied to the larger socio-cultural context. Therefore the activity, the social interaction and the inter-subjectivity that develops are in a state of continuous multi-directional influence, each transforming and defining the other. According to this model, the study of young children's subjectivity, i.e., social understanding is re-conceptualized as the study of *inter-subjectivity*, which is rooted in the concrete experience of shared activity.

Empirical research supports the view that activity based inter-subjectivity, rather than individual subjectivity is a developmentally valid paradigm for assessing young children's social understanding. Research in children's initial understanding of mind has been conducted along two lines. One reflects a socio-cultural approach in which knowledge of mental processes are thought to develop via relationships with parents mainly through conversations about such processes (Nelson, 2007). The other approach uses an experimental paradigm to assess children's understandings of mind and claims that such understanding occurs as a result of individual cognitive processing (Flavell, 2004. However the findings regarding individual differences in children's understanding of mind support the socio-cultural explanation. This research shows that children's knowledge of mind is significantly influenced by exposure to communication regarding internal states by parents (Fernyhough, Wainwright, Gupta, & Tuckey, 2002; Lemche, Kreppner & Joraschy, 2007) and teachers (Kienbaum, Volland & Ulich, 2001; Lucariello, et al., 2004). Although experimental findings show that a full understanding of the intentions and emotions of others is limited during early childhood

(Astington & Pelletier, 1996; Flavell, 2004), naturalistic studies have found children as young as two years old capable of demonstrating empathy (Kochanska,1997) and have found evidence that 3 and 4 year olds are capable of more advanced social understanding during naturally occuring social interactions than that evidenced in experimental settings (Ontai & Thompson, 2002). The question of what qualifies as understanding of mind during early childhood has been raised by studies which show a difference in children's use of mentalist terms and their comprehension of those terms (Lucariello, 2004), as well as differences between 3 and 4 year olds expressed lack of empathy with a peer "victim" during experimental situations (Arsenio & Kramer, 1992) versus their expressed empathy with peers during naturalistic settings (Johnson, 2008; Kochanska, 1997). Additional research has found that children's understanding of belief and emotion is related to talk about each of these "mind" concepts in relation to direct observations and experiences rather than exposure to mentalistic terms per se (Racine & Carpendale, 2007). This evidence suggests that young children's social understanding relates to an emergent understanding of the psychological world as it is directly experienced by them rather than as a purely cognitive process that occurs separately from ongoing social interactions. This finding is consistent with what is known about the constraints on young children's thinking. For example the Piagetian pre-operational stage demonstrates that during early childhood children's knowledge is based in direct experience, and excludes the ability to generalize or to extract logical principles from concrete experiences. Therefore social understanding, as other domains of understanding, must be tied to the concrete experiences that elicit such understanding, namely social interactions, and cannot expect to be carried in the young child's mind as more general principles from one social experience to another. Such a view is supported by Racine &

Campbell's (2007) argument that infant joint attention emerges from the particular shared practices in which they engage rather than pre-determined capacities for social understanding.

The Contextualized Approach to Language and Social Development

The importance of context for providing the basis for knowledge in use has long been argued by functionalist accounts of development. In particular, research in language development has shown that primary language acquisition is contingent on language expression for a meaningful purpose (Nelson, 2007). According to this research, children learn language embedded within a social purpose. Therefore, children's language development varies by the nature of the interactive contexts in which they use it. Since young children's thinking is tied to concrete experiences, their communication is often tied to immediate situations and activities (Piaget, 1971). Research on language development in early childhood has found that children aged 2 to 5 years regularly use contextual supports for their expressive communication. In particular, concrete referents, (i.e., objects), are often necessary for communication with peers (Cazden, 2001; Roskos & Neumann, 1998). Consistent with evidence that children use certain types of language to support play interactions, the linguist, Halliday (1976) has identified 6 distinct language functions that describe young children's communicative intent. Halliday argues that assessing the communicative competence of young children requires a focus on the effectiveness of the child's utterances for a particular purpose. Therefore, during early childhood, assessment of children's linguistic competence cannot be divorced from either the social or the activity context. Language as a purely symbolic system cannot be understood by the pre-logical child. However, language as a tool may be used more or less successfully within various contexts. Therefore, it is necessary to consider language development in early childhood as a tool of the

dynamic interactions between the child and their social partners, whose meaning is tied to a shared activity, rather than solely as an indicator of individual children's capacities. This view of early childhood language development is similar to the socio-cultural view of early childhood social understanding. Given that language is generally used as an indicator in studies of children's social understanding, a shift to assessing either language or social development through interactions would trigger a similar shift in the means of assessing the other.

In early childhood, the social context of peer interactions has been shown to be highly influenced by the larger setting. For example young children often require adult intervention in expressing themselves with peers, especially during conflict (Girolametto, Weitzman & Greenberg, 2004). Consistent with this, Halliday has found that different environmental settings elicit different language functions among children. In addition types of pretend play have been found to vary with different areas of the classroom (Howe, Moller, Chamber & Petrakos, 1993), as well as between indoor and outdoor settings (Shim, Herwig, & Shelley, 2001). This evidence suggests that context, for young children, is not limited to the immediate social interaction and the shared activity, but must include attention to the larger setting, including the physical environment and adult support.

The Developmental Context of Play

Variations in context can elicit greater or lesser competence among children in both linguistic and social domains. The context of pretend play provides unique developmental supports which allow for a higher complexity of both language and social understanding in use (Goncu, 2002).

Since pretend play exists in the realm of fantasy, it is necessary for the players to agree on the symbolic rather than the actual meaning of events, objects and terminology in order to participate in the shared fantasy. Researchers in this area have developed categories of meta-communication used by preschoolers to achieve this inter-subjective meaning and have investigated developmental differences in their use (Goncu, 1999; Sawyer, 1997). Meta-communication refers to talk about what things mean, (i.e., language about language). For example, if a child says "pretend this is a baby bed", they are establishing a newly created label for the object that will determine its meaning. In this case, the signifier replaces the object as the basis for meaning. Therefore, the play activity allows for a form of inter-subjectivity that is based in mutual perspective taking and supported by de-contextualized language; a form of social interaction and language use that is characteristic of older children and adults. Through the contextual supports provided by the play activity, young children's inter-subjective behavior is able to transcend their developmental constraints. However, this inter-subjectivity is entirely contingent on the shared practice of pretend play as well as the material and social context of the classroom, (e.g., objects, physical arrangement and adult support).

The context contingent behavior that occurs during pretend play has been termed "inter-subjectivity" by researchers in the area, because it demonstrates an ability of young children to use de-contextualized language to create shared meanings. The inter-subjectivity that occurs during pretend play emerges from the social interaction and the shared activity while each of these emerges from the establishment of shared meanings via inter-subjectivity (see review by Goncu, Patt and Kouba, 2002).

Findings indicate that both the categories of communication and the resulting complexity of pretend play change between the ages of 3 and 4. Complexity was defined by the extent to which the play was "cooperative" rather than "associative" or "parallel", (for category definitions see Smilansky, 1968, and Rubin, 2001) Four year olds used more representational meta-communication whereas 3 year olds used more bids for attention. Older children, i.e., 6 year olds, engaged in the same frequency of pretend play as 4 year olds but devoted less time to coordination and more to representational talk. This is consistent with developmental differences found in a study of siblings pretend play (Howe, Petrakos, Rinaldi & LeFebvre, 2005). In this study, dyads with greater inter-subjectivity, defined as better strategies to establish shared meaning, also used more pretense and internal state language, two indicators of social understanding. These studies all suggest that there is a strong relationship between inter-subjectivity and social understanding as developed within the context of pretend play.

Developmental Context of Peer Interactions

An assessment of social understanding in use during early childhood requires the interaction, rather than the individual, to be used as the unit of analysis. Although adult-child interactions have often been the social context for the assessment of social and language development, these asymmetrical partnerships cannot yield a complete picture of children's social understanding in use, since the child's demonstration of understanding is guided by the adult's expertise. Peer interactions, on the other hand, provide a view of children's social understanding in use as it emerges during the course of the interaction with an equal partner. Indeed there is evidence that peer interactions provide a unique context for assessing inter-subjectivity. In observational studies, children as young as two years old, who do not

demonstrate any understanding of the social world in other contexts have shown an ability to coordinate behavior with peers and to maintain peer interactions across multiple classroom settings (Brownell, Ramani & Zerwas, 2006). In studies of peer teaching, children as young as 4 have shown an increase in skill as a result of working with an expert same age peer to complete a task (Fawcett & Garton, 2005). Conceptual shifts towards increasing complexity happened in older children's thinking as a result of discussion with peers (Kumpulanen & Kaartinen, 2003). The research on peer pretend play discussed previously supports the importance of the peer interactive context for assessing young children's social understanding in use.

It is clear from the above discussion that early childhood inter-subjectivity occurs within peer interactions and around shared activity, however, the question of when such inter-subjectivity comes into being remains. The individualist paradigm of social understanding assumes that children bring a pre-existing set of social concepts and skills to every social interaction they experience. However, the idea that the interaction, the activity and the inter-subjectivity are mutually constitutive suggests that the elements of inter-subjectivity cannot exist prior to the interaction. According to the traditional model of play assessment, the type of interactivity characterizing an interaction is viewed as a static category that describes the interaction in total. Categories of young children's play have historically assessed the extent to which play episodes are cooperative and social (Smilanksy, 1968). However, new research challenges the notion that play episodes can be classified as either cooperative, and thus more socially complex, or parallel/ associative and thus less socially complex. This research used new methods to show moments of each of the categories occurring within a single episode of play (Robinson, Anderson, Porter, Hart & Wouden-Miller, 2003). Using log-linear analysis,

the study demonstrated that the interactive component of the play developed over the course of the episode, beginning in onlooker, then parallel and finally cooperative play. This suggests that since interactivity develops as a function of unfolding play, inter-subjectivity would develop similarly, in conjunction with increasing interaction. Consistent with the view of inter-subjectivity as emergent in the interaction is evidence that peers increased their conceptual alignment, goal sharing and reciprocal elaboration according to a sequential and increasingly collaborative process during a joint problem solving activity (Bearison & Dorval, 2001). Additional research showed that peers increasingly aligned their perspectives during shared participation in a task (Fawcet & Garton, 2005) and during extended conversation among older peers (Forman, Minick & Stone, 2004). Therefore, empirical evidence supports the view of inter-subjectivity as emergent in the interaction, developing from its particular elements, rather than as a constant that can be used to label an interaction in its entirety. This view is consistent with a definition of inter-subjectivity as embedded within and emergent from the unfolding interaction and the shared activity.

Dimensionality of Inter-subjectivity

Current theories of inter-subjectivity focus on one or another developmental domain such as cognitive, emotional, social, language or physical. However, in focusing primarily on one or another domain, the possibility that inter-subjectivity may be a multi-dimensional construct comprising many domains of development is excluded. Psycho-analytic writings focus on the emotional dimensions, in which inter-subjectivity is strongly tied to empathy and emotional reciprocity between interacting partners (Johnson, 2008). Developmental research tends to focus on the cognitive (Trevarthen & Aiken, 2001) and linguistic (Goncu, Patt & Kouba 2002) dimensions. For example Trevarthen and Aiken (2001), suggest two

developmentally sequential types of inter-subjectivity: primary and secondary inter-subjectivity. Primary inter-subjectivity is defined as joint attention between infant and parent, wherein the infant matches their attention, assessed via gaze following and eye-contact, to the parent. Secondary inter-subjectivity describes an interaction in which an object or activity is added. With the introduction of the object the older infant is able to coordinate action sequences and object references with the parent. On this view inter-subjectivity is based in joint attention which develops into shared tasks. This falls primarily into the cognitive domain of infant development. Criticism of this view claims the assumption that developmentally determined capacities allow for inter-subjectivity ignores the importance of shared practices in shaping the inter-subjectivity within the context of meaningful social interactions (Racine & Campbell, 2007). The collaborative cognition literature focuses exclusively on mutual perspective taking and conceptual alignment. However this literature is primarily addressed to older children who are more capable of attention and emotion regulation than preschoolers, as well as being able to draw logical conclusions that are detached from concrete experiences. The preschool play literature, bases its theory of inter-subjectivity in language and symbolic thought (Goncu, Patt and Kouba, 2002). While the domains of language and cognition are the basis for defining inter-subjectivity as the establishment of shared meanings, the shared meanings developed during pretend play cannot be separated from the social and emotional dimensions of the peer interactions in which they unfold.

Bowlby's (1965) theory of the gradual mutuality that develops between parent and child overlaps conceptually with the construct of inter-subjectivity. During early childhood Bowlby describes a goal-corrected partnership; in which the child and parent make adjustments to their own behavior in order to accommodate each other's goals. The conceptualization of this

partnership combines both emotional and cognitive dimensions as both must be aligned in order to be successful.

Among the above mentioned theories of inter-subjectivity there is little mention of a bodily dimension. The alignment of body rhythms and physical states is not included in Trevarthen's theory of inter-subjectivity, defined as an infant's increasing ability to match their responses to their mother's attention cues. However, if inter-subjectivity is emergent in the interaction, it is likely that attention based inter-subjectivity reflects the nature of a certain type of interaction while other types of interaction may elicit inter-subjectivity in different forms, even among infants. Indeed research with borderline disordered mothers showed that infants attempted to synchronize their own bodily and rhythmic states with those of the mothers. In these cases, in the absence of maternal support, an alignment of the infant's emotional and bodily states with that of the mothers' was observed, while joint attention was not (Bateman & Fonagy, 2004). Colloquial examples describe inter-subjectivity as an embodied state as well as one that may include cognitive and emotional dimensions. Rommetviet (1979) and Fuchs and De Jaegher (2009) describe the alignment of body rhythms, respiration, and other physical dimensions that comprise reciprocity and mutuality between individuals during a tennis match, working on an assembly line or while playing in a musical group. In analyzing the basis for young children's moral behavior, inter-subjectivity is discussed as experiencing the other through the totality of their "life-world" including the lived body, emotions and actions (Johnson, 2008). Rasmussen, cited in Johnson, (2008) describes children's play as a rhythmic dance, saying, "There is an implicit, mutual and bodily understanding between the children". This description of inter-subjectivity is reminiscent of

Vygotsky's (1986) description in Thought and Language, which highlights the non-cognitive, non-linguistic dimension that defines inter-subjectivity as pure understanding between people.

The concepts of "participatory sense making" and "mutual incorporation" have been described as consistent with a multi-dimensional conceptualization of inter-subjectivity (Fuchs & De Jaegher, 2008). These concepts describe social coordination which is centered on shared activity that develops a common meaning during the course of an interaction. This coordination includes: attention, emotion, body rhythms, verbal and non-verbal communication.

In considering the age typical social behavior of preschoolers, along with the importance of material and social support for interactive play it is likely that the action dimensions of inter-subjectivity would be frequently observed among this age group. Furthermore, given the developmental constraints on preschoolers' social understanding, a definition of inter-subjectivity based primarily in perspective taking ability would be unlikely to have validity for the age.

Among older children and adults inter-subjectivity may exist entirely in the form of a conversation in which ideas, perspectives, emotion and knowledge are negotiated then shared in an exclusively discursive context (Rommetviet, 1979). The developmental progression of inter-subjectivity shows the form in which people engage to become increasingly representational with the advent of greater perspective taking and socio-linguistic skill. However, young children's peer interactions do not include much de-contextualized language or social interaction based in knowledge or perspective exchange that is unrelated to immediate experience. Therefore, models of inter-subjectivity that are situated in shared

activity and inclusive of multiple dimensions, including attention, emotion, physical and even conflict domains are most valid for this developmental context.

Inter-subjectivity as an Indicator of Social Competence

A study of preschool peer inter-subjectivity must take into account current research on young children's social development. This research has found much variation between children on measures of social competency. There is a significant relationship between social competence during peer interactions and other concurrent and long-term outcomes including those related to academic achievement (Gifford-Smith & Brownel, 2003; Ladd, Birch & Bus, 1999). These relationships have been found particularly salient for low income children (Miles & Stipek, 2006). Low income preschoolers' social competence with peers has been shown to predict their school readiness and other adjustment outcomes (Bulotsky-Shearer & Mcdermott, 2008; Coolahan, Fantuzzo, Mendez & McDermott, 2000; Fantuzzo, Sekino & Cohen, 2004). However, these studies have taken a view of social competence as a set of social capacities existing within the individual child prior to the interaction. This approach does little to explain the observed differences between children during peer interactions or to offer implications for teachers. The individual child measures are based in an assumption that unsuccessful peer interactions can be entirely explained by a problem with the social capacities of individual children.

The Importance of Social Development for Low Income Children

The creation of Head Start in 1964 was based in the idea that high quality early childhood education is necessary to ameliorate the effects of poverty on the development of young children. Current policy priorities underscore the importance of early education for the positive development of low income children (Dillon, 2009). In particular, research with children from

low income families has found the early development of social and relational skills to be significantly related to later school achievement (Ladd, Birch & Buhs, 1999; Miles & Stipek, 2006). This literature suggests that the social realm of schooling is particularly salient for the overall success of low income children (Miles & Stipek, 2006). Indeed research has linked problems that children experience in peer interactions to those in learning situations within a head start classroom (Bulotsky-Shearer & Mcdermott, 2008). Another study linked measures of school readiness to children's peer interactive behaviors in preschool (Coolahan, Fantuzzo, Mendez & McDermott, 2000).

Experimental research has found an income gap in the development of social understanding between low and middle income children (Lucariello, 2004). Specifically the onset of theory of mind understanding was shown to occur later and in a more context contingent form for children from low income families as compared to their middle class peers. However, this study did not address the relationship between this measure and social competence or individual differences among low income children. One study that did so assessed scaffolding and joint attention among low income parent-toddler dyads and found relationships between joint attention during free play and dyadic reciprocity, scaffolding and problem solving during a structured task (Hudstedt & Raver, 2002). The authors cited prior research showing parent-child reciprocity to relate to global measures of parental sensitivity. This factor was shown to predict better outcomes for low birth weight infants longitudinally.

Therefore it seems that although income gaps exist in both social understanding, language development and academic achievement (Mckown & Strambler, 2008), social coordination skills such as those based in joint attention and reciprocity may be key features of low income children's development for addressing this persistent income gap. Therefore it

is necessary to investigate the nature of low income children's social interactions, with a focus on social coordination in Head Start.

The Importance of a New Model for Assessing Social Competence

The re-conceptualization of social understanding as inextricably connected to the immediate social interaction, shared activity and the larger setting requires a new assessment model for young children's emerging social understanding and competence. Inter-subjectivity as a measure of social understanding in use shifts the focus of research towards the emerging dynamics and vicissitudes of social interactions and away from traits or characteristics of isolated individuals. The view of interactions as tied to the activity and the activity as tied to the larger material and social environment requires assessments of those environments in conjunction with children's interactions and activities. Finally, a definition of inter-subjectivity as comprised of cognitive, emotional, social, linguistic and physical dimensions expands the lens through which children's behavior is assessed and provides a more developmentally valid picture. This model is particularly useful when applied to low income preschoolers, who continue to show lags in both social and achievement outcomes when compared with middle-class peers. Therefore, the construct of inter-subjectivity as defined here suggests a new model for conceptualizing and assessing the social understanding of this population. The first step in developing this model is to create a measure of inter-subjectivity and test its validity among low income preschoolers. Towards this end the following hypothesis will be tested:

1. Inter-subjectivity as assessed by this measure is a multi-dimensional construct that includes social, emotional, cognitive and physical dimensions

2. The dimensions of inter-subjectivity will vary according to differences in group characteristics and type of play

In order to determine the significance of inter-subjectivity for child outcomes, the assessment must include a measure that is tied to the efficacy of social interactions. Peer collaboration has been shown to predict cognitive, achievement and social outcomes depending on the sophistication of the collaboration (Forman & McPhail, 1994). Inter-subjectivity assesses the micro-interactive behaviors that define the extent of coordination between interacting partners. If such a construct assesses social competence, it should predict the collaborative sophistication of interactions as assessed more globally. Such a study should begin where these children experience the majority of their peer interactions, namely the preschool environment. Therefore, the present study sought to test the validity of inter-subjectivity as a measure of social competence and to investigate the aspects of the immediate environment that promote or impede such competence.

The Context and Definition of Preschooler's Collaborations

The impact of the immediate classroom environment on the behavior of preschoolers has been demonstrated in prior studies. Children at this age are in the Piagetian (1971) stage of pre-operational thought, in that their way of making sense of the world is tied to concrete objects and experiences of the here and now. Given that their thinking is pre-logical they are particularly reliant on the external environment rather than on internal thought processes for guiding their behavior. This is especially true of social behavior, a fact that has been highlighted since the work of Maria Montessori, and echoed by major early childhood thinkers who emphasize the importance of the physical environment for guiding children's play and behavior (Bredekamp & Copple, 1997). However few studies have tested the effect

of particular environmental features on young children's social behavior. Those that have, found significant effects for the following features: Indoor versus outdoor settings (Shim, Herwig & Shelley, 2001), abstract versus realistic materials (Roskos & Neumann, 1998), and the arrangement and type of materials in dramatic play areas (Howe, et al., 1993). A greater amount of research has been conducted on the social environment, namely the impact of teacher's interactive behaviors on children's development. These studies found that teacher warmth had a significant impact on children's social behavior (Kienbaum, Volland & Ulich, 2001) and that teacher instructional style had a significant impact on children's engagement in the curriculum and activities (De Kruif, McWilliam, Ridley & Wakely, 2000). More fine grained analysis found that teacher's verbal responses impacted children's thinking and peer interaction (Girolametto, et al., 2004).

Classroom Quality and Child Outcomes

No study has determined how both the social and environmental aspects of the preschool environment in tandem relate to the complexity of children's peer collaborations. One possible rationale for this gap in the literature may be the lack of appropriate measures for the constructs of peer collaboration and preschool environment. In his paper, Melhuish (2001) argued that measures of preschool quality have done little to distinguish environments or to show significant relationships to child outcomes. Indeed a number of large scale studies aimed at assessing preschool quality across the country did not yield significant results for predicting child outcomes (Early, et. al, 2007). In other studies, the measures of quality did not detect significant differences between programs, finding the majority of programs to fall in the middle range of quality (Peisner-Feinberg, et al, 2001). These findings indicate that many measures of quality assess too broadly, and may not be sensitive to the more nuanced

aspects of classroom environment that make a difference in child outcomes. Another problem with current studies of preschool quality is the way child outcomes are measured. The most common method is to use individual child measures as outcomes for a pre/post- test design, in order to determine the impact of preschool on children's development. However, these studies do not asses gains in positive peer interaction. Tests which assess discrete individual gains in knowledge or IQ would be appropriate when assessing programs with the explicit goal of increasing those factors through individual instruction. Most preschool programs, such as head start (Head Start Bureau, ACF, 2006) have more global goals, such as promoting gains in social competence and inspiring intellectual curiosity and self expression. These goals are reflected in the daily schedules of head starts in which the majority of the day is spent in freely chosen small peer groups participating in different forms of play. Therefore a valid assessment paradigm for preschool quality and child outcomes should focus on outcomes and environmental features that directly relate to the experiences children are having during the preschool day. In this way it will be possible to delineate which aspects of the environment are influencing development and in what way.

There are two examples of how a focus on process features of children's daily experiences in head start may be used to predict child outcomes. These include the Classroom Assessment Scoring System (C.L.A.S.S.) by LaPara, Pianta, & Stuhlman (2004) and the Emerging Academic Snapshot by Ritchie, Howes, Kraft-Sayer & Weiser (2002). The C.L.A.S.S. uses observations of interactions between teachers and children as well as child peers to assess a number of specific behavioral items linked to 3 main dimensions. These dimensions must be determined following the results of each study, but are designed to assess emotional and instructional climate among others. The majority of items focus on teacher

responsiveness, sensitivity and interactive complexity in terms of promoting critical thinking. Positive relations to child outcomes have been found with this measure, most likely because particular interactive behaviors were assessed, and because the meaning of the constructs is not standardized but allowed to vary with different populations, through the use of factor analysis. The snapshot uses a systematic, naturalistic approach to observation which tracks the behavior and activities of focal children throughout the preschool day. The items focus on engagement in pre-academic activities, learning centers and behavior that has been linked to school readiness. There is some focus on peer interactions as well, although this is not the major emphasis of the measure. This measure has also been linked to child outcomes. Although neither of these measures focus on peer interactions, they both provide a model for early childhood education assessment systems that focus on particular interactive behaviors as observed in a naturalistic environment. This focus on process rather than structural features seems to be necessary in order to capture those aspects of children's experiences in preschool that are most salient for their development.

Given that the ability to participate in positive collaborations with peers has been found to be a salient predictor of other positive outcomes and that the preschool experience is designed to allow for a variety of peer interactions in various settings, peer interaction and collaboration are reasonable concurrent outcomes to test for in assessing the quality and impact of the preschool environment. Therefore in order to develop a measure of preschool peer collaboration it is necessary to review what is known about peer collaborations in early childhood.

Collaborations in Early Childhood

Research into the nature of peer collaborations in early childhood has focused on both the extent to which collaborative interactions occur among preschoolers and the nature of those collaborations. One study analyzed the length and frequency of reciprocal conversation during a structured and open ended task. The study found a significant increase between the ages of four and six in the length and frequency of collaborative communication regardless of task. Four and five year old peers had shorter reciprocal turns and were less likely to extend verbally on their partners ideas than older peers (Ogden, 2000). A similar study compared four and seven year old dyads in which the peers were asymmetrical with one peer being more capable at the task than the other. The study found that less capable peers improved as a result of the collaboration across age groups. The older peers used more language regardless of type of group than the younger pairs (Garton & Pratt, 2005). In both of these studies, preschool age peer collaborations used language less as an integral part of the interaction than did older peers. Since there is less reliance on language, preschool peer collaboration is mainly reliant on joint attention, mutual observation and non-verbal manipulation of materials. Another study of peer tutoring among same age preschoolers who were either experts or novices in a structured task found a diversity of strategies used by both children to engage in effective tutoring and collaboration (Verba, 1998). The study found that both peers benefited from the interaction and that the experts used a variety of verbal and non-verbal strategies to both tutor and cooperate with the novice peer. This is consistent with a study of toddler's emerging peer collaboration skills. The study showed an increase in coordinated actions that included joint attention and peer monitoring with age. All of the two and a half year olds were able to cooperate with a peer to complete a simple task using non-verbal dimensions of coordination as well as gestures. In addition, these abilities related to their

ability to establish joint attention with an adult that was assessed separately (Brownell, Geetha & Zerwas, 2006).

In all three studies young children's collaborative abilities were based on coordinated behaviors and references to the concrete objects at the center of the task. All three studies used structured or semi-structured tasks involving pre-selected materials as the focus of the collaboration. Research assessing the partnership choices of early childhood collaborations take a different approach and generally observe children's behavior over an extended period of free play within a large group. One study analyzed peer groupings by observing children's peer groups chosen during free play within head start classrooms. The study found children had a tendency to play in triads and that the majority of children did not select the same group members across multiple play interactions (Hanish, et al., 2007). Finally, a series of studies investigating young children's peer collaborations and friendships defined a developmental sequence in which children's behavior with peers becomes increasingly complex. This sequence begins in the toddler period with complementary social play followed by reciprocal, i.e., turn-taking play and finally the most complex form, cooperative social pretend play (Howes & Matheson, 1992). This research is contradicted by a more recent study which found 4 year old peers to engage in all three of these forms of play within a single episode of pretend play (Robinson, et al., 2003).

In summary, the findings thus far support the inclusion of particular features in the present study's measure of peer collaboration for use with a preschool population. These include designations of various levels of complexity, beginning with parallel or imitative play, followed by reciprocal and then by the most complex form: cooperative. Each of these forms should describe both verbal and non-verbal behavior that is related to the shared activity in

which the interacting children are engaged. In addition, the measure should allow for the likelihood that each of the three forms of collaboration may occur within a single play episode, contributing differentially to the general form of collaboration. In order to reflect the nature of preschooler's collaborations, the measure should be applied to various social configurations beyond the same sex dyad, and should follow children's naturally occurring choices for free play. The design should also include various forms of play including pretend play, constructive play and other task oriented play.

Classroom Quality and Peer Interactions

Research has found a relationship between early childhood classroom quality and the extent of positive child behavior, including positive peer interactions (Lambert & Abbot-Shim, 2000). Children's positive social behavior and on-task behavior was also found to relate to global ratings of kindergarten classroom quality (Pianta, la Paro, Payne, Cox, & Bradley, 2002). More specifically, features of the physical environment have been found to be highly influential in directing children's behavior. A review of the impact of different preschool classroom activity settings on children's behavior found a relationship with type of activity setting in the following ways: length and intensity of participation, social density, type of peer interaction, and type of play (NICHD early childcare research network, 2001). Another study found that the rate of peer interaction varied both by activity setting and environmental density, i.e., number of children within a given space. Such research often points to the effects of environmental features on peer interaction.

For example one showed that when the environment was designed to encourage solitary versus group play children's social play changed accordingly (Petrakos & Howe, 1996). A similar study found that highly structured play environments elicited the lowest level, i.e.,

imitative types of play, whereas highly flexible environments produced the most complex, dramatic form of play (Droege & Howe, 1996). Another study found peer interactive play to vary by whether the play occurred in indoor or outdoor environments. This study found more peer interaction and more dramatic and functional play in the outdoor environment (Shim, et al., 2001). Finally, studies have found that realistic versus flexible objects changed the nature of children's play (Neumann & Roskos, 1992), and that flexible objects elicited more complex fantasy play (Hogan & Howe, 2001). One study investigated how environmental variables impact the nature of collaborations among adults interacting in a virtual environment. The study found that the nature of the player's collaborations varied with both the task requirements and the environmental affordances. More complex collaborations occurred within sections that contained greater flexibility in which the environment allowed for changes to its structure and or function (Gamberini & Spagnolli, 2004).

It is likely that environmental flexibility contributed to the increase in social and complex play found in outdoor environments and the finding that real objects elicit a more structured type of play than abstract ones. There is likely a similar explanation for why different activity settings, such as art, puzzles, or blocks elicited different amounts of attention, participation and peer interaction given that these areas vary in material flexibility. Given the significant impact of activity setting on the nature of play, the activity setting will be used as a nesting variable for peer interaction measures across classrooms and will add a measure of the material and space flexibility within each setting.

Teacher Interactions and Child Peer Interactions

Finally, when assessing the classroom context, teacher responses to children have long been assumed to shape children's behavior in the classroom. Research assessing individual

child social development outcomes has found a relationship with teacher responsiveness (Peisner-Feinberg, et al., 2001), however few studies have investigated the way teacher responses impact peer interactions. Those that have touched on this question have found that teacher training to facilitate peer interaction during play resulted in a greater number and complexity of peer interactions than those trained to improve individual child language (Girolametto, et al., 2004). One specific effect of the training was that the teachers provided more opportunities for children to speak to each-other by speaking less and by targeting their speech to children's needs. Additional research found that in classes where teachers increased attention to children with disabilities and decreased attention to typically developing children, peer interaction increased significantly among both groups (Hundert & Hopkins, 1992). As explanation the authors cite prior research that showed teacher interventions in peer play interrupts the social interaction. Given the findings of this small body of research it seems that peer interactions are sensitive to teacher responsiveness. More specifically, the presence or absence of teacher intervention in peer interactions, as well as whether the intervention is child directed and responsive or teacher directed and intrusive are likely important variables in how children's peer interactions will be affected. Therefore these variables will be included in the present study.

In summary, the present study will utilize original measures developed to reflect the features identified in prior research as most directly impacting young children's peer interactions and collaborations. The measure of collaboration used in this study reflects a developmentally valid range of collaboration types among a preschool population. Given the expected impact of different activity areas on these measures, a hierarchical linear model with

activity areas as the nesting variable for episodes of peer interaction will be tested. This model will test the following hypotheses:

1. Peer collaborations will differ between activity areas
2. Higher levels of inter-subjectivity will predict greater complexity of collaborations
3. Collaborations will vary between activity areas in the following ways: Activity areas with greater flexibility of space and materials will have more complex collaborations; higher teacher intrusion will have less complex collaborations
4. The activity area variables will moderate the relationship between inter- subjectivity and collaboration similarly to the expected between area effects; teacher responding will have a positive effect, and the effect of intervening will vary with type of inter-subjectivity

Methodology of the Study

Overview of Methods Section

This section describes the data collection process, the development and coding of measures and the description and reliabilities for each of the measures. The present study employed naturalistic observations that were later quantified through coding procedures. All but one measure used in the study was developed and designed for the purpose of the study. The measures were created specifically for use with the participants of the study. The development of each of the measures was informed by observations of a similar population within a similar context to that in which data was collected. The methods section includes ethnographic descriptions of the research sites, measure development, systematic coding procedures, descriptions of the measures and tests of reliability.

Study Design

Naturalistic observation. The present study was conducted in a naturalistic setting where spontaneous peer interactions were most likely to be observed. This setting was the indoor free play periods that occurred as part of the daily routines of classrooms participating in the study. This indoor play took place across various activity areas, selected because of a high frequency of play episodes were expected to occur in these areas (Rubin, 2001). Cross-sectional comparisons of episodes of peer interaction nested within activity areas were made. The study employed a between groups design, in which the groups were defined by features of the interaction episode as well as the activity area in which the interaction occurred.

The episode as the unit of analysis. This study used interactions that occurred between children as the smallest unit of analysis. No individual child measures were used in the study. All of the measures used were designed to assess interactive rather than individual behaviors. Each episode of play counted as a single case. This is consistent with the theoretical definition of inter-subjectivity given in the previous section as emergent within the interaction. Given that inter-subjectivity as a construct describes the nature of interactions, rather than individuals, using the interaction rather than the individual as the unit of analysis is necessary in order to adequately capture the construct empirically.

Participants

Schools from which the children were recruited. The schools in the study were identified from a list of Head Start centers published on the Internet by the National Head Start Association. Four of the schools were located in Manhattan. In: 1) East Harlem, 2) West Harlem, 3) Morningside Heights and 4) the Lower East Side. One of the schools was located in Brooklyn. The schools all used a play-based curriculum where children had access to hands-on materials that were located in distinct activity areas. The schools were organized

according to Head Start guidelines. In each classroom there was one teacher and one or two assistant teachers during the observation period. In addition, a number of intervention services and child assessment procedures were integrated into the daily functioning of the schools. Each school had approximately three classrooms divided by age, with three year olds in separate classes from four year olds. All of the schools had separate outdoor play areas for the children and all of the schools served breakfast and lunch as well as an afternoon snack.

Classrooms within each school. One classroom was selected to participate from each school. Certain pre-determined criteria guided the selection of classrooms. These criteria were designed to maximize the expected frequency of spontaneous peer interactions observed and to allow for comparable groups both within and between classrooms. The criteria were as follows: A daily schedule that included at least one indoor free play period lasting thirty minutes or more, a classroom population that remained constant throughout the period of data collection, a classroom in which the majority of the children in the class were four years old, and where English was spoken by some of the children and teachers in the room. The final criterion was added to facilitate ease of data collection and coding, since the researcher is a monolingual English speaker.

Classrooms differed in the number and type of staff present at different times. For example the afternoon free play periods of classroom three were staffed by only one assistant teacher who was also present along with the head teacher in the morning. Classroom two's afternoon free play periods were staffed by two assistant teachers who worked in other classrooms in the morning. This was due to the shift hours of teachers and the number of children who remained in the class for afternoon free play.

The classroom schedules also differed. This meant that some classrooms, such as classroom five had their morning free play period beginning at 9:00 am, while others began at 10:00. The timing of lunch, rest and snack affected the timing of the afternoon free play periods. Classrooms with free play occurring after 4:00, tended to have fewer children remaining and to be supervised by one or two assistant teachers. On the other hand afternoon free play that began at 2:00, such as in classroom four, had the full class present and the same teachers supervising as in the morning session.

Finally, classrooms differed in terms of spatial arrangement and materials. Although each of the classrooms contained a similar and adequate amount of space, the placement of activity areas and the room arrangements differed between classrooms. In addition, although each of the classrooms appeared to have adequate amounts of developmentally appropriate (Bredekamp & Copple, 1997), and well maintained materials, the particular types of materials within each classroom varied. For example classrooms three and four had audio-visual centers, with head-phones and computers set up for children's independent use. Classrooms one and five had no computer and classroom two's computer was not set-up for children's independent use.

Musical instruments were accessible in an activity center in both classrooms four and three, while a vide variety of manipulatives, games and construction materials were available in classrooms one and five. Overall the classrooms represented developmentally appropriate environments (Bredekamp & Copple, 1997; Harms, Clifford & Cryer, 1998) that adhered to the federal Head Start guidelines and mission (Head Start Bureau, ACF, 2006). Within each of these generally similar environments, details that reflected staff, budgeting and other particularities differed between classrooms.

Classroom teachers. Head Start and the Bureau of Day Care of New York City require that head teachers in four year old classrooms be certified by the city and state. This certification requires at minimum a bachelor's degree in early childhood education. Although data on teacher education level and/or experience was not collected for this study, it was assumed that all of the head teachers met the state and city requirements. Among the five head teachers, two were Black, one was Hispanic and two were White. Four were female and one was male. Among the ten assistant teachers regularly present in the classrooms, one was Asian, four were Hispanic and five were Black. Nine were female and one was male. As with the children, variations in terms of country of origin, within ethnic groups were present among the teachers. All of the Hispanic head and assistant teachers were bilingual in Spanish and English and used both languages in the classroom. None of the other teachers or assistants used any language other than English in the classroom.

The children. Seventy children participated in the study. Eighty percent of the children were between the age of 48 and 54 months, the remaining 20 percent of the children were between 44 and 48 months old. All of the children came from low income families as defined by the eligibility criteria for government subsidized Head Start. The children were from a variety of ethnic groups: 53 percent were Hispanic; 40 percent were Black, 5 percent were White, 2 percent were Asian. Due to the fact that Head Start centers are community based, the cultural make-up of each school's attendants, in terms of country of origin within each ethnic group, reflected the community it served. Table 1 lists the break down by ethnic group of the children and teachers in each classroom.

Table 1

Frequency of Children and Teachers in Each Classroom by Ethnic Group and Gender

Classroom	Ethnic Group				Gender	
1	Black	Hispanic	Asian	White	Female	Male
Teachers	2	0	1	0	3	0
Children	13	3	0	0	6	10
2						
Teachers	0	2	0	1	3	1
Children	4	11	1	0	9	7
3						
Teachers	0	2	0	0	2	0
Children	5	11	0	1	9	8
4						
Teachers	2	0	0	0	3	0
Children	8	9	0	0	9	8
5						
Teachers	2	0	0	1	3	1
Children	6	5	1	4	9	7

In terms of children, the population of classroom one was predominantly Black, while the population of classroom four was evenly divided between Black and Hispanic children. Classrooms two and three were predominantly Hispanic, while classroom five had the most ethnic diversity with similar numbers of Black, Hispanic, and White children, although White children were still the minority group. In general the ethnicity of the teachers reflected the majority ethnicity of the children in each classroom.

Data Collection and Coding Procedures

Recruitment of participants. The sample was limited to a low income population due to the particular significance of social development for the academic achievement and general school adjustment of low income children (Miles & Stipek, 2006). As discussed in the introduction, a number of studies have found the social skills of children attending head start to be linked to a range of concurrent and longitudinal outcomes. In addition, the income based school achievement and adjustment gap among children has been linked to earlier problems in social development (Miles and Stipek, 2006). Therefore this study sought to investigate peer interactions among a low income sample.

This was achieved by a selection of five different preschools whose enrollment was limited to families meeting income guidelines that placed them at or below the federal poverty level. Four out of five of the schools were federal head start centers. One school was a government subsidized day care center with similar income guidelines, regulations and organization to those of Head Start.

The researcher located participating preschools by using a listing of New York City Head Starts obtained from the national Head Start website listing programs in New York City. The researcher explained the study to each school director until a school that matched

the selection criteria agreed to participate. Between five and fifteen different schools were contacted during each round of calls until one agreed and was selected. The school's director then selected one of their classrooms to participate in the study.

Scheduling procedures. Data collection was completed for each classroom before the next school/ classroom was selected. Data was then collected in that classroom. One to four months were required for each classroom. Times for data collection were arranged so they were convenient for both the school and the researcher. After each session of videotaping the researcher checked with the teacher to see if a visit would be convenient. In classroom four, a research assistant (RA) conducted all the videotaping. Table 2 lists data collection procedures by classroom.

Table 2

Data Collection Schedule by Classroom

Classroom	AM/ PM hours	#Weeks in which data was collected	Months
1	3.5 AM/ 4.5 PM	5	May- July
2	3 AM / 6 PM	5	Feb.- June
3	4 AM/ 4 PM	3	July-August
4	3 AM/ 4.5 PM	3	July-August
5	6 AM/ 1.5 PM	2	December -January

Three out of five of the classrooms were observed during the summer months and classroom five was observed during the smallest number of weeks. Given that all the classrooms were observed for the same number of hours, the differences were in the spread of hours over weeks and months. Also classrooms one, three and four were evenly split between morning and afternoon sessions, while classroom two was primarily observed in the afternoon and classroom five almost entirely in the morning.

Videotaping procedures. After each participating classroom was selected, the researcher was introduced to that classroom's head teacher by the director and the teacher was given consent forms to distribute to parents. The directors then contacted the researcher once all the consent forms were returned and the researcher began data collection. The researcher was aware of the daily schedule and visited the classrooms at the start of the first free play period. On the first visit, the researcher met the assistant teachers and became familiar with the classroom lay-out. The goal of the researcher was to be as unobtrusive as possible throughout all the sessions of data collection.

Also this goal guided data collection in every classroom, the relationships which developed between the researcher and the adults and children in each classroom differed. In general all of the teachers were cordial yet distant at the beginning of data collection. At some point, it became clear to the researcher that most of them were unsure of the meanings or goals of the research, even though it had been explained to them previously. Many of the teachers made comments that reflected a belief that the researcher was looking for something in particular. To clarify, the researcher explained more emphatically that she did not want any changes to be made to the functioning of the classroom in any way. She also mentioned that she was only interested in children playing with each other and was not focused on assessing

the teachers. She reiterated that she would prefer to tape peer interactions that were child directed. After this clarification the relationship between the teachers and the researcher tended to change, either slightly or significantly, in that the teachers became more at ease with her presence in the classroom.

The researcher also offered to help in the classroom after the free play session was over. She wiped tables, helped prepare snack and offered other help with basic duties. However, in some classrooms more extensive help became necessary. For example, during one day of data collection in classroom one, all three of the usual teachers were absent. In their place were two substitutes, although usually the classroom was staffed by two assistants and one head teacher. The classroom had become very chaotic, so after asking the substitutes' permission, the researcher helped organize the children and calm them down. After about half an hour one of the regular assistants came in and took over. However, the relationship between the researcher and the class had been significantly changed, in that the researcher was viewed more as a participant than simply an observer. A similar situation occurred in classroom three. This classroom had undergone significant teacher turnover in the months before data collection began and the head teacher who was present during data collection had been newly hired. The assistant teacher was left alone to supervise the entire class between 3:30 and 5:30, a time that included the afternoon free play session. Because of this situation the assistant teacher developed a much closer relationship with the researcher than any other staff participating in the study. Before and after the taping of afternoon free play in this classroom, the researcher frequently served as a second supervising adult in the classroom. At one point, in order to allow the assistant teacher to prepare for snack, she occupied the children with stories and songs for approximately 20 minutes.

During data collection the researcher did not engage directly with the children, however, once the camera was trained on an interaction episode it was possible for the researcher to respond verbally to both children and adults in other parts of the room, by holding the camera still and looking in other directions. Often the researcher responded non-verbally and minimized conversation as much as possible. However, in classrooms one, two, three and five there were occasions when one or more children frequently sought the researcher's attention during data collection. At these times, the researcher would say, "I'm taking pictures of the children who are playing, if you start playing with a friend I can take pictures of you". Children often tried to pose for the camera and the researcher reminded them that she wasn't taking those kinds of pictures. Occasionally, the researcher would help the child to look through the lens at their classmates. This often helped to calm a child who was actively seeking attention.

During the taping of peer interactions, the researcher positioned herself in the classroom using the zoom lens in a way that an observer could not tell on whom she was focusing. This way children and teachers were not usually aware of her immediate focus. However, at times the researcher did approach interacting children very closely. These children were almost never aware of being observed. If a child did become aware of being the focus of taping, the researcher quickly moved her gaze in the opposite direction. Although the camera remained trained on the same focal children, this non-verbal signal was effective in dissuading the child that they were being observed, and they generally resumed their interaction without distraction. These procedures were possible because self-consciousness is not highly developed during early childhood. Prior research has shown four and five year old children to be unaware of observer presence when engaged in activities (see Pellegrini, 2004 for review).

Each teacher's awareness of being observed varied. Because they were never the focus of taping, observer bias was not much of an issue. Once the researcher made it clear that she was only interested in the children's behavior as it occurred naturally, the teachers seemed unaware of the camera. Teachers even occasionally stepped in front of the camera or disrupted an interaction that was the focus of taping at the time. They also frequently commented to the researcher while she was taping with no apparent awareness of the taping itself.

In this way, the researcher was able to establish a separation between her own presence in the classroom and the presence of the video-camera. For both children and teachers this split allowed for an objective record of classroom behavior, while simultaneously allowing for the researcher to be integrated into the classroom community, thereby putting the participants at ease with her presence.

Early on in the data collection for each classroom the researcher informed the teachers that she was certified in early childhood education and had been a pre-kindergarten teacher for four years. The RA had worked previously as an assistant teacher in a head start classroom. Therefore the researcher and RA were familiar with classroom routines and the field of early childhood education. This familiarity most likely contributed to the success of these non-traditional data collection procedures.

Procedure for episode selection. The focus of observation during videotaping was activity settings in which more than one child was observed playing in close proximity to another. The researcher entered the classroom during the start of the free play period. She used a small hand held video camera and positioned herself near the perimeter of the classroom and out of the center of activity. The classroom was scanned until an activity area

was identified in which more than one child was playing in close proximity to another. The video camera then zoomed in on the activity area and the interacting children. If more than one of the activity areas were identified simultaneously to be meeting the selection criteria, both activity areas were captured on the same frame. The focal children were observed for a minimum of two minutes and remained the focus of observation until they separated from one another. If no interaction was observed between the children after two minutes, the room was surveyed again until another activity area with children in close proximity to one another was found. This procedure was repeated until an episode of reciprocal interaction between children was observed. Once an episode had been identified it was recorded until there was no interaction between the focal children for twenty seconds or more. While training the camera on a single episode it was possible for the researcher to scan the room visually to check for additional episodes. If a new episode was observed during an ongoing episode, the researcher positioned herself in order to capture both episodes on the same frame and /or zoom between them with the camera. When no activity area meeting the selection criteria was observed the researcher hit the video pause button and visually surveyed the classroom until one was detected. It was rare that the same interacting partners were observed in the same activity area. If this did occur the first episode observed was the only one used in the analysis. In addition no more than two episodes with the same interacting partners were used per classroom.

Each classroom contained between fifteen to seventeen children playing in between seven to eight separate activity areas which were clearly visible from nearly all points in the room. Within those activity areas, episodes of sustained peer interaction could only occur when children were in close proximity to one another for an extended period of time. Prior

research has shown that spontaneous reciprocal peer interactions among four year olds are relatively infrequent compared to slightly older children, i.e., six and seven year olds (Ogden, 2000). Therefore, it was possible to observe nearly all episodes of interactive play that occurred during videotaping by focusing only on the areas in which children were playing in close proximity to one another.

Coding of Peer Interaction

Defining the peer interaction episode. The first step in coding the video-tapes was to delineate discrete episodes of peer interaction from the stream of behavior on the videotape. Although the observations focused on activity areas likely to yield peer interaction, the tapes included many types of child behavior that could not be defined as interactive episodes. Episodes were defined based on two criteria: duration and participants. In terms of duration it had been determined during the development of the measures that an interaction lasting less than one and a half minutes could not be reliably coded. In addition, the theoretical definition of inter-subjectivity as being centered on shared activity required that interactions be adequately sustained so that some shared activity could be identified. In addition, the definition of inter-subjectivity as a multi-dimensional form of social coordination would be unlikely to develop during a passing encounter, such as interactions lasting less than one and a half minutes. A review of the tapes supported the notion that at least one and a half minutes of interaction were required to meet such criteria. In order for an interaction to qualify as being sustained, it must have no more than twenty seconds elapse in which there was no interaction between the focal partners. This time frame was chosen based on a review of the tapes, in which it was determined that interactions that ceased for twenty seconds or more did not re-instigate interaction with the same partners.

In addition, it was determined that episodes must be defined by continuity of participants. In other words the interacting children who initially participated in the interaction must remain as the sole participants throughout the duration of the episode. If additional children joined in, the previously defined episode would be considered ending. This reflects the conceptualization of inter-subjectivity as something that develops between interacting partners as a function of their particular social dynamic. In addition this criterion allowed for increased reliability of coding and followed prior research assessing episodes of naturally occurring interaction among child peers (Pellegrini, 2004). If a new child participated interactively for at least one and a half minutes, a new episode, inclusive of that child, was marked as beginning at the one and a half minute mark on the coding sheet. In a situation where participants were frequently entering and leaving the interaction, a determination was made as to whether any discrete episode within the changing of partners could be delineated. If this could not be reliably determined, the interaction was not included in the analysis.

Each identified episode was listed on the coding sheet in the order it appeared on the video tape. The beginning and end times were marked in minutes and seconds, the size and gender composition were marked, and the activity area, and details of the children's activity, (i.e., "playing monsters") were written out descriptively on the coding sheet. The delineation of the episodes was reviewed and discussed with the inter-subjectivity and the collaboration coders and areas of disagreement were resolved. A sample of the coding sheet is included in the appendix.

Establishing the Validity of Interaction Quality Measures

Development of the inter-subjectivity measure and its face validity. The coding scheme for inter-subjective behaviors was initially developed and tested during in-situ observations of a bi-lingual head start classroom in East Harlem. This classroom was visited over a month and a half month period, for 3-5 days a week depending on the class and the researcher's schedule. During this time 80 discrete episodes were identified from the children's naturally occurring peer interactions during morning and afternoon indoor free play. In order to establish face validity of the inter-subjectivity items, episodes were coded using the inter-subjectivity measure once they had been identified. Minor changes to the definitions of items were made based on this process. A research assistant was identified at the beginning of data collection and trained on the inter-subjectivity measure via joint coding with the researcher in-situ. Fifteen episodes were used to establish reliability of the inter-subjectivity measure.

Development of the collaboration measure and its face validity. The collaboration measure was initially developed during the in-situ. observations. At that time it included four categories and was scored on a four point scale. However, the category of "goal corrected partnership", in which children changed their goals to reflect those of their interacting partners, was not observed among the population. In addition, the four point scale did not adequately reflect the differences in collaboration type that were observed in a single episode. Therefore the measure was changed to the current form of a 7 point scale and the "goal corrected partnership" category was dropped from the measure.

Training the Interaction Quality Coders and Establishing Inter-rater Reliability

Inter-subjectivity measure training. One research assistant (RA) was trained to establish inter-rater reliability on the inter-subjectivity measure. The RA was an African

American undergraduate psychology student who had experience working with young children. This RA was blind to the hypothesis of the study and the other measures. She was initially trained using in-situ observations. Prior to beginning the in-situ observations she was given a copy of the code-book for review. The definitions were discussed with the researcher and areas of confusion were clarified. A number of episodes were then jointly coded for training purposes. The researcher and the RA sat near each other with separate coding sheets and observed peer interactions identified by the researcher. Each code was discussed as it was observed during the interaction. Three separate episodes of interaction were jointly coded in this manner until it appeared that the RA had been adequately trained in the use of the measure. The researcher and RA then sat further apart and coded eight episodes identified by the researcher simultaneously without discussion. Scores were compared for agreement between the coders summarily. Adequate, (83%) absolute agreement was reached. Simultaneous coding was then done on thirty consecutive episodes. The joint coding occurred over a period of two weeks during both morning and afternoon sessions of indoor free play. The Intra-class correlation coefficient, (ICC) was .88. The Cohen's Kappa, a conservative statistic that adjusts for chance agreement was .73.

This RA also conducted all of the videotaping in classroom four. The researcher accompanied the RA on the first day of videotaping after completing the initial steps of recruitment. The RA was trained on the videotaping procedures from watching and discussing prior videotapes and through direct supervision on the first day of videotaping in classroom four. The RA also offered volunteer services in the classroom after the day's free play sessions were over, as instructed by the researcher.

Reliability of interaction episode delineation. The boundaries of each interaction episode were reviewed three times. The first was the initial delineation made by the researcher. Next was the review of the inter-subjectivity reliability coder and third was the review of the collaboration coder. In addition, the random selection of episodes for joint coding required the researcher to re-review the delineation of all episodes. The original sample of episodes was 319. The inter-subjectivity reliability coder only reviewed those episodes that had been selected by the researcher for joint coding. Due to disagreement, the time frame and participants of two of these episodes was adjusted. Following the second review of the researcher and in consultation with the inter-subjectivity coder ten episodes were dropped due to low reliability. The remaining 309 episodes were entered with demographic variables and time frames on the collaboration coding sheet. In consultation with the collaboration coders and due to this third review by the researcher, an additional 20 episodes were dropped from the sample due to low reliability. The final sample size of 280 episodes reflects episodes dropped due to inadequate inter-rater reliability and data entry errors. These problems occurred evenly between all classrooms and there was no evidence of systematic bias in the errors.

Inter-rater reliability of the inter-subjectivity measure. Following the in-situ observations the RA provided reliability coding for the videotaped episodes on the inter-subjectivity measure. Episodes were randomly selected to be joint coded from each classroom, by selecting every 11^{th}, episode within each classroom. Ratings were compared and analyzed for agreement once all data had been coded. Cronbach's Alpha was .90, Intra-class coefficient was .83. Cohen's Kappa assesses across both score and item and adjusts for the possibility of random agreement, therefore it is a highly conservative statistic of

agreement with adequate reliability expected at or above .70. The Cohen's Kappa for this data was .71 Table 3 lists inter-rater reliability by item and score.

Table 3

Percentage of Agreement between raters on the Inter-subjectivity Measure across Score and Item

Item (N=32)	n agree	% Agree
Touch	28	87%
Positive Emotion	29	90%
Negative Emotion	30	93%
Eye Contact	27	84%
Joint Attention task	24	75%
Joint Attention Mate	30	93%
Joint Attention Convo	29	90%
Mutual Focus	29	90%
Reciprocal Converse	21	65%
Violate Property	31	96%
Violate Space	31	96%

Score	Never	Brief	Sustained	Constant	Total
N	143	103	96	32	374
% agree	84%	67%	89%	75%	80%
n agree	121	70	86	24	301

Table three shows the highest rates of agreement to be among the conflict dimensions items with scores ranging from .93 to .96. "Reciprocal conversation" had the lowest rate of agreement with a score of .65, followed by "joint attention to task" with a score of .75. The rest of the items had moderate to high agreement and ranged from .84 to .93 with the majority at or above .90. In terms of score the lowest rate of agreement was for items scored as "brief", at .67, while the highest was for items scored as "sustained" at .89.

Collaboration measure training. Two research assistants (RAs) were trained on the collaboration measure. The RAs were given the codes and definitions to study. Any questions or need for clarification were discussed with the researcher prior to coding. Each RA then jointly coded three randomly selected episodes with the researcher and discussed scores and rationales. Three more randomly selected episodes were then coded until each RA reached 90% or higher agreement with the researcher. The RAs were then given either an entire classroom to code independently or six randomly selected episodes from a single classroom. At no time were both RAs coding the same classroom and the RAs never conducted any coding together. The RAs were blind to the study's hypothesis and to all the other measures.

After each classroom was completed both RA's reviewed the codes and definitions with the researcher separately and discussed how they would code a single randomly selected episode to ensure they had retained their understanding of the measure. One of the RAs was the primary coder for three and a half of the classrooms, while the other primarily coded one and a half classrooms.

Inter-rater reliability of collaboration measure. Twenty five episodes were joint coded by both RAs. Their ratings were compared after the last classroom had been coded on the collaboration measure. The Intra-class correlation coefficient (ICC) was used to compute agreement between the raters. This statistic estimates the reliability of a single rater on multiple items, which is used to interpret inter-rater agreement for those items. The total ICC for the three items was .74. Table 4 lists the inter-rater reliability of the collaboration measure by item. Table 5 lists the cross-tabulated agreement of both raters by score.

Table 4

ICC and Cronbach's Alpha for agreement between two raters on the measure of Collaboration by Item

	Cronbach's Alpha	ICC	Lower-Upper Bound
Imitation	.80	.67	.36- .85
Reciprocal	.88	.79	.57- .91
Cooperation	.87	.77	.53 - .90
Total	.85	.74	.60- .83

Table four shows the average agreement across raters to be moderate to high as assessed by Cronbach's alpha while the reliability of a single rater on each item to be moderate as assessed by the ICC. In particular "imitation" had the lowest inter-rater reliability while "reciprocal" had the highest.

Table 5

Cross-tabulation of Collaboration Scores between two Raters

	Rater 1							
Rater 2	1.00	2.00	3.00	4.00	5.00	6.00	7.0	Total
1.00	16	0	1	0	2	0	0	19
2.00	1	10	3	0	1	0	0	15
3.00	0	1	9	0	0	0	0	10
4.00	0	0	0	0	4	0	0	4
5.00	1	0	1	0	7	0	1	10
6.00	1	0	0	2	0	2	1	6
Total	19	11	14	2	14	2	3	

Table five shows the patterns of agreement and disagreement in scoring between the two raters. For scores of 1 to 4 disagreements were generally within a 2 point range. However for scores of 5 and six a few items were scored on the opposite ends of the scale. In addition rater 2 did not give any items a score of 7, while rater 1 scored 3 items with 7. There was no agreement on the score of 4, which represents "half the time", while the highest agreement

was for a score of one, which represents “none of the time”. In the totals column it is shown that the two raters generally assigned a score four times more or less than one another.

Designating the Activity Areas

Each classroom consisted of between six to eight distinct activity areas. The boundaries of the areas were designated by shelving units and by related materials being grouped together. In addition to areas with fixed boundaries created by shelves, there were areas that used tables or rugs to define them, as well as some areas that were only open when the teacher provided the materials. In addition, many of the areas were marked with signs and in most of the classrooms there were a limited number of children allowed to play simultaneously in each area. Therefore, within each classroom, children’s free play was further segmented by the number of distinct activity areas. Classrooms varied in terms of the rules for moving between activity areas, however all classroom teachers imposed some regulation regarding the responsibilities of children to clean up whichever area in which they had been playing. Every episode of peer interaction occurred within an activity area. During the initial delineation of episodes, a description of the materials and type of activity were listed on the coding sheet for each episode. This information was used to determine the activity areas in each classroom and to place the episodes into those areas accordingly.

Measures Describing the Interaction Episodes

Structural measures.

Group characteristics. Two measures assessed the social context of the interacting group. **Size** assessed the number of children in each episode as follows: 1 = 2 children, 2 = 3 children, 3 = 4 children 4 = 5/6 children. **Gender** assessed the gender composition of the episode as follows: 1 = boys, 2 = girls, 3 = mixed.

Play type of interaction episodes. Play Type assessed the type of activity occurring during the episode. Play type was assessed using "The Play Observation Scale" developed by Rubin, (2001). The item definitions are listed in the appendix according to the author's exact words. Play type was coded as follows: 1 = Dramatic Play, 2 = Functional Play, 3 = Constructive Play. Adequate reliability has been established in prior studies.

Length of interaction episodes. The measure of length assessed the number of minutes in which children were engaged in a single episode of peer interaction with the following categories: 1 = 1.5-5 minutes, 2 = 6-9 minutes, 3 = 10-14 minutes, 4 = 15 minutes or more

Quality measures of interaction episodes.

Inter-subjectivity of interaction episodes. This measure was developed to reflect the dimensions of inter-subjectivity as defined by: "An embodied experience of joint participation, coordinated attention and emotion that is centered on shared activity". When applied to episodes of interaction the measure is designed to assess both the nature and degree of inter-subjectivity that characterizes the interaction. This assessed variation between episodes in terms of both inter-subjectivity level and type. The measure of inter-subjectivity contained thirteen items and was scored on a four point scale. The behavioral indicators each assessed mutual behaviors. The items were designed to capture moments of mutuality occurring within the behavioral stream rather than any individual behavior. The conflict items were included in order to provide an exhaustive measure of mutual engagement between peers.

The following scale items assessed the extent to which each behavioral indicator was observed during the episode.

4 = Constant: The behavior is interrupted no more than 2 times otherwise it is observed as constant, i.e., children maintain eye contact throughout the activity, twice one of the children looks away but quickly resumes eye contact

3 = Sustained: The behavior is observed more than 3 times, and /or lasts more than 1 minute at any time without interruption

2 = Brief: The behavior is observed, but less than 3 times and lasts less than 1 minute each time

1 = None: The behavior is not observed

The item definitions are listed below, a full description of each item and instructions for coding are listed in Appendix C:

1. Touching: Children touch each other's bodies, (non aggressive only)

2. Eye Contact: Children look each other in the eye simultaneously

3. Mutual Positive Emotion: Children show positive emotion simultaneously

4. Mutual Negative Emotion: Children show negative emotion simultaneously

5. Joint Attention Task: Children are paying attention to the same task at the same time

6. Joint Attention Materials: Children are paying attention to the same material(s) at the same time

7. Joint Attention Conversation: Children are focused on the same conversation

8. Mutual Focus: Children are concentrating for the same amount of time with the same amount of attention to the same activity.

9. Body Orientation Towards: Children face each other

10. Proximity Increasing: All children move closer to each other, if they begin at a close distance but don't increase proximity it is not counted

11. Reciprocal Conversation: Children take turns and listen to each other speak, they respond to what their partner said verbally, or follow the other child's directions.

12. Violation Property: Children take materials from each other without asking or destroy each other's work.

13. Violation Space: Children touch each other in unwelcome ways, take over work space or push into each other's space aggressively

Collaboration measure. The measure of collaboration assessed the type of collaboration observed between interacting peers. The definitions are listed from least to most complex as follows:

1. Imitation: One child follows or mimics the actions of another. The leader/ follower can change as long as there is only one idea guiding the activity at a time

2. Reciprocal: Children take turns; respond to each other's actions or words back and forth only. They do not build on each other's ideas and do not create something new together

3. Cooperation: An interaction reaches the threshold of cooperation when something new is created as a result of collaboration by at least 2 children. This may be a new game, a new construction or a new story line for dramatic play.

Each of these behaviors was scored on a 7 point scale, reflecting the extent to which they characterized the collaboration. The scale definitions are as follows:

1 = None of the time; 2 = Very small amount of the time; 3 = Less than half the time; 4 = Half the time; 5 = More than half the time; 6 = Most of the time; 7 = All the time

If cooperation received a score of 5 or greater the type of cooperation was marked with one of the following definitions, full descriptions of each item are listed in Appendix C:

1. Escalation: Children contribute to the same activity in a way which extends or expands on it in terms of intensity or duration

2. Negotiation: Children change the nature of an ongoing activity as a result of the words or actions of their interacting partners

3. Mutual Goal Setting: Children discuss what they want to do and make a plan for how to proceed. They then carry out the plan together.

Activity area measures. *Environmental flexibility.* The measure of environmental flexibility assessed the extent to which materials could be used in a variety of ways and the affordances of the physical environment. The term "affordances" refers to the opportunity for change to an object or space's structure and function (Gibson, 1986). Each activity area was scored for both material and space flexibility on a 5 point scale, with 1 being the least flexible and 5 being the most flexible. The scores were then ranked for total flexibility from 1-14. If the flexibility score was high on either space or materials it was given a higher total score than if both dimensions were equally high.

Validity and reliability of environmental flexibility. The scoring of the materials and space within each activity area was based on both the data collected via videotapes and notes that had been taken on the materials and space of activity areas during data collection. Therefore, the scoring was based on an assessment of the materials and space as they

appeared as well as being informed by how the children were observed using them. For example, if manipulatives were available on a large rug, it was helpful to know that the children used the rug space in many different ways, implying a high score of space flexibility for the area.

To determine reliability of the environmental flexibility score two professors of early childhood education with prior experience as pre-school teachers scored ten of the activity areas based on the list of materials and a written description of the spatial arrangement of each area. The scores and inter-rater agreement for each activity area are listed by flexibility ranking in Table 6.

Table 6

Score and rank on Material/ Space flexibility of each Activity Area by Expert Raters

Flexibility Ranking	Activity Areas	Material/Space	Expert ICC
1	class 1 poster, class 3 computer, class 4 computer	1/2	.89
2	class 2 science, class 3 library, class 5 library	2/2	.87
3	class 2 art, class 4 toys, class 5 kitchen	3/2	.86
4	class 3 music	1/5	.90
5	class 4 manipulatives	4/2	.85
6	class 1 kitchen, class 1 dinosaurs, class 3 kitchen, class 3 table toys, class 4 kitchen, class 4 art, class 5writing	3/3	.86
7	class1 toys/dolls, class 3 manipulatives, class 2 rug/movement class 2 computer/camera, class 5 puzzles	2/5	.87
8	class 1 connectors	3/4	.88
9	class 1 puzzles, class 5 blocks	4/3	.82
10	class 1 unit blocks, class 2 blocks, class 3 blocks, class 4 blocks	4/4	.90
11	class 2 water table, class 4 water/sand, class 5 play-doh	5/3	.91
12	class 2 manipulatives, class 4 trains	3/5	.85

13	class 1 manipulatives, class 3 kitchen, class 5 manipulatives	4/5	.86

Teacher interaction. *Description of teacher interaction measure.* Each episode of interaction was assessed for whether there was any type of teacher interaction with the interacting group of children. The following codes indicated which type of teacher was observed interacting with the children during the episode:

1 = None 2 =Head Teacher, 3 = Assistant Teacher, 4 = Head and Assistant teacher, 5=other (i.e., director/ special teacher, substitute)

If interaction was observed it was coded for the purpose and form of interaction. The purpose was coded according to the following definitions:

1. Responding: Teacher communicates or moves closer to the group in response to one or more of the children's demands, i.e., child questions, teacher answers, child asks for help or attention from teacher, teacher provides it
2. Intervening: Teacher initiates proximity or communication to address a specific issue, i.e., the interaction is targeted and based on a perceived need
3. Intruding: Teacher initiates proximity or communication with group unrelated to any children's request or perceived need, the interaction is sustained for an extended period, with no clear need
4. Ignoring: Teacher does not respond to the requests of children in any way

Each of these categories were scored according to the mode of behavior with which the interaction was observed: 1= Not observed, 2= Verbal, 3= Increased proximity, 4= Both verbal and increased proximity

Validity and reliability of the teacher interaction measure. The teacher interaction measure was developed to exhaustively capture the ways in which the classroom teachers

interacted with groups of children engaged in sustained peer interactions. The categories were developed after the tapes had been extensively reviewed for the coding of other measures. Prior research assessing the effect of teacher intervention on preschoolers peer interactions also informed the development of the measure (Girolametto, et al., 2004; Hundert & Hopkins, 1992). Reliability was determined via intra-rater coding. The researcher scored each episode initially for teacher interaction. At no time after the initial coding did the researcher review her codes. Four months after the coding of the measure was completed the researcher randomly selected ten episodes from each classroom, n = 50, to re-code on the teacher interaction measure, using coding sheets with only the episode times and child demographics listed. The codes from both time points were then compared to determine intra-rater reliability. Intra-rater agreement for the items ranged from .90 to .95. Total absolute agreement was 93%. Table 7 lists the number of items, scale and average reliability for each measure.

Table 7

Number and Possible Range of Items and Average Reliability by Measure

Measure	Items	Scale Range of Items	Reliability
Inter-subjectivity	13	1-4	.89
Collaboration	3	1-7	.83
Environmental Flexibility	2	1-14	.87
Teacher Interaction	3	1-4	.93

Independence of Measures

Separate coding sheets and raters were used for the inter-subjectivity and collaboration measure. The inter-rater reliability of the environmental flexibility measure was established by two additional coders who were blind to the other measures and used a separate sheet for scoring the activity areas. The teacher interaction measure was scored on coding sheets that listed only the time of the episodes and the group composition. The coding sheets are listed in appendices D through F.

Data Analysis

The software SPSS 16 was used to factor analyze the inter-subjectivity measure and to perform analysis of variance with some episode level variables. The software HLM 6.0 was used to construct and test the 2- level model. The level- 1 variables describing the episodes were entered into one data set. The level 2 variables describing the activity areas were entered with the mean of the outcome variable; collaborative quality, entered for each activity area. The material/ space flexibility describing each activity area was entered as a raw score. The teacher interaction variables were entered as the mean of teacher interaction for each activity area and entered into the second level of the analysis.

Summary of Methods Section

To summarize, an observational approach to data collection was used, in which systematic selection criteria chosen by the researcher guided the focus of videotaping, while the more general role of the researcher in the classroom was determined by the particular

context of each classroom. The videotape procedure used an event sampling design, in which episodes of peer interaction were selected from activity areas in each classroom.

All but one of the measures was developed specifically for use with the study's participants within the context of the research sites. The measures included two continuous measures of interactive quality, a categorical measure of teacher interaction with child peer groups, and a rating of environmental flexibility.

Three research assistants were trained as independent raters and two experts were used to establish reliability on the measures. Inter and Intra-rater reliabilities were found to be adequate for all measures.

The procedures and measures were chosen to reflect theoretical assumptions regarding the construct of inter-subjectivity and a socio-cultural approach.

Results of Statistical Analysis

Overview of Results

Results are reported for two sections of the study. First the findings related to the inter-subjectivity measure are reported. These findings report the descriptive statistics of the interaction episodes and the construct validity of the inter-subjectivity measure. Factor analysis was used to determine the dimensions of the measure. In addition, analysis of variance was used to test for significant between group differences in the inter-subjectivity measure. This specified the variations in the construct of inter-subjectivity that can be expected among the population.

Second results of hierarchical linear modeling are reported. The episodes were entered as nested within activity areas. The dimensions of inter-subjectivity were used to predict the collaboration types of the episodes. In addition variables assessing the activity areas, such as

teacher interaction and environmental flexibility were included in the model to explain differences in collaboration between activity areas.

Descriptive Statistics

Interaction episode structural measures. Each episode of interaction was assessed on group size, gender composition, type of play, and length in minutes. A descriptive summary of frequencies for each of these variables was conducted to determine the make-up of the sample. For size, the greatest frequencies were of three children, and the least were of five or more. For gender the greatest number were of mixed gender groupings, the least of boy only groups. For play type the greatest number were of functional type, the least of constructive. For length most interactions were between 1.5 and 5 minutes, the least were 15 minutes or more. Table 8 lists the frequencies and percentages of each structural variable.

Table 8

Frequencies of Group Variables Across Interaction Episodes (N=280)

Variable	Frequency	Percent
Size		
2.00	104	37
3.00	105	37.5
4.00	56	20
5.00	15	5
Gender		
Boy	74	26
Girl	82	29
Mix	124	44
Type of Play		
Dramatic	93	33
Functional	114	40
Constructive	71	25
Length in Minutes		
1.5-5	115	41
6-9	77	27.5
10-14	54	19
15+	34	12

Note: The values give are frequency counts of each variable within the total sample

Interaction episode quality measures. Each interaction episode was assessed on the inter-subjectivity measure and the collaboration measure. The inter-subjectivity measure contained three dimensions and the collaboration measure contained three types of collaboration. The distribution of the scores on each measure in the sample was assessed via descriptive statistics. For the inter-subjectivity measure, the social and joint attention dimensions were normally distributed among the sample. The conflict dimension was skewed to the left implying that conflict was most frequently scored low. Evenly distributed variables have a skewness score between 1 and 0. Positive skewness greater than 1 indicates a mean centered on the low end of the possible range of scores, while a negative skewness greater than 1 indicates a mean centered on the high end of the possible range of scores. The measure of skewness for conflict was 2.3 and the histogram of this variable's distribution showed the central tendency in a range of scores from 2 to 9 to be at 3.6, on the far left. For the collaboration measure imitation and cooperation were both skewed to the left, at a skewness measure of 1.7 and 1.2 respectively. Histograms showed the means of both of the items to fall on the low end of the possible range of scores. Reciprocal was normally distributed. The full descriptive statistics for the interaction quality measures are provided in Table 9.

Table 9

Descriptive Statistics for the three Dimensions of Inter-subjectivity and three Types of Collaboration (N=280)

	Minimum	Maximum	Mean	Std. Deviation
Social				
	6.00	22.00	12.85	4.01
Joint Attention				
	3.00	12.00	8.00	2.25
Conflict				
	3.00	9.00	3.61	1.15
Imitation				
	1.00	7.00	1.89	1.38
Reciprocal				
	1.00	7.00	3.45	1.50
Cooperation				
	1.00	6.00	2.11	1.45

Note: The values listed are scores given on each dimension/ item across episodes

Activity area measures. A measure of environmental flexibility was used to describe the flexibility of the space and materials in the activity areas. Flexibility ranged from a score of 1 indicating least flexible to 13 indicating most flexible. Descriptive statistics showed the measure to be normally distributed with a mean of 7.5.

Three types of teacher interaction were assessed for each peer interaction episode, and then entered as mean scores per activity area. Responding, intervening and intruding were each skewed to the left, indicating a predominance of low scores on the teacher interaction measure for all three types. The descriptive statistics for the activity area measures are listed in Table 10.

Table 10

Descriptive Statistics for the Environmental Flexibility and Teacher Interaction measures

	Minimum	Maximum	Mean	Std. Deviation
Respond	1.00	4.00	1.28	.76
Intervene	1.00	4.00	1.30	.8
Intrude	1.00	4.00	1.40	.95
Environmental Flexibility	1.00	13.0	7.5	4.1

Note: Values indicate the possible range of scores on each measure, their mean and standard deviation

Although the teacher intervention measures were all skewed negatively, no data transformations were made.

Following the determination of the distributions of all the study variables, it was necessary to determine the extent to which the inter-subjectivity measure tested the theoretical assumptions of the construct. Three hypotheses guided the analysis of the relationship between the theory of inter-subjectivity and the inter-subjectivity measure.

Construct Validity of the Inter-subjectivity Measure

Hypothesis 1: Inter-subjectivity as assessed by this measure is a multi-dimensional construct that includes social, emotional, cognitive and physical dimensions

Principle components factor analysis with Promax rotation was used to determine the dimensionality of the inter-subjectivity measure. The results of the exploratory factor analysis revealed four dimensions, however the fourth dimension did not add significantly to the total variance of the items explained by the model. Therefore confirmatory factor analysis was run asking for three dimensions. This analysis tests whether the predetermined number of dimensions can adequately explain the variance in the items. The three dimensional model explained 64% of the variance of the items. This meant that the items tended to fall into three distinct dimensions which represented a clustering of the data. 64% of the variance in items fell into this pattern. Eigen values explain the extent to which each dimension contributes to the total variance. Eigen values over 1 are considered significant in the extent of variance they explain. The eigen values were: 3.25 for the first dimension, 1.9 for the second dimension and 1.6 for the third dimension. Three items failed to load strongly on any one dimension. These items were: “body orientation towards”, “proximity increasing” and “proximity decreasing”. These items also had very low scale reliability when added together

to form a scale. When added to the scales formed by the other dimensions they decreased the reliability of the other scales. Therefore these items were dropped from any further analysis. The remaining items comprised 3 distinct dimensions. The dimensions were designated as follows: Dimension 1- Social, 5 items; Dimension 2 -Joint Attention, 3 items; Dimension 3- Conflict: 3 items. The factor loadings of all items and their inter-item correlations are listed in Table 11.

Table 11

Factor Loadings of Inter-subjectivity Items on 3 Dimensions

Item	Social	Joint Attention	Conflict
Touch	.562		
Mutual Positive emotion	.645		
Eye contact	.755		
Joint attention conversate	.765		
Reciprocal conversation	.767		
Joint attention task		.775	
Joint attention material		.867	
Mutual focus		.886	
Violate property			.771
Violate space			.813
Mutual negative emotion			.813

Correlations between Inter-subjectivity Dimensions

	Social	Joint Attention	Conflict
Social	1.00		
Joint Attention	.286	1.00	
Conflict	.208	.088	1.00

Table 11 shows that all the items loaded very strongly on their dimension, meaning each item was closely associated with the other items in that dimension and not associated with the other dimension. This finding is consistent with the correlation matrix of the three dimensions. Each of the dimensions have low correlations with each other, around .2, and conflict is uncorrelated with joint attention at .088.

The internal consistency of each dimension was assessed via scale reliability using Cronbach's alpha. Reliability for the social dimension was .80, joint attention dimension was .85 and conflict was .75. Given the variance explained by the three dimensional model and the adequate scale reliabilities for each dimension, it can be concluded that the inter-subjectivity measure assessed a valid construct for this population.

Between Group Differences in Inter-subjectivity

Hypothesis 2: The dimensions of inter-subjectivity will vary according to differences in group characteristics and type of play

To determine whether inter-subjectivity varied significantly between groups, two 3 (inter-subjectivity dimensions) by 3 (gender composition) and (type of play) analysis of variance (ANOVAs) were run and one 3 (inter-subjectivity dimensions) by 4 (group size)

ANOVA was run. The results of the significance tests and the post-hoc analysis are discussed for each group characteristic.

Differences in inter-subjectivity due to group size. Episodes of inter-subjectivity varied significantly by size. In particular, joint attention varied at $p < .000$, $F = 9.3$, ($df = 3$), and conflict varied at $p < .003$, $F = 4.7$ ($df = 3$). Post Hoc analysis revealed that smaller groups were significantly higher in joint attention inter-subjectivity than larger groups. The greatest difference was between groups of only 2 children and all other group sizes. On the other hand larger groups were significantly higher in conflict than smaller groups. The greatest difference in conflict was between the largest group and all other groups.

Differences in inter-subjectivity due to group gender composition. Episodes of inter-subjectivity varied significantly by gender composition. In particular, social inter-subjectivity varied at $p < .001$, $F = 7.1$,($df = 2$). Post Hoc analysis revealed that girl only groups were significantly higher in social inter-subjectivity than boy only and mixed gender groups. The greatest difference was between girl only and boy only groups.

Differences in inter-subjectivity due to group play type. Episodes of inter-subjectivity varied significantly by play type. In particular, social inter-subjectivity varied at $F(2) = 8.59$, $p < .000$, joint attention inter-subjectivity varied at $F(2) = 4.7$, $p < .010$, and conflict varied at $F(2) = 2.34$, $p < .098$. Post Hoc analysis revealed that dramatic play groups were significantly higher in social inter-subjectivity than the other groups and functional groups were moderately higher than constructive groups on social inter-subjectivity. On the other hand dramatic play groups were significantly lower than the other two groups on joint attention inter-subjectivity. In terms of conflict, constructive groups were significantly greater than functional groups.

Hypothesis 3: Higher inter-subjectivity will predict longer interactions

As described in the measures section, the length of each episode was determined by marking each beginning and end time in minutes, seconds before any coding with the inter-subjectivity measure had been conducted. To determine whether higher levels of inter-subjectivity predicted the length of interactions regardless of group characteristics, a hierarchical linear regression analysis using length as the dependant variable, group characteristics as covariates and social, joint attention and conflict inter-subjectivity as the independent variables was conducted. The model showed a significant positive relationship at F (3) = 48, p< .000. In particular social, cognitive and conflict inter-subjectivity were each significant at p<.000 controlling for group characteristics at with: B = .332, t= 6.87; B= .316, t= 6.55; and B= .228, t= 4.7, respectively. The Durbin Watson test of multi-collinearity was run to determine whether there was auto-correlation between episodes. The results showed that there was no significant multi-collinearity between episodes.

Summary of Inter-subjectivity Measure Findings

Taken together the inter-subjectivity measure results demonstrate that the measure does assess a valid construct occurring within preschooler's peer interactions. Furthermore, the construct has been shown to be comprised of three distinct, yet related dimensions. In addition, the dimensions of the construct have each been shown to vary differentially by group size, gender composition and play type. The greatest differences were found between play type and the least between gender composition. Finally, higher inter-subjectivity along all three dimensions predicted longer interaction episodes with equally strong relationships for social and joint attention dimensions. Although within each classroom individual children participated in multiple episodes, it was rare that the same composition of children

participated in more than episode. This likely contributed to the lack of multi-collinearity found between episodes.

Overview of Hierarchical Linear Model

Heirarchical linear modeling is used specifically to test linear relationships within nested data. In this case interaction episodes ($N = 280$) were nested within activity areas ($N = 38$). Therefore a two level model was used for this data. At level 1, the variables describing each interaction were entered. Outcome variables were the three collaboration types, the predictors were the three dimensions of inter-subjectivity, and the covariates were the demographic variables, (size, gender and play type). At level 2, variables describing the activity areas were entered. These included the environmental flexibility ranking of each activity area and the teacher interaction variables which had been assessed at the episode level and then entered as the mean score for each activity area.

Two types of models can be tested in HLM. The random effects model assesses variance in interaction episodes between activity areas. The fixed effects model assesses variance in collaboration due to predictors at both levels. Five major hypothesis were tested using HLM. The variables entered at Level 1 and 2 are listed in Table 12

Table 12

Variables Included at Level 1 and Level 2

Measure	Items	Variable Type	Centering
Level 1			
Group Characteristics	Size, gender, play type	Covariates	Un-centered
Inter-subjectivity	Joint attention, Social, Conflict	Predictors	Group mean centered
Collaboration	Imitation, reciprocal, cooperation	Outcomes	Un-centered
Level 2			
Teacher Interaction	Respond, Intervene, Intrude,	Predictors	Grand Mean Centered
Environmental Flexibility	Space, Materials	Predictor	Un-centered
Collaboration	Imitation, reciprocal, Cooperation	Outcome	Group mean centered

Un-centered variables at level 1 refer to variables analyzed by case. Group mean centered refers to variables analyzed by the mean of the variable within each activity area. Grand mean centered refers to the mean of the variable across all activity areas.

Level 1 Models Predicting Collaboration Between Activity Areas

Hypothesis 1: The level of collaboration would differ due to activity area.

To determine whether collaboration differed between activity areas three models were run for each collaboration type. Each of these was an unconditional random effects model that tested the effect of activity areas on collaboration without any predictors. In order to treat the data as nested within activity areas, collaboration must be found to differ significantly between activity areas. The amount of variance in the outcome variable explained by the nesting variable can be determined by comparing the variance components of the intercept; the mean difference in the outcome between nested groups and the slope of the outcome across nested groups. The variance component of the intercept divided by itself plus the outcome variance provides the percent of variance in the outcome explained by the intercept. In this case, the variance in collaboration due to activity area, is provided.

Between activity area differences in imitation. There was a significant difference in imitation due to activity areas, $CO = 1.8$, $t = 12.2$, $p < .000$. Using the equation described above, the percent of variance in imitation explained by activity area differences was .35, $p < .000$. Therefore 35% of the variance in imitation was due to activity area.

Between activity area differences in reciprocal. There was a significant difference in reciprocal collaboration due to activity areas at $CO = 3.5$ $t = 27.5$ $p < .000$. Activity area differences explained 13% of the variance in reciprocal collaboration, which was significant at $p<.000$.

Between activity area differences in cooperation. There was a significant difference in cooperation due to activity areas at $CO = 2$, $t = 17.8$, $p < .000$. Activity area difference explained 10% of the variance in cooperation, which was significant at $p < .002$.

In summary there were significant between activity area differences in all three types of collaboration, with the greatest effect of activity area being for imitation and the least being for cooperation.

Hypothesis 2: Inter-subjectivity will predict collaboration within activity areas

Hypothesis 2a: Higher joint attention and social inter-subjectivity should predict the most complex types of collaboration; cooperation and reciprocal, with the strongest effect being for cooperation. Higher conflict should predict imitation; the least complex type of collaboration.

The results of the previous unconditional model supported the hypothesis that the strongest impact of inter-subjectivity would be on cooperation, given that cooperation had the greatest amount of variance left unexplained by the effect of activity area. Similarly it is expected that imitation, which has the least amount of unexplained variance remaining after the effect of activity area will be the least effected by predictors.

Three level 1 fixed effects models were run with each of the collaboration types entered as outcome variables. The three dimensions of inter-subjectivity were entered as predictors in each model. Results showed the strongest impact of inter-subjectivity for cooperation, with a highly significant effect of both social and joint attention inter-subjectivity. There was a significant effect of social inter-subjectivity on reciprocal collaboration and no effect of any inter-subjectivity dimension on imitation. The full results of all three models are listed in Table 13.

Table 13

Impact of Inter-subjectivity on Collaboration Controlling for Group Characteristics

	Social		Joint Attention		Conflict	
	Coefficient	t value	Coefficient	t value	Coefficient	t value
Imitation	-.01	-.558	-.00	-.187	.0195	.059*
Reciprocal	.127	5.25***	-.06	-1.439	.04	.613
Cooperation	.067	2.95*	.16	3.77***	.14	1.27

Note: * p< .05, ** p< .01, *** p< .000
The values of the coefficients represent the effect size of each dimension of inter-subjectivity on each type of collaboration, the t values represent the significance test of the effect sizes

Table 13 shows the largest effect size to be for the impact of joint attention on cooperation, followed by the effect of social on reciprocal. A smaller effect was found for social on cooperation and for conflict on imitation. These significant effects were all positive. Although non significant, it is interesting to note that both social and joint attention were negatively related to imitation.

Level 2 models: The Effects of Activity Area Variables

Hypothesis 3: The environmental flexibility of activity areas will explain the differences in collaboration between them.

To test this hypothesis three intercepts as outcomes model were run for each collaboration type using the environmental flexibility variable as a predictor. This model tests whether the environmental flexibility of the activity areas can explain the differences in collaboration previously found between activity areas in the unconditional model. The results of this model showed the significant effect of environmental flexibility to be for cooperation at Co= .08, t= 3.4, p< .05 and for imitation at Co= -.08, t= 3.15, p< .05. Environmental flexibility did not explain activity area differences in reciprocal or imitation collaboration.

Hypothesis 4: The teacher interaction of activity areas will explain the differences in collaboration between them.

The same model as that run for hypothesis 3 was tested, using teacher interaction variables as the level 2 predictors. There was no significant relationship between teacher interaction variables and any of the collaboration types. The full results of the impact of activity area variables on between area differences are listed in Table 14.

Table 14

Impact of Classroom Variables on Activity Area Differences in Collaboration

	Respond		Intervene		Intrude		Environmental Flexibility	
	Coefficient	t value	Coefficient	t value	Coefficient	t value	Coefficient	t value
Imitation	-.114	-.353	-.328	-.814	-.087	-.2	-.08	-3.15**
Reciprocal	.033	.092	-.155	-.393	.246	.549	.033	.913
Cooperation	-.106	-.216	-.17	-.6	.347	1.145	.08	3.49**

Note: * p< .05, ** p< .01, *** p< .000

Table 14 shows that in terms of environmental flexibility the effect size for both imitation and cooperation were in the opposite direction, meaning that more flexibility predicted higher levels of cooperation and lower levels of imitation to the same extent. Although none of the teacher variables were significant in predicting collaboration it is interesting to note that the majority of the effects were in the negative direction, meaning that higher levels of teacher interaction related to lower levels of collaboration. Two of the positive relationships were for reciprocal and two were for teacher intrusion.

Hypothesis 5: The environmental flexibility and teacher interaction of activity areas will affect the impact of inter-subjectivity on collaboration.

To test this hypothesis, three level 2 models were run to determine whether activity area variables moderated the relationship between inter-subjectivity and collaboration. More specific hypotheses about the nature of these relationships are listed below along with the results of the models.

Hypothesis 5a: Activity areas with high environmental flexibility will have stronger positive relationships between inter-subjectivity and collaboration.

Results showed that the impact of joint attention on all collaboration types was increased due to high environmental flexibility of activity areas. In addition the impact of social inter-subjectivity on cooperation was increased due to high environmental flexibility.

Hypothesis 5b: Activity areas with high intervening and intrusive teacher interactions will have weaker relationships between inter-subjectivity and collaboration.

These results were mixed. Activity areas that were high on intervening teacher interactions had weaker relationships between all three inter-subjectivity variables and reciprocal collaboration. However the relationship between social inter-subjectivity and imitation was strengthened. There was a significant positive influence of high teacher intrusion on the relationship between social and conflict inter-subjectivity and reciprocal collaboration. In the case of cooperation the relationship with inter-subjectivity was not affected by teacher intrusion or intervening.

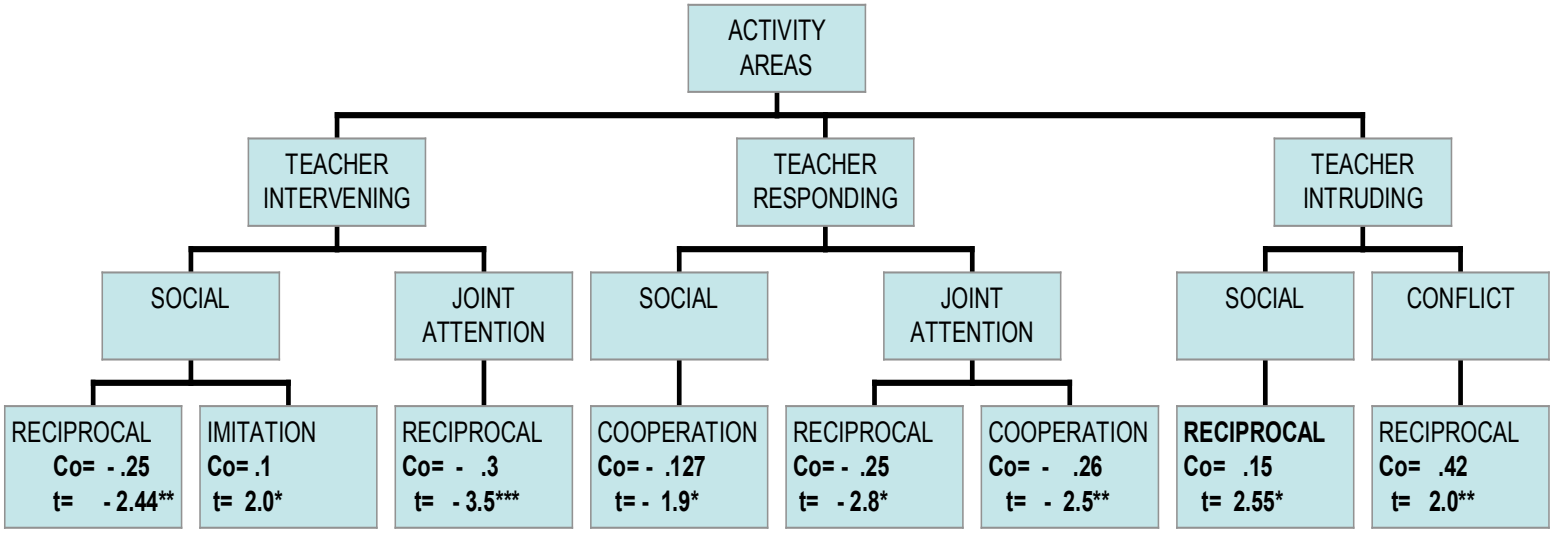
Hypothesis 5c: Activity areas with high teacher responsive interactions will not affect the relationship between inter-subjectivity and collaboration.

The results did not support this hypothesis. There was a negative effect on the relationships between joint attention and social inter-subjectivity and cooperation, and between joint attention and reciprocal collaboration due to a high level of teacher responding.

In summary the moderating effects of the activity area variables were the most significant for reciprocal collaboration. In addition, the impact that joint attention had on collaboration was the most effected by activity area variables. Although the degree to which inter-subjectivity effected imitation and the effect of conflict on collaboration were both influenced by one or more classroom variables, the imitation and conflict variables were the least impacted by the moderation effects. The details of all interaction effects are presented in Figures 1 and 2.

Figure 1

Coefficients and significance tests of the effects of Teacher Interaction on the Relationship between Inter-subjectivity and Collaboration



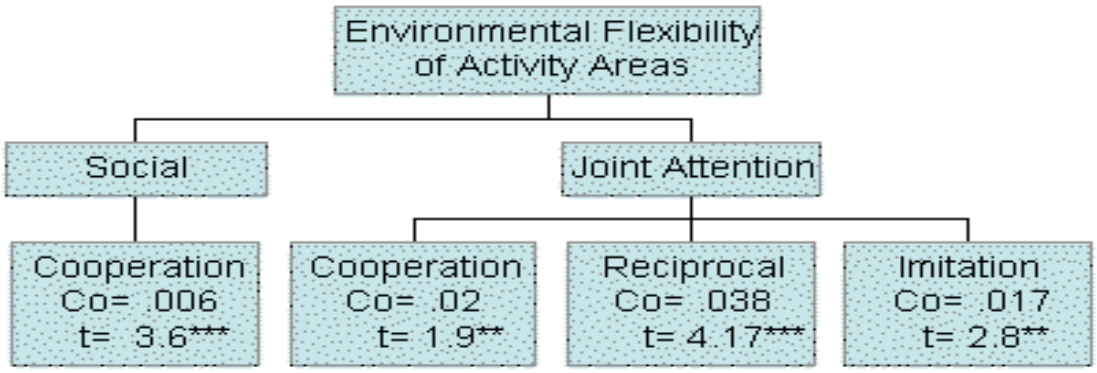
Note: * p< .05, ** p< .01, *** p< .000

Note: Co=coefficient, i.e., effect size and t=the statistic for significance testing

Figure 1 shows a number of significant moderating effects of teacher variables on the relationship between inter-subjectivity and collaboration. The most significant effect was for the negative impact of teacher intervening on the relationship between joint attention inter-subjectivity and reciprocal collaboration. The next most significant moderating effects were the negative impact of teacher intervening on the relationship between social inter-subjectivity and reciprocal collaboration and of teacher responding on the relationship between joint attention and cooperation. Teacher intruding was the only teacher variable to have positive moderating effects on the relationship between inter-subjectivity and collaboration. These effects were for the relationship between social and conflict on reciprocal collaboration, with the stronger effect for conflict.

Figure 2

Moderating Effects of Environmental Flexibility on the Relationship between Inter-subjectivity and Collaboration



Note: * p< .05, ** p< .01, *** p< .000

Note: Co=coefficient, ie; effect size, t=statistic for significance testing

Figure 2 shows significant moderating effects of environmental flexibility on the relationship between inter-subjectivity and collaboration. More specifically the relationship between social and cooperation was moderated by environmental flexibility. The relationship between joint attention and all three types of collaboration were moderated by environmental flexibility. The largest effect was for the relationship between joint attention and reciprocal. All of the effects were in the positive direction.

Predictors as Outcomes: The Effect of Activity Area Variables on Inter-subjectivity

Given that inter-subjectivity was a predictor that varied between activity areas and described the interaction episode it was important to know the extent to which it was affected by between activity area differences. Therefore 3 random effects models were run which included social, joint attention and conflict inter-subjectivity as level 1 outcome variables, and

gender, size and type of play as level 1 covariates to determine the effect of activity area on each dimension of inter-subjectivity. The results showed a highly significant effect of activity area on social and joint attention inter-subjectivity, with between area differences explaining 27% and 35% of the variance in each dimension respectively. To determine whether level 2 activity area variables could explain these differences, 3 fixed effects models were run with teacher interaction and environmental flexibility entered as level 2 predictors of the intercept. Both intervene and intrude had a significant negative effect on social inter-subjectivity and intrude had a significant negative effect on joint attention inter-subjectivity. Intervene had a positive effect on joint attention. These results are listed in Table 15.

Table 15

Significant Effects of Activity Area and Teacher Interaction on Inter-subjectivity

Activity Area			Intervene		Intrude	
Coefficient	*t*	Variance	Coefficient	*t*	Coefficient	*t*
Social						
12.8	28.3***	37%	-2.64	-3.849***	-3.18	-2.58**
Joint Attention						
8.1	38.6***	25%	1.17	2.5**	-1.2	-2.3**

Note: * p< .05, ** p< .01, *** p< .000

Note: Coefficient is the effect size of the activity area variables on inter-subjectivity, variance is the amount of variance in inter-subjectivity explained by activity area

Table 15 shows the most significant effects to be the impact of activity area on social and joint attention. A significant amount of variance in these dimensions of inter-subjectivity were explained by activity area. There was a highly significant negative effect of intervening on social inter-subjectivity, in that higher intervening predicted lower levels of social inter-subjectivity. The same relationship was found for the effect of intruding on both social and joint attention. However there was a positive effect of intervening on joint attention, meaning that higher intervening predicted higher joint attention inter-subjectivity.

Summary of HLM Results

In summary, the three types of collaboration differed significantly in their relationships to other variables. The level of imitation differed highly between activity areas. However, the activity area variables did not explain those differences. On the other hand, reciprocal and cooperation types of collaboration varied less due to differences between activity areas. These variables also had more unexplained variance in those two variables after controlling for the effect of activity area. Conflict had no significant effect on any of the collaboration types.

The effect of inter-subjectivity on collaboration was found to vary as a function of activity area variables such as teacher interaction and environmental flexibility. In general there was a negative effect of teacher interaction and a positive effect of environmental flexibility on these relationships. Although conflict and imitation were the least effected by activity area variables, the interaction effects of the activity area variables did result in significant relationships for this predictor and outcome, although neither had shown significant main effects in the prior models.

Both social and joint attention inter-subjectivity were found to differ significantly between activity areas and to be significantly affected by the activity area variables.

Discussion

Descriptive Findings

Group characteristics. The frequency of groupings sheds light on the social behavior of this population. It was expected that dyads would most frequently demonstrate sustained interaction. However triads were the most frequently observed groupings. Another surprise was the predominance of mixed gender groupings. These two findings contradict prior research on friendship choices among preschoolers yet are consistent with a recent study on peer choices during free play (Hanish, et al., 2007). These contradictory findings may be due to the methodological differences between friendship research using socio-metric methods versus studies which used naturalistic observations to assess friendships. Because preschoolers' social behavior is activity based children may play together with those who share their interest in a certain activity at any given time. This activity based social behavior may have little to do with peer nominations of friendship or preferences for peers during non-play activities, (i.e., routines, whole group activities, etc…). Therefore the predominance of triads and mixed gender groupings may reflect the highly contextualized nature of preschooler's social behavior rather than simply their choice of play-mates.

Finally, the finding that functional play was the most frequent type of play followed by dramatic play and then constructive play likely relates to the relative difficulty in maintaining social coordination during these three types of play. Functional play refers to simple actions, found to be the first type of social play that emerges in development (Howes, 1988). Therefore it would be easier to coordinate with peers during this type than dramatic play which requires establishing shared meanings among play partners or constructive play which requires complimentary contributions of different group members to achieve a goal. Given

these differences in social complexity, constructive play would likely be the most difficult form of play for maintaining social coordination. This reflects the findings and also suggests that among this population the ability to coordinate with peers during play is still developing.

The distribution of the variables. Among the inter-subjectivity dimensions conflict was negatively skewed. This finding makes sense given that conflict is inconsistent with high inter-subjectivity and is likely related to lesser amounts of inter-subjectivity. Among the collaboration variables both imitation and cooperation were negatively skewed. This may indicate something about the nature of most collaborations among this sample. Since imitation is the predominant form of collaboration among children younger than four years old (Brownell, Geetha & Zerwas, 2006), it may be less likely to occur among this sample of four year olds. On the other hand cooperation was the most complex form of collaboration. This may indicate that this level of collaborative complexity is relatively uncommon among this sample. This is likely due to developmental constraints on the attention and planning necessary to work with same age peers towards a particular goal (Piaget, 1971).

The Construct of Inter-subjectivity

The above results support particular aspects of how inter-subjectivity should be defined for this population. The finding that the construct is multi-dimensional reflects the theoretical definition of the construct. In addition, it allows for the likelihood that the type of inter-subjectivity experienced will vary with the particular dimensions of any given interaction. Although it is possible to have high or low inter-subjectivity on all three dimensions during a single interaction, it is also likely that one dimension will predominate based on the nature and meaning of the interaction at a particular time.

The finding that the two language items loaded strongly with the social items, rather than the attention items may offer insight into the relative role of language in joint attention and social interaction at this age. Although young children's social behavior is primarily activity based, the important role of language during play has been established in prior research (Goncu, 1999). The current findings suggest that the particular function of language is a social one related strongly to positive emotion, eye contact and other behaviors that connect children socially and emotionally and make the interaction mutually enjoyable. On the other hand, joint attention to particular tasks and activities seems to be primarily centered on the shared activity. In the case of high joint attention, mutual engagement in the shared activity may be enough to connect children inter-subjectively without requiring a high degree of emotional reciprocity or social bonding. In addition, non-verbal communication was observed as most prevalent during joint attention to shared activities. In this sample children used language primarily as a means of social bonding, rather than as a tool for communicating about specific activities. However, this finding may not generalize to preschoolers from other populations, such as those from higher SES families.

Finally the item "mutual negative emotion" was designed to assess children's reciprocal displays of negative emotion. It was initially expected that such behavior would demonstrate empathy and load together with mutual positive emotion. However, this item loaded strongly with the two conflict items, suggesting that among this population negative emotion exchange occurs during conflict and not as a result of empathy. Although young children have been observed to show empathy for another child's distress, this has been defined as comforting the distressed child (Kochanska, 1997) rather than empathic mirroring of the distressed child's

negative emotional state. Therefore this finding is consistent with prior developmental research.

Group Differences in Inter-subjectivity

The results of the relationship between group characteristics and inter-subjectivity showed that girl only groups and dramatic play groups had the highest social inter-subjectivity. This is consistent with the idea that girls are socialized to place more emphasis on social emotional bonding from a young age (Maccoby, 1990). Given that dramatic play is based primarily in interpersonal interaction between children, it makes sense that this type of play would require a high degree of social and emotional connection. Although prior research has shown that inter-subjectivity is related to more complex forms of pretend play (Goncu, et.al, 2002), the type of inter-subjectivity most salient for this play has not been previously delineated. By specifying the social dimension of inter-subjectivity as related to dramatic play, the findings of the present study extend the literature in this regard.

Constructive and small groups were highest on joint attention inter-subjectivity. Because constructive play requires sustained attention to a particular task it makes sense that a small group working on a task would have high degrees of joint attention. This is consistent with work on collaborative cognition in which children require a high level of mutual focus and cognitive reciprocity to complete a shared goal (Bearison & Dorval, 2001). This is also consistent with the conceptualization of secondary inter-subjectivity in which infants match their attention with a parent towards an object or situation (Trevarthen & Aiken, 2001). In these earlier studies the dyad was the unit of analysis, therefore the findings of this study are consistent with prior research, in that the smallest groups found it easiest to coordinate and maintain mutual focus.

Finally large and constructive groups were highest on conflict. As difficulties in maintaining social coordination arise, conflicts between interacting partners will also occur, making large groups the most conflicted. On the other hand, conflict within constructive groups may reflect the structured nature of the play compared to the other two play types. With group members all contributing to the completion of a single construction task, differences in opinion will arise. Given the egocentric nature of the preschool age, these differences are likely to lead to conflict, but not necessarily to dissolution of inter-subjectivity if the mutuality of focus remains.

These findings highlight the activity and contextually based nature of inter-subjectivity wherein different types of shared activity within different social contexts generate different dimensions of inter-subjectivity. However, these dimensions do not exist in opposition to each other. For example: girls are higher than boys on social inter-subjectivity, yet not significantly different from boys in either joint attention or conflict. On the other hand, different types of play both elicit and require different types of inter-subjectivity to enable sustained interaction around a particular activity.

Inter-subjectivity and Length

Social and joint attention both significantly predicted longer interactions. This result confirms the idea that the construct of inter-subjectivity may be used an indicator of social competence. This predictive relationship was particularly strong and persisted regardless of group characteristics or play type. This indicates that inter-subjectivity is assessing a type of social cohesion which allows children to maintain interactions regardless of social and contextual factors. In addition, interactions that are able to be maintained for longer periods are more likely to develop complex forms of collaboration.

Inter-subjectivity and Collaboration

In addition to length, collaboration was used to assess children's social competence during peer interactions. The measure of collaboration delineated three distinct levels and each level was scored for the extent to which it occurred during the interaction episode. The hypothesis was that inter-subjectivity, as a measure of mutuality and reciprocity between interacting partners would predict the more global complexity of the collaboration. The results supported the hypothesis that social and joint attention inter-subjectivity would predict the most complex form of collaboration, namely cooperation. Social inter-subjectivity predicted reciprocal collaboration while none of the dimensions of inter-subjectivity predicted imitation.

These results are consistent with the theoretical conceptualization of the three forms of collaboration. The reciprocal form describes collaboration based in turn taking. A socially and emotionally connected partnership could easily maintain a highly reciprocal collaboration, while a cognitively aligned partnership based in joint attention would most likely predict a more goal oriented type of collaboration. This is consistent with the results showing that joint attention inter-subjectivity predicted cooperation, during which something new is created as a result of the partnership. In this sense, compared to imitation and reciprocal, cooperation most clearly reflects the term "collaboration" when used to describe the behavior of older children or adults. Although this type of interaction does occur during early childhood it is rarer and requires more effort given the developmental constraints of the age.

A high degree of joint attention inter-subjectivity would support the ability of the interacting partners to share a similar focus and maintain shared goals. As the more cognitive oriented type of inter-subjectivity it makes sense that it would predict the type of collaboration that is based in the sharing of ideas and goals. Similarly, in order for a

collaboration to be cooperative the interacting partners must be socially and emotionally connected as well. Therefore it makes sense that social inter-subjectivity would play a role in predicting cooperation as well.

Activity Area Differences in Collaboration

The 38 different activity areas were distributed among the five classrooms representing between seven and eight different areas per classroom. There was support for the hypothesis that there would be differences in collaboration type due to activity areas. However, the effect of activity areas varied by collaboration type. This finding supports the idea that young children's peer interactions, including collaborations are highly sensitive to context. As mentioned in the introduction section, it has been shown that during early childhood; materials, space, furnishings and adult presence have strong and immediate influences on young children's social behavior. The finding of significant differences in collaboration and inter-subjectivity between activity areas is consistent with young children's social competence being highly sensitive to context. Given that activity areas were distributed among all the classrooms, the importance of the micro-context within classrooms may have been as significant as between classroom differences.

This finding challenges the current assessment paradigm guiding much research on early childhood classroom quality. The majority of current measures of quality assess global indicators that describe overall classroom features. In particular, the most commonly used measure, the Early Childhood Environment Rating Scale (ECERS), scores a wide variety of classroom features, such as materials, space, routines, teacher response style, and curriculum areas, in general terms with ratings ranging from poor to excellent on each dimension. The score of all of the combined scales equal one classroom's quality score (Harms, Clifford &

Cryer, 1998). Similar methods are used by the Assessment Profile for Early Childhood Programs (Lambert, Abbot-Shim & McCarty, 2000) and others. However, the results of the present study challenge the idea that the micro-contexts of activity areas can be assumed to be aggregated per classroom. Similarly, the idea that scores of the social and learning environment of a classroom can be made without specifying the context in which they are being assessed, is challenged by the finding that children's peer interactions vary significantly even within a single classroom context, namely indoor free play periods.

Alternatively, these results support the type of assessment methods used in the Emergent Academics Snapshot (Ritchie, Howe, Kraft-Sawyer & Weiser, 2002). This assessment records and describes episodes of children's engagement in different activity centers individually, with teachers and with peers. This system has also been shown to highly correlate with the CLASS and to predict child outcomes, lending further support for the notion that child behavior can only be adequately understood with attention to the particular contexts in which it occurs.

The effects of activity areas on the three types of collaboration suggest additional interpretations about the relationship between peer interactions and context. The level of imitation was most highly influenced by activity area. Given that imitation is the least complex form of collaboration this may indicate that less developmentally advanced types of interaction are the most susceptible to influences occurring outside of the interaction. Indeed this has been shown to be the case in studies of early social behavior among toddlers (Howes & Matheson, 1992). Given that inter-subjectivity does not predict imitation, this type of collaboration may be less dependant on social dynamics between partners and more easily influenced by differences in the play area. This further implies that while social aspects of the

classroom environment may be highly influential for older four and five year olds, three year olds and young four year olds may be more affected by the physical environment. Again, this challenges the idea that there is a single type of high quality preschool environment for all 3-5 year olds. Depending on the particular developmental levels of the children, certain aspects of the environment may be more or less important in predicting positive outcomes.

Reciprocal and cooperative collaborations also differed by activity area to a much lesser degree, with reciprocal forms being slightly more affected than cooperation. This suggests that in more complex collaborations inter-personal dynamics within the interaction may be of greater importance than influences from outside the interaction.

Although there was significant variation in all three types of collaboration due to activity area the teacher interaction variables were not able to explain the differences between them. This indicates that there are other factors not assessed by this study that vary between activity areas and impact collaboration. Given that activity areas also reflect differences in classrooms, more global classroom factors may explain these differences in collaboration. There was a significant effect of the environmental flexibility of activity areas on cooperation and imitation. These effects were in the opposite direction for the two types of collaboration in that higher flexibility of space and materials related to higher cooperation and lower imitation. This is likely explained by the fact that imitation and cooperation reflect opposite types of collaboration and are often given opposing scores on the collaboration measure.

The relationship between flexible or open ended materials and children's behavior has been studied previously. Findings showed that more cognitive complexity emerges from the use of highly flexible materials, however, children who demonstrate less complex forms of play may benefit from more concrete and inflexible materials (Neumann and Roskos, 1998).

These findings are consistent with the results of this study and suggest that the influence of materials on the cognitive complexity of individual children's play may be similar to the complexity of collaborations between children.

The moderation effects of activity area variables on the relationship between inter-subjectivity and collaboration showed that the effects of teacher interaction indirectly affected collaboration through inter-subjectivity. Since inter-subjectivity describes the micro-behaviors of interactions, it is likely to be more sensitive to the social context created by the teacher, whereas collaboration is the product of the interaction itself and so less directly influenced by the social context beyond the interaction.

Imitation was not directly effected by inter-subjectivity, however the impact of joint attention on imitation was increased due to high environmental flexibility and the impact of social inter-subjectivity on imitation was increased due to high teacher intervening. This suggests that while inter-subjectivity does not predict imitation on its own, the social and material environments of classrooms supports inter-subjectivity enough to increase its effect on imitation.

The effects of environmental flexibility were significant in strengthening the relationship between joint attention and all three forms of collaboration. Given the findings discussed above, it makes sense that highly flexible materials and space increased the effect of joint attention, the cognitive form of inter-subjectivity, on collaboration. This further supports the notion that cognition can occur in the form of social interactions and may be affected by materials and space in a way that is similar to that of individual cognition during play. In addition this finding suggests that certain types of classroom environments may promote a

greater degree of joint attention inter-subjectivity which in turn promotes more complex collaborations.

The strength of social inter-subjectivity in effecting cooperation was also increased by environmental flexibility. This may be due to the fact that having more options promoted more social engagement within cooperative collaborations.

Activity areas that were high on teacher intervention had weaker relationships between all three inter-subjectivity variables and reciprocal collaboration. This makes sense given that when an outsider frequently intervenes in an ongoing interaction, the mutuality between the interacting partners will be disrupted. In particular, reciprocal collaboration depends on turn taking and mutuality, so an intervening teacher would disrupt the social dynamic of reciprocal collaborations. In addition, teacher intervention may be triggered by disruptions in the interaction, so activity areas high on intervening may also tend to have more highly disrupted, (or less inter-subjective) collaborations.

On the other hand the relationship between social inter-subjectivity and imitation was strengthened due to high teacher intervention. This may be due to the fact that imitation is the least complex form of collaboration. It is possible that in this case teacher intervention was helpful in promoting social/ emotional connectedness through resolving conflicts or other types of support to maintain the collaboration. It has been found that children who engage consistently in less complex forms of peer play benefit from teacher intervention to strengthen their peer relationships (Hundert & Hopkins, 1992).

The impact of both social and conflict inter-subjectivity on reciprocal collaboration was increased by activity areas having high teacher intrusiveness. In the case of conflict this makes sense, given that intrusion should cause disruptions in play that would likely increase

conflicts during reciprocal collaborations. However it is unclear why social inter-subjectivity would have a stronger impact on reciprocal collaboration due to high teacher intrusion. Perhaps, this is due to the fact that extended teacher proximity, if not requested by the children, was scored as intrusion. Some children may have felt more comfortable being in the close presence of a teacher and increased their social connectedness as a result.

Finally there was a negative effect of teacher responding on the relationship between both social and joint attention inter-subjectivity and cooperation. Although responding is meant to assess teacher's responses to children's needs, the intervention of a teacher seems to have a negative impact regardless of the basis for it. It may also be the case that teacher responding is triggered by children's requests as a result of a disruption in the inter-subjectivity. Responding also had a negative effect on the relationship between inter-subjectivity and reciprocal collaborations most likely for similar reasons.

The results relating to the teacher interaction measures challenge many current assessments of teacher behavior as indicators of overall early childhood classroom quality. The results of this study suggest that the particular situation of sustained peer interactions during free play construct the meaning of teacher interactions in a way that is opposite to how current measures assume teachers should behave. Measures such as the Care-giving Interaction Scale (Arnett, 1989), the Assessment Profile for Early Childhood Programs (Lambert, Abbot-Shim & McCarty, 2000) and the E.C.E.R.S. (Harms, Clifford & Cryer, 1998), all assume that a teacher's behavior can be assessed regardless of the activity in which the children are engaged and that scores are comparable across classroom contexts. In each of these measures elaborative, warm and responsive styles indicate higher teacher quality. However, most of the results reported here, particularly the effect of teacher responding

showed that during sustained peer interactions, teacher behavior has no direct effect on children's social competence as assessed by collaborative complexity. The moderating effects of most of the teacher interactions are negative.

These results are consistent with a study described in the introduction where teacher interaction had a negative effect on typically developing children's peer interactions. However, with the exception of the C.L.A.S.S. and the Snapshot, current measures of teacher interaction do not distinguish between free play and other classroom activity contexts, such as transition times, whole group and clean-up. They also do not specify expected relationships between "teacher quality" and particular child outcomes.

In general, the activity area variables had the greatest effect on the relationship between inter-subjectivity and reciprocal collaboration. This suggests that inter-subjectivity may be most susceptible to contextual features during turn taking forms of collaboration. This may be due to the fact that the interacting partners are less thoroughly invested in the collaboration than during the more complex cooperative form and so factors external to the interaction have more influence. On the other hand, given that the impact of most of the teacher interaction variables was negative, reciprocal collaborations may be most affected by the influence of external social factors on inter-subjectivity, because those types of collaborations are the most reliant on inter-subjectivity for supporting social coordination.

On the other hand imitation was the least affected by the activity area variables. This is likely related to the fact that inter-subjectivity did not predict imitation. The fact that there was a positive interaction effect of environmental flexibility on joint attention and a positive effect of teacher intervening on social inter-subjectivity when predicting imitation, shows that inter-subjectivity may relate to imitation but only under certain contextual conditions.

Conflict was affected only by teacher intervention and intrusion in its impact on reciprocal collaboration. Given that high conflict would be likely to disrupt collaborations, it makes sense that high teacher intervention and intrusion strengthened the relationship between conflict and reciprocal collaboration.

These results present a dynamic picture of the complex relationships between children's activity, peer interactions and the social and material context of the classroom. Standard measures of preschool quality assume that the nature of quality can be determined a-priori, apart from the meanings given to situations and contexts by the children themselves through their own self chosen activity. Play has long been touted as the most powerful medium through which young children learn and develop. However, the early childhood assessment paradigms most commonly in use ignore the power of play to shape the meanings of social interactions, environmental features and in turn influence development. What is important to the development of low income preschoolers cannot be considered apart from the most salient activities of the children themselves. Play is the "leading activity" (Stetsenko, 2005) of early childhood. Therefore the free play period of the early childhood classroom must be the starting point for understanding quality. It is within this period that children actively develop social competence through interactions with each other. Therefore it is only within the particular dynamics of this period that the meaning of space, materials, and teacher interaction can be understood.

Conclusion and Future Implications

The present study used methods that challenge a number of assumptions of developmental psychology. The first assumption is that the individual is the unit to be analyzed, even when attempting to understand the social domain. The next is that the

meanings of participants' behavior may be determined and tested a-priori by the researcher as represented by fixed measurement tools. The most basic is the mechanistic assumption that in order to understand the basis of developmental outcomes one must first identify and test each component of an individual separately and then determine the predictive relationships between them.

Contrary to these assumptions, the present study was based on the principle that inter-subjectivity as tied to social competence cannot be reduced to individual behavior. The constructs measured in this study assess phenomena that can only exist between people during moments of interaction. Social psychology was founded upon the idea that the behavior of groups is fundamentally distinct from the behavior of individuals. Studies within this field have supported the idea that group behavior cannot be reduced to or even explained by the psychology of individual group members. Developmental psychology, the study of psychological change, must recognize the unique contribution of the social interaction to such change. Vygotskian derived researchers have long contended that children grow into their social environments, not apart from them. The present study provides a method for investigating development as social by highlighting those behaviors which occur interactively. Just as much research is limited to assessing the behavior of individuals, the present study provides a method for exclusively assessing interactive behavior.

While the relationship between the individual and the social interaction may be related, the two are not reducible and each must be adequately assessed in order to capture the full range of what is meant by developmental psychology.

The next assumption of the present study is that the meaning of participants' behavior is best determined through a dynamic process which involves both the researcher and the

participants. This assumption has much in common with anthropological and phenomenological approaches to human behavior. However, it is rare in current approaches to developmental psychology. In works employing "participant observation" methods, the researcher is cautioned to be aware of their own biases in assigning meanings to the behavior of the participants (Denzin, 2006). The researcher must consider the influences of their own life experiences and personal values on the research endeavor. Through living with the participants, the researcher first develops a sympathetic awareness of the subjectivity of the participants. The researcher then takes the perspective of an informed outsider and discovers patterns in the participant's behavior which lend themselves to systematic interpretation. This research generally uses descriptive rather than quantitative methods of reporting and does not use standardized measures for assessing participant behavior. Therefore, this type of research is rare in developmental psychology which is interested in generalizable findings that can be replicated and applied to various populations.

The present study was fully informed by the researcher's prior experience as a teacher of low income preschoolers. This experience familiarized the researcher with the full range of participant behavior, as well as the range of meanings of such behavior in various contexts. However, even with this background, the researcher revisited a classroom as a participant observer/ researcher, to balance her prior role as teacher with the new, outsider role of researcher. The goals of these methods were to capture what happens in Head Start classrooms in a systematic way. More specifically, in order to understand the meaning of preschooler's behavior it was necessary to focus on times when they had the freedom to act in accord with their own immediate interests. To assess young children within an adult imposed structure is to assess them in reaction to that adult and their structure. Therefore the meaning

of that behavior does not provide direct insight into the child's subjectivity, but can only be understood as it is constructed within the adult determined context.

This is analogous to an ethnographer studying the least powerful group within a hierarchically organized society. The psychology of this group cannot be understood if they are only observed when relating to the higher status members. They must be understood among themselves, acting on their own terms, before their functioning within the hierarchy can be fully understood.

Free play periods provide a unique context for assessing young children on their own terms. Engaged in personally meaningful activity of their own volition and largely apart from the direction and restriction of adults, it is possible to interpret the meanings of children's behavior.

Finally, the mechanistic approach to psychology seems particularly prevalent in research on low income preschoolers. The socio-cultural and functionalist approach to developmental psychology has challenged the idea that what makes good developmental outcomes can be understood by analyzing the components of cognitive, social-emotional and linguistic functioning separately and then testing the relationships between the various sub-parts. Instead the recent approaches have been interested in the meaning of behavior as it develops within the contexts of close relationships and meaningful activities.

Although studies along these lines have been done of poor children, they seem to be out-numbered by recent research attempting to answer the urgent question prompted by the persistent income and race based achievement gap, "Why can't we fix them?" This deficit model underlies much recent and current research in Head Starts, with the goal of fixing the problem in preschool in order to close the achievement gap that occurs later in elementary

school. Some targeted problem areas include: Disruptive classroom behavior, inattention, poor adjustment, literacy and math delays. To explain poverty related deficiencies more basic psychological processes are invoked as causal: Poor executive functioning, lack of theory of mind, poor impulse control, low emotion regulation, unelaborated language and so on. These capacities are often assessed via measures on tasks that are unrelated to the familiar routines children experience during early childhood.

Furthermore, such studies fail to consider what is known about early childhood development from studies of middle class children. Namely that pretend play and problem solving during hands-on activities are the best indicators of cognitive development, that children's development is integrated, the result of a multitude of relationships between all domains and most importantly that their behavior is intensely sensitive to context. To assume that child functioning in elementary school can be directly predicted from individual behavior in Head Start assumes that context is irrelevant. It assumes a static view of development in which individual skills function similarly across widely divergent contexts.

The present study sought to assess children holistically while engaged in the activity that all young children do best, playing with one other. Through this context, it was possible to see cognitive, social, emotional, linguistic and conflict dimensions functioning simultaneously and in response to a meaningful and supportive context. This is the direction that developmental research has turned in its efforts to understand developmental processes among middle class children. The development of poor children must be assessed similarly if it is to be understood in the interest of closing the achievement gap.

At a recent conference somebody who was working in Guatemala commented that inter-subjectivity is a skill that non-Western people do particularly well. She went on to say

perhaps it was something that could be taught. I have not seen cross-cultural research on inter-subjectivity. Although the particular nature of an inter-subjective interaction is highly culturally contingent, inter-subjectivity as a social skill that may be more developed in some cultures than others is a new idea. However, if she is right, perhaps inter-subjectivity is an entry point to seeing the unexamined strengths of immigrant and poor children who lag behind their White, Western and middle class peers in school achievement.

Educational writings have long argued that the key to teaching is identifying the strengths of the learner. The Vygotskian zone of proximal development is based on this premise. Perhaps inter-subjectivity can offer a window into the unique strengths of poor children. Regardless of the uniqueness of this ability, it should at least provide a counter to the deficit model assumptions underlying much research on children in Head Start.

The present study described the details of children's free play during preschool by providing information on their play behaviors across five classrooms and used this information to test a hypothesis about how children maintain play interactions and demonstrate social competence. The findings of how inter-subjectivity related to collaboration and how these relationships varied with contextual factors offers a new paradigm for considering preschool classroom quality.

The findings offer some implications for how preschool teachers choose classroom materials and how they interact with children during free play. The study results suggest that these decisions should be based on careful observations of children's social competence. For example children who engage mainly in imitative forms of collaboration may need more concrete materials and teacher support for their social interactions. On the other hand, those children engaging in more complex collaborations need highly flexible space and materials

and teachers should limit the extent of their interaction during play. Finally, in order to support inter-subjectivity teachers can direct all children to notice the emotional, social and attention signals of their peers. Teachers can further promote this by modeling inter-subjectivity in their interactions with their students.

These implications and the methods of the study reflect an additional assumption about early childhood education. This assumption is that good preschool teachers are highly skilled professionals who are capable of understanding their students intellectually and psychologically. Teachers should be encouraged to build on their understanding of individual children's needs and to respond accordingly. Head Starts have been involved in a number of intervention studies where curriculum and methods are imposed without the input of teachers. Although some have gleaned positive results, the question of how much value is added by these interventions to what teachers were already doing is rarely addressed. Any good teacher knows there is no one approach that will work for every child, and that methods and content must extend on what is known about the children rather than being decided apart from them. Preschool teachers know how important free play is for the development of young children. Building on that knowledge and helping teachers to further develop highly inter-subjective connections with each child may offer more value to the Head Start curriculum than any curriculum intervention developed by outsiders.

Finally, it may be of interest to further investigate the implications of this study. Some future directions would be to follow children longitudinally to determine whether interaction based social competence continues in supporting group learning and social skills later on in development. Concurrent or longitudinal studies may want to determine the relationship between interactive competencies and individual social and cognitive competencies of

children. In addition more fine grained analysis of teachers, in terms of their levels of inter-subjectivity with their students may be investigated and compared with student outcomes. Finally, a cross-sectional study of children within different cultural and SES groups may be conducted to determine how inter-subjectivity functions within different groups.

Limitations

There were a number of limitations of this study. The first limitation was the small number of classrooms participating. This made it impossible to assess between classroom differences. Given that this was a cross-sectional study it was impossible to determine the direction of effects between measures. For example, collaboration type may have been established prior to inter-subjectivity and teacher interactions may have been entirely in response to children's behavior with peers. Measures of group constellations would have added important information to the study and settled questions of the relationship between individuals and interactions. Finally, many of the measures were scored by the researcher, who also conducted the data collection and delineation of episodes. Obviously this compromised the independence of the measures and suggests that the statistical relationships be interpreted with caution. Any replications of this study should use independent raters for all measures and multiple researchers for data collection to avoid contamination.

Appendix A: Parental Consent Form

Dear Parent,

My name is Rebecca Garte and I am a Ph.D. student in developmental psychology at the Graduate Center of the City University of New York (CUNY), and Principal Investigator of this project, entitled "inter-subjectivity in the pre-school classroom". This is a research study of children's interactions while they play and learn in small groups. The study is expected to show that children who work closely together have more successful interactions during different classroom activities.

Videotaping of children in their normal activities at school will take place for approximately 2-4 weeks. I will videotape groups of children during free play in the morning and afternoon sessions 2-3 times a week. The tapes will only be viewed by myself, my assistant and my advisors. All information gathered will be kept strictly confidential, and will be stored in a locked file cabinet, to which only I, and my advisor, will have access. If at any time you decide to withdraw permission for your child to be video-taped you may tell either the classroom teacher or myself, either verbally or in writing and I will not record them.

The risks to your child from participating in this study are no more than encountered in their regular daily activities. The benefit of your child's participation is the knowledge I may gain both about children and about quality pre-school education programs. There will be approximately 80 children in 5 different schools taking part in this study.

I may publish results of the study, but names of people, or any identifying characteristics, will not be used in any of the publications. If you would like a copy of the study, please provide me with your address and I will send you a copy in the future.

If you have any questions about this research, you can contact me at 646-509-8368 or pokropski@aol.com, or my advisor, Anna Stetsenko at (212) 817-8715 or astetsenko@gc.cuny.edu. If you have questions about your rights as a participant in this study, you can contact Kay Powell, IRB Administrator, The Graduate Center/City University of New York, (212) 817-7525, kpowell@gc.cuny.edu.

Thank you for your participation in the study. I will give you a copy of this form to take with you.

I agree to allow my child to be videotaped by Rebecca Garte while participating in their normal classroom activities at _____.

Yes No

_____ _____ _____ _____

Parent's signature Date Child's Name Date

_____ _____

Investigator's signature Date

Appendix B: Item definitions from the Play Observation Scale (Rubin, 2001)

1. Dramatic Play: The purpose of the activity is imaginative, for example: taking on the roles of someone else, or any pretend activity (e.g., pouring pretend water into a cup and then "drinking" it).

2. Functional Play: The purpose of the activity is for the enjoyment of the physical sensation it creates and/ or the completion of a child directed task, such as feeding fish, tying a knot, washing something, pouring water from one container to another; jumping on and off a chair; making faces; singing or dancing for non-dramatic reasons; ringing bells and buzzers, etc.

3. Constructive Play: The purpose of the activity is constructing or creating something, using materials to make something new.

Appendix C: Code-book

The purpose of this observation is to record continuously behavior that occurs within activity areas that are selected from ongoing classroom behavior. An activity area is defined as an area of the classroom during free-play time where materials are available to the children and 2 or more children are observed in close proximity to one another. The rationale for this selection criterion is that such a situation provides the opportunity for inter-subjectivity to occur, whereas in areas of the classroom where children are playing alone there is no opportunity to observe inter-subjectivity. Inter-subjectivity for this purpose is defined as reciprocal or mutual interaction. For example: If one child attempts to get the other's attention and the other responds or if both children attend to the same material, task, or to one another simultaneously. If one child attempts to engage the other and is ignored it is not recorded as onset of inter-subjectivity. Once an activity area has been selected it is recorded continuously. The first instance of inter-subjectivity is noted and given a time stamp. If Inter-subjectivity continues between the same partners for longer than 1.5 minutes it is defined as an episode of Inter-subjectivity within the activity area. It is then recorded continuously until either the partners change or no signs of Inter-subjectivity are observed for 20 seconds. It is then given an end time. The activity area is then observed until the next onset of inter-subjectivity. Observation of a specific activity area ends once there are no longer 2 or more children in close proximity in the same area, and/ or no additional inter-subjectivity is observed. The number and duration of activity areas observed may vary across classrooms and within a given time frame. Within each activity area the number and duration of inter-subjectivity episodes may also vary as well as the type of episode as defined by mutual behavior ratings.

After each Inter-subjectivity episode is defined for the classroom the tapes are reviewed

to provide ratings for the episodes. Each episode is reviewed multiple times to yield ratings of frequency and duration for each mutual behavior that is observed during the episode.

Activity Area Variables

Record this information for each activity area prior to rating inter-subjective behaviors

Activity: Record the name of materials being used/ action being performed, i.e., blocks, housekeeping, play-doh, playground equipment

Time: Record the time of day: am or pm

Monitor: Record the level of teacher's monitoring of the activity on a 5 point scale

High: teacher is very close by, frequently comments or intervenes on the behavior of the children being observed

Medium: teacher is close by but is not observing or interacting with the observed children

Low: teacher is at a distance from observed children, could not easily see or hear their behavior unless she moved closer

Movement: How restricted is the children's movement during the activity?

Highly restricted: must stay in the same seat at the table

Medium: must stay in same area of the room but can move within that area

Low: free to move about the room, between different areas

Inter-subjectivity Episode Variables

Start coding when one child attempts to get the other's attention and the other responds or if both children attend to the same material, task, or to one another simultaneously. Record the type of mutual/ reciprocal behavior, i.e., says something repeatedly, taps arm, shows toy, makes eye contact, smiles. One child attempts and the other child responds, interaction has

begun. Episode ends when there is no interaction between 2 or more partners for 20 seconds

Contextual variables of episode

Size: Record the number of children initially engaged in the interaction. If another child joins the group, add to size count only if they contribute to the interaction for more than 1.5 minutes

Language: Record the native language of the children being observed, English if all the participants speak English as a 1rst language, Spanish, or mixed if the group consists of both English and Spanish primary speakers

Gender: Record girls if girls only, boys if boys only, mixed if both

Age: Record the age of the children in the group 3, 4, 5 or mixed if there is an age difference of 6 months or more within the class.

Materials: Describe the materials the children are using,

Play Type : Record what the children are doing, i.e., dressing a baby, pretending to sing into a block, etc, later coding for: Dramatic, Functional or Constructive Play

Inter-subjective Behavior Variables

Note: In groups of 3 or more a behavior is coded when 2 or more members display it simultaneously and no more than 20 seconds elapse before the other group members display it. For example: in a group of four, two children make eye contact with one another, five seconds later, another child makes eye-contact with one of the two or both, ten seconds later the final member makes eye-contact with one or more of the group, (i.e., chain)

Inter-subjective Behavior Rating Scale:

Rate each of the inter-subjective behavior by circling the corresponding letter on the coding sheet: 4= Constant 3= Sustained 2= Brief 1=None

C= Constant: The behavior is interrupted no more than 2 times otherwise it is constant. For example: Children maintain eye contact throughout the activity, twice one of the children looks away but quickly resumes eye contact

S= Sustained: The behavior is observed more than 3 times, and /or lasts more than 1 minute at any time without interruption

B= Brief: The behavior is observed, but less than 3 times and lasts less than 1 minutes each time

N= None: The behavior is not observed

Inter-subjective Item Definitions:

1. Touching: children touch each other's bodies, (non aggressive only)

2. Mutual positive emotion: Both children show positive emotion; laughing and smiling at the same time. If one child is smiling but the other is not don't code Code: Laughing, smiling simultaneously Don't Code: Jumping, talking fast, nodding, agreeing

3. Mutual negative emotion: Both children show negative emotion, i.e., frowning, crying, pouting, anger, at the same time, one child may mirror the other's negative emotional expression, however if only one displays clear negative emotion don't code

Code: pouting, knotted brows, stomping with angry face, crying Don't code: blank face, silly face, staring

4. Eye contact: Children look at each other's eyes at the same time Don't code: children are facing each other but only one is looking at the other's eyes, the other's eyes are

wandering

5. **Joint Attention to Task**: children are paying attention to the same task at the same time, they can be working on it or watching it, task is defined as the action in which the children are engaged for example: Pretending to put out a fire, making something, pouring water, etc… It is the same exact action, not 2 related ones side by side. Code: putting a puzzle together, dancing with each other, cooking the same meal, working on the same building or art project, watching the same computer game and responding, feeding the same fish, filling up same funnel with sand Don't code: Drawing two different pictures side by side, one child setting the table while the other cooks, building 2 buildings side by side
6. **Joint attention to materials**: Children are paying attention to the same material (s) at the same time, watching and or using the same materials eg: one lump of play-doh, one plant, one story-book Code: Sharing a book together, stirring in the same bowl, using a single jump-rope together, painting/ drawing on the same piece of paper with the same set of crayons/ paints Don't Code: Pretending to put out a fire with different hoses/ equipment, Cooking in 2 different bowls with different sets of materials, Building same structure with different sets of blocks, playing in water with different materials with conversing
7. **Joint attention to conversation**: Children are focused on the same conversation, they are talking to each other, listening and speaking about the same topic Code: one child makes a dinosaur sound, the other's join in, child talks about mommy the other says something about their mommy, Don't code: one child talks/makes sounds, the other children in the interaction do not look at or respond to

her speech in any way

8. **Mutual focus**: Children are concentrating for the same amount of time with the same amount of attention to the same activity Code: children working on different puzzles, trying to see who will finish first; 2 children painting/drawing side by side, comparing each other's work Don't code: 1 child builds in the blocks, the other makes pretend with one of the toy animals, 1 child dances around the rug, another sits on the rug doing stretches
9. **Body orientation towards**: Children face eachother, Code: all children are facing towards eachother Don't code: One child turns to the other (s) but their back is to that child
10. **Proximity increasing**: all children move closer to eachother, if they begin at a close distance but don't increase proximity it is not counted Code: Children see each-other and move closer, keeping each-other in line of sight Don't code: Children move closer to each-other because they want a material in that part of the room, or because of crowding, the other child(ren) are not the target
11. **Reciprocal conversation**: children take turns and listen to each other speak, they respond to what their partner said verbally, or follow the other child's directions Code: One child asks a question, the other(s) answer it, One child makes a statement, the other(s) affirm, disagree or expand, i.e., "I'm having a birthday party" "I wanna come" Don't code: One child says something, the other listens then says something unrelated, i.e., "I have a shark" "my turtle is swimming"
12. **Violation of property**: children take materials from each other without asking or destroy each other's work Code: grabbing materials from a child's hand, ripping

another's paper Don't code: Writing on another's paper with the other's approval, holding onto the same material without disagreement

13. **Violation of space**: children touch each other in un welcomed ways, take over work space or push into each other's space aggressively Code: Pushing, hitting, spitting, kicking Don't code: tagging, pulling as part of agreed upon pretend play, touching as part of play

Length of interaction: Number of minutes in which children are engaged with each other on a shared activity from initiation to dis-engagement 1=1.5-5 minutes, 2=6-9 minutes, 3=10-14 minutes, 4=15 minutes or more

Collaborative Complexity: What is the nature of the children's overall collaboration?

Scoring: Collaborative quality will be scored for the extent to which each category is observed during the interaction

Mark how much of the episode is spent in this type of collaboration?

1=none of the time 2=very small amount of time 3=less than half the time 4=half the time 5=more than half the time 6=most of the time 7=all the time

IM= Imitating: one child follows or mimics the actions of another. The leader/ follower can change as long as there is only one idea guiding the activity at a time

RE= Reciprocal: Children take turns, respond to each other's actions or words back and forth only. They do not build on each other's ideas and do not create something new together

CO= Cooperating: An interaction reaches the threshold of cooperation when something new is created as a result of collaboration by at least 2 children. This can be a new

game, a new construction or a new story line for dramatic play.

If cooperating receives a score of **5** or greater the type of cooperation must be marked according to the following definitions:

If more than one of these types is observed within an episode select the one that most accurately describes the episode overall

Escalation: Children contribute to the same activity in a way which extends or expands on it in terms of intensity or duration i.e., one child puts one block on the floor, the other adds 2 more, the next dumps them all; one child pretends to stir in a bowl with milk the other adds 5 more ingredients, etc…One child is singing, two get musical instruments to accompany him

Negotiation: children change the nature of an ongoing activity as a result of the words or actions of their interacting partners: I.e., In a group of children build vertically, until one starts building horizontally and the others follow, or all children pretend to be firefighters, until one says "we need a dog" and the others begin to act like dogs. This does not include advance planning, but rather individual children adjusting to the behavior/ideas of other children during the activity and changing the nature of the activity as a result.

Mutual goal setting: Children discuss what they want to do and make a plan for how to proceed. They then carry out the plan together. I.e., "Let's make a tower," "Okay, we can use these blocks", etc… or "We're going to the beach, you be the mom," "Okay, lets get some towels and go make some sandwiches," they then do this together . In this case children address the activity with the same plan in mind working together to achieve it.

Environmental Flexibility of Activity areas:

Based on the data collected previously about the materials, space and movement; activity areas are designated for each classroom and each area is scored from 1 to 5 representing least to most flexible for materials and space:

Materials are flexible, can be used in a variety of ways: 1= Does not describe the materials in this area 5= Very much describes the materials in this area

Space is flexible, can be changed and used according to children's needs: 1= Does not describe the space in this area 5=Very much describes the space in this area

Teacher Interaction variables

The prior information collected about teacher monitoring is added to the following table to determine whether teacher interaction is Responding, Intervening, or Intruding, through verbal, proximal or both modes. For each episode, a frequency count of each instance of verbal teacher interaction is made according to category observed, and the extent of proximity is marked

Episode	Verbal-Elaborative	Verbal-Regulatory	Non-Verbal	Child initiated	Teacher-Initiated
1					
2					
3					
4					

Episode	Proximity	Constant	Occasional	None
Episode	Teacher	Head	Assistant	Aide/Sub/other

Appendix D: Inter-subjectivity Coding Sheet

Date_____ Classroom_____

Episode #								
Activity								
Start Time								
	am		pm		am		pm	
Monitor Size	Hi	med	low		hi	med	low	
Movement	Free		Restric		Free		Restric	
Gender	Boy	Girl	Mix		Boy	Girl	Mix	
Materials	O/C							
Play type	Dra	Fun	Con		Dra	Fun	Con	
Mutual Touching	N	B	S	C	N	B	S	C
Mutual positive	N	B	S	C	N	B	S	C
Mutual negative	N	B	S	C	N	B	S	C
Eye contact	N	B	S	C	N	B	S	C
Joint attention task	N	B	S	C	N	B	S	C
Joint attention materia	N	B	S	C	N	B	S	C
Joint attention conver	N	B	S	C	N	B	S	C
mutual focus	N	B	S	C	N	B	S	C
Body orientation towards	N	B	S	C	N	B	S	C
Proximity Increasing	N	B	S	C	N	B	S	C
Violate property	N	B	S	C	N	B	S	C

Violate space N B S C N B S C
Time end

Appendix E: Collaboration Coding Sheet

Episode # 1 Date:7/28/8 Start:10:09 End 10:19 2 boys, 1girl (pink dress), blocks tools	Episode # 7 Date: 7/28 Start:10:26:16 End: 10:34 3 boys, 1 girl, doctor	Episode #12 Date: 7/28 Start:10:413 End: 10:44 2 boys, computer	Episode # 14 Date: 7/29 Start:3:08:38 End: 3:12:27 2 girls, bells
Imitation 1 2 3 4 5 6 7	Imitation 1 2 3 4 5 6 7	Imitation 1 2 3 4 5 6 7	Imitation 1 2 3 4 5 6 7
Reciprocal 1 2 3 4 5 6 7	Reciprocal 1 2 3 4 5 6 7	Reciprocal 1 2 3 4 5 6 7	Reciprocal 1 2 3 4 5 6 7
Cooperation 1 2 3 4 5 6 7	Cooperation 1 2 3 4 5 6 7	Cooperation 1 2 3 4 5 6 7	Cooperation 1 2 3 4 5 6 7
Escalation	Escalation	Escalation	Escalation
Negotiation	Negotiation	Negotiation	Negotiation
Mutual goal setting	Mutual goal setting	Mutual goal setting	Mutual goal setting

Appendix F Sample Activity Area Coding Sheet

Classroom 4

July 28th 2008

Activity Area	Puppets	Kitchen	Blocks	Writing
Start Time	10:09 AM	10:09 AM	3:09	3:16
Materials	2	4	2	3
Space	3	4	2	5
IS Episodes	10:09-10:19	10:09-10:19		
	10:09- 10:18	10:19-10:24		
	10:29-10:37			

July 29th

Activity Area	Puzzles	Table toys
Start Time	3:26	3:34
Materials	2	3
Space	5	1

References

Arnett, J. (1989). Care givers in day-care centers: does training matter? *Journal of Applied Developmental Psychology, 10*, 541-552.

Arsenio, W. F. & Kramer, R. (1992). Victimizers and their victims: Children's conceptions of the mixed emotional consequences of moral transgression. *Child Development, 63*, 915- 927.

Bateman, A. & Fonagy, P. (2004). *Psychotherapy for borderline personality disorder: Mentalization based treatment*. New York, NY: Oxford University Press.

Bearison, D. & Dorval, B. (2002). *Collaborative cognition: Children negotiating ways of knowing.* MA: Greenwood Press.

Bredekamp, S. & Copple, C. (1997). *Developmentally appropriate practice in early childhood programs.* National Association of the Education of Young Children

Brown, W. H., Holcombe, S. L. & Odom, A. (1996). Observational assessment of young children's social behavior with peers. *Early Childhood Research Quarterly, 11,* 19-40.

Brownell, C. A., Geetha, R. B., & Zerwas, S. (2006). Becoming a social partner with peers: cooperation and social understanding in one and two year olds. *Child Development, 77,* (4), 803-821.

Bruner, J. (1996). *The culture of education*. Cambridge, MA: Harvard University Press.

Bowlby, J. (1973). *Attachment and loss: Separation (Vol. 2)*. New York, NY: Basic Books.

Bulotsky-Shearer, R. J., Fantuzzo, J.W. & Mcdermott, P.A., (2008). An investigation of classroom situation dimensions of emotional and behavioral adjustment and cognitive and social outcomes for head start children. *Developmental Psychology, 44*,(1), 139-154 .

Cazden, C. B. (2001). *Classroom Discourse: The Language of Teaching and Learning*. NH: Heinemann

Coolahan, K., Fantuzzo, J., Mendez, J. & McDermott, P. (2000) Preschool peer interactions and readiness to learn: Relationships between classroom peer play and learning behaviors and conduct. *Journal of Educational Psychology*, *92*, (3), 458.

De Kruif, R. E. L., McWilliam, R. A., Ridley, S.M. & Wakely, M.B. (2000). Classification of teacher's interaction behaviors in early childhood classrooms. *Early Childhood Research Quarterly*, *15*, (2) 247-268.

Denzin, N. K., Lincoln, Y. S., Giardina, M. D. (2006). Disciplining qualitative research. *International Journal of Qualitative Studies in Education 19,* (6), 769-782.

Dillon, T. (2009) Liberal education and the future of American schooling. *Education Week 28,* (24), 30-31.

Early, D. M., Maxwell, K. L., Burchinal, M., Bender, R. H., Ebanks, C., Henry, G.T., Alva, S., …Vandergrift, N. (2007). Teacher's education, classroom quality, and young children's academic skills: results from seven studies of preschool programs. *Child Development, 78,* (2), 558-580.

Fantuzzo, J., Sekino,Y., & Cohen, H. L. (2004). An examination of the contributions of interactive peer play to salient classroom competencies for urban head start children. *Psychology in the Schools, 41*, (3).

Fawcett, L. M. & Garton, A. F. (2005). The effect of peer collaboration on children's problem-solving ability. *British Journal of Educational Psychology, 75,* 157-169.

Fernyhough, C., Wainwright, R., Gupta, E., & Tuckey, M. (2002). Maternal mind-mindedness and attachment security as predictors of theory of mind understanding. *Child Development, 73* (12).

Flavell, J. H. (2004). Theory of mind development: Retrospect and prospect. *Merrill-Palmer Quarterly, 50,* (3), 274-290.

Forman, E. A. & McPhail, J. (1993). Vygotskian perspective on children's collaborative problem solving activities. In Forman, E.A., Minick, N. & Stone, C.A.(Eds.) *Contexts for learning: Sociocultural dynamics in children's development*. New York, NY: Oxford University Press.

Forman, E.A., Minick, N. & Stone, C.A.(Eds.) *Contexts for learning: Sociocultural dynamics in children's development*. New York, NY: Oxford University Press.

Fuchs, T. & De Jaegher, H. (2009). Enactive intersubjectivity: Participatory sense making and mutual incorporation. *Phenomenological Cognitive Science, Springer Science Online Publication.*

Gamberini, L. & Spagnolli, A. (2004). The "presence of others" in a virtual environment: Different collaborative modalities with hybrid resources. *Cognition, Technology and Work ,6,* (1), 45-48

Gibson, J. J. (1986). *The ecological approach to visual perception.* Hillsdale, NJ: Lawrence Erlbaum Associates.

Gifford-Smith, M. E. & Brownell, C. A. (2003). Childhood peer relationships: Social acceptance, friendships and peer networks. *Journal of School Psychology, 41,* 235-284.

Girolametto, L. Weitzman, E. & Greenberg, J. (2004). The effects of verbal support strategies on small group peer interactions. *Language, Speech and Hearing Services in Schools, 35,* 254-268

Goncu, A. (1999). *Children's engagement in the world: Socio-cultural perspectives.* New York, NY: Cambridge University Press.

Goncu, A., Patt, M.B., & Kouba, E. (2002) Understanding young children's play in context. In P.K. Smith and C.H. Hart (Eds.) *Blackwell Handbook of Childhood Social Development.* (pp.417-437) Oxford, UK: Blackwell Publishers.

Halliday, M.A.K. (1976). Functions and universals of language in Kress, G. R. (Ed.) *System and function in language.* London: Oxford University Press.

Hanish, L. D., Barcelo, H., Martin, C. L., Fabes, R. A., Holmwall, J., Palermo, F. (2007). Using the Q-Connectivity method to study frequency of interaction with multiple peer triads: Do preschoolers' peer group interactions at school relate to academic skills? *New Directions for Child and Adolescent Development, 118*, 9-24.

Harms, T., Clifford R.M., & Cryer, D. (1998). *Early childhood environment rating scale*. New York, NY: Teachers College Press.

Hogan, C. & Howe, N. (2001). Do props matter in the dramatic play center? The effects of prop realism on children's play. *Canadian Journal of Research in Early Childhood Education, 8,* (4), 51-66.

Howe, N., Moller, L. Chamber, B & Petrakos H. (1993). The ecology of dramatic play centers and children's social and cognitive play. *Early Childhood Research Quarterly, 8*, 235- 251.

Howe, N., Petrakos, H., Rinaldi, C. & Lefebvre, R. (2005). "This is a bad dog you know: Constructing shared meanings during sibling pretend play. *Child Development, 76,* (4), 783-794.

Howes, C. (1988). Peer interaction of young children. *Monographs of the Society for Research in Child Development, 53,* (1).

Howes, C. & Matheson, C. C.(1992). Sequences in the development of competent play with peers: Social and social pretend play. *Developmental Psychology, 28,* (5)

Hundert, J. & Hopkins, B. (1992). Training supervisors in a collaborative team approach to promote peer interaction of children with disabilities in integrated preschools. *Journal of Applied Behavior Analysis, 25,* (2), 385-400.

Hustedt, J. T & Raver , C. C. (2002). Scaffolding in low-income mother-child dyads: Relations with joint attention and dyadic reciprocity. *The International Journal of Behavioral development , 26,* (2), 113–119.

Johnson, E. (2008). Empathy or inter-subjectivity? Exploring the origins of morality in young children. *Studies in Philosophy of Education, 27*, 33-47

Kienbaum, J., Volland, C., & Ulich, D. (2001). Sympathy in the context of mother-child and teacher-child relationships. *International Journal of Behavioral Development, 25,* (4), 302-309.

Kochanska, G. (1997). Mutually responsive orientation between mothers and their young children: Implications for early socialization. *Child Development, 68,(*1) 94-112.

Kumpulainen, K. & Kaartinen, S. (2003). The interpersonal dynamics of collaborative reasoning in peer interactive dyads. *The Journal of Experimental Education, 71,* (4), 333- 370.

Ladd, G. W., Birch, S. H., & Buhs, E. S. (1999) Children's social and scholastic lives in kindergarten: related spheres of influence? *Child Development, 70,* (6), 1373-1400

Lambert, R., Abbott-Shim, M., & McCarty, F. (2000). The relationship between indicators of the quality of a head start classroom environment and ratings of child social behavior. *Administration for Children, Youth, and Families (DHHS),* Washington, DC.

LaParo, K.M., Pianta, R. C., Stuhlam, M. (2004). The classroom assessment scoring system: Findings from the pre-kindergarten year. *The Elementary School Journal, 104,* (5)

Lemche, E., Kreppner, J. M., & Joraschky, P. (2007). Attachment organization and the early

development of internal state language: A longitudinal perspective. *International Journal of Behavioral Development, 3,(*13), 252-262.

Leontiev, (1978). *Activity, consciousness and personality.* New Jersey: Prentice Hall

Lucariello, J., Hudson, J., Fivush, R., & Bauer, P. (Eds.), (2004). *The development of the mediated mind: Sociocultural context and cognitive development.* Mahwah, NJ: Erlbaum.

Lucariello, J. (2004). New insights into the functions, development and origins of theory of mind: The functional, multi-linear socialization (FMLS) model. In Lucariello, J., Hudson, J., Fivush, R., & Bauer, P. (Eds.) *The development of the mediated mind: Sociocultural context and cognitive development.* Mahwah, NJ: Erlbaum

Maccoby, E. E. (1990) Gender and relationships. American Psychologist, 45, 513-520

Melhuish, E.C. (2001). The quest for quality in early day care and preschool experience continues. *International Journal of Behavioral Development, 25* (1) , 1-6

McKown, C. & Strambler, M.J. (2008). Social influences on the ethnic achievement gap. In: Quintana, S. M & McKown, C. (Eds.) *Handbook of race, racism, and the developing child*. Hoboken, NJ :Wiley.

Nelson, K (2007). *Young minds in social worlds: Experience, meaning and memory* Boston, MA: Harvard University Press

Nelson, K. & Fivush, R. (2004) The emergence of autobiographical memory: A social cultural developmental theory *Psychological Review , 111*, (2), 486-511.

NICHD Early childcare research network (2001). Child care and children's peer interaction at 24 and 36 months: The NICHD study of early child care. *Child Development, 72,* (5) 1478-1500.

Ogden, L. (2000). Collaborative tasks, collaborative children: an analysis of reciprocity during peer interaction at key stage 1. *British Educational Research Journal, 26,* (2).

Ontai, L. L. & Thompson, R. A. (2002). Patterns of attachment and maternal discourse effects on children's emotion understanding from 3 to 5 years of age. *Social Development, 11,* 433-450.

Peisner-Feinberg, E. S., Burchinal, M. R., Clifford, R. M., Culkin, M.L., Howes, C., Kagan, S. L., & Yazejian, N. (2001). The relation of preschool child-care quality to children's cognitive and social developmental trajectories through second grade. *Child Development, 72,* (5), 1534-1553.

Pellegrini, A.D. (2004). *Observing children in their natural worlds.* Mahwah, NJ: Lawrence Erlbaum Associates.

Pelletier, J. & Astington, J.W. (2004). Action, consciousness and theory of mind: Children's ability to coordinate story characters' actions and thoughts. *Early Education and Development, 15,* (1) 5-22.

Perez, P. & Gauvain, M.(2009). Mother-child planning, child emotional functioning and children's transition to 1rst grade. *Child Development, 80,* (3), 776-791 .

Petrakos, H. & Howe, N. (1996). The influence of the physical design of the dramatic play center on children's play. *Early Childhood Research Quarterly, 11,* (1), 63-77.

Piaget, J. (1971). *The construction of reality in the child.* New York, NY: Ballantine.

Pianta, R. C., la Paro, K. M, Payne, C., Cox, M. J. & Bradley, R. (2002). The relation of kindergarten classroom environment to teacher, family, and school characteristics and child outcomes. *The Elementary School Journal, 102,* (3), 225-238.

Racine, T. P. & Carpendale, J. I. (2007). The role of shared practices in joint attention. *British Journal of Developmental Psychology, 25,* 3-25

Ritchie, S., Howes, C., Kraft-Sawyer, M. & Weiser, B. (2002). *Snapshot.* Los Angeles, CA: University of California Los Angeles.

Robinson, C.C., Anderson, G. T., Porter, C. L., Hart, C. H., & Wouden-Miller, M. (2003). Sequential transition patterns of preschooler's social interactions during child-initiated play: Is parallel-aware play a bi-directional bridge to other play states? *Early Childhood Research Quarterly, 18,* 3-21

Rogoff, B. (2003). *The cultural nature of human development.* New York, NY: Oxford University Press.

Rommetviet, R. (1979). On the architecture of inter-subjectivity. In Rommetviet & Blakar (Eds.) *Studies of language, thought and verbal communication* (pp. 93-108). London: Academic Press

Roskos, K & Neumann, S.B. (1998). Play as an opportunity for literacy. In O. Saracho & B. Spodek (Eds.) *Multiple perspectives on play in early childhood education.* (pg. 100-115) Albany, NY: SUNY Press.

Rubin, K.H. (2001). The Play Observation Scale, revised (POS). Center for Children, Relationships and Culture. University of Maryland

Sawyer, R. K. (1997). *Pretend play as improvisation: Conversation in the preschool classroom.* Mahwah, NJ: Lawrence Erlbaum Associates

Shim, S., Herwig, J. E., Shelley, M. (2001). Preschoolers' play behaviors with peers in classroom and playground settings. *Journal of Research in Childhood Education ,15,* (2), 149-63.

Smilansky, S. (1968). *The effects of socio-dramatic play on disadvantaged children*. New York: Wiley

Stetsenko, A. (2005). Activity as object-related: Resolving the dichotomy of individual and collective types of activity. *Mind, Culture, and Activity, 12,* (1), 70-88.

Trevarthen, C. & Aitken, A. K. (2001). Infant inter-subjectivity: Research, theory and clinical applications. *Journal of Child Psychiatry and Psychology, 42,* 3-48

Verba, M. (1998). Tutoring interactions between young children: How symmetry can modify asymmetrical interactions. *International Journal of Behavioral Development, 22,(*1),195- 216

Vygotsky, L. (1978) *Mind and society: The development of higher mental processes*. Cambridge, MA: Harvard University Press

Vygotsky, L. (1986) *Thought and Language.* The MIT Press.