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Preschool children's joint block building during a guided play activity

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ABSTRACT

Although children build in block areas both individually and jointly, little is known about the nature of children's behavior and communication in this play context with peers. We observed 4- and 5-year-old same-age, same-sex dyads ($n = 38$) during a guided play activity, which involved building a house with large colorful blocks. We analyzed children's communication and building behaviors, as well as the role of their coordinated behavior in the structures that they built. Children's spatial talk was associated with the features of a house included in structures, whereas children's building behavior was associated with the complexity of the structures. However, children's coordinated behavior during the interaction mediated the relations between spatial talk and the structures they built. Results are discussed in terms of the importance of encouraging joint guided block play activities in early childhood classrooms to provide children with opportunities to practice and expand their language, math, and spatial skills.

Play and informal learning activities can promote foundational skills and knowledge in young children. Playing with blocks, a popular activity found in most preschool and kindergarten classrooms, can contribute to children's early mathematical development, such as spatial reasoning, knowledge of geometric shapes, numerical knowledge, and problem-solving skills (Kamii, Miyakawa, & Kato, 2004; Ness & Farenga, 2007; Reifel & Greenfield, 1982; Seo & Ginsburg, 2004; Wellhousen & Kieff, 2001). Block play can also contribute to children's language and literacy skills (Cohen & Uhry, 2007; Stroud, 1995). The benefits of playing with blocks seem to have long-term implications. Children's block play during the preschool years has been associated with concurrent spatial skills, as well as later math achievement (Caldera et al., 1999; Stannard, Wolfgang, Jones, & Phelps, 2001; Wolfgang, Stannard, & Jones, 2001).

Young children in early childhood classrooms play with blocks both independently and collectively (Kersh, Casey, & Mercer Young, 2008); however, little is known about the nature of children's behavior and communication during block building with peers. Examining children's joint block play is critical for understanding both the cognitive and social benefits of playing with blocks. Thus, the current study examined preschool children's peer communication and building behaviors, as well as the role of their coordinated behavior with each other in the structures that they built during a guided play block building activity.

Block building during the preschool years

Children's ability to create sophisticated structures with blocks develops during the preschool and school-age years. Reifel and Greenfield (1982) describe how the spatial relations within children's buildings, defined as "the dimensionality" and "hierarchical integration of block constructions," become more complex with age. Structures of toddlers and young preschoolers are typically limited in their spatial dimensionality, with structures being mainly composed of a single block or several blocks simply placed next to each other, such as in a row or tower. During the later preschool years and into early elementary school, children will arrange multiple blocks to create arch or bridge structures by placing two or more blocks vertically and placing another block on top. Children also create enclosures with the open spaces representing a part of the building (Goodson, 1982; Sluss, 2002). Children then integrate these different aspects together to build increasingly complex structures. Even within the preschool years, block building becomes more sophisticated, with 4-year-olds focusing on placing blocks on top of one another to make towers and posts, and 5-year-olds attending to complex features of the structures, such as its symmetry and patterns (Ness & Farenga, 2007).

These advancements in young children's block building behavior are supported by and can contribute to the development of children's math and spatial abilities. For example, integrating different building aspects together is likely related to the development of the understanding of part–whole relationships (Gura, 1992). Kamii et al. (2004) suggest that building and manipulating blocks provide numerous opportunities for children to explore and develop their logical–mathematical knowledge, theorized by Piaget (1950) to include skills such as classification, seriation, spatial relations, and number. When children arrange blocks of the same size, shape, color, and orientation together, they are sorting and classifying, as well as exploring concepts related to congruence, equivalence, and patterning (Kersh et al., 2008). Thus, block play can foster children's development, as well as contribute to more advanced building.

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Children's joint block play with peers

Several theoretical approaches posit that peer interactions, and play, in general, are critical for children's development. Piaget (1962) suggested that play provides children with opportunities to interact with materials around them that assist in constructing their knowledge of the world. Piaget (1932) also suggested that when peers of equal ability solve problems together, they must understand each other's views to reach a joint solution. Through discussion, children attempt to resolve their differing perspectives and advance their understanding of difficult problems. Contemporary theorists and researchers also describe that during playful interactions with peers, children practice and utilize advanced social and cognitive skills to create, sustain, and fulfill joint goals. According to Pellegrini (2009), during peer play, children must coordinate their behaviors, communicate effectively to establish the goals and rules of the interaction, and work through any disagreements. Children's ability to coordinate their behavior with a peer by monitoring and accommodating their behavior to one another and their joint goal is an important milestone in the development of peer cooperation (Brownell, Ramani, & Zerwas, 2006; Eckerman & Peterman, 2001). Tomasello (2009) hypothesizes that successful cooperation requires that both children have a mutual understanding of these shared goals and the processes to achieve them. Joint cooperative activities are characterized by this common understanding of the goals, behaviors, and processes necessary to meet them (Bratman, 1992).

Children's abilities to coordinate behavior to complete joint goals with a peer emerge during toddlerhood and develop during the preschool years. During the toddler years, children begin engaging in joint activities with peers (Eckerman & Peterman, 2001). On cooperative tasks that required one child to manipulate a lever on a toy to release a reward, while the other child retrieved it, 18-month-old dyads only occasionally solved the problem, typically accidentally and unsystematically, whereas 24-month-olds were consistently successful at retrieving the reward (Brownell & Carriger, 1990, 1991). Brownell et al. (2006) found similar age differences on a simpler cooperative task that required children to pull two handles to receive a reward. On a slightly more complex task that required children to both coordinate complementary roles, 2-year-old dyads were not successful, whereas 3½-year-old dyads were consistently able to coordinate their actions and language to retrieve a prize (Ashley & Tomasello, 1998). Further, 3.5-year-olds are able to commit to joint goals and assist their partner in retrieving a reward during a problem-solving task, even after they have retrieved their own (Hamann, Warneken, & Tomasello, 2012). On joint problem-solving tasks, young children can coordinate their behaviors, work together with a peer, and commit to joint goals.

Although the majority of research on block play has focused on the building complexity of individual children, block building with a peer can have additional benefits for children, such as providing opportunities to coordinate behavior with peers and establish joint building goals. Working with a peer likely allows children to create more complex structures than they would be able to complete alone, because they can each contribute to the building. Furthermore, joint building requires that children create and establish joint goals, such as what they are going to build and how they are going to build it. Similar to dramatic play, block play can also involve elements of pretense, which requires peers to communicate the meanings of their actions, the symbolic representations of the blocks, and the significance of the structures they create (Reifel & Yeatman, 1991). Thus, block building could provide an important play context to observe children creating, negotiating, and working towards completing shared building goals with peers.

Fewer studies, however, have examined children's coordinated behavior and peer communication during block building. Cohen and Uhry (2007) observed individuals, dyads, and small groups of children in the block play area of a preschool classroom. As would be expected, dyads and small groups talked more than children building by themselves, with peers often describing the ongoing activities, past actions, or future plans. Reifel and Yeatman's (1991) observation of preschool children's talk during block play showed that children worked together to form ideas about what to build, created symbolic meanings of the blocks, and developed solutions to problems. Sluss and Stremmel (2004) observed preschool dyads and found that girls built more complex structures and communicated more when paired with a more experienced social partner. Thus, working with a partner during block play elicits talk that could contribute to children gaining valuable linguistic skills during block play.

Communication between peers during block building could also elicit important discussion of mathematical and spatial concepts, although little is known about this type of talk in young children. Building a structure with a peer could involve talk related to numbers (e.g., "Put three blocks in the tower."), geometry (e.g., "The square goes here."), or spatial relations (e.g., "Turn the block around."). Engaging in math- and spatial talk can be critical for promoting early mathematical knowledge. For example, parent's spatial language has been shown to be related to children's spatial abilities, and these relations are mediated by the child's own spatial language (Pruden, Levine, & Huttenlocher, 2011). Language about how objects in a space are related to one another can facilitate spatial thinking by providing children with labels for reasoning about spatial relations and patterns (Gentner & Loewenstein, 2002). Thus, engaging in joint block play can benefit children through two processes: Physical manipulation of blocks and collaboration with related peer talk during the interaction. Each of these processes appears critical for gaining important social and cognitive skills.

Guided play block building activities

The nature of block building activities can provide insight into varying aspects of children's spatial and building skills. For example, the complexity of 3- to 5-year-olds' free play or unstructured block building was associated with a measure of creativity; however, their structured block play, which involved copying a complex block structure, was related to their performance on a measure of spatial visualization (Caldera et al., 1999). This suggests that different kinds of block play activities may require different skills and tap into different abilities.

One type of activity that is especially important during block play is guided play. Guided play involves activities that are enjoyable, but also provide opportunities for exploration and learning. These activities "are subtly directive, embedding new learning into meaningful contexts that correspond with children's prior knowledge and experience" (Hirsh-Pasek, Golinkoff, Berk, & Singer, 2009, p. 27). Guided play is being used increasingly in early childhood classrooms as a way to engage children in play activities that can connect to the curriculum and promote learning. For example, Casey et al. (2008) found that a guided block play intervention promoted preschool children's spatial skills. Specifically, children were told a story about characters in a book that needed a new castle and specified the elements to include in the structure. They found that children who engaged in the guided play activities with a group of children or alone built more complex buildings and showed greater improvement on spatial reasoning tasks than children who simply engaged in free play with blocks.

Guided play activities also may help to better understand the nature of gender differences in block building. Gender differences have been found in the complexity of children's structures during free play with blocks. Specifically, preschool- and kindergarten-aged boys built structures that are more similar to towers, whereas same-age girls built structures with more enclosures (Goodfader, 1982; Sluss, 2002). One hypothesis is that preschool-age boys have an advantage over same-age girls on spatial tasks that require spatial visualization and mental rotation of objects (Levine, Huttenlocher, Taylor, & Langrock, 1999; Rosser, Ensing, Gilder, & Lane, 1984). However, gender differences are likely influenced by the nature of the block building activity (Kersh et al., 2008). Although gender differences are found during unstructured block play, when children are provided with guided play building