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Synchronized movement experience enhances peer cooperation in preschool children

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ABSTRACT

Cooperating with other people is a key achievement in child development and is essential for human culture. We examined whether we could induce 4-year-old children to increase their cooperation with an unfamiliar peer by providing the peers with synchronized motion experience prior to the tasks. Children were randomly assigned to independent treatment and control groups. The treatment of synchronous motion caused children to enhance their cooperation, as measured by the speed of joint task completion, compared with control groups that underwent asynchronous motion or no motion at all. Further analysis suggested that synchronization experience increased intentional communication between peer partners, resulting in increased coordination and cooperation.

Introduction

Cooperation occurs when two or more individuals work together to solve a problem, perform a joint task, or create a product that could not have been created by one individual. Cooperation is essential for sustaining human culture and plays a key role in child social–cognitive development (Hamann, Warneken, Greenberg, & Tomasello, 2011; Warneken, Chen, & Tomasello, 2006). Moral philosophers and economists have long been interested in what induces people to cooperate (Hume, 1738/1978; Rousseau, 1762/1913). Educators seek to "teach" cooperation to young children (Barron, 2000) to prepare for collaborative learning in school and the workforce (Kuhn, 2015).

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The ability to cooperate depends on a basic motivation and willingness to interact with another individual as well as on specific social–cognitive skills (e.g., Brownell, Ramani, & Zerwas, 2006). Previous studies with adults have shown that success in timing-dependent cooperation tasks, such as two people jointly tilting different ends of a wooden platform so that a ball could move through a maze, can be enhanced by exposing the adults to prior experience of synchronous rocking (Valdesolo, Ouyang, & DeSteno, 2010; see also Lang et al., 2016). These findings indicate that in adults certain forms of cooperation are amenable to rapid modulation through prior shared temporal experiences. The aim of the current study was to examine much younger participants (4-year-old unfamiliar peers) using more precisely controlled treatments of prior synchronous movements.

It is currently unknown whether and how synchronous experience may influence subsequent cooperation among unfamiliar child peers. However, there is an extensive literature on the effects of synchrony, or synchrony-rich interactions such as music, on children's social attitudes and behaviors. To better situate the current study within this literature, we briefly review converging lines of research on children and synchrony.

Effects of shared synchrony and music on children's social behavior

Several studies have examined the impact of synchrony on children's attitudes toward one another. For example, Rabinowitch and Knafo-Noam (2015) showed that synchronous tapping enhances 8-year-olds' judgments of their perceived similarity and closeness to each other. Tunçgenç and Cohen (2016a, 2016b), showed that movement synchrony engenders 7- to 11-year-olds' self-reported feelings of "social bond" between children and more helping between pairs of previously acquainted 4- to 6-year-olds. These studies provide evidence for a positive change in attitudes in pairs or groups of children following synchrony.

Cirelli, Einarson, and Trainor (2014) conducted experiments using music in infants. In their study, 14-month-olds listened to a song while being bounced (knee bends) by an adult and facing another adult who performed knee bends in either synchrony or asynchrony with the rhythm of the song. Results showed that the infants who were bounced in this en face synchrony with an adult increased their propensity to extend help to that experimenter.

Other related studies have investigated how making music together influences older children's social behavior. Good and Russo (2016) reported that elementary school children shared with each other more in a Prisoner's Dilemma game following group singing. However, Kirschner and Ilari (2014) studied the effects of 2- to 4-year-olds jointly drumming with an adult and found no change in helping or sharing behaviors toward that adult. Other research has demonstrated that shared musical experience enhances other types of social behaviors in elementary school children, including prosocial skills (Schellenberg, Corrigall, Dys, & Malti, 2015), empathy (Rabinowitch, Cross, & Burnard, 2013), and a sense of social inclusion (Welch, Himonides, Saunders, Papageorgi, & Sarazin, 2014). In one study with kindergarten children, a shared musical experience (dancing, singing, and playing instruments while music is played in the background) prompted children to approach their familiar peers and to play a game jointly rather than individually (Kirschner & Tomasello, 2010).

Music is both a communicative and aesthetic medium. These forgoing effects of music may be due to synchrony but may also stem from other features of the musical interaction and joint music making. Musical theorists have conjectured that music provides players with an experience of freedom from competitiveness as they focus on sound, color, and contour—similarly to Kant's (1790/1951) *disinterested pleasure* idea, which denotes the aesthetic appreciation of music as the heart of the experience—rather than on the desire for some functional/instrumental outcome. Music making is also a joint creation that encourages flexibility in the face of changing patterns and dynamics, which could contribute to a more general "acceptance" of musical partners (Rabinowitch et al., 2013). In addition, meaning in music is ambiguous (whereas most language interactions strive for precision in meaning), permitting a coexistence of contrasting feelings and perspectives among different individuals (Cross, 2001). These qualities of music could engender positive feelings that persist beyond the musical context and contribute to enhanced social interactions (Cross, Laurence, & Rabinowitch, 2010; Huron, 2001). Therefore, it remains important to tease out the specific role of *synchrony* per se, stripped from a musical context, in enhancing children's prosocial behavior.