

Bouncing babies to the beat: Music and helping behaviour in infancy

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ABSTRACT

Background

Musical behaviour (dancing, singing, music production) is unique to humans and cross-culturally universal. An important prerequisite for musical behaviour is the ability to entrain movement to an external auditory beat. Participating in such musical activities with other individuals has implications on our social behaviour. Specifically, interpersonal auditory-motor entrainment to an external beat has been associated with increased group cohesion and social bonding. For example, individuals who walk, sing, or tap together are subsequently more helpful, compliant or cooperative in later interactions with one another (Wiltermuth & Heath, 2009; Hove & Risen, 2009). Evidence for this effect has also been shown in 4-year-old children (Kirschner & Tomasello, 2010).

The developmental trajectory of this social facilitation effect is still unclear, but there is evidence that auditory-motor entrainment is possible to some extent by young infants. For example, infants tend to spontaneously produce rhythmic movements (albeit asynchronous) while listening to music and beats (Zentner & Eerola, 2010). Also, their perception of the meter in a beat pattern is influenced by the way in which an adult bounces them to those beats (Phillips-Silver & Trainor, 2005). However, it is unclear whether such early immature auditory-motor systems are able to support the social effects of auditory-motor entrainment seen in adults.

Aims

The current study investigated whether the social effects of auditory-motor entrainment are measurable in 14-month-old infants.

Method

40 infants were tested individually. Infants that could not yet walk, were not primarily English-learning, or who were too fussy for the procedure to continue were removed from analysis, leaving 23 infants (11 male) in the analysis, with an average age of 429 days.

During testing, the infant was held by Experimenter A in an infant carrier facing outwards. The infant heard a melody either in its original form or manipulated to contain unpredictable beats (created by adjusting the tempo of each beat in a random manner). Experimenter A bounced the infant in a way congruent to the beat contained in the melody heard by the infant. Experimenter B faced the infant, and bounced to beats heard through headphones. Experimenter B's bouncing was either synchronous or asynchronous to the infant's bouncing. This created four conditions (2X2) into which each infant was randomly assigned: predictable or unpredictable beats; infant and Experimenter B synchronous

or not. The movements of the infant and Experimenter B were recorded in three dimensions using Wii technology.

After the bouncing phase was over, infants were then tested in a situation in which they had the opportunity to help Experimenter B by handing over desired objects. These tasks were based on helping tasks previously tested using infants of this age (Warneken & Tomasello, 2007). These tasks were videotaped so the behaviour of the infant could be coded.

The data presented here are the results from the infants tested to date, which includes the two extreme groups; 1) predictable bounces synchronous to Experimenter B and 2) unpredictable bounces asynchronous to Experimenter B.

Results

The infants that were bounced synchronously with the researcher while listening to predictable beats (61% helping likelihood) were significantly more helpful than those that were bounced asynchronously while listening to unpredictable beats (25% helping likelihood), $t_{(20.5)}=3.02, p=.007$.

Conclusions

These results support the hypothesis that the social facilitation effect of interpersonal auditory-motor entrainment previously found in 4-year-old children and adults is measurable in 14-month-old children as well. This hypothesis suggests that the auditory-motor entrainment system in 14-month-old children is mature enough to interact with social cues. This also suggests that social facilitation is a fundamental component of musical behaviour that is found early in development.

Data collection is currently underway in the two remaining control conditions; 1) bounced synchronously while listening to nonisochronous music, and 2) bounced asynchronously while listening to isochronous music.

Keywords

Entrainment, child development, music, interpersonal synchrony, social behaviour

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