

Infant Spontaneous Motor Tempo

Sinead Rocha¹, Victoria Southgate, Denis Mareschal

Centre for Brain and Cognitive Development, Birkbeck, University of London

¹sineadrocha@gmail.com

ABSTRACT

Background

Spontaneous Motor Tempo (SMT), or the interval between self-paced repetitive movements, is known to slow with age (McAuley, 2006), and preferred tempo correlates with body size, with larger bodies preferring slower rhythms (Mishima, 1965; Todd, Cousins & Lee, 2007; Dahl, Huron, Brod & Altenmüller, 2014). Rate of locomotion is a hypothesised factor underlying these links. Studying the development of SMT in infants, whose primary experience of locomotion is of being carried by their caregiver, may help us to parse the contribution of *experience of locomotion* from one's own *biomechanical features*, to better understand what may 'set' our SMT.

Aims

The current study therefore aimed to i) be the first to create a measure of infant SMT, ii) elucidate the relationship between SMT and age over the first two years of life, iii) measure the relationship between infant SMT and own body size, and iv) measure the relationship between infant SMT and parental body size.

In line with existing literature, we predicted that infant SMT would slow with age, and would correlate with anthropometric features, such that larger babies would show a slower SMT. However, as infants are often carried by their caregiver, we also predicted that SMT may be linked to passive experience of the parent's rate of locomotion, such that infants with larger parents would exhibit slower SMT.

Method

170 infants ($M = 12.3$ months, $SD = 6.5$ months) took part in a spontaneous drumming task for up to five minutes. We recorded the sound wave of their drumming and computed the mean inter-onset-interval to give the SMT for each infant, and obtained demographic and anthropometric information. Infants had to perform at least four sequential hits to be included for analyses, leaving 115 infants with useable data.

Results

Contrary to our hypothesis, we found that infant SMT negatively correlated with age, such that older infants were faster ($r(114) = -.279$, $p = .003$). Older infants were also more consistent drummers, with a negative correlation between age and the Relative Standard Deviation (RSD) of drumming ($r(114) = -.217$, $p = .021$). Infants who did not show a consistent SMT (RSD more than one SD above the mean) were excluded from further analyses. On the remaining 94 infants, a linear regression assessing the contribution of infant age, infant arm length, infant leg length, parent height, parent

arm length and parent leg length to infant SMT, revealed that infant age ($\beta = -.459$, $p = .012$) and parental height ($\beta = .413$, $p = .013$) were the only significant predictors. The overall model fit was $R^2 = .266$.

Conclusions

We find that infant SMT becomes faster with age. This can be explained by the fact that younger infants are still learning how to control their limbs to make continuous and targeted movements. Indeed, infants also get more regular with age. Our results are the first to suggest a U-shaped, rather than linear, relationship between age and SMT.

Whilst tempo does not seem influenced by own body size, we see a relationship between infant SMT and parental height, such that infants with taller parents drum more slowly than infants with shorter parents. We suggest that infants' self-produced rhythm may be influenced by their parents' walking tempo, and particularly by the vestibular information they receive when being carried on the caregiver's body.

Keywords

development; rhythm; Spontaneous Motor Tempo; locomotion

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