

Tracing the emergence and development of cerebral lateralisation in babble

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Speech and language are supported predominantly by structures in the left hemisphere of the brain (Graves & Landis, 1990) in the majority of humans. My study examines whether this left laterality is in evidence in pre-linguistic infant vocal behaviour.

Laterality is not an exclusively human trait. Higher apes show left lateralisation in intentional communicative vocalisations, so this trait may have been present in our common ancestor (Losin et al., 2008). This, in turn, suggests that the left cerebral hemisphere may be predisposed to recruit speech sound articulation. Indeed, from 31 weeks gestation, foetal brains show a pattern of right-left brain asymmetry in language areas, consistent with that in adults (Chi et al., 1977), and the proportion of left lateralised foetal mouth movements increases between 23-36 weeks gestation (Reissland et al., 2013). However, the link between early non-speech oro-motor behaviours and speech sound articulation is debated (Wilson et al., 2008), and these 'linguistic' brain areas also support general, non-linguistic functions. This study therefore aims to map the development of laterality in infants during the period in which their vocal behaviour becomes increasingly intentional and tuned to language development.

Analysis of the asymmetry in mouth opening is a non-invasive method, which can reveal differential hemispheric involvement in vocalisations and facial expressions, so is well-suited for use with naturalistic infant data. Holowka & Pettito (2002) found that babble (the most language-like behaviour emerging during the first year of life) was left lateralised, while smiles were right lateralised, and non-babble vocalisations showed roughly equal hemispheric involvement. They interpreted this as an indication that babble is underlyingly linguistic. However, babble is not produced with communicative intent, and so is different from human language and ape communicative behaviour. Additionally, Holowka & Pettito (2002) did not investigate whether this left lateralisation emerged with babble or developed over time with articulatory practice. In a pilot study, I found that hemispheric specialisation during babble may increase in line with the attainment of milestones in speech sound articulation.

This current longitudinal study aims to ascertain whether this lateralisation does, indeed, increase in line with specifically linguistically relevant developments, or with more general development. I examine hemispheric specialisation during vocal behaviour and emotional facial expressions in infants, aged 5-12 months, to capture the transition into babble and subsequent increases in the control and sophistication of its articulation. Caregivers are also asked to keep a record of their infant's general development. Preliminary results from five infants' initial two sessions (at 5 months), prior to babble onset, indicate that smiles were right lateralised in 8 of 10 data collection sessions, while non-babble vocalisations showed more variable hemispheric involvement, being right lateralised in 5 of 10 sessions and left lateralised in 5 of 10. The data currently under analysis, to be presented at BAAP, were collected following the emergence of babble and may provide insight into the point of emergence and developmental trajectory of the hemispheric specialisation observed during babble.

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