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EARLY LEFT BRAIN ASYMMETRY IN NEW-BORN BABOONS: WHAT DOES IT TELL US (OR NOT) ABOUT THE EVOLUTION OF THE LANGUAGE-READY BRAIN?

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Language and its typical asymmetric brain organization are considered as unique to *Homo sapiens* evolution (Crow, 2002), suggesting a specific "language-ready" brain dating back to 350 000 ago. Therefore brain lateralization was hypothesized as central to characterize the language-ready brain, a majority of humans showing greater cortical activations in the left hemisphere for most language functions (Vigneau et al. 2006). The specific "language-ready" brain also suggests infant brain is pre-wired to learn languages. At birth preverbal new-born infants are already sensitive to their native vocal prosody and are able to distinguish every phonemes (e.g. Mehler, 1988), suggesting the innate inherited readiness for language acquisition. Similarly than adults, infants also show structural and functional leftward asymmetry of a critical language area, the planum temporale (PT), highlighting the PT asymmetry as a marker for functional language readiness in children development prior to language exposure (e.g. Dubois, 2009). Surprisingly, PT structural asymmetry has been now reported in nonhuman species such as chimpanzees and baboons (e.g. Marie et al., 2018).

The aim of the present study is to investigate the neuroanatomical asymmetries of the PT in new-born nonhuman primates, the baboons (*Papio anubis*). T1 & T2 weighted anatomical images were acquired *in vivo* on a 3T MRI scanner in 32 unwean infant baboons of different ages (from 4 days to 2 months old at the Centre IRM (Institut de Neurosciences de la Timone) before the full maturation of myelin, synapses and cell bodies. Among those baboons, 18 have been

scanned a second time when reaching 7 to 10 months of age (i.e., after myelin maturation). Both infant and mother were anesthetized for each MRI session and then put back in their social groups housed at the Station de Primatologie CNRS. For each subject's MRI scan, the PT's surface area was manually traced in both hemispheres using ITK-SNAP software (see Marie et al., 2018).

We found, for the first time in nonhuman new-born, a human-like significant PT's surface asymmetry in favor of the left hemisphere, a brain asymmetry which increases across ages. This finding in non-linguistic primate infants strongly questions the idea that early PT asymmetry constitutes a robust marker for speech development in humans. It also suggest that such asymmetric brain organisation might be (1) highly heritable with a strong genetic component in its development, at both ontogenetic and phylogenetic levels and (2) be inherited from our common ancestor shared with old-world monkeys at least 25-35 million years ago.

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