

# Neuroanatomical asymmetries of the central sulcus (CS) in relation to handedness in baboons. An anatomical MRI study in 90 *Papio Anubis*.

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The preferential use of the right hand and its relationship to brain anatomical asymmetries are prominent manifestations of hemispheric specialization in the human brain. On that account, many studies investigate the origins of human handedness and hemispheric specialization in studying the manual lateralization in nonhuman primates. Manual lateralization for complex manipulative bimanual coordination in chimpanzees has been shown to be associated to structural asymmetries within the motor cortex and specifically at the central sulcus (CS), namely the motor hand area (known as KNOB) but not with homologs of language areas. This evidence attributes the origins of handedness to increased motor skills, such as bimanual coordination, beyond asymmetries in language area. Since non-human primates are our closest ancestors, studies on handedness in a large comparative approach including both apes and monkeys can be of great importance, in respect to the phylogenetic origins of cerebral specialization for manual control.

In the present study, we investigate the anatomical asymmetries in respect to depth and surface area of the CS in 90 baboons (*Papio anubis*) from in vivo anatomical magnetic resonance imaging (MRI) scans that have been previously collected at the Center IRMf (INT, Marseille). For the post-processing of the MRI scans, we used a free distributed software BrainVisa, which is based on sulcus-based morphometry and allows the extraction of the brain sulci and their anatomical characteristics, such as depth and profile.

Moreover, the anatomical findings of the present study have been correlated with behavioral data on handedness for the TUBE task, since previous studies have shown the presence of population level right-handedness in baboons for the same task. The behavioral data have been previously collected on the TUBE task in order to assess handedness on baboon for bimanual actions at the Station de Primatologie CNRS (France).

The main results indicate the presence of CS depth asymmetry at the hemisphere contralateral to the preferred hand of the baboons for the TUBE task. The present neuroanatomical correlate of manual preference is an argument in favor of a continuity in manual laterality in humans a baboons, that perhaps goes back to a common ancestor 30-40 mya. This research was funded by ANR-12-PDOC-0014-01 (LangPrimate Project, P.I. Adrien Meguerditchian).