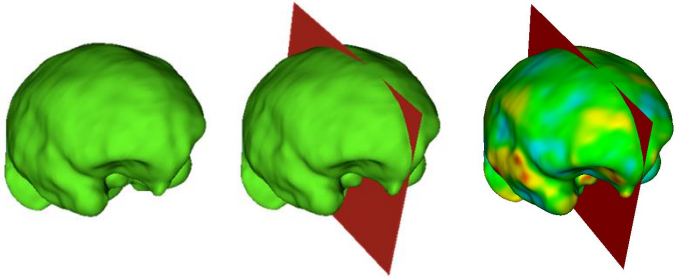


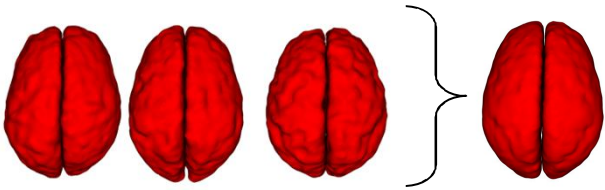
Automatic, landmark-free quantification of 3D endocranial asymmetries in extant and fossil species: new insights into paleoneurology

BENOÎT COMBÈS, MARC FOURNIER, JOSÉ BRAGA, GÉRARD SUBSOL, ANTOINE BALZEAU, EMMANUEL GILISSEN, FRANCIS THACKERAY, SYLVAIN PRIMA

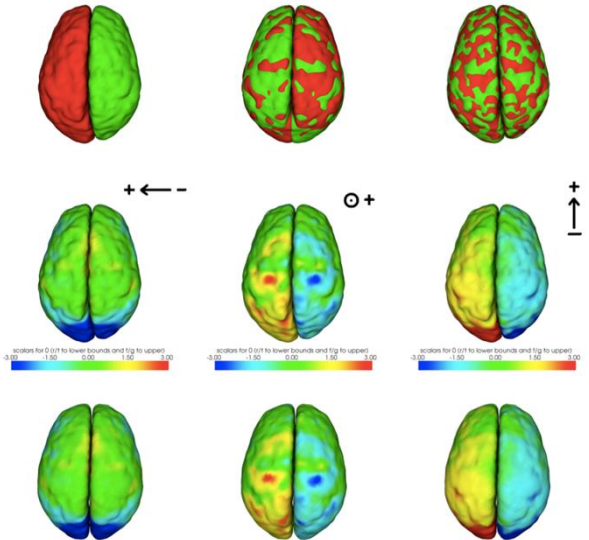
1. Estimate a directional (L-R / A-P / H-F) asymmetry map of an endocast



2. Build a mean endocast from a database

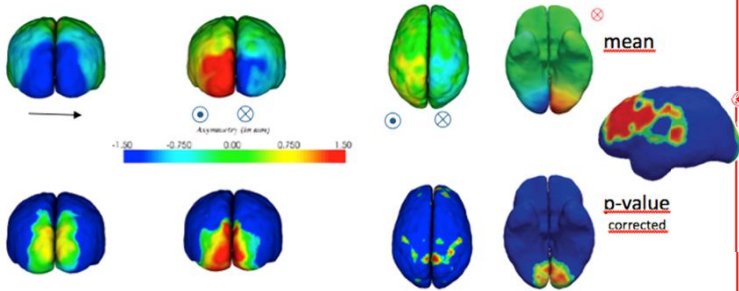


3. Project all the individual asymmetry maps on the mean anatomy (and make statistics)



Q1: What is the prevalence and nature of the asymmetries?

Database: right-handed men (n=11)



H_0 : there is no asymmetry

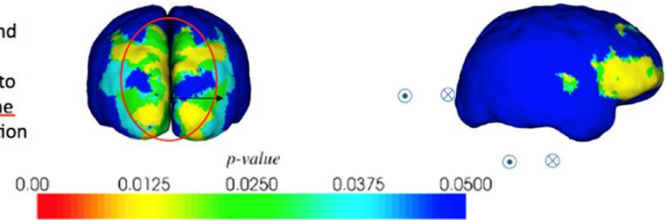
- Left occipital laterally more extended than the right
- Left occipital lobe protrudes more than the right
- Right parietal lines "higher" compared to the left
- Left occipital lobe lower compared to the left
- Asymmetry in the R/L component around Broca's area

Torque?

Q2: Is there a genetical basis of these asymmetries?

Database: right-handed situs solitus (n=11) / situs inversus* (n=2)

H_0 : SI and control belong to the same population

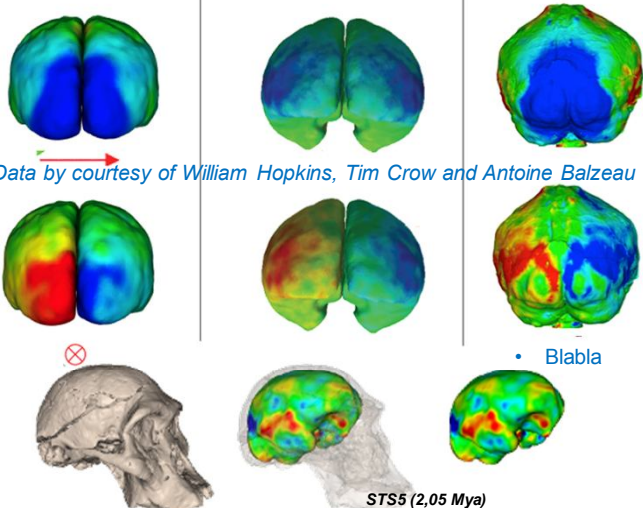


- partially significant reversed asymmetry (protrusion in occipital lobe)
- normal localization of language area

* Data by courtesy of David Kennedy & Neil Roberts

Q3: when did these asymmetries appear?

Mean of 11 Humans | Mean of 7 chimpanzees | Cro-Magnon (30,000 years)



Q4: are these asymmetries specific to humans?

