Study shows brain groove unique to humans

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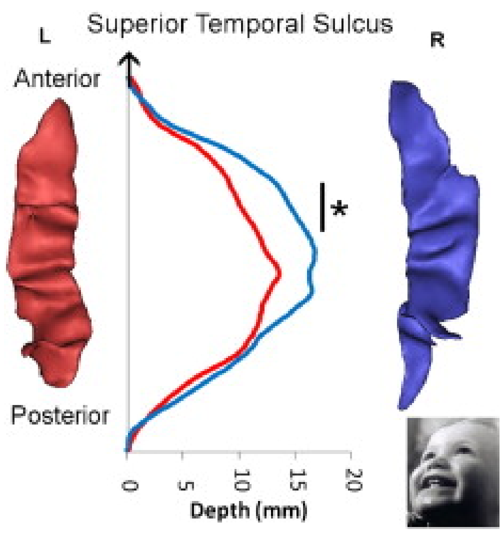

Credit: H. Glasel et al. *NeuroImage*, Volume 58, Issue 3, 1 October 2011, Pages 716–723

(Medical Xpress)—An international team of researchers has found via study that a groove in the brain, which they have named the "superior temporal asymmetrical pit" (STAP) appears to be unique to humans as it is barely noticeable in primates. In their paper published in *Proceedings of the National Academy of Sciences*, the team describes how they studied brain scans of humans of a wide variety of ages and compared them with similar scans of other primate brains and found the difference. They suggest their finding may help better understand the evolution of our species.

Medical scientists and doctors have known about the STAP for some time, but until now, it was not known just how unique it is. It is on average just 4.5-centimetres long and is deeper in the right hemisphere than it is in the left. No one knows why the groove exists, but its location offers clues—it is likely associated with communication, the researchers note.

To learn more about the STAP, the researchers looked at brain scans of 177 people and 73 chimpanzees—analyses revealed that while clearly present in all the human scans, it was barely present in any of chimps. The team notes that in the right hemisphere, the groove is in a part of the brain involved in facial recognition and in figuring out the motives or feelings of other people. In the left hemisphere, the groove runs through a part of the brain very clearly associated with language skills.

The human brain is approximately three times as big as a chimp's, yet finding functional differences in brain structure has been difficult to pinpoint. One structure that has been seen to be different is Broca's area, which is known to be important to speech. It is smaller in chimps which would seem to make sense as their speech capabilities are far less complex.

The researchers note that the STAP is prominent in people of all ages, from those still in the womb to the elderly. That suggests, they theorize, that the groove is involved in inherited traits—traits not present in other primates, a finding that could lead to a better understanding of what makes our human brains so unique. They suggest also that further research into which genes are responsible for the STAP might reveal even more differences between our brains and other primates.

More information: New human-specific brain landmark: The depth asymmetry of superior temporal sulcus, François Leroy, *PNAS*, DOI: 10.1073/pnas.1412389112

Abstract
Identifying potentially unique features of the human cerebral cortex is a first step to understanding how evolution has shaped the brain in our species. By analyzing MR images obtained from 177 humans and 73 chimpanzees, we observed a human-specific asymmetry in the superior temporal sulcus at the heart of the communication regions and which we have named the "superior temporal asymmetrical pit" (STAP). This 45-mm-long segment ventral to Heschl's gyrus is deeper in the right hemisphere than in the left in 95% of typical human subjects, from infanthood till adulthood, and is present, irrespective of handedness, language lateralization, and sex although it is greater in males than in females. The STAP also is seen in several groups of atypical subjects including persons with situs inversus, autistic spectrum disorder, Turner syndrome, and corpus callosum agenesis. It is explained in part by the larger number of sulcal interruptions in the left than in the right hemisphere. Its early presence in the infants of this study as well as in fetuses and premature infants suggests a strong genetic influence. Because this asymmetry is barely visible in chimpanzees, we recommend the STAP region during midgestation as an important phenotype to investigate asymmetrical variations of gene expression among the primate lineage. This genetic target may provide important insights regarding the evolution of the crucial cognitive abilities sustained by this sulcus in our species, namely communication and social cognition.