

**Date:** May 28, 2014; 1-5 pm

**Location:** California Academy of Sciences, San Francisco

**Event:** Public symposium on aspects of being human and our evolutionary trajectory; Falk's presentation: Brain evolution from *Australopithecus* to Albert Einstein: What matters, size or wiring?

**Abstract:**

Human relatives who lived around three million years ago (australopithecines) had brain volumes that averaged about 400 cubic centimeters (cm<sup>3</sup>), similar to living chimpanzees; modern humans have brains that average around 1350 cm<sup>3</sup>. As hominin brain size more than tripled through time, material culture became increasingly complex. Australopithecines are, thus, associated with a record of the first known stone tools, which were simple compared with the more varied tools of their descendants. The trend for innovation in material culture is accelerating in today's rapid advancements in information and technology. Evolving hominin brains not only increased in size, they also became more complex in the wiring between neurons. Remarkably, a fossil record of casts of the interiors of hominin braincases (endocasts) provides a window into the evolution of both brain size and wiring. The techniques that have been developed to analyze the bumps and grooves of the brains of our ancestors have recently been applied to an analysis of newly emerged photographs of the surface of Albert Einstein's brain, with fascinating results. One of the most advanced regions in australopithecine brains was the middle part of the frontal lobes. This region is even more complicated in human brains, and is associated with particular aspects of advanced cognition. Einstein's brain was average in size for his species, but extraordinarily wired in this part of the frontal lobe (and elsewhere) compared to most people. Features of Einstein's brain suggest that, although brain enlargement was important during hominin evolution, advancements in the brain's wiring was especially crucial for the emergence of highly advanced cognition in *Homo sapiens*.