



## Human evolution

# Of bairns and brains

**Babies are born helpless, which might explain why humans are so clever**

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HUMAN intelligence is a biological mystery. Evolution is usually a stingy process, giving animals just what they need to thrive in their niche and no more. But humans stand out. Not only are they much cleverer than their closest living relatives, the chimpanzees, they are also much cleverer than seems strictly necessary. The ability to do geometry, or to prove Pythagoras's theorem, has turned out to be rather handy over the past few thousand years. But it is hard to imagine that a brain capable of such feats was required to survive on the prehistoric plains of east Africa, especially given the steep price at which it was bought. Humans' outsized, power-hungry brains suck up around a quarter of their body's oxygen supplies.



### Sexy brains

There are many theories to explain this mystery. Perhaps intelligence is a result of sexual selection. Like a peacock's tail, in other words, it is an ornament that, by virtue of being expensive to own, proves its bearers' fitness. It was simply humanity's good fortune that those big sexy brains turned out to be useful for lots of other things, from thinking up agriculture to building internal-combustion engines. Another idea is that human cleverness arose out of the mental demands of living in groups whose members are sometimes allies and sometimes rivals.

Now, though, researchers from Rochester University, in New York, have come up with another idea. In *Proceedings of the National Academies of Science*, Steven Piantadosi and Celeste Kidd suggest that humans may have become so clever thanks to another evolutionarily odd characteristic: namely that their babies are so helpless.

Compared with other animals, says Dr Kidd, some of whose young can stand up and move around within minutes of being born, human infants take a year to learn even to walk, and need constant supervision for many years afterwards. That helplessness is thought to be one consequence of intelligence—or, at least, of brain size. In order to keep their heads small enough to make live birth possible, human children must be born at an earlier stage of development than other animals. But Dr Piantadosi and Dr Kidd, both of whom study child development, wondered if it might be a cause as well as a consequence of intelligence as well.

Their idea is that helpless babies require intelligent parents to look after them. But to get big-brained parents you must start with big-headed—and therefore helpless—babies. The result is a feedback loop, in which the pressure for clever parents requires ever-more incompetent infants, requiring ever-brighter parents to ensure they survive childhood.

It is an elegant idea. The self-reinforcing nature of the process would explain why intelligence is so strikingly overdeveloped in humans compared even with chimpanzees. It also offers an answer to another evolutionary puzzle, namely why high intelligence developed first in primates, a newish branch of the mammals, a group that is itself relatively young. Animals that lay eggs rather than experiencing pregnancy do not face the trade-off between head size at birth and infant competence that drives the entire process.

To test their theory, Dr Piantadosi and Dr Kidd turned first to a computer model of evolution. This confirmed that the idea worked, at least in principle. They then went looking for evidence to support the theory in the real world. To do that they gathered data from 23 different species of primate, from chimps and gorillas to the Madagascan mouse lemur, a diminutive primate less than 30cm long.

The scientists compared the age at which an animal weaned its young (a convenient proxy for how competent those young were) with their scores on a standardised test of primate intelligence. Sure enough, they found a strong correlation: across all the animals tested, weaning age predicted about 78% of the eventual score in intelligence. That correlation held even after controlling for a slew of other factors, including the average body weight of babies compared with adults or brain size as a percentage of total body mass.

The researchers point to other snippets of data that seem to support their conclusions: a study of Serbian women published in 2008, for instance, found that babies born to mothers with higher IQs had a better chance of surviving than those born to low-IQ women, which bolsters the idea that looking after human babies is indeed cognitively taxing. But although their theory is intriguing, Dr Piantadosi and Dr Kidd admit that none of this adds up to definitive proof.

That, unfortunately, can be the fate of many who study human evolution. Any such feedback loop would be a slow process (at least as reckoned by the humans themselves), most of which would have

taken place in the distant past. There are gaps in the theory, too. Even if such a process could drastically boost intelligence, something would need to get it going in the first place. It may be that some other factor—perhaps sexual selection, or the demands of a complex environment, or some mixture of the two—was required to jump-start the process. Dr Piantadosi and Dr Kidd's idea seems a plausible addition to the list of explanations. But unless human intelligence turns out to be up to the task of building a time machine, it is unlikely that anyone will ever know for sure.

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