

PART TWO

How Human Sexuality Helped Create Our Large Brain — by George Leonard

In less than five million years, starting with our ancestors, the Australopithecines, the hominid brain was to triple in size. Such explosive brain development was itself a risky evolutionary gamble. Our brain is an extremely greedy organ. Every minute, enough blood must be pumped through it to equal its own weight. Any animal with a disproportionately large brain has to find considerably more food to feed itself and its offspring than do other animals of the same size and weight. The need for even ten percent more food than a competing species in the wild might mean extinction. Why and how did such an organ evolve?

In this case, anatomy was destiny; the upright stance—first seen in *Australopithecus*—set the runaway growth of the brain in motion. Hands and arms, no longer needed for locomotion, were free not only to carry objects and offspring over long distances but also to explore and manipulate the environment, to make things. The importance of skilled manipulation is reflected in the disproportionately large amount of the motor cortex in the modern brain devoted to controlling the hand, thumbs, and fingers.

The millennia passed, the glaciers of the Ice Ages advanced and receded, and our predecessors beyond *Australopithecus* learned to make tools and weapons, to use fire, to hunt cooperatively. Such manipulative and technical skills played a part in the development of the large brain; still, they probably don't demand nearly enough mental power to create a need for the overgrown organ in our skulls.

What does? To get a crude answer, simply tune in to the daily television soap operas. Just to deal with the subtle, complex and often convoluted web of relationships, alliances, status-seeking, gossip, flirtation, manipulation, and deception involved in any intense social grouping requires as much brain power as one could easily imagine. By the time we come to the large-brained *Homo* specie that lived in hunting and gathering bands of around 30 men, women, and children, dealing continually with intra- and inter-band relationships, we confront a social chess game of daunting complexity.

Language and self-aware consciousness might well have developed in the service of the prehistoric soap opera. Neither toolmaking nor signaling in the hunt would seem to require the intricate syntactical language that exists in even the most primitive surviving hunting and gathering bands. And self-aware consciousness itself can be seen first of all as an aid to successful social interaction: If I know what I'm feeling or thinking about something, then I can more skillfully understand and predict what someone else is and will be feeling and thinking. With language and consciousness, of course, comes a new kind of evolution—cultural evolution, which can be faster by far than biological evolution, and capable of wonders and horrors beyond the power of the primitive mind to imagine.

Leveraging the greedy human brain

How could hominid evolution leverage such a large organic change with such a small amount of genetic variation? First of all, the explosive growth of brain size in the Homo genus actually required very little in the way of new DNA. The anatomical modifications necessary for the upright stance and the human hand probably took more. The basic pattern for the human brain was already set, if modestly, in the brain of the ape. An ingenious bit of genetic leveraging made it possible for this basic ape brain to become much, much larger, more complex, more capable in the human.

Here's how it works: Simply change the rate of human growth and maturation, a change that requires little more than simple on-off switches in the genes to control the timing and thus slow the maturation of the human individual. This results in the baby Homo sapiens being born quite immature and helpless—a fetus actually—and staying relatively helpless for many years after birth, years during which the brain can keep on growing. A young chimpanzee starts feeding itself not long after birth and can take care of itself by age four. A young human needs parental care until around age eight. The chimpanzee's brain grows only about a third after birth. A human's brain at birth is already larger than an adult chimp's, almost too large for the head to get through the mother's pelvic girdle. And it goes on to triple in size before it stops growing at around age seven.

This strategy of stretching out an organism's period of immaturity comes under the heading of neoteny. It's this neoteny, in fact, that most clearly distinguishes us from the apes, and not just in brain development. Note that a human baby and a chimpanzee baby bear a strong resemblance, while a grown-up human looks more like a human baby or chimp baby than does a grown-up chimp. We might go so far as to say that a human being is essentially a chimpanzee that is very slow in growing up. We might also say that some of the smartest humans, the geniuses among us, the Mozarts and Einsteins, never quite grow up.

Primitive parents put to the test

This prolonged immaturity, though simple to program, creates one more of those tricky situations that have marked our evolution. In most primates, the males are considerably larger than the females. Such disparity, known as dimorphism, generally goes along with the harem system of mating. Male gorillas, for example, weigh nearly twice as much as each female and have a harem of some three to six females. Australopithecus males, also significantly larger than females, were probably polygamous, the larger, dominant males mating with more than their share of females, leaving a horde of restless, dissatisfied bachelors. As the Homo specie evolved, however, the difference of size between the sexes decreased, down to a mere 15 percent in Homo sapiens. This suggests more pair-bonding between the sexes, less competition and more cooperation among males, along with the food-sharing we have seen in hunting and gathering cultures.

Without these conditions, the large brain couldn't have come into being. The equation is simple and urgent: The development of the large brain required prolonged immaturity and a dependable, larger-than-usual food supply, both of

which, in the wilds, required fairly stable, two-parent families, not single mothers in harems. To make the equation even more critical: while our evolutionary cousins, the chimpanzees (with a four-year dependency period for their young) tend to have only one baby every four years and thus only one dependent at the time, humans (with an eight-year dependency period) might have several children over eight years. This produced an evolutionary breeding advantage, but it also put human parents to the test of having several slow-maturing dependents to care for at once.

Human sexuality and the large brain

What could the process of evolution do to encourage pair-bonding and discourage destructive male sexual competition? In yet another display of skillful leveraging, evolution came up with two unique conditions that secured a large and lasting return for a small genetic investment. The human female, unlike other primate females, developed breasts that are full and rounded all the time rather than only during lactation. More important, the females achieved freedom from the sexual limitations imposed by the estrus cycle.

The full breasts served as sexual attractors. Freedom from the estrus cycle—rare among mammals—encouraged long-term pair-bonding by making the female sexually available and active all the time while discouraging the fierce male competition that prevails where females can be sexually active only during certain highly charged periods. It would be hard to imagine that the prolonged immaturity necessary for the development of the large brain would have been possible if the hominids hadn't evolved away from the more common primate sexual pattern, with its single-parent families and recurrent and disruptive male sexual competitions during female estrus. Human societies have explored many kinds of sex arrangements, but even now the most common pattern, worldwide, is monogamy with occasional clandestine affairs.

Consider the legacy. Despite the harsh and often bizarre sexual repression practiced by various societies through the ages, human beings generally enjoy not the most prodigious (lions are known to have 30 orgasms in one hour) but the richest, most varied, and most continually accessible erotic life of any species. Human sexuality transcends procreation. Our ardent desire has served from earliest times not just to ensure reproduction and survival but also to create enduring bonds of love and care, crucial elements in our definition of the human potential. This gift of Eros echoes an ancient necessity: the nurturance of the burgeoning human brain, from which, in time, came complex language, self-aware consciousness, and our highest esthetic and spiritual aspirations.