

Three strange things that evolution did to our minds

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Over the last few years, a fledgling science called evolutionary psychology has provoked renewed interest in how the human mind evolved. But current thinking about the issue is quite confused, because evolution means two different things to two different groups of scientists. The schism can be traced back to Darwin.

On the one hand, evolution meant descent with gradual modification: describing how species arose from ancestors through a sequence of intermediate stages. This view leads primatologists, palaeontologists, and archaeologists to study great apes, hominid fossils, stone tools, and cave paintings, and then to speculate about the mental stages that link the anthropoid common ancestor to the modern human. This approach has dominated thinking about human origins over the last century, and is exemplified by Merlin Donald's book *Origins of the modern mind* and by Steven Mithen's book *The prehistory of mind*. The emphasis has been on when, where, and how our ancestors' minds were transformed through intermediate stages. For short, we can call this the "mental stages" approach.

On the other hand, Darwinian evolution meant describing how adaptations arose through natural selection or sexual selection to solve particular problems of survival or reproduction. Biological adaptations are very special things, complex organisations of matter and energy with so much structure and such refined functionality that they can only be explained by cumulative selection over many generations.

Mutations are basically blind and random, but selection is not. On the contrary, cumulative selection is such a powerful way to find creative solutions for difficult problems that computer scientists are using it in situations where ordinary design methods fail. These methods, especially genetic algorithms and genetic programming, are leading to a Darwinian revolution in engineering. This extraordinary development confirms what Darwin suspected all along: the only way for Nature to produce really complex structure and really impressive functionality is through cumulative selection in large populations over many generations.

Cumulative selection looks like an appallingly wasteful, slow, inefficient process; but every other natural way to produce functional complexity is even worse. Natural selection isn't stupid, it's just that the problems it solves are really hard.

This contrasting view leads evolutionary psychologists to study the human mind as a collection of mental adaptations that solve specific problems like finding food, avoiding predators, making alliances, attracting mates, and raising children. This approach is really quite new and unfamiliar in psychology, but has been lucidly explained in recent books like *The language instinct* by Steven Pinker, *The red queen* and *The origins of virtue* by Matt Ridley, and *The evolution of desire* by David Buss. Evolutionary psychology talks about things like "fitness" more than fossils, "optimality" more than

ochre, and “cognitive domains” more than carbon dating. The emphasis is on what the adaptations are, what functions they served, and why they evolved.

Although this “adaptationist” view is common and uncontroversial in evolutionary biology, it seems strange both to the general public and to scientists working in the older, stage-story framework. So it should. Analyzing mental stages and analyzing mental adaptations are very different games with different players, rules, strategies, and goals.

Stage theorists tend to view the mind as an architectural system that undergoes major renovations by each successive owner, from the Australopithecenes through Homo habilis, Homo erectus, and Homo sapiens. Adaptationists tend to view the mind as a loose confederation of separable capacities that evolve in parallel, in response to particular environmental challenges. Stage theorists tend to relegate speculation about the biological functions of various mental capacities to the final chapters of their books, whereas adaptationists start with functional hypotheses and then spend entire book testing alternatives. Stage theorists tend to quote Stephen Jay Gould on why biology is like history, while adaptationists tend to quote Richard Dawkins on why biology is like engineering.

The shift from mental stages to mental adaptations has produced confusion among people who expect evolutionary psychologists to tell the same kind of stories that the stage-theorists told. Some reviewers were disappointed that Steven Pinker didn't speculate about exactly when the language instinct evolved, didn't make much out of fossil hyoid bones from Neanderthal throats, and didn't try to link the Upper Paleolithic revolution in cave painting to the evolution of some new language form.

Some experts on bones and stones seem frustrated that their evidence is no longer viewed as the starting point for all serious theorizing. Interested observers still expect theories of mental evolution to resemble the most tedious book in the Bible, Chronicles I (“Azariah was the father of Helez, Helez the father of Eleasah, Eleasah the father of Sismai, Sismai the father of Shallum”) rather than a provisional reverse-engineering report on an efficient but poorly documented software package.

Adaptations are rich and subtle things, best analysed by looking at their full complexity in living organisms. This is especially true with mental adaptations, because behaviour doesn't fossilise, and the brains that produce behaviour don't fossilise. Only the skulls around the brains that make the behaviour do. The richest lode of information about the origins and functions of our mental adaptations is right in front of our noses, in the psychological details of human life, human thoughts, and human feelings, not in East African gorges and French caves.

So, the first strange thing that evolution did to our minds was to leave its best clues about our past in the present behaviour of modern humans. Human nature is where we find it, right here, right now.

Why sexually selected adaptations don't always feel very sexy

One troubling thing about evolutionary psychology is that the focus on cumulative selection sounds so reductionistic. In a sense, it is. There is only one scientific way to explain the origin of a complex mental adaptation like intelligence, creativity, language, or consciousness: cumulative selection across many generations, sifting adaptive

designs that promote their own replication from those that do not. And there are only two basic kinds of selection, natural selection for survival and sexual selection for reproduction. That's it. Death and Celibacy are the main routes to genetic oblivion.

Now, the difficulty comes when people suppose that explaining all mental adaptations by natural and sexual selection somehow implies explaining all human behaviour as expressions of just two subconscious motives, fear of death and lust for sex. This confuses the biological function of a mental adaptation with its motivational structure. It confuses evolutionary psychology with psychoanalysis.

People seem to find the sexual selection case especially troubling. I know, because over the last few years I've been proposing that sexual selection through mate choice was a major force in shaping our mental adaptations for creative intelligence as manifest in language, art, music, and ideology. People often misunderstand me as trying to revive Freud's idea that these sorts of displays are driven by a sublimated "sex drive". Because concealed sexual motives are associated with seduction, harassment, adultery, and child abuse, people tend to react with distaste to the idea that much of human behaviour was shaped by sexual selection.

Such distaste is misplaced. A heart does not need to know that it's a blood pump in order to function as one. A penis does not need to know that it was sexually-selected through female choice in order for it to function in a female-pleasing way -- see William Eberhard's wonderful new book on the evolution of copulation, *Female control*. Likewise, a mental adaptation, even one as complex as human creative intelligence, does not need to know that it functions as a courtship display, in order to work as such.

All adaptations are shaped throughout to fulfil their biological functions; they don't need to include a little copy of their function inside them, in the form of an explicit, sublimated, or repressed motive, in order to remember what they're supposed to be doing.

In some cases, the opposite probably holds: the less the mental adaptation knows about its function, the better. Take creativity for example. Most creativity researchers agree that people produce more creative solutions to problems when they are "intrinsically motivated" by the joy of playing around with the problem, compared to when they are "extrinsically motivated" by payoffs like money for performing well.

Highly creative artists, musicians, and writers agree that their best work comes when they feel inspired by the irrepressible need for self-expression, not when they have some ulterior motive like bedding one of their groupies. Likewise, ordinary folks find that the best wit, romance, and foreplay comes without too much self-conscious sexual strategizing. You just put the mental adaptations for courtship in the right social context, and set them free to do their own thing.

So, our sexually-selected creative intelligence doesn't usually feel very sexy. That's O.K. The subjective motivation for a behaviour is not the best direct indicator of its evolutionary origin or adaptive function. But it can be a good indirect clue. Again, take the feeling we call creative inspiration. It hits most people hardest from late adolescence through young adulthood, just in time for the peak of courtship activity. It seems, across all cultures and all historical epochs, to motivate more display behaviour by males than by females, just as predicted by sexual selection theory. It seems to wane after the first few years of marriage, but may surge back again if we divorce or have an affair. It

waxes when we're feeling healthy and is the first thing to wane when we're feeling hungry, tired, ill, injured, or depressed, just as we would expect from a trait that functions as a "health indicator" in courtship. It tends to provoke big, bright, loud, high-contrast, novel displays, just like the peacock's tail, the nightingale's song, and the bowerbird's architecture. And it does, after all, tend to attract sexual partners.

The second strange thing that evolution did to our minds was to make the emotions that run our minds such fallible guides to the biological functions that our minds serve. Sexual selection in particular is like a con man who leaves no physical evidence and conceals all signs of motive, but who flashes his wealth so flagrantly that suspicions are always aroused. Our creative intelligence doesn't usually feel like an adaptation for courtship, even though it leads to all kinds of behaviour with sexual payoffs. In this regard the old Behaviourists were right: observable behaviour, rather than introspected motives, are sometimes the best evidence about what the mind is up to.

Rationality debauched: The epistemology of sexually selected minds

Evolution is often assumed to favour minds that accurately represent the environment. This is a reasonable assumption for many mental adaptations shaped by natural selection. As Roger Shepard argued in a recent Ciba Foundation Symposium on evolutionary psychology, our minds have evolved to internalize certain basic physical regularities of the world. Some of these, such as the three-dimensionality of space, the asymmetry of time, the pervasiveness of gravity, the continuity of motion, and the conservation of mass, are so fundamental that we barely notice them, but our perceptual systems are built to rely on them. So, our minds are pretty good at dealing with medium-sized physical objects and their motions.

But our minds are even more attuned to things with biological significance for survival and reproduction: prey, predators, parasites, pathogens, competitors, kin, mates, and offspring. In principle, evolved minds shouldn't even bother noticing objects or events that don't have any implications for biological fitness, because, by definition, there would be no selection pressures for noticing such things. But our minds should be very good indeed at registering, representing, predicting, and manipulating things that do have fitness implications.

This sort of argument, that natural selection solves many of our epistemological problems, has been advanced ever since Darwin by evolutionary psychologists such as Herbert Spencer, William James, John Tooby, and Leda Cosmides, by evolutionary epistemologists such as Donald Campbell, John Ziman, and Henry Plotkin, and by naturalistic philosophers such as Dan Dennett, Ruth Millikan, and Peter Godfrey-Smith. The problem is, it all starts to break down when sexual selection enters the picture, because sexual selection cares more about entertainment value than truth value.

Consider the epistemological status of the peacock's tail. It is truthful in the very restricted sense of being a reliable indicator of the peacock's health: very sick, injured, starving, incompetent peacocks simply can't afford the energy to grow a long tail, and couldn't take good care of it even if they could. It truthfully represents the environment in the very fragmentary sense of including eye-spots that resemble real eyes. It has also internalised a certain level of knowledge about the peahen's visual system into its structure and movements, which optimally excite the peahen's eyes. But the peacock's

tail as a whole is neither truth nor lie; it is entertainment. It evolved through sexual selection because peahens happened to enjoy that kind of tail.

Now, what if some of our mental adaptations evolved to function like the peacock's tail? One of our species' most puzzling traits is our tendency to believe in fantastically unlikely, pragmatically useless, but extraordinarily amusing things, such as ancient Greek myths, homeopathy, alien abductions, European Monetary Union, and the inevitability of getting tenure. We show strong motivations and incredible capacities to learn, create, recombine, and disseminate ideas. Why would selection favour such extreme, costly, and obsessive ideological behaviour? And if ideological behaviour were naturally selected to have some survival function in coping with the natural environment, why do our most abstract, most general ideologies tend to represent the world so inaccurately?

Richard Dawkins views ideologies as virus-like memes that replicate by playing upon the perceptual, cognitive, memory, and communication biases of the human mind. The question then is why the human mind should have been so vulnerable to the more attractive of such ideologies, and why it should show such inventiveness in producing them, especially in young adulthood. Perhaps they are just spandrels, arbitrary by-products of having minds evolved for other purposes.

After all, the damage such ideologies do to the business of surviving and reproducing is well contained by our astonishing skills at hypocrisy and rationalisation, and by unconscious, automatic efficiency of most mental adaptations. Although Goethe's theory of colour was completely wrong, his eyes still worked. Still, we do spend an awful lot of time filling our heads with useless conceits and then broadcasting them, fervently and energetically, to others. Perhaps this costly display served some courtship functions.

Sexual selection seems to have liberated human ideologies from the need to have any epistemological relevance to the real world. How did this happen? Most animals produce courtship displays that play upon each other's eyes and ears more than their brains. Their simple signals activate sensations but not concepts. Humans are different. We load our courtship displays with meaning, to reach deeper into the minds of those receiving the signals.

From this angle, the evolution of language was driven not so much by the survival advantages of communicating useful information, but by the reproductive advantages of activating more complex ideas in the heads of potential mates. Through deftly modulating exhaled breath (i.e. speaking), humans can conjure imagined worlds full of engaging characters and memorable stories. Language as a sexually-selected medium for fiction may have preceded and promoted language as a naturally-selected medium for non-fiction. Our ancestors may have been story-tellers first, and fact-teachers only later. (Of course, for stories to be comprehensible, they have to recombine known idea-units in novel combinations, rather than using entirely novel words and ideas).

The most disturbing thing that evolution did to our minds was to add some baroquely ornamental towers of creativity, consciousness, and communication to our plainly utilitarian foundations of perception, memory, motor control, and social intelligence.

Could evolution really produce such an architectural hybrid, part puritan and part pagan, part streamlined survival machine and part sexual ornament? Of course. It's already happened to the human body. We sport sexually-selected breasts, buttocks, penises, beards, everted lips, hairless skin, and long head hair of diverse colours and forms, in addition to the basic engineering of torso, legs, arms, and head.

The difference is that whereas our body parts must all fit together into an integrated system obeying certain structural principles, our mental ornaments may not need to fit together with any structural coherence, or obey any epistemological principles. Minds can be much more inconsistent patchworks than bodies.

The result is a human creative intelligence that can flood the planet with the wonderful fictions reviewed in journals like this, but that judges such displays more often for their capacity to excite, intrigue, entertain, and distract, than for their capacity to remind us of the stark, mortal, lonely truth of human life. Our instincts for entertainment and self-delusion may too powerful for us to act as epistemological individualists.

One major strategy for defying these instincts is to pool our critical faculties into those delicate social institutions called sciences. Evolutionary psychology, like other sciences, are designed to harness our sexually-selected, fiction-prone intelligence to produce stories as non-fictional as we can make them. But science is not the only way to pool our epistemological resources. Literary criticism and other humanities serve a rather similar function: they push even our fiction to reflect consensual realities rather than idiosyncratic conceits. While evolutionary psychology reminds us that human nature has been around for a hundred thousand years, it should never pretend that serious inquiry into human nature only began with Darwin.