

Review of Agustín Fuentes' "The Creative Spark: How Imagination Made Humans Exceptional"

By Kevin N Laland

In *The Creative Spark*, Agustín Fuentes, a biological anthropologist at the University of Notre Dame, sets out to achieve "a far more nuanced, complete, and judicious account of our evolution than has previously been possible" (p5). Recognizing that he has written a popular science book rather than a textbook, and that this field has a history of monographs replete with dubious storytelling and sensationalism, Fuentes' objectives are entirely laudable. *The Creative Spark* synthesizes recent findings from biological anthropology, archaeology, paleontology and evolutionary biology into a rich and accessible treatise that overturns several long-held myths about the human condition.

There is indeed a judicious balance to Fuentes' writing. He provides a sketch of the latest thinking in human evolution, and does so with authority and balance. Too many books in this genre either trumpet human achievements at the unfair expense of other species or otherwise "big up" other animals, such as chimpanzees, to exaggerate the extent of continuity in intellectual abilities with humans. Fuentes falls into neither of these traps, and yet manages to achieve a readable text, solidly grounded in scientific data. As well as an excellent introduction for the uninitiated, *The Creative Spark* is likely to prove a useful teaching aid for students of human evolution and specialists in other fields. One of its many admirable qualities are a series of exceptionally clear and useful figures depicting the geographical locations of hominin fossil finds and dispersal events, the sites of animal and plant domestication, and time lines for the major events in human evolution and of key innovations.

However, this is more than a book about human evolution – *The Creative Spark* also presents an explanation for our species' uniqueness. According to Fuentes, the power of imagination, more than any other human attribute, is the secret of our success. Today's arts, science and religion all derive from the same creative facility that empowered our ancestors' hunting and gathering millions of years ago. They are manifestations of

humanity's hypertrophied imagination, as are human language, cooperation, and technological achievements.

In this respect, at least ostensibly, Fuentes' monograph is the latest representative of a now rather crowded genre of popular-science books that attribute our species' distinctiveness to a particular 'magic bullet' – be it our aggression, intelligence, language or cooperative tendencies. Such books deploy the slightly tired formula of explaining how all that is exceptional about our species follows from a single key evolutionary innovation. I generally don't find such treatments particularly compelling, primarily because they tend to pay too little attention to process and as a result often provide a rather superficial explanation. For me, a satisfactory account of our species must explain *how* any putative unique qualities evolved, rather than simply attributing all our achievements to a single character that by chance appeared in our lineage. Rather than a single magic bullet, human uniqueness is the product of complex and mutually reinforcing feedbacks between social, technical and cultural competences (Laland, 2017).

Here I am conscious that I could appear vulnerable to a charge of hypocrisy, having myself also written a monograph – *Darwin's Unfinished Symphony* – that covers much of the same territory, and attributes human successes to our culture. However, that book attempts to provide a plausible mechanism for how the unique qualities of human culture evolved out the something like the social learning and tradition observed in other species, and to document empirical and theoretical findings consistent with that process. Whether it succeeds is for others (including Fuentes, this volume) to judge, but it at least attempts to provide an explanation outlining the processes that led to the human condition.

Prima facie, the central thesis of *The Creative Spark* — that creativity alone is responsible for human success — is open to question, since it appears to package itself as a magic bullet account. In reality, that packaging is misleading and I think undersells Fuentes' argument. His message is actually far richer and more sophisticated than it might appear from the headline claims. Indeed, I suspect that there are few, if any, substantial differences in how Fuentes and I understand the causes of human uniqueness: we have simply chosen to describe them differently.

At the outset, Fuentes' asserts (p2) that "Countless individuals' ability to think creatively is what led us to succeed as a species", and that "We are, first and foremost, the species singularly distinguished and shaped by creativity". However, he characterizes

creativity broadly, such that “a social tradition is a shared bit of creativity” and that “successful collaboration is inseparable from imagination”. He goes on to describe a gene-culture coevolutionary feedback process arising from our ancestors’ cultural activities, including stone tool manufacture: “The behavior and collaboration involved in making tools actually changed the way our ancestors used their brains and resulted in changes in the way their (and our) brains work” (p60). This leaves Fuentes’ stance broadly in line with a cluster of “cultural intelligence” accounts of human evolution, including the arguments of Robert Boyd and Peter Richerson (1985; Richerson & Boyd 2006; Boyd, 2018), Joseph Henrich (2016), and myself (Laland, 2017). Recognition that a deeper, process-based perspective lies at the heart of Fuentes’ argument to my mind greatly strengthens it, even if it might be thought to undermine *The Creative Sparks’* originality.

I detect an emerging consensus in the field that our species’ remarkable successes derive from a potent mix of innovation and copying. That cocktail is sufficiently generative and accurate to support the cumulative cultural process that underlies human technological advances, feeds back to act as a major source of selection on human bodies and minds, and underpins the large-scale cooperation that characterizes human societies. Boyd, Richerson, Henrich and I have tended to emphasize the social learning (or “copying”) component, whilst Fuentes dwells on the creative (“innovation”) element, but really these are two sides of the same coin. There is strong evidence from comparative phylogenetic analyses that social learning and innovative capabilities have coevolved very tightly amongst primate species (Reader & Laland, 2002; Reader et al., 2011; Navarette et al., 2016), which lends theoretical support to the assertion that they go together.

Whilst the formal theory that supports cultural evolution research (Cavalli-Sforza & Feldman, 1981; Boyd & Richerson, 1985) has probably tended to encourage the treatment of innovation as a process analogous to mutation in which individual organisms generate novel cultural variants, it is widely recognized that this fails to capture the social aspects of innovation. Fuentes is correct to emphasize that much human creativity, including the evolution of complex institutions such as science and religion, and technological progress, result from creative refinement or recombination of socially transmitted knowledge. Cumulative culture, comprising repeated bouts of copying and innovation, is what lends humanity its creative spark, whilst the creativity that fuels that iterative refinement itself evolved through a process imbued with selective feedback

Fuentes is at his best when using his knowledge of primatology and paleoanthropology to overturn common misconceptions about war and aggression, race, gender differences, and human nature. My favorite chapter in *The Creative Spark* is entitled *Creating War (and Peace)*. A popular and longstanding evolutionary story is that human violence and war derive from an inherent aggressive tendency adaptive amongst our primate or hominin ancestors. According to this view, aggressive behavior abounds in human societies today because it increased our forebears' biological fitness. This argument has been championed by some very prominent biologists and evolutionary psychologists for nearly a century, including Raymond Dart, Konrad Lorenz, Richard Wrangham and Steven Pinker. Fuentes calmly evaluates the claims, and shows that the data do not corroborate them.

There is no clear pattern in primates that supports the hypothesis of a shared evolutionary basis for human violence. Severe aggression that results in injury or death is actually quite rare in most primates. Common chimpanzees can certainly be really aggressive, with males using threats to try to coerce females, and infanticide sometimes occurring. There can also be violence between chimpanzee groups patrolling their borders. However, there is quite a lot of variation in aggressiveness and sexual coercion between *Pan troglodytes* populations. Moreover, bonobos (who are equally closely related to humans as common chimpanzees) do not engage in border patrols, lethal intercommunity violence, or infanticide, and females are dominant to males in many circumstances. This means that there would be no less justification for the argument that our primate ancestry predisposes humans to peaceful coexistence than to severe violence.

Considering paleoanthropological and archaeological data, Fuentes details how "98 percent of all the sites for which we have hard fossil evidence over nearly 2 million years of human life up until 10,000 years ago show no signs of traumatic violence" (p149). The clear evidence for hominin hunting during this period undermines any suggestion that "man the hunter" triggered "man the warmonger". There is no compelling evidence for warfare or even mass killings prior to 14000 years ago, with the earliest evidence at Jebel Sahaba in northern Sudan where 59 bodies were uncovered, 24 of which experienced human-inflicted violence. Rates of violent death increase in the period from 14,000 to 7,500 years ago and again at 7,500 to 5,000 years ago. Even the data from contemporary small-scale societies, such as the Yanomamo of the Venezuela and Waorani of Ecuador, which are famed for their

aggression, have now been reanalysed to show that aggressive males do not acquire more wives and children (i.e. contrary to earlier suggestions, they do not achieve greater biological fitness). Fuentes concludes that any explanation for our current patterns of organized and lethal violence needs to focus not on the deep past but more recent times. The data strongly suggest that the rise of coordinated lethal violence and warfare coincided with the emergence of complex agricultural societies, food storage, ownership and societal stratification and inequality, as well as the institutionalization of differences within and between communities: “Surpluses of food and other goods, trade relationships, strong community identities, larger and denser communities, and social hierarchies within and between communities all added fuel, and options, to the motives and possibilities for serious conflict” (p161).

Fuentes also gently dismantles the story of ancient “he-man hunter-provider” and “delicate female nurturer” sex roles. Following a review of the fossil and archaeological data Fuentes is able to find no evidence of gendered hunting (or toolmaking) differences until relatively recent times. Again, it is with the advent of agriculture, and associated increase in birth rates and division of labour, that sex roles become much more pronounced. Myth busting is one of *The Creative Spark's* most admirable qualities. Agustin Fuentes is the Jamie Hyneman (or Adam Savage) of biological anthropology, and his scientifically grounded deconstruction of suspect evolutionary stories provides an important service to the community.

Part of what makes Fuentes' book successful is the progressive evolutionary framework on which he draws. *The Creative Spark* begins with a “trumpeting” of a new evolutionary synthesis that recognizes important evolutionary roles for extra-genetic inheritance (most obviously, the transmission of cultural knowledge) and niche construction, whereby our ancestors themselves created and reshaped their environments, and the natural selection that ensues. It will come as no surprise that I view these refinements as making for a richer and more compelling account of human evolution, as they draw on my work (Laland et al., 2015); however it is becoming increasingly clear that many human scientists share this perspective. Fuentes describes how our ancestors' toolmaking imposed selection on the human brain, how their culturally learned diets favored gene variants expressed in requisite digestive enzymes, how domestication generated selection for genetic variants of rice with grains that do not readily fall off, and

how they created the deeply symbolic and meaning-laden world that spawns both artistic flights and religious foundations.

Fuentes' view of humans as active agents that set their own and other species' evolutionary agenda (albeit often inadvertently), will resonate with those of us tired of evolutionary portrayals of humans as "lumbering robots" pushed around by their naturally selected genes. Humans unquestionably possess an ability to act on their world and to modify their experience of it, including in ways that are neither predetermined nor random. More generally, it is high time to recognize the fact that organisms are self-building, self-regulating, highly integrated, and "purposive" wholes, that through entirely natural processes exert a distinctive influence and a degree of control over their own activities, outputs, and local environments, and thereby codirect natural selection. These properties must be possessed by *all* organisms in order for them to be alive (Schrodinger, 1944), but they are perhaps more manifestly self-apparent for humans than other species. We are not merely vessels through which the causal explanatory power of natural selection flows; we are active agents that transduce and filter genetic inputs that derive from prior selection, and thereby impose direction on subsequent evolutionary events (Lewontin, 2000).

There is so much to admire in Fuentes' monograph that it seems churlish to pick up on its peccadillos, however I take it as my job as reviewer to do so. A couple of issues come to mind. While in general his claims are well backed up by scientific findings, there were a few places where the text averred to hominins a creativity that I worried might actually belong to Fuentes. For instance, having described how our ancestors transported honey on large leaves, Fuentes goes on to acknowledge: "we have no direct evidence that they did this". Likewise, the assertions that early Homo were "power scavengers" that drove predators away from their kills by shouting, waving sticks and throwing stones, or that later spear-throwing hominins were intuitive scientists that engaged in experimentation and understood projectile physics, come across as rather speculative. At best, these are plausible hypotheses. I suspect that these suppositions were included in an attempt to make the book fun to read and/or accessible to a general audience, and fortunately unsupported speculation of this nature is rare.

More of an issue for me was the slightly moralizing, even life-affirming, tone of the final chapter, in which Fuentes draws on his knowledge of human evolution to tell us how we should lead our lives, and how greater creative expression will enrich us. No doubt

Fuentes gives good advice, and I found nothing particularly sinister about any of his pronouncements, but this chapter nonetheless left me feeling ill at ease. There is a difference between scientist and agony aunt. This material felt like Fuentes had strayed beyond the scientific evidence to express his own politics and personal opinions. I don't like big-box stores and shopping malls any more than Fuentes, but can we really be sure that their uniformity is "dampening our creative capacities"? Does a knowledge of paleoanthropology really teach us that we should "create equitable access to food and water in our local communities"? Irrespective of what parenting styles were manifest in the stone age, can we legitimately treat the postulate that "parenting is not a solo (or female-only) activity" to be "implicit advice from our ancestors"? And whether or not one agrees with Fuentes that: "If one is not religious, one shouldn't knock religious individuals because they have a particular faith", I can't see that this moral stance follows from knowledge of human evolution. In truth, I am skeptical as to whether "our evolutionary story can act as a guide" to how to maximize happiness or creativity in the present. The comparison is slightly unfair, but the final chapter stirred up uneasy distant memories of Edward Wilson's human sociobiological writings (*On Human Nature*, 1978), and the fact that Fuentes' 'evolutionarily informed' messages are progressive, politically correct, and broadly in line with my own views did not take away that discomfort. Happily, Fuentes redeems himself in the final pages by encouraging his readers not to passively accept what they are told, including by him, but rather to "do some science" and check out the evidence for themselves (referring readers to some helpful endnotes).

Quibbles aside, *The Creative Spark* is a compelling book, providing an up-to-date overview of the latest thinking on human evolution and a valuable corrective to age-old myths about 'human nature'. I whole-heartedly recommend it.

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