

01. Dario Maestriperi, Andrea Henry, & Nora Nickels
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03. Just My Imagination: beauty premium and the evolved mental model
04. Ryo Oda
05. Graduate School of Engineering, Nagoya Institute of Technology
06. Gokiso-cho, Showa-ku, Nagoya 466-8555, Japan
07. +81-52-735-5112
08. oda.ryo@nitech.ac.jp
09. <https://sites.google.com/site/ethologyodakeneng/>
- 10.

Abstract: Imagination, an important feature of the human mind, may be at the root of the beauty premium. The evolved human capacity for simulating the real world, developed as an adaptation to a complex social environment, may offer the key to understanding this and many other aspects of human behavior.

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Japan has a large-scale idol industry in which teenage girls with no significant talent are supported by their fans solely on the basis of their cute appearance. Some men purchase multiple copies of the same CD solely for the opportunity to shake hands and briefly chat with their idols at promotional events. This 'Idol Otaku' represents the emergence of an extreme version of the phenomenon referred to in the target article, and may be based on similar psychological mechanisms.

I agree with the argument that the beauty premium is based on attitudes related to seeking potential mates. The authors contrast a model in evolutionary psychology with ones rooted in behavioral economics and social psychology. However, the 'models' proposed by behavioral economics or social psychology are simply proximate factors that were identified by Tinbergen in his famous introduction to ethology (Tinbergen, 1963). In contrast, evolutionary psychology is concerned with ultimate factors underlying human behavior, and generates models of causal mechanisms through the use of reverse engineering (Pinker, 1997). That is, the differences among these academic fields amount to differences with respect to the time scales of the critical questions. Ideally, the authors should review the issue at hand within the framework of Tinbergen's four questions rather than by

contrasting models across these academic disciplines.

Although an explanation of the beauty premium through sexual selection is plausible, additional factors should be considered. Indeed, as the authors have described in their discussion of error management theory, favoring beauty is most advantageous when the cost of doing so is sufficiently low. The phenomenon of Idol Otaku in Japan, however, suggests that the beauty premium is not supported by such a simple mechanism. People are sometimes willing to pay a considerable cost for attractiveness without receiving any tangible reward for doing so, as in the case of the Otaku who spend large sums of money on young girls with whom they could never have a close relationship. I believe that imagination, which is an important characteristic of the human species, is related to this phenomenon. The beauty premium may have emerged due to an optimistic delusion that allows a person to believe that he may be able to have a close relationship with a particular attractive person even if this is impossible in the real world. This kind of imaginative activity may have developed as an adaptation in human evolutionary history.

Geary (2005) insists that human intelligence is characterized by the construction of a mental model of the outer world, a capacity that may have evolved as an adaptation to a complex social environment. Human general intelligence has evolved as a means of controlling resources required for survival and reproduction. Humans acquired the ability to control ecological variables such as food or predators through the use of tools and various other methods. As a result, the social environment in which people competed or cooperated with each other for resources, obtained through the exertion of such control, gave rise to important selective pressures. In this environment, those whose behavior was difficult to predict held an advantage over others; hence, simulations of the real world in a virtual world within one's own brain became important. Geary (2005) refers to such internal models as 'autonoetic mental models'. People generate mental models representing the outer world and the involvement of a present, past or future self. "These are perfect worlds in which the individual is able to control other people, events, and access to material resources and to do so in ways that would have enhanced survival or reproductive outcomes during human evolution" (pp. 235, Geary, 2005). This idea corresponds to the 'Popperian Creature' proposed by Dennett (1995) as a model of the evolved mind. Popperian creatures can preselect behaviors from among a variety of possible options, eliminating the truly stupid ones in their inner virtual world before taking the risk of applying them in the harsh external environment. Compared to the 'Skinnerian Creature', which can learn only by testing actions in the external environment, such that successful actions are reinforced and therefore tend to be repeated, the Popperian Creature is more sophisticated and efficient (Dennett, 1995). This ability to simulate the external world in an inner model may be one reason why the human species has evolved such a large and complex brain despite its significant costs (Aiello & Wheeler, 1995). Excessive simulation, however, may occasionally lead to delusion. One such example is religion. Humans exhibit cognitive characteristics such as those described by theory of mind (Premack & Woodruff, 1978) and patternicity (Shermer, 2011), which have allowed us to adapt to various ecological and social environments throughout human evolutionary history. These traits lead us to imagine entities that do not really exist and to attribute agency to them (Bering, 2010). Such a simulation underlies the

belief in a god or multiple gods. In some cases, religions require their followers to pay extreme costs, ranging from donations to suicide bombing. Religion does, however, serve the function of strengthening the cohesiveness of a group and facilitating the process of group selection, which may explain the existence of religion despite its unscientific nature and irrationality. Delusion has positive as well as negative consequences.

The ability to create a mental world that simulates actions in the external environment has an impact on many social and cultural phenomena. For example, altruism toward non-kin from whom they do not expect future help is an important behavior that is characteristic of human beings; such altruism is based on indirect reciprocity (Nowak & Sigmund, 2005). Altruistic behavior toward strangers can then be interpreted as a kind of investment because a reward for the behavior is not guaranteed. Our societies, however, are sustained by this highly developed indirect reciprocity. Optimistic misinterpretations and imagination regarding the behavior of other people are needed to make such investments possible (e.g., Oda et al., 2011). The target article should, therefore, address future challenges and shed light on human behavior by appealing to the power of imagination.

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