



Editorial

Evolutionary, neurobiological, gene-based solution of the ideological ‘puzzle’ of human altruism and cooperation

Summary Despite hundreds of published articles about humankind’s eusocial behaviours, most scholars still regard the origin of human altruism and cooperation as an enduring puzzle, because it seems incompatible with two central tenets of evolution, namely, the competition between individuals and the consequent selective advantages of selfish traits. This ‘puzzle’, however, rather than being due to insurmountable scientific difficulties, is to be attributed to two powerful ideologies, which are politically opposite, but nevertheless concurred to prevent scholars from solving it. One ideology rejects the concept of genetic determinism, whereas the other dislikes the concept of group selection. As a consequence, these widespread ideologies, which are common in the scientific community, too, kept scholars from realising that the puzzle of human altruism and cooperation can only be solved by proposing a theoretical model that is based precisely on both genetic determinism and group selection. This model, which was never advanced in published papers, is presented here. This article also proposes to regard ancestral environments as determinants of human eusociality. By contrast, virtually all previous articles about it leave primitive habitats unmentioned. To support the hypothesis that human unselfish behaviours represent genetically conserved traits that evolved ancestrally, not products of cultural transmission, this paper also discusses six groups of arguments in the section ‘Genes versus culture’. Finally, this article advances a purely genetic evolutionary explanation for the uniqueness of human eusociality, thereby challenging prevailing cultural explanations for the incomparably developed levels of cooperation in humankind, which are observed in no other social species.

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Introduction

It has lately been reiterated that ‘‘One of the enduring puzzles in biology and the social sciences is the origin and persistence of intraspecific cooperation and altruism in humans and other species’’ [1]. The term ‘‘puzzle’’, which was also adopted with reference to human sociality [2], has especially been used by many scholars to define cooperation [3–6]. The puzzle of such unselfish behaviours as altruism and cooperation would consist in the fact that evolution is based on a ‘‘fierce competition between individuals’’ [7] and, therefore, natural selection should reward only selfish behaviours. To solve that puzzle, many scholars proposed ‘‘Hundreds of theoretical models’’ [1]. Although the process of coding some of them has been defined ‘‘tedious and error-prone’’ [8], many

authors tried to assess whether the origin of human altruism and cooperation could be accounted for by different models focusing on supposedly explicative mechanisms, including individual selection [9], kin selection [10], mutual benefit [11], direct reciprocity [12], indirect reciprocity [13], generalised reciprocity [14], inclusive fitness [15], friendship [16], reputation [17], generational overlap [18], information and group structure [19], imitation [20], altruistic punishment [21], and cultural transmission [22,23]. All of these models and others, however, fail to offer a persuasive solution of what has also been defined ‘‘an enduring conundrum in evolutionary biology’’ [24]. Indeed, the puzzle of human altruism and cooperation continues to be ‘‘enduring’’ [1]. This puzzle can be solved by the new model presented here. It proposes that human eusocial behaviours are genetically

determined and reflect group selection. These connotations may explain why no one advanced this model before, probably for ideological reasons.

Two opposite ideologies

Two powerful ideologies, despite being politically opposite, have presumably concurred to dissuade most scholars from exploring the hypothesis that human altruism and cooperation are determined genetically and produced by group selection. Indeed, one ideology, which has been described as the “left-liberal Marxist dogma of environmental determinism” [25] rejects any form of genetic determinism, and especially the neurogenetic one [26], which argues that there is “a directly causal relationship between gene and behaviour” [27]. The other ideology dislikes the concept of group selection. As Celeste M. Condit (Distinguished Research Professor, University of Georgia) argued most appropriately, “I believe that there is good reason to believe that humans have been subject to group selection. However, the geneticists I have spoken with in the US seem mostly unwilling to accept the concept. I believe that this is a hold-over of US ideologies, which have been strongly individualist and anti-collectivist” (Condit C.M., personal communication, 2007).

The first ideology, which has also been defined “ideologically based dogma” hindering research [28], explains why “in some quarters there is a knee-jerk rejection to anything that smacks of a ‘biological explanation’ of human behaviour” [29]. The second ideology explains why the hypothesis of group selection “fell victim to a seemingly devastating critique in 1960s evolutionary biology” [30, p. 185]. As the sentence against Galileo exemplifies, however, the progress of science may well be hindered by dogmatic obstacles, but scientific truths, sooner or later, come eventually to light. Indeed, the ideological rejection of neurogenetic determinism is scientifically unjustifiable now, in view of the growing scientific evidence that genes do dictate human behaviour [31–36]. Likewise, the ideological dismissal of group selection is no longer tenable, because this concept re-emerged as an important component of a multilevel theory of evolution [37]. This scientific truth has recently been confirmed by two authors, who wrote that “group selection is an important organizing principle that permeates evolutionary processes from the emergence of the first cells to eusociality and the economics of nations” [38].

Considering that both ideologies outlined above have clearly been weakened by recent scientific

evidence, it is time to investigate the hypothesis that human eusociality reflects purely genetic conserved traits that evolved by group selection. Such an unexplored hypothesis deserves particular attention especially because, in animals, “eusociality cannot arise without the driving force of group selection” [39]. Moreover, it is worth recalling that Darwin himself wrote as follows: “social qualities, the paramount importance of which to the lower animals is disputed by no one, were no doubt acquired by the progenitors of man in a similar manner, namely, through natural selection, aided by inherited habit. . . . A tribe including many members who. . . were always ready to aid one another, and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection” [40, p. 129,132].

99.5% versus 0.5%

The enduring puzzle of human altruism and cooperation, besides being largely attributable to ideological factors, is also a consequence of a scientific misconception, which compromises most of the existing models proposed to solve that conundrum. Indeed, they generally aim at explaining the origin of human unselfish behaviours between unrelated individuals living in great societies. However, considering that our species began to live in great communities only in the last 0.5% of its existence [41], after the advent of agriculture [42], it is more logical to assume that the unselfish behaviours of modern humans reflect genetically conserved traits that were selected during the first 99.5% of humankind’s evolution, when our hunter–gatherer ancestors lived in small groups consisting of a few tens of members [41]. If we adopt this gene-based evolutionary model, the origin of human altruism and cooperation emerges to be an obviousness, not a puzzle.

Should a damaged airplane transporting a small group of evolutionary scientists be forced to land in the most savage and remotest part of the Amazonian forest, which represents an environment very similar to the one inhabited by our prehistoric ancestors, those scholars will not need mathematical models to determine the best strategy for optimising their chances of survival in such a savage and hostile environment. Indeed, they will intuitively realise that:

- (1) The cohesion of the group is vital, because isolated individuals are more likely to be killed by predators.

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