SHORT REVIEW

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Why do we love pandas and hate cockroaches?

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ABSTRACT

This short review explores the intricate interplay between human emotions towards different animal species. It delves into the contrasting feelings we harbor towards appealing animals like pandas and our aversion towards others like cockroaches. This study uncovers how biophilia and biophobia, deeply rooted in our evolutionary past, shape our reactions to various species. We also examined the role of the Behavioral Immune System (BIS) in aversion to pathogen-carrying arthropods, the impact of educational interventions on changing attitudes toward wildlife, and the influence of animation on human memory and attention. We emphasize the significance of understanding these psychological mechanisms in conservation strategies. We highlight how the evolutionary naturalist mind, influenced by ancestral threats and contemporary challenges, is pivotal to fostering a more harmonious coexistence with nature.

Keywords: Biophilia; Biophobia; Evolutionary Ethnobiology; Human-Animal Relations; Plant blindness.

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SIGNIFICANCE STATEMENT

This short review illuminates the intrinsic connection between human emotions and evolutionary history, particularly regarding our interactions with the animal world. Unraveling the deep-seated reasons behind our affinity for certain species and aversion to others provides vital insights for designing effective conservation strategies. Understanding these evolutionary psychological mechanisms is not just important; it is crucial in fostering positive attitudes towards wildlife, which is paramount for biodiversity conservation.

INTRODUCTION

Human fascination with some animals, such as pandas, and intense aversion to others, such as cockroaches, is an intriguing aspect of our psychology. This duality of emotions encouraged us to explore the complexity of the relationships between human beings and different life forms throughout our evolutionary history. This intricate web of emotions is rooted in our ancestral dependence on other life forms, a fundamental link from the earliest hominids to the present (Serpell 2003; Gittins 2013).

Wilson (1986) introduced the concept of biophilia to explain our innate affection for life, a predisposition we carry with us. However, this relationship is heterogeneous and multifaceted and is shaped by social, cultural, ontogenetic, and environmental influences (Alves and Barboza 2018; Manning and Serpell 2002). These influences, in turn, are intertwined with the selective pressures we face throughout our evolution.

Although biophilia may explain our affinity for pandas, aversion to cockroaches requires a more specific approach. Evolutionary ethnobiology is a discipline that seeks to understand the ecological, evolutionary, and psychological relationships with the natural world (Albuquerque and Ferreira Júnior 2017; Ferreira Júnior et al. 2022). Focusing on the evolutionary approach and embracing approaches from evolutionary psychology and cultural evolution theory, this discipline is fundamental to deciphering why certain animals awaken extreme emotions.

Thus, this text aims to present the profound evolutionary and psychological foundations that underlie human relationships with different animal species using the enlightening perspective of evolutionary ethnobiology. This short review analyzes the dynamics of biophilia and biophobia, emphasizing how these predispositions influence the human perception of biodiversity, conservation, and environmental education strategies.

Other (non-human) animals in our evolutionary history

In addition to the subsistence aspect of our interactions with wildlife, fear has been an influential structuring factor in human relationships with animals (Janovcová et al. 2019). Investigating how the human mind responds to the presence of snakes (Ophidia) reveals the interplay between external and evolutionary factors in shaping our cognition. As demonstrated by Frynta et al. (2023), human ancestors frequently encountered these reptiles in their natural habitats, a fact corroborated by ethnographic research (Headland and Greene 2011) and studies with other primates (McGrew 2015). This regular exposure imposed significant evolutionary pressure, leading to aversion and the development of special abilities to detect such animals (Isbell 2006; Öhman et al. 2001). Snakes represent a classic example of ancestral fear of predatory reptiles, highlighting a fundamental aspect of mammalian evolution (Öhman and Mineka 2003).

However, research involving children indicates that they tend not to show an initial fear of snakes but rather more fascination towards them than fear. LoBue et al. (2013) found that children between 9 months and three years could quickly associate snakes with harmful elements, such as scary voices and threatening facial expressions, but did not display fear or stress when faced with them. In experiments in which children were placed in front of live snakes, they also did not show fear reactions, reinforcing that fear of snakes may not be an early instinctive response.

Although there is an apparent contradiction between children's initial fascination with snakes and the fear response common in adults, studies indicate that both groups have a perceptual predisposition to notice the presence of these reptiles. Children and adults can quickly identify features that suggest the presence of snakes, such as curled shapes or attacking positions, more quickly than other elements of nature (LoBue et al. 2010; LoBue and DeLoache 2008), such as flowers and mushrooms (LoBue and Adolph 2019; Masataka et al. 2010), even leading to the misidentification of other animals with serpentiform characteristics (Lima-Santos et al. 2020). In addition, there is an intense neural response to these animals (Bertels et al. 2020).

This detection mechanism, however, may have developed not only because of the threat snakes posed to survival but also because these animals acted as prey and ecological competitors for hunter-gatherer hominids and other primates (Falótico et al. 2018; Headland and Greene 2011). Therefore, the negative perceptions of these reptiles emerge from several influences throughout development, including negative experiences and cultural factors. The innate ability to detect and distinguish these animals in the environment is a crucial aspect of our cognition.

Aversion to certain other animals, especially notable in our behavior toward arthropods and pathogen vectors, has its roots in evolutionary defense mechanisms. This phenomenon is deeply linked to the Behavioral Immune System (BIS), an adaptive psychological response developed throughout human evolution to identify signs of contamination by pathogens, leading to evasive behaviors (Schaller and Park 2011). During evolution, interactions with such arthropods were expected, whether while collecting plants, having contact with animals, wearing clothing, or during the development of agriculture (Barnes 2005; Perry 2014). Nowadays, intense urbanization has increased the frequency of these meetings, as Neiderud (2015) observed. This increase in interactions with insects in urban environments, in contrast to less exposure to them in natural environments, has intensified entomophobia in modern populations (Fukano and Soga 2021, 2023). This adverse history of insects may be the key to understanding why the disgust reaction elicited by these animals is similar to the reaction elicited by the direct presence of pathogens (Curtis and Biran 2001; Lorenz et al. 2014).

However, how might this aversion, like entomophobia, affect modern behavior? Gish et al. (2024) examined the relationship between insect aversion and home insecticide usage. Although many participants expressed intense disgust for common household insects, such as cockroaches and mosquitoes, this aversion moderately influenced insecticide use. The study also highlighted a critical methodological limitation in the standard methods used to measure disgust in biophobia research, resulting in data with low variance that complicates the analysis. The authors propose alternative methods, including psychophysiological assessments and body motion capture technologies, to investigate the nuances of extreme insect aversion and its impact on human behavior.

Aversion is also related to how the animals are phylogenetically close to our species (Prokop et al. 2021). The tendency to find vertebrate animal cuters, especially those with bipedal characteristics, could be linked to the ancestral need to protect creatures that could be allies in the fight for survival, or even due to the degree of similarity. Simultaneously, aversion to animals that are phylogenetically distant from our species may be a manifestation of an evolutionary mechanism that alerts us to possible unknown threats. This complex interplay between emotions and evolutionary history highlights the importance of considering these aspects when developing conservation strategies.

Although we can identify these biophilic or biophobic components installed in our mind, context, culture, and education can also modulate emotional and behavioral reactions. Prokop and Fančovičová (2024) explored the impact of the positive presentation of wolves on students' explicit and implicit attitudes. Using a sample of Slovak schoolchildren aged 9 to 15, the researchers divided the participants into an experimental group, which received positive information about wolves and their ecological importance, and a control group, which was exposed to more harmful and traditional views of wolves. The results indicated that the experimental group demonstrated a significant shift toward more positive attitudes toward wolves, explicitly (self-report) and implicitly (through drawings of wolves), compared to the control group. This study highlights the importance of educational interventions that promote a positive understanding of wolves to foster more favorable attitudes toward their conservation.

The Human Naturalistic Mind

Everything we discussed previously is related to the naturalistic human mind, one of the primary theoretical constructs of Evolutionary Ethnobiology (Albuquerque and Ferreira Júnior 2017). The naturalistic human mind, an adaptive construct that developed throughout the evolution of hominid lineage, emerges as an essential piece of this puzzle. This mind is not just an adaptive response; it incorporates complex cognitive elements such as memory, learning, and cultural transmission. Furthermore, it reflects our emotional responses to nature, influenced by ancestral selective pressures and contemporary challenges (Moura et al. 2018).

The idea of a naturalistic mind is a recent addition to the scientific scene. It was introduced in 2017 and is still in the construction and development stages (Albuquerque and Ferreira Júnior 2017). As in any discipline, assimilating a new term involves debate and criticism. The human naturalistic mind is a construct that reflects our evolutionary history and the selective pressures that have shaped our instincts and emotions toward nature. Throughout the evolutionary process, we developed distinct emotional responses to different elements of the natural world influenced by factors such as ancestral threats and cognitive predispositions (Moura et al. 2023; Silva et al. 2019, 2022, 2023). These responses are fundamental to the survival and reproduction of ancestors in diverse environments.

How does our naturalistic mind operate? Albuquerque et al. (2020) argued that the naturalistic mind emerges because of the various selective pressures faced throughout the evolutionary pathway of hominids. This evolution has led to psychological mechanisms adapted to respond to various environmental challenges beyond a specific environment, such as the Pleistocene savannas. Memory, a crucial element of the naturalistic mind, prioritizes information with adaptive relevance and classifies it hierarchically. This implies that information vital for survival in ancestral environments can be emphasized compared to other adaptive data, without prioritizing ancestral threats over contemporary ones.

Furthermore, a naturalistic mind sculpted by evolution can occasionally result in adaptive mismatches in our species. However, cultural responses manifest more quickly than evolutionary ones and can influence and even change these possible adaptive delays. Mental reactions triggered in the ancestral environment can be adjusted according to an individual's previous experiences with a phenomenon. Furthermore, the regularity with which a phenomenon occurs affects the cognitive processes linked to the naturalistic mind (see Soldati et al. 2024). Less frequent or rare phenomena are only considered if previous experience reinforces them (Ferreira Júnior et al. 2019).

Evidence of a Biased Mind and Animacy

The human inclination to pay more attention to moving elements, known as "animacy", has deep roots in our evolution. The historical relevance of identifying threats to motion during the ancestral past justifies this bias. Thus, this natural inclination can explain the lack of interest in botany and the preference for zoology.

The human mind is biased to focus better on objects that move, especially those that move towards us (Neuhoff 2018; Rossini 2014), with the approach of elements perceived as threatening (snakes and spiders) perceived as faster in comparison with elements that do not represent a direct threat (butterflies and rabbits) (Vagnoni et al. 2012). This is an ancient heritage, as these moving elements often represent challenges, including potential predators or prey.

Komar et al. (2024) addressed the effect of animacy on memory, exploring the hypothesis that richness in information encoding could influence the ability to remember words related to living beings compared to inanimate objects. The research involved a series of four experiments that varied the richness of coding through different techniques, such as generating multiple ideas and assessing the relevance of words to survival goals. Contrary to expectations, the results showed that, although words related to animate beings were consistently remembered more than inanimate ones, manipulating encoding richness did not alter the animacy effect. This finding challenges the notion that encoding richness is a mechanism underlying the animacy effect, suggesting the need to investigate other cognitive factors to explain the robust human memory phenomenon.

Félix et al. (2023) presented a detailed investigation into how animacy influences prospective memory, which is responsible for planning and carrying out future actions. The study consisted of three distinct parts, starting with a sample of American participants and replicating the findings using a Portuguese sample. A third study expanded the scope to include a broader sample of English speakers by applying a new experimental procedure. Consistent across studies, it was found that animate targets (living things) were more effectively remembered than inanimate ones in prospective memory tasks. These results are significant because they suggest that the animacy advantage previously observed in retrospective memory also applies to prospective memory. This finding reinforces the adaptive theory of memory, emphasizing the importance of animacy as a critical element in memory research, especially prospective memory, which plays a vital role in functionality and independence in daily life.

These findings shed light on a series of studies typically labeled "botanical blindness". This phenomenon manifests itself in the preference for animals over plants, primarily explained by the evolutionary predisposition to focus on moving elements, such as animals. Therefore, the basis of the phenomenon itself would not be the lack of school incentives to study plants or even the loss of interest in plants among different generations. For example, in the study by de Blue et al. (2023), plant blindness, defined as the inability to notice plants, was examined from the perspective of its influence on the loss of generational knowledge and cultural identity. The study found that while participants more accurately identified plants from forests and humid areas, they needed to help identify plants from Prairies. The ability to identify plants decreased among younger people. The authors highlight that the loss of knowledge about traditional plants, an integral part of cultural and medicinal practices, represents a significant loss of cultural identity for the group studied. Finally, they emphasize the importance of educational strategies that integrate traditional and scientific ecological knowledge to combat plant blindness, especially among the younger generations.

Guerra et al. (2024) suggested that the phenomenon of 'plant blindness' can be attributed to several key factors. First, plants' lack of visible movement makes them less perceptible to the human eye than animals. Second, studies have demonstrated attentional differences, with individuals showing a more remarkable ability to detect animals than plants, suggesting a bias towards animals. Third, educational curricula and materials often prioritize animals over plants, resulting in students and the public needing more knowledge of and interest in plants. In addition, cultural perceptions that view plants as inferior to animals may exacerbate plant blindness, reflecting a misguided anthropocentric perspective. Furthermore, research indicates that animals are more strongly encoded in memory than plants, providing animals with a memory advantage. Lastly, plants' perceived slow lifecycles and behaviors may fail to capture human attention like animals do, thereby contributing to "plant blindness".

These findings underscore the complexity of the "plant blindness" phenomenon and how various factors may intertwine in shaping the human naturalistic mindset. This multifaceted nature highlights the intricate construction of the naturalistic human mind, wherein different elements interact to influence the extent of attention and recognition accorded to plants versus animals.

Final considerations

When considering conservation and educational strategies, paying attention to the psychological mechanisms underlying human cognition is vital. Understanding the naturalistic mind and evolutionary biases that shape our emotions toward nature is essential for developing practical approaches while alleviating pathological fears and aversions. Ultimately, the naturalistic mind is a powerful and flexible tool shaped by evolution but influenced by the current context. Integrating this understanding into conservation strategies respects our evolutionary history and opens doors to more harmonious coexistence with the natural realm.

DATA AVAILABILITY

The data availability statement does not apply to this study.

CONFLICT OF INTEREST

Dr. Ulysses Albuquerque declares that he serves as Co-Editor-in-Chief for Ethnobiology and Conservation and has removed himself from the peer-review process for this paper.

CONTRIBUTION STATEMENT

Conceived of the presented idea: UPA
Wrote the first draft of the manuscript: UPA
Review and final write of the manuscript: UPA and JVMS

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