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# Not So Much Rational but Rationalizing: Humans Evolved as Coherence-Seeking, Fiction-Making Animals

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The evidence for biased perceptions and judgments in humans coupled with evidence for ecological rationality in nonhuman animals suggest that the claim that humans are the rational animal may be overstated. We instead propose that discussions of human psychology may benefit from viewing ourselves not so much as rational animals but rather as *the* rationalizing animal. The current article provides evidence that rationalization is unique to humans and argues that rationalization processes (e.g., cognitive dissonance reduction, post hoc justification of choices, or confabulation of reasons for moral positions) are aimed at creating the fictions we prefer to believe and maintaining the impression that we are psychologically coherent and rational. Coherence appears to be prioritized at the expense of veridicality, suggesting that distorted perceptions and appraisals can be adaptive for humans—under certain circumstances, we are better off understanding ourselves and reality not so accurately. Rationalization also underlies the various shared beliefs, religions, norms, and ideologies that have enabled humans to organize and coordinate their actions on a grand scale, for better or worse. We conclude with a discussion of the implications of this unique human psychological trait.

*Keywords:* rationalization, evolutionary psychology, adaptation, rationality, cognition

“You could never convince a monkey to give you a banana by promising him limitless bananas after death, in monkey heaven. Only Sapiens can believe such fictions.”

—Yuval Noah Harari, *Sapiens*

Every day, people invent stories. We are sometimes aware of these fictions, such as when students fabricate excuses to justify not doing their homework. Many other times, however, we are not aware, such as when consumers rationalize their preference for products they thought they had chosen but actually did not (Hall et al., 2010) or when eyewitnesses give incorrect evidence derived from false memories (Loftus, 1992). Our made-up stories are certainly not trivial—they have the capacity to influence us because

we are, quite remarkably, inclined to believe them. Why do people come up with reasons and justifications and believe them even if they are untrue? What underlies their origins and potency?

The current article points to our propensity for rationalization—the psychological process by which we formulate, reach, and express a coherent understanding of ourselves and reality, regardless and sometimes despite the actual reality—as a significant yet overlooked feature of human nature. We propose that viewing humans as fiction-making, fiction-believing, rationalizing beings, as opposed to the folk characterization of humans as rational creatures, can elucidate the distinct challenges our ancestors faced that gave rise to the rationalization instinct and foster a better understanding of what makes us truly unique. We do not claim that humans are not rational, but that rationalization is what makes humans special—an approach that follows in the tradition of evolutionary scholars who found studying our most unique traits to be especially illuminating. Henrich and colleagues (1998, 2003, 2006), for example, view intelligence as less impressive than our intergenerational transmission of cultural information, which is certainly very special and arguably promises more insights. To our knowledge, however, no comprehensive examination of human

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rationalization from an evolutionary standpoint exists nor has rationalization been studied as a feature that makes humans special. We argue that adaptive challenges set in motion selective pressures that make us crave coherence and meaning in our observations of reality. Although this coherence motive can bias us away from truth, being factually inaccurate may, in fitness terms, sometimes be less costly than being incoherent.

We note at the outset that this analysis is not the first to claim that humans tend to rationalize (e.g., Jones, 1908) or that rationalization processes are functional (e.g., Cushman, 2019). The present contribution rests in an extension of these ideas through an evolutionary lens centered around the key thesis that humans are *the* rationalizing animal. This novel characterization offers an integrated account of our many psychological biases, the adaptive functions of coherence and rationalization, and the emergence of group-level outcomes from individual-level rationalization. Furthermore, given the difficulty of proving that animals do not rationalize, our article is necessarily boldly speculative on the assertion that only humans rationalize while nonhumans do not. Through this novel view of humans, we hope to engender further discussions in this important yet neglected direction.

### **Are Humans the Rational Animal?**

For sizable portions of humanity's intellectual history, it has been assumed that humans are *the* rational animal—a view that was trumpeted perhaps most notably by Aristotle's claim that "man alone of the animals has reason." Compared with nonhuman animals who seem to act only

through thoughtless instinct, we appear capable of deriving the facts or logical reasons that guide our actions (Manktelow, 2004). Rationality, according to thinkers like Aristotle, is regarded as an essential property of humankind and distinguishes human from beast. Although the celebration of "rational man" has been reinvigorated multiple times throughout history (cf., Macintyre, 1984), particularly with homo economicus as the basis for standard economic orthodoxy, the more tempered offshoot of bounded rationality and humans as "satisficers" (Simon, 1957) marked the beginnings of a growing suspicion toward our legitimacy and eminence as rational animals. We consider two strands of thought that bear critically on this issue. Here, we aim to briefly present each camp's perspective and their limitations rather than to provide a detailed analysis or to adjudicate between them.

### **Consideration 1: Humans Are Not Always Rational**

Following from intellectual traditions since ancient Greece, individuals are regarded as rational when they engage in reason before action. This normative view holds that rational action depends on reasoning based on sound beliefs (derived through rules of logic, probabilistic inferences, facts, etc.) and desires (e.g., goals, preferences) to deduce the optimal action that maximizes desires based on beliefs (Cushman, 2019). Hence, individuals cannot be regarded as rational if their actions fail to accord with their beliefs or desires, or when they act based on nonrational processes such as instincts.

By normative standards of rationality, numerous studies describe humans as behaving rather irrationally or nonrationally. Research has routinely revealed that people's beliefs—the critical foundations upon which people rely for reasoning—can be distorted through natural psychological biases or experimental manipulation (Brehm, 1956; Cantor & Mischel, 1979; Haselton et al., 2005). For instance, conformity bias causes people to align their beliefs with an incorrect majority (Asch, 1951) and participants can be experimentally induced to make choices that contradict their stated preferences (Hall et al., 2010; Johansson et al., 2005). People also sometimes act first before deducing their reasons for action in a post hoc manner, which constitutes a violation of the rational planning process (Cushman, 2019). These widely documented reasoning deficiencies have led some scholars to pessimistically conclude that episodes of human rationality are merely "scattered beacons on the irrational coastline of human history" (Stich, 1985, p. 115).

### **Consideration 2: Nonhuman Animals Can Also Be Rational**

Detractors of the pessimistic view of human rationality have criticized the various experiments or rejected the nor-



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mative standards of reasoning that support such pessimism (Lopes, 1991). For instance, Gigerenzer et al. (1999) argue that organisms are rational to the extent that they engage in cognitions that are well-suited for a particular task environment. A tendency to be biased toward the group, for example by copying or conforming to the majority, is rational despite not being a reasoning process if it improved survivability by leveraging collective intelligence or safety in numbers (Henrich & Boyd, 1998). This ecological approach stresses that rationality should be judged by specifying precise models of cognitive mechanisms and examining in what environment each mechanism yields adaptive decisions (by an ecological benchmark for rationality) and in what environments it will not. Accordingly, experimental manipulations, such as those that bias participants toward outcomes that are unlikely to be encountered in the natural world, are too ecologically unrealistic to be a meaningful test of rationality. Moreover, evolutionary scholars suggest that systematic biases hint at rationality at a fundamental level (Kenrick et al., 2009).

By the standards of ecological rationality, however, humans are not the only rational agents. Nonhuman animals have routinely been observed to make basic but undoubtedly logical and adaptive decisions, such as when meerkats scan a patch and infer that it is safe from the perceived absence of predators before foraging. While the extent to which animals have “higher” cognitions like reasoning and abstract thought is still unclear (Watanabe & Huber, 2006), some thinkers have ventured that animals exhibit a remarkable degree of rationality when they successfully appraise and navigate the environment under conditions of uncertainty (Osto, 2010). Comparative researchers have increas-

ingly taken rationality among nonhuman species to be so axiomatic that the current focus in their research is to show when they are *not* rational (Santos & Rosati, 2015; Sweis et al., 2018).

Despite the divergent norms and standards between these camps on how human rationality should be evaluated, they dovetail in suggesting that talking about humans as *the* rational animal is passé—human rationality can be either fallible given our biased or nonrational tendencies, or mundane alongside the broad spectrum of other problem-solving organisms. These distinct perspectives highlight the conceptual challenges underlying our grasp of rationality and produce an intractable dilemma over which norms and standards should be adopted. The intractability of the rationality problem coupled with the stance that humans are not particularly remarkable as rational animals sets the stage for a timely consideration of another underappreciated human trait—our peculiar tendency to rationalize.

### Humans Are the Rationalizing Animal

A quick etymological analysis of “rationalization” reveals that “ration” is rooted in words denoting unambiguous measurements such as reckoning and ratio, following which “rational” arose to convey reasoning based on objective foundations (Oxford English Dictionary, n.d.). As “rationalize” emerged, early definitions had more to do with the act of being rational (i.e., to render something rational) than with justification for something illogical or immoral. This analysis highlights a conflict between being rational (or reasoning) and rationalizing in modern use. Reasoning is associated with logical thinking, carries a positive valence, and is the idea that is typically conveyed when humans are called rational animals. By contrast, rationalization carries significant baggage—beyond simply a rendering of rationality, it also involves the problematic outcomes associated with being illogical or deceptive with the self and others.

The departure of rationalization from its straightforward, reason-based usage can be traced to 1908 when Ernest Jones noted that, as self-perceived rational agents, people feel the need to give a “connected, logical, and continuous account” of themselves, and as such their mental processes are unconsciously manipulated and revised to achieve that (p. 166). These mental accounts may or may not correspond with the real reasons that underlie our behaviors, but they at least create a veneer of logic that allows us to believe that we are not absurd. Thus, as an early pronouncement of rationalization as a fascinating human quirk, Jones argued that we rationalize because of the peculiar human need to view the self as rational.

Over a century later and much more recently, Cushman (2019) provided a framework describing the rationalization process and offered a functional explanation for why it occurs. Noting that people often perform actions and then



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adjust or concoct beliefs to make those actions rational, Cushman argued that such post hoc constructions importantly function to transfer information between different kinds of processes and representations that influence behavior (see Figure 1). That is, behavior is influenced not only by conscious and intentional rational processes (i.e., deliberative, logical reasoning) but also those that are nonconscious, nonintentional, and nonrational (e.g., instincts, habits, or social norms). As many of these nonrational processes function to guide behavior in the absence of knowledge or awareness, it is deeply rational to be able to infer plausible reasons for nonrationally instigated behaviors as such inferences produce congruency over past actions and can help to inform future reasoning and action. Thus, Cushman describes rationalizations as “useful fictions”: Fiction because these reasons, no matter how plausible or educated they may be, are essentially made up, and useful because rationalizations can improve subsequent reasoning and behavior.

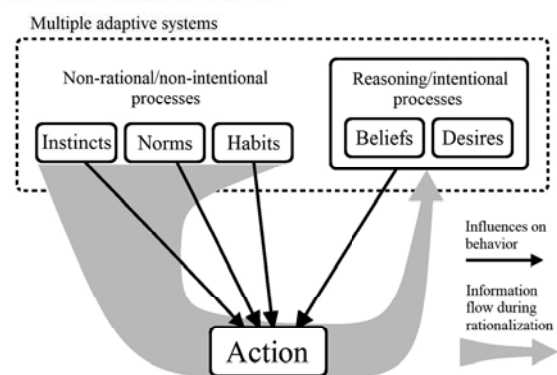
The fiction-like nature of rationalization has long been recognized. For instance, Bruner (1991) argued that people often behave as storytellers who construct reality through narratives. The basis of narrative construction is like the criteria for a good story, which include having a guiding plot for which the story is formed, adding content that relates to the plot, and structuring the content coherently. Constructing narratives allows experiences and beliefs to be organized, and the emotional effects of experiences become more manageable when they have order and meaning (Ochs & Capps, 1996).

The coherence motive driving the rationalization process provides a quick-and-dirty means to satisfy epistemic needs

and promote decisive action. In a world fraught with uncertainty, coherence serves as a useful benchmark by which logical integrity in one’s knowledge structures—the mental models and representations that schematically encompass our ideas and beliefs (Anderson, 1977; Bartlett, 1932)—may be swiftly inferred (Zynda, 1996). More specifically, we rationalize by selecting among various plausible explanations those that seem most reasonable (and desirable) through parsimony with our current knowledge structures and self-narratives. A strong sense of coherence produces verisimilitude (Bruner, 1991), increases one’s confidence of being correct or right, and facilitates the ability to predict, explain, and control events (Heine et al., 2006). However, coherence as a benchmark can also render explanations that simply fit well with preexisting beliefs compelling, making us convinced of the explanations we arrive at regardless of their truth value (Feinberg, 2002).

The potential for rationalization to be systematically inaccurate brings us to another one of its crucial features: Although rationalizations reflect what we believe to be the best explanations of reality, the fuzzy nature of reality also allows preferred rather than true explanations to be chosen. As our sense of reality emerges from our own subjective involvement in the world (Ochs & Capps, 1996), the self inevitably exerts a biasing influence. For example, people may rationalize away unsavory past actions that do not cohere with their preferred self-narrative (Mezulis et al., 2004) or selectively attend to information that depicts them or their affiliated groups as virtuous (von Hippel et al., 2005). Culturally biased beliefs also emerge when people build a coherent self-story by connecting their knowledge structures with the cultural narratives they identify with (Nelson, 2003). For instance, religious individuals often

**Figure 1**  
*Multiple Adaptive Systems.*



*Note.* Behavior is influenced by rational and nonrational adaptive processes as indicated by the solid line arrows. The large gray arrow illustrates how information is extracted from non-rational processes through inferences made on actions to guide understanding and future reasoning (image adapted from Cushman, 2019).

explain behaviors and observations in terms of the workings of the gods they believe in, which in turn reinforces their religious group identity.

Rationalizations can be classified into two distinct motives: when one does not know the truth and rationalizes as ways of inference, and when one may know the truth but refuses to accept it and comes up with reasons to justify their prior (i.e., preferred) opinions or decisions. As we will discuss further later, the former serves general inferential functions aimed at uncovering the truth or determining appropriate behaviors, whereas the latter leverages the capacity for rationalization to produce strategically skewed beliefs.

While we believe that the conceptualization of humans as uniquely rationalizing animals is timely, this view is admittedly speculative. Our assertion rests on the premises that humans feel the need to construct reasons and prioritize distorted perceptions and judgments in service of coherence over accuracy, whereas animals do not. These claims are hampered by the dearth of rationalization studies for animals. As humans can articulate the reasons for their beliefs and actions in a language that researchers understand while animals cannot, discrepancies between expressed beliefs versus actual actions can be readily observed for humans but not for animals (Kacelnik, 2006). However, concluding that animals cannot rationalize from the absence of evidence would commit the fallacy of arguing from ignorance.

Yet, extant difficulties do not excuse us from seeking plausible sources of support that, despite their limitations, may offer serious food for thought. The logic of scientific hypothesis testing stresses that multiple confirmations of a theoretical prediction can increase the confidence that the theory is true despite not proving it. Thus, a practical alternative solution to the elusiveness of perfect proof for humans as uniquely rationalizing animals may exist in the provision of two forms of evidence: a relatively weaker one that suggests lack of rationalization in nonhumans and a relatively stronger one that demonstrates the robustness, ubiquity, and functional purpose of rationalization in humans. We acknowledge that even the “stronger” support is limited as it is akin to sampling on the dependent variable, but we hope that this thought experiment offers a useful foundation upon which other scholars may build.

### **Support 1: Rationalization Is Not a Feature of Nonhuman Species**

One way to infer if nonhumans rationalize is to observe whether they engage in the neurocognitive processes that reportedly underlie rationalization. For instance, Reynolds (2006) identified the C-system, which consists of the anterior cingulate, prefrontal cortex, and hippocampus, as a functional system that facilitates rationalization by using preexisting beliefs (e.g., a prototype of an extroverted per-

son, maxims such as “good things come to those who do good”) to reason about social reality. Brain imaging studies show that although humans and animals share similar C-system features (Clark & Squire, 2013; Walton & Mars, 2007), the combinatorial activation of the C-system for rationalization is present in humans but absent in animals (Reynolds, 2006). Correspondingly, it may be inferred that nonhuman animals do not rationalize (or at least not in the way that humans do). In addition, C. Lloyd Morgan (1894) established a means of regulating the analysis of animal behavior in the form of a canon stating that if an animal’s behavior can be argued to occur without higher-order mental functions, such as self-concepts or metarepresentational capacities, then those mental functions should be assumed to be absent in the animal. Experiments have indeed shown that animal behaviors can be explained through general conditioning, learning, and processing mechanisms without reliance on additional complex reasoning processes (see Dwyer & Burgess, 2011; Egan et al., 2010; Harris et al., 2009; for fuller discussions). These findings suggest that nonhumans fare sufficiently well with nonrational systems for behavior without the need for rationalization.

A few possible criticisms of this analysis immediately come to the fore. First, as animal research methods improve, there is growing evidence of advanced cognitive functioning among nonhumans (e.g., Sweis et al., 2018) and studies have documented hints of rationalization in animals (Egan et al., 2010; Egan et al., 2007). In some of these studies, researchers get capuchin monkeys to select one of two options that are roughly equally attractive (e.g., a blue candy vs. a red candy). Later, they make another choice between two equally attractive options, one of which is the option initially rejected (e.g., a green candy vs. the rejected blue candy). Data indicate that the initial rejection carries over such that the option initially rejected tends to be subsequently rejected; thereby, implying the workings of coherence and rationalization. Second, it is arguable that rationalization appears unique to humans only because language as a required conduit is exclusive to humans, not because animals do not rationalize. Lastly, pointing Morgan’s canon back at humans may ironically reveal simple conditioning and learning processes to sufficiently account for our behaviors; thereby, undermining the significance of rationalization in human behavior.

These criticisms invite a few counterpoints. First, animal researchers have invoked Morgan’s canon to debate whether the seemingly coherence-driven behaviors of animal subjects in recent studies implicate the use of sophisticated beliefs and mental representations or more general kinds of processing (Chen & Risen, 2010; Dwyer & Burgess, 2011; Egan et al., 2007). As these phenomena can be explained in terms of animals’ preferences simply mimicking prior choices and, in addition, further studies show that very young children with relatively undeveloped self and

mental representations similarly exhibit such choosing patterns (Egan et al., 2010), the data does not go as far as saying that animals are engaging in rationalization. Laboratory-induced hints of rationalization among nonhumans can also be understood within the context of bipedalism as an analogy. Specifically, humans are not the only species capable of standing and walking on two hind legs; chimpanzees, gorillas, and meerkats, for instance, can be occasionally bipedal, but humans are the only *full-time* bipedal species. This distinction is sufficient grounds to label humans as bipedal and other species as not. Similarly, even if other animal species occasionally and under limited and contrived circumstances (e.g., experiments) engage in what seems like rationalization, humans are still the only full-time rationalizing animal. Thus, even if the comparative data reveals some flashes of rationalization among nonhumans, we cannot conclude that they engage in rationalization as frequently or consistently as humans do, nor can we affirm that such behaviors are truly instances of rationalization.

Second, our argument that rationalization is specific to humans has more to do with the motive to produce coherent explanations than with language capabilities. To rule out language as the main reason why only humans rationalize, we can perhaps look at early hominins who arguably lacked the language capacities of modern humans (Quam et al., 2013). The fact that they produced cave drawings depicting past events not only indicates that they were capable of explanations without advanced language (Miyagawa et al., 2018), but also suggests that the desire to explain and tell elaborate stories may have propelled language advancement in our species. Finally, when we subject ourselves to Morgan's canon, rationalization appears to be the most parsimonious account for our wide variety of behaviors (detailed in the next section) rather than several disparate lower-level cognition explanations. As the evidence for animal rationalization is unconvincing based on the foregoing analysis, we cannot afford nonhuman animals the luxury of this special trait to account for their behavior. Taken together, the available evidence suggests that rationalizing what they do or see may be superfluous or irrelevant for nonhuman animals, and their lack of rationalization is not just an artifact of language.

## Support 2: Humans Rationalize in Abundance

Although the indirect evidence might be construed as somewhat weak support for our argument that nonhumans do not rationalize, our stance that rationalization is a hallmark human proclivity derives stronger support from the numerous examples of human rationalization in the psycho-

logical literature. The following represents a nonexhaustive list:

### *Cognitive Dissonance Reduction*

Festinger's (1957) work on cognitive dissonance provided important foundations for the modern examination of rationalization processes. Cognitive dissonance is characterized as mental stress or discomfort experienced when an individual holds two or more contradictory beliefs at the same time or is confronted by new information that conflicts with existing beliefs. For instance, dissonance can occur when people make difficult choices between equally attractive alternatives. After a choice is made between initially matched options, people unknowingly adjust their attitudes to support their decision by increasing their preference for the selected option, decreasing their preference for the rejected option, or both (Brehm, 1956). The anticipation of inconsistency can also compel people to actively avoid situations that are likely to increase dissonance and seek information that supports favored or preexisting beliefs. A recent study reported that liberals and conservatives in the United States are similarly motivated to avoid information that may conflict with their beliefs, and approximately two thirds of people forfeited the opportunity to win extra money to avoid hearing from the other side (Frimer et al., 2017). This effect was unrelated to how knowledgeable the participants were; thus, suggesting that the motivation to protect their cherished beliefs was not because of ignorance.

### *Choice Blindness and Confabulation*

In a study conducted at a supermarket, volunteers were asked to taste two different types of jams and choose their favorite (Hall et al., 2010). The volunteers were then asked to taste again what they had chosen, but unbeknownst to them, they were made to taste the one they had rejected. When the volunteers were asked to explain why they had chosen what they chose, less than 20% noticed that they tasted the jam they had turned down earlier. People are also capable of offering postdecisional reasons for why they chose the way they did. In another experiment, male participants were asked to select the more attractive of two different female faces, and the experimenters then used a sleight-of-hand card trick to give the participant the picture of a different woman altogether (Johansson et al., 2005). Consistent with choice blindness findings, only about 13% of the participants noticed the switch. When asked to explain their choice, those who failed to notice the switch gave confabulated reasons. For instance, one participant claimed he liked blondes when he was given the picture of a blonde woman, even though the picture he had initially chosen was that of a brunette. These choice blindness effects have been replicated across other types of preferences including smell

(Sela & Sobel, 2010), tactile (Gallace et al., 2007), vocal (Lind et al., 2014), and political choices (Hall et al., 2013).

### ***Moral Reasoning***

Research on moral dumbfounding (Haidt, 2001) typically asks participants to imagine, for example, a man going to a supermarket, buying a ready-to-cook chicken, taking it home, having sexual intercourse with it, and then cooking and eating it. Another scenario involves a brother and sister who go on holiday and end up having sex. They are very careful with birth control so pregnancy will not result, and they felt that the experience brought them closer. Most participants make the initial judgment that it was wrong for the individuals in these scenarios to have done what they did before searching for reasons to justify the initial judgment (Haidt et al., 2000). Participants are dumbfounded as they are typically unable to give good reasons for their judgments—no one is harmed, the food is not wasted, and the siblings are happy—and even after participants admit that they are unable to say why these acts are wrong, most of them continue to judge them as immoral. The feeling that moral reasoning causally produces moral judgment is hence illusory; moral stances are, instead, often a post hoc rationalization of initial judgments that have already been reached through nonrational intuitions.

### ***False Eyewitness Accounts***

Perceptions can be affected by false memories created through the rationalization process, such as in the case of false eyewitness accounts (Loftus, 1992). A reliance on eyewitness testimonies incorrectly assumes that human memory works like a video recorder where events are recorded veridically and can be replayed upon request. Instead, memories are rebuilt like fitting together incomplete pieces of a puzzle without the box each time we recall them. Even questioning by a lawyer can alter the witness's testimony as memory fragments may unknowingly be integrated with information provided by persuasive or authoritative questioners, leading to inaccurate recall. False memories have been created in participants across various studies and many of these participants are convinced that the false memories are real (Loftus & Pickrell, 1995). Rationalization processes can allow stereotypic information (e.g., when individuals of a particular race are believed to be more violent) to bias the memory reconstructions that eyewitnesses are fully convinced of, which has tragically led to wrongful convictions (McMurtric, 2005).

### ***Self-Enhancement***

Rationalization drives the interpretation of events so that a preferred positive self-view can be maintained (Sedikides & Strube, 1995). One such rationalization is the self-serving attributional bias where people make sense of poor performance by attributing it to external forces rather than per-

sonal characteristics (Mezulis et al., 2004). The self-construals that people use to understand themselves and their social world also create subtle shifts in social comparisons or estimations so that their interpretations of events lead to self-enhancement (Cantor & Mischel, 1979). Such strategic construals manifest especially following negative feedback. For example, low achievers in a particular domain selectively regard the successes of high achievers as exceptional; thereby, lessening the shame of their own inability (Alicke et al., 1997). People also increase their skepticism of a test if the results they receive are discouraging (Ditto & Lopez, 1992); conversely, people do not react the same way to similar test results received by others (Ditto et al., 2003).

In summary, evidence of rationalization as an important feature of humans but not of nonhumans establishes us as *the* rationalizing animal. Although rationalizations are the means by which we hope to reach true or accurate inferences, this process is also liable for incorrect judgments and false explanations, and our systematic tendency to be skewed suggests that other benefits may be gained from achieving coherence despite being inaccurate. On the basis that rationalization is not some merely random or trivial human occurrence, we turn to the adaptive challenges and associated benefits that may have spurred its emergence in humans.

## **Evolutionary Origins of Rationalization**

The ubiquity and uniqueness of a trait to a particular species suggest that the trait serves functions that are highly specific to the species. For example, echolocation is a unique adaptive trait to bats and dolphins—species residing in environments with poor visual acuity. Similarly, the ubiquity and uniqueness of rationalization to humans highlight the distinct adaptive challenges our ancestors faced for which rationalization was selected to solve. The question can then be asked what these adaptive challenges and associated benefits might be, which offers further insights into the idiosyncrasies of our human nature.

We suggest at least six major adaptive benefits of rationalization. The first two, (1) sense-making and learning and (2) accuracy and knowledge heuristic, reflect rationalization as an inferential tool aimed at reaching an accurate or correct understanding of reality. The last four, (3) norm adhesion and socially appropriate behavior, (4) optimism and self-esteem, (5) purpose and long-term goal pursuit, and (6) deceiving others, reflect its instrumentality in facilitating strategic perceptions that carry benefits beyond having accurate appraisals. This section also elucidates how rationalization may have evolved as an epiphenomenon from simple sense-making processes driven by coherence to its current form as the social complexity of our species expanded and demands on coherence became more sophisticated.



### **Adaptive Benefit 1: Sense-Making and Learning**

An unpatterned world is unpredictable and debilitating to inhabitants. For an organism to effectively navigate the world, it needs to make sense of reality. Sense-making is a validation process: to make reasoned judgments or actions, people can seek substantiation for their beliefs either by painstakingly examining their correspondence with objective truth or through coherence with preexisting beliefs as an inference shortcut (Zynda, 1996). Because decisions must be made with limited knowledge, time, and energy, humans evolved the latter simple yet practical form of sense-making (Gigerenzer et al., 1999). Under considerable uncertainty, particularly for early hominin who must cope with the natural environment using primitive knowledge and tools, simple sense-making mechanisms enable swift appreciation of logical consistencies and efficient decision-making (Haselton & Buss, 2000). The capacity to detect logical patterns also drives how we construct knowledge, refine our representational structures, and learn (Heine et al., 2006). According to Popper (1963), learning is based on the perception of regularities and coherence that this perception produces, as well as the drawing of meaningful connections between observations and concepts.

Our craving for coherence can also make us construct meaning where none exists. For instance, participants who were primed to feel loss of control tended to see patterns in random dots (Whitson & Galinsky, 2008), and this inclination has been argued to underlie cases of pareidolia, apophenia, and superstitions (Shermer, 2002). People also rely on stereotypic beliefs to form social judgments when information about others is lacking. For example, when participants rated hypothetical job candidates, racial stereotyping occurred most when their qualifications were ambiguous (Dovidio & Gaertner, 2000). These findings attest to the potency of rationalization processes, particularly when the lack of coherence (and meaning) feels absurd and unnerving.

### **Adaptive Benefit 2: Accuracy and Knowledge Heuristic**

Another way that humans overcome uncertainties in the natural world is to rely on information provided by others. Thus, people often trust the judgment of the majority over their own. In Asch's (1951) seminal experiment on conformity, participants rationalized in alignment with the majority, even when the majority was blatantly wrong from an external observer's viewpoint. One adaptive reason why this happens is that the group is usually correct, especially in natural settings (Surowiecki, 2004). Therefore, rationalizing according to the majority is a simple conformity heuristic that can facilitate accurate or correct judgments (Henrich & Boyd, 1998). For example, when choosing between a nutritious or poisonous food, copying the behav-

ior of the majority who have thrived within a particular ecology would be adaptive. Long-time inhabitants likely have useful knowledge pertaining to their ecology (e.g., weather, resources, or social conduct) that can be leveraged, and humans are indeed unique among primates in that they acquire significant knowledge and adaptive behaviors from other humans and through culture (Henrich & McElreath, 2003).

### **Adaptive Benefit 3: Norm Adherence and Socially Appropriate Behavior**

Conformity through rationalization with the majority promotes norm adherence and enactment of socially appropriate behaviors. Group living carries benefits such as protection against threats from nature or other groups, and groups whose members follow similar beliefs and norms are better able to unite and mobilize against those threats (Van Vugt & Park, 2009). Disunity makes groups vulnerable against external threats, which can result in significant costs to the individual fitness of those belonging to fragmented or weak groups.

To preserve the integrity of the group, social norms are enforced and those who do not conform are punished in various ways including bullying, stigmatization, and social expulsion (Kurzban & Leary, 2001). In ancestral times as well as societies lacking social welfare today, ousted individuals would incur a huge survival disadvantage. Thus, people evolved to conform as a response to others' evolved adaptations to punish nonconformers as well as to receive the benefits of group membership. For instance, the group norm might be to believe in a particular god. If the failure to attribute one's good fortune to that god is punishable (as is the case in religiously staunch communities), conformist rationalization certainly becomes adaptive by enabling individuals to behave appropriately while reducing any realization of why they adopted those particular beliefs or behaviors. Furthermore, associating reasons (even if arbitrary) for cultural practices increases group members' likelihood that they will remember to enact them (Henrich & Henrich, 2006; Nelson, 2003). As socially appropriate behaviors emphasize conforming to normative social standards, behaviors and beliefs based on objective truths or facts are often undermined. Given the critical benefits of group membership, rationalization is adaptive as errors in the accuracy of judgments and appraisals can be less costly than being the correct but odd one out.

### **Adaptive Benefit 4: Optimism and Self-Esteem**

Although the awareness of mortality and dangerous things in the environment may be adaptive in helping us avoid danger and stay safe, the anxiety that accompanies such knowledge can become a crippling byproduct (Solo-

mon et al., 2015). Therefore, people who believe they are better off than they really are may be primed to deal with difficult or frightening situations more effectively (Taylor et al., 1992). Trivers (2000) states that “life is intrinsically future-oriented and mental operations that keep a positive future orientation at the forefront result in better future outcomes” (p. 126). Being optimistic, even if somewhat delusional, helps people feel less neurotic and provides the motivation to push forward and try new things or complete ongoing tasks. Indeed, optimism has been shown to increase the likelihood of carrying out fitness-enhancing behaviors such as creativity, planning, sociality, and mating (Diener et al., 2015).

Similarly, because elevated self-esteem is associated with reduced anxiety, people may benefit from rationalizing the self as more positive than is actually warranted. Self-esteem is defined as a person’s overall attitude toward oneself (Leary & MacDonald, 2003), and better wellbeing is associated with maintaining moderate positive illusions of the self, such as believing that one is a little more generous, competent, or attractive than is suggested by a realistic analysis (Armor & Taylor, 1998). Individuals who genuinely believe in their own goodness may also convincingly project a positive self-image and increase their likability (Wortman & Wood, 2011). Finally, as anxious individuals are reluctant to form social connections, self-esteem can help individuals approach social situations more confidently and reap the benefits of social interactions (Lee & Robbin, 1998).

### **Adaptive Benefit 5: Purpose and Long-Term Goal Pursuit**

Compared with other organisms, humans are especially capable of overcoming short-term challenges or forgoing short-term benefits to achieve long-term goals (Rosati et al., 2007). This ability is facilitated by rationalization. For example, two individuals could be instructed to repeatedly carry out the same mundane or stressful tasks at a job, but the individual who rationalizes his work efforts as serving a greater purpose (e.g., income earned from the job can support his family, the task outputs can better the lives of the less fortunate, etc.) is more likely to endure the aversive aspects of the work, construe the experience more positively, and persevere relative to individuals who do not see any higher purpose to the work (Hartanto et al., 2020). Having a rationale for one’s life events also puts them in meaningful context such that, when viewed from a broader perspective of purpose, the negative aspects of past events become justified as valuable experiences within a coherent and future-oriented life journey (Trivers, 2000). Indeed, individuals who perceive greater coherence and meaning in life report leading more comprehensible lives, experience

greater control and agency, and strive longer than individuals who do not (McKnight & Kashdan, 2009).

### **Adaptive Benefit 6: Deceiving Others**

While the act of rationalization can be fundamentally regarded as a self-deception perpetuated by humans to maintain a rational or positive self-view, rationalization processes can also be utilized to distort perceptions of reality to strategically misinform others. Other-deception is a strategy that has evolved in our ancestors’ struggle to accrue resources, and people frequently lie to those on whom they are dependent to receive resources that might not otherwise be provided (Steinel & De Dreu, 2004). Rationalization facilitates deception by making a lie the focal, preferred belief, after which reality is reinterpreted to make the lie appear more plausible. For instance, a person may steal from his friend and then lie about how he was out of town during the theft. Thereafter, beliefs about the self and information pertaining to the theft, such as details about his travels or other potential suspects, may be reconstructed in his own mind to maintain the ruse. Individuals who cheat on their partners can rationalize their actions to such an extent that they become convinced of their lack of responsibility in the affair (Foster & Misra, 2013).

As being caught as a deceiver is costly through either immediate retaliation (e.g., withdrawal of cooperation) or incurring an untrustworthy reputation (Brosnan & Bshary, 2010), people who desire to misinform can increase their effectiveness by being unaware of the misinformation themselves. Cues that give away deceptive intent include signs of nervousness, suppression, and cognitive load (von Hippel & Trivers, 2011). By believing their lies or excuses to be actually true, deceivers can sell their fictions while obscuring the cues associated with consciously mediated deception. Furthermore, attribution of intent is critical in determining whether the deceived seeks retribution or forgives (Schweitzer et al., 2006). By maintaining that there was no intent to deceive, unaware deceivers are more likely than conscious deceivers to avoid retribution.

## **Discussion**

The ubiquity and multiple adaptive benefits of rationalization for humans suggest that rationalization is a unique feature of our species. Both human and nonhuman species can enact rational behaviors, but only humans are driven to construct reasons for action and maintain coherence. Several outcomes of rationalization, in particular those associated with skewed perceptions and judgments, may have been byproducts of sense-making induced through coherence at first, but have over time become adaptive themselves. Because of our sociality, the challenges we face go beyond tackling relatively predictable elements of nature to

dealing with complexities and ambiguities created by con-specifics, which can be serviced with the efficient and strategically nuanced understanding of reality afforded by rationalization. Thus, while nonhumans may have made sense of the world and survived fine without rationalizing, our ability to understand reality through a coherence motive *and* extract information from nonrational influences served multiple functions beyond sense-making, including long-term goal pursuit, impression management, and deception. These functions have become so ingrained in our psychological repertoire that we cannot fathom basic learning and sense-making without the accompaniment of rationalization, a truly cornerstone human trait.

### Implications and Further Directions

The adaptive view of rationalization espoused herein stresses that veridicality and normative standards of rationality are, in evolutionary terms, overrated. Many people still fare rather well with a limited grasp of facts and truths—selection has crafted a suite of design features to ensure the acquisition of adaptive rather than objective knowledge (Cosmides & Tooby, 1992). It might also be argued that most, if not all, of the cases of rationalization where people conjure explanations in the absence of full information reflect a deeply rational process (Cushman, 2019; Kenrick et al., 2009). When information is missing and people have to make best-guesses about themselves or others, it is adaptive to choose explanations based on parsimony with available knowledge structures and individual strategies. Despite its imperfections, rationalization is what makes reasoning possible.

Our proposition of humans as the rationalizing animal rests on our speculation that rationalization is exclusive to humans only. We are, however, unable to provide direct evidence that nonhuman animals do not rationalize. Given these hurdles, we sought alternative sources of evidence and inferred that animals do not rationalize from comparative animal research and Morgan's canon. Despite these efforts, we acknowledge that such indirect sources of evidence only provide tenuous support for the absence of rationalization in nonhumans. Nevertheless, we hope that the current article will serve as a preliminary foray into this underexplored research direction and inspire others to probe further.

While our analysis focused primarily on rationalization at the individual level, collective narratives and fictions, such as religions and ideologies, can also be understood as group-level rationalizations (Nelson, 2003) and they function as a powerful basis for collective solidarity, direction, and cooperation (Harari, 2015). Incredible endeavors such as the building of the pyramids were accomplished because collective fictions enabled large groups of individuals to coordinate and sustain their efforts. That said, our analysis also reveals a dark side to rationalization, which includes bias

and deception with detrimental group-level implications. Collective fictions are responsible for mass departures from objective knowledge, such as cult followers who were convinced about the end of the world or the arrival of aliens (Bader, 1999), as well as brutality and devastation when large armies feel justified by the shared belief of their righteousness over the enemy (Armstrong, 2014). The contemporary problem of widespread misinformation can also be viewed as an adverse combination of rationalization with modern technologies (Li et al., 2018). Many people today acquire information through false online content such as hoaxes and clickbait articles (Shao et al., 2017). On the one hand, the incentives of deliberate deception are apparent, such as monetizable traffic to fake news sites or manipulation of political support (Shao et al., 2017). On the other hand, misinformation can also be perpetuated unknowingly by regular folk. People attend more readily to and share articles that cohere with their beliefs, reducing suspicion that the information might be untrue and hindering more objective data assessments (Frimer et al., 2017). Despite lacking outright diabolical intentions, the perpetuation of misinformation by laypersons has caused real harms ranging from undermined health decisions (Hotez, 2016) to economic bubbles (Ferrara et al., 2016).

By viewing these problems as rationalization gone awry at the group level, insights can be gained as to how they may be mitigated. As illustrated in Figure 1, perceptions and judgments are biased toward preexisting beliefs and desires in a subconscious and automatic process. Quick-and-dirty yet influential sources of legitimacy (e.g., charismatic diplomats, websites parading as proper news) capitalize on people's assumptions about credibility and desire to justify prior beliefs (Petty & Cacioppo, 1986); thereby, precluding more discerning judgments. Conversely, greater objectivity can be achieved by being cognizant of one's beliefs and consciously overriding the coherence drive. Thus, efforts to develop interventions promoting greater skepticism and acute judgments will prove judicious. For instance, an online course titled "Calling Bullshit" (<http://callingbullshit.org/>) was set up to train students to be more stringent in their assessment of informational sources (Long, 2017). Especially in today's age of social media where misinformation runs rampant, the ability to scrutinize the veracity of information, disrupt the automaticity of the coherence process, and be aware of one's biases will become valuable features of future academic curricula and life skills.

It is also worth noting that innovation and cultural evolution are driven by refusal to conform. For example, history has repeatedly shown that scientific insights emerge when bravely nonconformist individuals (e.g., Copernicus, Galileo, or Darwin) refuse to endorse collective (e.g., religious, ideological) rationalizations and explanations of the natural world. These men were severely punished and denounced by the authorities of their day, but their scientific

explanations eventually came to be widely accepted. As George Bernard Shaw (1903) aptly said, “The reasonable man adapts himself to the world: the unreasonable one persists in trying to adapt the world to himself. Therefore, all progress depends on the unreasonable man” (p. 260). The benefits of knowing how and when to curtail our rationalizing tendencies are considerable. From our perspective, it is also instructive that Shaw goes on to say, “The man who listens to Reason is lost: Reason enslaves all whose minds are not strong enough to master her,” seemingly presaging our argument by more than a century that rationalization is more predominant in human thought than rationality (or reason).

In conclusion, we advanced the argument that humans should be viewed not so much as rational animals but rationalizing ones instead, a characterization that affords a better grasp of our tendency to rationalize and be biased in favor of coherence, encourages mindfulness of the dark side of rationalization, and provides a basis for further research on the distinctive and exclusive features of our species.

## References

- Alicke, M. D., LoSchiavo, F. M., Zerbst, J. I., & Zhang, S. (1997). The person who outperforms me is a genius: Maintaining perceived competence in upward social comparison. *Journal of Personality and Social Psychology, 73*, 781–789. <https://doi.org/10.1037/0022-3514.73.4.781>
- Anderson, R. C. (1977). The notion of schemata and the educational enterprise: General discussion of the conference. In R. C. Anderson, R. J. Spiro, & W. E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 415–431). Erlbaum.
- Armor, D. A., & Taylor, S. E. (1998). Situated optimism: Specific outcome expectancies and self-regulation. In M. Zanna (Ed.), *Advances in experimental social psychology* (pp. 309–379). Academic Press. [https://doi.org/10.1016/S0065-2601\(08\)60386-X](https://doi.org/10.1016/S0065-2601(08)60386-X)
- Armstrong, K. (2014). *Fields of blood: Religion and the history of violence*. Random House.
- Asch, S. E. (1951). Effects of group pressure on the modification and distortion of judgments. In H. Guetzkow (Ed.), *Groups, leadership and men* (pp. 177–190). Carnegie Press.
- Bader, C. (1999). When prophecy passes unnoticed: New perspectives on failed prophecy. *Journal for the Scientific Study of Religion, 38*, 119–131. <https://doi.org/10.2307/1387588>
- Bartlett, F. C. (1932). *Remembering: A study in experimental and social psychology*. Cambridge University Press.
- Brehm, J. W. (1956). Postdecision changes in the desirability of alternatives. *The Journal of Abnormal and Social Psychology, 52*, 384–389. <https://doi.org/10.1037/h0041006>
- Brosnan, S. F., & Bshary, R. (2010). Cooperation and deception: From evolution to mechanisms. *Philosophical Transactions of the Royal Society of London Series B: Biological Sciences, 365*, 2593–2598. <https://doi.org/10.1098/rstb.2010.0155>
- Bruner, J. (1991). The narrative construction of reality. *Critical Inquiry, 18*(1), 1–21. <https://doi.org/10.1086/448619>
- Cantor, N., & Mischel, W. (1979). Prototypicality and personality: Effects on free recall and personality impressions. *Journal of Research in Personality, 13*, 187–205. [https://doi.org/10.1016/0092-6566\(79\)90030-8](https://doi.org/10.1016/0092-6566(79)90030-8)
- Chen, M. K., & Risen, J. L. (2010). How choice affects and reflects preferences: Revisiting the free-choice paradigm. *Journal of Personality and Social Psychology, 99*(4), 573–594. <https://doi.org/10.1037/a0020217>
- Clark, R. E., & Squire, L. R. (2013). Similarity in form and function of the hippocampus in rodents, monkeys, and humans. *Proceedings of the National Academy of Sciences of the United States of America, 110*(Suppl. 2), 10365–10370. <https://doi.org/10.1073/pnas.1301225110>
- Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163–228). Oxford University Press.
- Cushman, F. (2020). Rationalization is rational. *Behavioral and Brain Sciences, 43*, e28. <https://doi.org/10.1017/S0140525X19001730>
- Darwin, C. (1871). *The descent of man and selection in relation to sex*. Appleton.
- Diener, E., Kanazawa, S., Suh, E. M., & Oishi, S. (2015). Why people are in a generally good mood. *Personality and Social Psychology Review, 19*, 235–256. <https://doi.org/10.1177/1088868314544467>
- Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and non-preferred conclusions. *Journal of Personality and Social Psychology, 63*, 568–584. <https://doi.org/10.1037/0022-3514.63.4.568>
- Ditto, P. H., Munro, G. D., Apanovitch, A. M., Scepansky, J. A., & Lockhart, L. K. (2003). Spontaneous skepticism: The interplay of motivation and expectation in responses to favourable and unfavourable medical diagnoses. *Personality and Social Psychology Bulletin, 29*, 1120–1132. <https://doi.org/10.1177/0146167203254536>
- Dovidio, J. F., & Gaertner, S. L. (2000). Aversive racism and selection decisions: 1989 and 1999. *Psychological Science, 11*, 315–319. <https://doi.org/10.1111/1467-9280.00262>
- Dwyer, D. M., & Burgess, K. V. (2011). Rational accounts of animal behaviour? Lessons from C. Lloyd Morgan’s canon. *International Journal of Comparative Psychology, 24*, 349–364.
- Egan, L. C., Bloom, P., & Santos, L. R. (2010). Choice-induced preferences in the absence of choice: Evidence from a blind two-choice paradigm with young children and capuchin monkeys. *Journal of Experimental Social Psychology, 46*, 204–207. <https://doi.org/10.1016/j.jesp.2009.08.014>
- Egan, L. C., Santos, L. R., & Bloom, P. (2007). The origins of cognitive dissonance: Evidence from children and monkeys. *Psychological Science, 18*, 978–983. <https://doi.org/10.1111/j.1467-9280.2007.02012.x>
- Elliot, A. J., & Devine, P. G. (1994). On the motivational nature of cognitive dissonance: Dissonance as psychological discomfort. *Journal of Personality and Social Psychology, 67*, 382–394. <https://doi.org/10.1037/0022-3514.67.3.382>
- Feinberg, L. (2002). *Hypocrisy: Don’t leave home without it*. Pilgrims Process.
- Ferrara, E., Varol, O., Davis, C., Menczer, F., & Flammini, A. (2016). The rise of social bots. *Communications of the ACM, 59*, 96–104. <https://doi.org/10.1145/2818717>
- Festinger, L. (1957). *A theory of cognitive dissonance*. Stanford Univ Press.
- Foster, J. D., & Misra, T. A. (2013). It did not mean anything (about me): Cognitive dissonance theory and the cognitive and affective consequences of romantic infidelity. *Journal of Social and Personal Relationships, 30*, 835–857. <https://doi.org/10.1177/0265407512472324>
- Frimer, J. A., Skitka, L. J., & Motyl, M. (2017). Liberals and conservatives are similarly motivated to avoid exposure to one another’s opinions. *Journal of Experimental Social Psychology, 72*, 1–12. <https://doi.org/10.1016/j.jesp.2017.04.003>
- Gallace, A., Tan, H. Z., & Spence, C. (2007). Do “mudsplashes” induce tactile change blindness? *Attention, Perception, & Psychophysics, 69*, 477–486. <https://doi.org/10.3758/BF03193905>
- Gigerenzer, G., Todd, P. M., & the ABC Research Group. (1999). *Simple heuristics that make us smart*. Oxford University Press.

- Griffin, A. (Dec, 2016). What is Pizzagate? The Hillary Clinton conspiracy theory that led to a man opening fire in a restaurant. *Independent*. Retrieved from <https://www.independent.co.uk/life-style/gadgets-and-tech/news/pizzagate-what-is-it-explained-hillary-clinton-paedophile-conspiracy-gunman-fake-news-a7456681.html>
- Haidt, J. (2001). The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review*, 108, 814–834. <https://doi.org/10.1037/0033-295X.108.4.814>
- Haidt, J., Bjorklund, F., & Murphy, S. (2000). *Moral dumbfounding: When intuition finds no reason* (Unpublished manuscript). University of Virginia.
- Hall, L., Johansson, P., Tärning, B., Sikström, S., & Deutgen, T. (2010). Magic at the marketplace: Choice blindness for the taste of jam and the smell of tea. *Cognition*, 117, 54–61. <https://doi.org/10.1016/j.cognition.2010.06.010>
- Hall, L., Strandberg, T., Pärnamets, P., Lind, A., Tärning, B., & Johansson, P. (2013). How the polls can be both spot on and dead wrong: Using choice blindness to shift political attitudes and voter intentions. *PLoS ONE*, 8, e60554. <https://doi.org/10.1371/journal.pone.0060554>
- Harari, Y. N. (2015). *Sapiens: A brief history of humankind*. HarperCollins Publishers.
- Harris, J. A., Gharaei, S., & Moore, C. A. (2009). Representations of single and compound stimuli in negative and positive patterning. *Learning & Behavior*, 37, 230–245. <https://doi.org/10.3758/LB.37.3.230>
- Hartanto, A., Yong, J. C., Lee, S. T. H., Ng, W. Q., & Tong, E. M. W. (2020). Putting adversity into perspective: Purpose in life moderates the effect of childhood emotional abuse and neglect on adulthood depressive symptoms. *Journal of Mental Health*, 29, 473–482. <https://doi.org/10.1080/09638237.2020.1714005>
- Haselton, M. G., & Buss, D. M. (2000). Error management theory: A new perspective on biases in cross-sex mind reading. *Journal of Personality and Social Psychology*, 78, 81–91. <https://doi.org/10.1037/0022-3514.78.1.81>
- Haselton, M. G., Nettle, D., & Andrews, P. W. (2005). The evolution of cognitive bias. In D. M. Buss (Ed.), *The handbook of evolutionary psychology* (pp. 724–746). Wiley.
- Heine, S. J., Proulx, T., & Vohs, K. D. (2006). The meaning maintenance model: On the coherence of social motivations. *Personality and Social Psychology Review*, 10, 88–110. [https://doi.org/10.1207/s15327957pspr1002\\_1](https://doi.org/10.1207/s15327957pspr1002_1)
- Henrich, J., & Boyd, R. (1998). The evolution of conformist transmission and the emergence of between-group differences. *Evolution and Human Behavior*, 19, 215–241. [https://doi.org/10.1016/S1090-5138\(98\)00018-X](https://doi.org/10.1016/S1090-5138(98)00018-X)
- Henrich, J., & Henrich, N. (2006). Culture, evolution and the puzzle of human cooperation. *Cognitive Systems Research*, 7, 220–245. <https://doi.org/10.1016/j.cogsys.2005.11.010>
- Henrich, J., & McElreath, R. (2003). The evolution of cultural evolution. *Evolutionary Anthropology*, 12(3), 123–135. <https://doi.org/10.1002/evan.10110>
- Hotez, P. J. (2016). Texas and its measles epidemics. *PLoS Medicine*, 13(10), 1–5. <https://doi.org/10.1371/journal.pmed.1002153>
- Johansson, P., Hall, L., Sikström, S., & Olsson, A. (2005). Failure to detect mismatches between intention and outcome in a simple decision task. *Science*, 310, 116–119. <https://doi.org/10.1126/science.1111709>
- Jones, E. (1908). Rationalisation in every-day life. *The Journal of Abnormal Psychology*, 3, 161–169. <https://doi.org/10.1037/h0070692>
- Kacelnik, A. (2006). Meanings of rationality. In S. Hurley & M. Nudds (Eds.), *Rational animals?* (pp. 87–106). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780198528272.003.0002>
- Kenrick, D. T., Griskevicius, V., Sundie, J. M., Li, N. P., Li, Y. J., & Neuberg, S. L. (2009). Deep rationality: The evolutionary economics of decision making. *Social Cognition*, 27, 764–785. <https://doi.org/10.1521/soco.2009.27.5.764>
- Kurzban, R., & Leary, M. R. (2001). Evolutionary origins of stigmatization: The functions of social exclusion. *Psychological Bulletin*, 127, 187–208. <https://doi.org/10.1037/0033-2909.127.2.187>
- Leary, M. R., & MacDonald, G. (2003). Individual differences in trait self-esteem: A theoretical integration. In M. R. Leary & J. Tangney (Eds.), *Handbook of self and identity* (pp. 401–418). Guilford Press.
- Li, N. P., van Vugt, M., & Colarelli, S. M. (2018). The evolutionary mismatch hypothesis: Implications for psychological science. *Current Directions in Psychological Science*, 27, 38–44. <https://doi.org/10.1177/0963721417731378>
- Lind, A., Hall, L., Breidegard, B., Balkenius, C., & Johansson, P. (2014). Speakers' acceptance of real-time speech exchange indicates that we use auditory feedback to specify the meaning of what we say. *Psychological Science*, 25, 1198–1205. <https://doi.org/10.1177/0956797614529797>
- Loftus, E. F. (1992). When a lie becomes memory's truth: Memory distortion after exposure to misinformation. *Current Directions in Psychological Science*, 1, 121–123. <https://doi.org/10.1111/1467-8721.ep10769035>
- Loftus, E. F., & Pickrell, J. E. (1995). The formation of false memories. *Psychiatric Annals*, 25, 720–725. <https://doi.org/10.3928/0048-5713-19951201-07>
- Long, K. (May, 2017). We crashed UW's class on calling BS. Here's what we learned about sleuthing 'big data'. *The Seattle Times*. Retrieved from <https://www.seattletimes.com/seattle-news/education/popular-uw-class-teaches-students-when-to-call-bs-on-big-data-claims/>
- Lopes, L. (1991). The rhetoric of irrationality. *Theory & Psychology*, 1(1), 65–82. <https://doi.org/10.1177/0959354391011005>
- Macintyre, A. (1984). The relationship of philosophy to its past. In R. Rorty, J. B., Schneewind, & Q. Skinner (Eds.), *Philosophy in history* (pp. 31–48). Cambridge University Press. <https://doi.org/10.1017/CBO9780511625534.005>
- Manktelow, K. I. (2004). Reasoning and rationality: The pure and the practical. In K. I. Manktelow & M. C. Chung (Eds.), *Psychology of reasoning: Theoretical and historical perspectives* (pp. 157–177). Psychology Press. <https://doi.org/10.4324/9780203506936>
- McGarty, C., Yzerbyt, V. Y., & Spears, R. (2002). Social, cultural and cognitive factors in stereotype formation. In C. McGarty, V. Y. Yzerbyt, & R. Spears (Eds.), *Stereotypes as explanations: The formation of meaningful beliefs about social groups* (pp. 1–15). Cambridge University Press. <https://doi.org/10.1017/CBO9780511489877.002>
- McKnight, P. E., & Kashdan, T. B. (2009). Purpose in life as a system that creates and sustains health and well-being: An integrative, testable theory. *Review of General Psychology*, 13, 242–251. <https://doi.org/10.1037/a0017152>
- McMurtrie, J. (2005). The role of the social sciences in preventing wrongful convictions. *The American Criminal Law Review*, 42, 1271–1287.
- Mezulis, A. H., Abramson, L. Y., Hyde, J. S., & Hankin, B. L. (2004). Is there a universal positivity bias in attributions? A meta-analytic review of individual, developmental, and cultural differences in the self-serving attributional bias. *Psychological Bulletin*, 130, 711–747. <https://doi.org/10.1037/0033-2909.130.5.711>
- Miyagawa, S., Lesure, C., & Nóbrega, V. A. (2018). Cross-modality information transfer: A hypothesis about the relationship among prehistoric cave paintings, symbolic thinking, and the emergence of language. *Frontiers in Psychology*, 9, 115. <https://doi.org/10.3389/fpsyg.2018.00115>
- Morgan, C. L. (1894). *An introduction to comparative psychology*. Walter Scott Publishing Co. <https://doi.org/10.1037/11344-000>
- Nelson, K. (2003). Self and social functions: Individual autobiographical memory and collective narrative. *Memory*, 11(2), 125–136. <https://doi.org/10.1080/741938203>
- Oxford English Dictionary. (n.d.). *Oxford University Press*. Retrieved from <https://www.oed.com/>

- Ochs, E., & Capps, L. (1996). Narrating the self. *Annual Review of Anthropology*, 25, 19–43. <https://doi.org/10.1146/annurev.anthro.25.1.19>
- Osto, K. (2010). Rationality in the domesticated dog and other non-human animals. *Revista Internacional de Filosofía*, 29, 135–145.
- Petty, R. E., & Cacioppo, J. T. (1986). *Communication and persuasion: Central and peripheral routes to attitude change*. Springer-Verlag. <https://doi.org/10.1007/978-1-4612-4964-1>
- Popper, K. R. (1963). *Conjectures and refutations*. Routledge.
- Quam, R. M., de Ruiter, D. J., Masali, M., Arsuaga, J.-L., Martínez, I., & Moggi-Cecchi, J. (2013). Early hominin auditory ossicles from South Africa. *Proceedings of the National Academy of Sciences of the United States of America*, 110(22), 8847–8851. <https://doi.org/10.1073/pnas.1303375110>
- Reynolds, S. J. (2006). A neurocognitive model of the ethical decision-making process: Implications for study and practice. *Journal of Applied Psychology*, 91, 737–748. <https://doi.org/10.1037/0021-9010.91.4.737>
- Rosati, A. G., Stevens, J. R., Hare, B., & Hauser, M. D. (2007). The evolutionary origins of human patience: Temporal preferences in chimpanzees, bonobos, and human adults. *Current Biology*, 17, 1663–1668. <https://doi.org/10.1016/j.cub.2007.08.033>
- Santos, L. R., & Rosati, A. G. (2015). The evolutionary roots of human decision making. *Annual Review of Psychology*, 66, 321–347. <https://doi.org/10.1146/annurev-psych-010814-015310>
- Schweitzer, M., Hershey, J., & Bradlow, E. (2006). Promises and lies: Restoring violated trust. *Organizational Behavior and Human Decision Processes*, 101, 1–19. <https://doi.org/10.1016/j.obhdp.2006.05.005>
- Sedikides, C., & Strube, M. J. (1995). The multiply motivated self. *Personality and Social Psychology Bulletin*, 21, 1330–1335. <https://doi.org/10.1177/01461672952112010>
- Sela, L., & Sobel, N. (2010). Human olfaction: A constant state of change-blindness. *Experimental Brain Research*, 205, 13–29. <https://doi.org/10.1007/s00221-010-2348-6>
- Shao, C., Ciampaglia, G. L., Varol, O., Flammini, A., & Menczer, F. (2017). The spread of fake news by social bots. *arXiv preprint arXiv:1707.07592*.
- Shaw, G. B. (1903). *Man and Superman: A comedy and a philosophy*. Penguin.
- Shermer, M. (2002). *Why people believe weird things: Pseudoscience, superstition, and other confusions of our time*. Holt, Rinehart & Winston.
- Simon, H. (1957). *Models of Man, social and rational: Mathematical essays on rational human behavior in a social setting*. Wiley and Sons.
- Solomon, S., Greenberg, J., & Pyszczynski, T. (2015). *The worm at the core: On the role of death in life*. Random House.
- Steinel, W., & De Dreu, C. K. W. (2004). Social motives and strategic misrepresentation in social decision making. *Journal of Personality and Social Psychology*, 86, 419–434.
- Stich, S. P. (1985). Could man be an irrational animal? Some notes on the epistemology of rationality. *Synthese*, 64, 115–135.
- Surowiecki, J. (2004). *The wisdom of crowds*. Doubleday.
- Sweis, B. M., Abram, S. V., Schmidt, B. J., Seeland, K. D., MacDonald, A. W., III, Thomas, M. J., & Redish, A. D. (2018). Sensitivity to “sunk costs” in mice, rats, and humans. *Science*, 361, 178–181.
- Taylor, S. E., Kemeny, M. E., Aspinwall, L. G., Schneider, S. G., Rodriguez, R., & Herbert, M. (1992). Optimism, coping, psychological distress, and high-risk sexual behavior among men at risk for acquired immunodeficiency syndrome (AIDS). *Journal of Personality and Social Psychology*, 63, 460–473.
- Tooby, J., & Cosmides, L. (1992). The psychological foundations of culture. In J. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind* (pp. 19–136). Oxford University Press.
- Trivers, R. L. (2000). The elements of a scientific theory of self-deception. *Annals of the New York Academy of Sciences*, 907, 114–131.
- Van Vugt, M., & Park, J. H. (2009). Guns, germs, and sex: How evolution shaped our intergroup psychology. *Social and Personality Psychology Compass*, 3, 927–938.
- von Hippel, W., Lakin, J. L., & Shakarchi, R. J. (2005). Individual differences in motivated social cognition: The case of self-serving information processing. *Personality and Social Psychology Bulletin*, 31, 1347–1357. <https://doi.org/10.1177/0146167205274899>
- von Hippel, W., & Trivers, R. (2011). The evolution and psychology of self-deception. *Behavioral and Brain Sciences*, 34, 1–16. <https://doi.org/10.1017/S0140525X10001354>
- Walton, M. E., & Mars, R. B. (2007). Probing human and monkey anterior cingulate cortex in variable environments. *Cognitive, Affective & Behavioral Neuroscience*, 7, 413–422. <https://doi.org/10.3758/CABN.7.4.413>
- Watanabe, S., & Huber, L. (2006). Animal logics: Decisions in the absence of human language. *Animal Cognition*, 9, 235–245. <https://doi.org/10.1007/s10071-006-0043-6>
- Whitson, J. A., & Galinsky, A. D. (2008). Lacking control increases illusory pattern perception. *Science*, 322, 115–117. <https://doi.org/10.1126/science.1159845>
- Wortman, J., & Wood, D. (2011). The personality traits of liked people. *Journal of Research in Personality*, 45, 519–528. <https://doi.org/10.1016/j.jrp.2011.06.006>
- Zynda, L. (1996). Coherence as an ideal of rationality. *Synthese*, 109, 175–216. <https://doi.org/10.1007/BF00413767>

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