

CULTURAL EVOLUTION

Seven Key Misconceptions about Evolutionary Psychology



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Evolutionary approaches to psychology hold the promise of revolutionizing the field and unifying it with the biological sciences. But among both academics and the general public, a few key misconceptions impede their application to psychology and behavior. This essay tackles the most pervasive of these.

Misconception 1: Evolution and Learning Are Conflicting Explanations for Behavior

People often assume that if something is learned, it's not evolved, and vice versa. This is a misleading way of conceptualizing the issue, for three key reasons.

First, many evolutionary hypotheses are about learning. For example, [the claim that humans have an evolved fear of snakes and spiders](#) does not mean that people are born with this fear. Instead, it means that humans are endowed with an evolved learning mechanism that acquires a fear of snakes more easily and readily than other fears. [Classic studies in psychology](#) show that monkeys can acquire a fear of snakes through observational learning, and they tend to acquire it more quickly than a similar fear of other objects, such as rabbits or flowers. It is also harder for monkeys to *unlearn* a fear of snakes than it is to unlearn other fears. As with monkeys, the hypothesis that humans have an evolved fear of snakes does *not* mean that we are born with this fear. Instead, it means that we *learn* this fear via an evolved learning mechanism that is [biologically prepared](#) to acquire some fears more easily than others.

Second, [learning is made possible by evolved mechanisms instantiated in the brain](#). We are able to learn because we are equipped with neurocognitive mechanisms that enable learning to occur—and these neurocognitive mechanisms were built by evolution. Consider the fact that both children and puppies can learn, but if you try to teach them the same thing—French, say, or game theory—they end up learning different things. Why? Because the dog's evolved learning mechanisms are different from those of the child. What organisms learn, and how they learn it, depends on the nature of the evolved learning mechanisms housed in their brains.

An analogy with perception helps to illustrate the point. Organisms perceive by virtue of perceptual mechanisms in their brains and sense organs. To understand how these perceptual mechanisms work and what kind of output they yield, we must look to the causal process that built them: evolution. This is an uncontroversial idea when it comes to perception, but it is less widely appreciated that the same reasoning applies to learning. Organisms learn, and learning is crucial for behavior—but learning is made possible by brain-based learning mechanisms whose provenance lies in evolution. Learning and evolution are not conflicting explanations; they are natural explanatory partners.

Third, construing evolution and learning as automatically in conflict is a mistake because they are not even located at the same level of analysis: learning is a proximate explanation, whereas evolution is an ultimate one. ([The proximate level of analysis explains how something works, whereas the ultimate level explains why it works that way](#), or [why the system was built that way in the first place](#)). To say that something is a product of evolution does not imply anything about *how the behavior comes about during an organism's lifespan*: it may involve some learning, no learning, or a great deal of learning. The two kinds of explanations are thus compatible. (It *is* possible for specific evolutionary hypotheses to conflict with specific learning hypotheses, as when a particular evolutionary hypothesis yields proximate predictions that conflict with those made by a particular learning hypothesis. The point, however, is that it is not *necessary* for the two to conflict, and there are plenty of examples in which [evolution and learning are perfectly compatible](#). The mistake is to think that the two explanations are automatically in conflict simply because one involves learning and the other involves evolution.)

Misconception 2: The Products of Evolution Must Be Present at Birth (or Must Emerge Very Early in Development)

A second common misconception is that the products of evolution must be present at birth—or, at least, must emerge early in development. But [this is not how natural selection works](#): it builds adaptations that come online during the developmental phase in which they are needed, not just adaptations that are present at the arbitrarily selected moment of birth. Teeth, breasts and facial hair illustrate this well: they are all uncontested products of evolution, yet are not present at birth. Similarly, nobody doubts that birds have evolved the capacity for vision and flight, despite the fact that many hatchlings are capable of neither. [To claim that a psychological tendency or behavior is produced by evolution](#) is *not* to claim that it is present at birth, but rather that it *develops reliably in all or most members of the species during the appropriate developmental stage of the organism's life*.

In order to develop properly, the products of evolution often require certain forms of environmental input—a point that leads directly to the next common misconception.

Misconception 3: Evolution Implies Genetic Determinism

No matter how widespread the belief, an evolutionary approach to psychology does *not* imply that behavior is genetically determined. There are two ways to appreciate this point.

First, like all other life scientists, evolutionary psychologists subscribe to an interactionist view that states that everything in the mind, body and brain is jointly co-determined by genes and environment.

Second, an evolutionary perspective emphasizes the centrality of the environment, pointing out that it is crucial at every phase of the causal process: the initial evolution of adaptations, their development across the lifespan and their triggers in the immediate present. In other words, an evolutionary approach suggests that a) environmental pressures drive the evolution of adaptations in the first place, b) adaptations require environmental input to develop properly during an organism's lifespan, and c) environmental triggers are necessary to activate the adaptation in the present moment. Across all three timescales of import, an evolutionary perspective places the environment center stage.

So why do (some) people persist in believing that evolutionary psychologists are genetic determinists? One possibility is that critics may be failing to draw a distinction between the fact that adaptations have a genetic basis and the idea that adaptations are genetically determined (all adaptations have a genetic basis, but are not genetically determined). Many critics may also be unaware of the widespread view among evolutionary scientists that species-typical evolved mechanisms usually have a heritability of zero. As with other misconceptions about evolutionary psychology, critics occasionally appear to have formulated their opinions without having engaged with the primary literature in the field.

Misconception 4: If a Behavior Varies across Cultures, It Is Not a Product of Evolution

This idea makes intuitive sense, but nonetheless misses the mark. The problem is this: evolutionary thinking does not suggest that *behavior* will be uniform across cultures, but rather that *the neurocognitive machinery that produces behavior* will be uniform across cultures. This is a very different claim.

Consider language. People who grow up in different cultures learn different languages. Does this mean that language abilities are not a product of evolution?

Hardly. It simply means that natural selection has sculpted a universal ability to learn language—but the actual language you learn depends on where you grow up. Similarly, everybody in our species is equipped with mechanisms that orient us to social status—but since the markers of status may differ by culture or subculture, we grow up paying attention to the local status markers in our culture, and we learn to value and emulate those. Some evidence suggests that a similar process may be at work with disgust and with food preferences. Just because the outcomes—which foods one eats, or which language one speaks—differ across cultures, *that does not mean that the underlying psychological mechanisms that generated those behaviors also differ across cultures*. Cross-cultural variability in behavior can be, and often is, underlain by cross-cultural uniformity in the neurocognitive mechanisms that generate those behaviors.

This is a key distinction that bears repeating: most evolutionary approaches to psychology and behavior predict universality at the level of the information-processing structure of the neurocognitive mechanisms that produce behavior, not at the level of the final behavioral outputs themselves.

One way to understand this is by reference to *evoked culture*. Evoked culture refers to cultural differences between groups that arise from the combination of a universal psychological mechanism with environmental inputs that differ across cultures. This can be neatly expressed as a kind of informal equation: universal psychological mechanisms + environmental inputs that differ by culture = behavioral outputs that differ by culture.

Cultural differences in mating strategies illustrate this point. Cross-cultural studies show that differences in mating strategy across cultures can be predicted on the basis of operational sex ratio. In countries with a dearth of men, the culture tends to lean more toward short-term mating. In countries with a dearth of women, the culture tends to lean more toward long-term mating. Why? These dynamics can be understood in economic terms: the mating market is a kind of biological market in which the rarer sex has greater bargaining power. Because men, on average, have a stronger desire than women for casual sex, cultures with fewer men tend to shift toward more short-term mating. And because women, on average, have a stronger desire than men for committed mating, cultures with fewer women tend to shift toward greater commitment (note the *on average* proviso—there is plenty of variation within each sex, but studies nonetheless show a clear and robust average sex difference).

This is what is meant by *evoked culture*: a universal psychological mechanism, combined with environmental inputs that differ by culture, yields behavior that differs by culture. Crucially, [not only does the cultural variation in mating behavior not conflict with an evolutionary explanation](#), it was actually *predicted before the fact* using evolutionary reasoning. This phenomenon—evoked culture—also appears to partially explain [cultural differences in personality traits such as extraversion, openness to experience and sociosexuality](#).

The conventional wisdom in the social sciences is that cultural differences in a behavior imply that the behavior in question does not have an evolutionary basis. This seems intuitive, but the conclusion is unwarranted because evolutionary approaches to psychology predict cross-cultural universality at the level of information-processing mechanisms, not at the level of behavior. Cross-cultural variation in behavior is not only consistent with an evolutionary perspective, it can often be predicted *a priori* using careful evolutionary thinking.

Misconception 5: Evolutionary Psychology Doesn't Pay Enough Attention to Individual Differences

There is some truth to this idea, especially if you turn the clock back twenty years.

Evolutionary psychology began with a focus on species-typical mechanisms and sex differences. At first glance, individual differences—especially heritable ones—appear more challenging from an evolutionary perspective, and it took researchers a while to start tackling the subject in earnest. Seminal early attempts included papers like [this one](#), [this one](#), [this one](#) and [this one](#).

More recently, evolutionary psychologists' interest in individual differences has grown apace, and we're seeing progress in both explanation and prediction. Some recent theoretical papers tackling individual differences include [this one](#), [this one](#), [this one](#), [this one](#) and [this one](#). Some recent empirical papers tackling specific individual differences include [this one on extraversion](#), [this one on sexual jealousy](#), [this one](#) on disgust and mating strategy, [this one on body odor](#), [this one on personality trait covariation](#), [this one on contributions to the public good](#), [this one on moralizing behavior](#), [this one on the effect of parasites](#) and [this one on a variety of individual difference variables](#). It is also common to see sections dedicated to individual differences in other, broader papers, such as [this one on sex differences](#)

[in jealousy](#) and [this one](#) on emotions, or papers that advance hypotheses about individual differences, such as [this one on the psychology of hunger](#). And [here](#) is an entire paper devoted to context effects, which are an important driver of individual differences in behavior.

[Entire volumes](#) in evolutionary psychology are now dedicated to the topic, as are [chapters in handbooks dedicated to personality psychology and individual differences](#).

So, yes, it is true that evolutionary approaches to psychology began with the low-hanging fruit of universal and sex-typical mechanisms, but the last twenty years have witnessed a naissance of interest in individual differences, including increased emphasis on within-sex variation. This trend shows no sign of abating, and is likely to grow in scope, importance and empirical harvest over the coming years.

Misconception 6: Evolutionary Psychologists Think That Everything is an Adaptation

This canard just won't die—though it is tenable only if you read [misinformed critiques rather than the actual primary literature](#) in the field.

In their published writing, [evolutionary psychologists frequently state explicitly that evolution yields three kinds of products: adaptations, byproducts and noise](#).

Beyond this theoretical statement, researchers also propose hypotheses about byproducts and conduct studies on byproducts.

For example, [here](#), [here](#) and [here](#) are three conceptual papers that explicitly reject the notion that all aspects of our psychology are adaptations. [This paper](#) on adaptations, exaptations and spandrels explicitly discusses byproducts at length. [This paper](#) thoughtfully addresses the question of how to carry out an exaptationist program in psychology. [Here](#) is a study suggesting that racism is an evolutionary byproduct, not an adaptation, and that it can be erased. [Here](#) is a paper suggesting that the higher prevalence of sexual fetishism among men is a byproduct of their easier-to-cross thresholds of sexual arousal combined with their biased sexual learning mechanisms. [Here](#) is an example of two prominent evolutionary psychologists claiming that homicide is a byproduct, not an adaptation, and [here](#) are the same two researchers (along with a third co-author) claiming that uxoricide and filicide are also byproducts. [Here](#), [here](#) and [here](#) are examples of researchers

explaining religion and belief in supernatural agents as a byproduct of other mechanisms, such as agency-detection mechanisms that are biased toward false positives, theory of mind mechanisms and [the attachment system](#). My colleagues and I recently submitted a chapter titled “The Products of Evolution” to a new handbook of evolutionary psychology, and, unsurprisingly, byproducts are a central part of the chapter.

The disparity between this criticism of evolutionary psychology and what evolutionary psychologists actually say in their published work is remarkable. The only reason it isn’t surprising is that there are many other examples of misrepresentations of the field—you can find some good examples of such misrepresentations [here](#), [here](#), [here](#) and [here](#).

Part of the problem is a philosophical disagreement about what adaptationism means. As many evolutionary psychologists understand the term, adaptationism is *not* a commitment to the idea that all or most features of our psychology will turn out to be adaptations once we’re done studying them. Rather, it is a [heuristic](#) and a methodological approach that involves testing hypotheses about potential adaptations—and then rejecting those hypotheses if the evidence is not in their favor. In other words, adaptationism is a working starting point and a [research strategy](#) that yields [testable hypotheses](#), not some kind of religious commitment to the notion that a particular trait will turn out to be an adaptation before the trait in question has even been investigated. As a working method and a research strategy, it has [borne a lot of fruit](#). As an unquestioned assumption, it would indeed be terrible—but [working evolutionary psychologists don't seem to use it that way](#). Observers can easily be forgiven for thinking that they do, because audiences have been repeatedly told so by prominent [authors such as Stephen Jay Gould](#), who had a documented tendency to [misrepresent his interlocutors' views](#).

Misconception 7: Evolutionary Psychological Hypotheses Are Just-So Stories

It’s much easier to maintain this misconception [if you don't engage with the primary literature in evolutionary psychology](#). I’ve discussed this misunderstanding [here](#), but would like to address it again for a broader audience in this essay. For those who aren’t familiar with the term, *just-so* storytelling refers to the unscientific process by which a psychologist notices something about human behavior, concocts a convenient explanation for it (in this case, an evolutionary one) and then decides to believe that explanation without further inquiry or testing.

There are two basic approaches to hypothesis testing in science. The first is the top-down method: the researcher uses a theory to generate a hypothesis, derives specific predictions from that hypothesis, and proceeds to test those specific predictions. It is almost impossible to make the mistake of just-so storytelling using the top-down approach, because the researcher is making predictions *a priori* on the basis of theory. [Much research in evolutionary psychology employs this approach, beginning with theory and proceeding from there.](#)

The second approach to hypothesis testing is the bottom-up approach: the researcher notices something about human behavior or psychology, comes up with a hypothesis that might explain that behavior, then uses this hypothesis to generate new predictions, and finally tests those predictions. Both of these approaches are normal and productive parts of science, but this second one (bottom-up) can *potentially lapse* into just-so storytelling *if the researcher stops halfway through and simply accepts the explanation he or she has concocted without bothering to derive and test any new predictions from it*. A researcher who does this is guilty of just-so storytelling. Fortunately, however, very few researchers in *any* scientific discipline make this egregious mistake (and in my experience, with a little effort you can even get undergraduate psychology students to avoid it).

If you survey the primary literature in evolutionary psychology, you'll notice two things: 1) a lot of evolutionary psychological work employs the top-down approach, rendering this research essentially immune to the just-so charge. And 2) most of the bottom-up evolutionary research does not stop halfway through the process; rather, the researchers usually generate novel predictions from the hypothesis they just concocted, and proceed to test those novel predictions in new empirical studies. This means that most bottom-up work in evolutionary psychology appears not to fall into just-so storytelling either.

So why do so many people persist in the notion that evolutionary psychological hypotheses are just-so stories? Here's a potential partial explanation. People might be under the impression that because 1) evolutionary psychology involves a historical element, and 2) we can't peer directly into the past, this means that evolutionary psychological hypotheses are ultimately untestable, and must therefore be just-so stories. This kind of thinking is tempting, but it is wrong—and it misunderstands the nature of hypothesis testing.

First, consider the fact that if it *were* true that hypothesis testing is ultimately impossible in any field that contains a historical element, this would make all of the following fields unfalsifiable and riddled with just-so nonsense: cosmology, astrophysics, paleontology, archeology, geology and evolutionary biology. This is obviously wrong, and should serve as a warning sign to those who think the historicity of evolutionary psychology automatically renders its hypotheses unfalsifiable.

Second, this misunderstands the nature of hypothesis testing. Evolutionary psychologists don't need to travel into the past to test their hypotheses at all—instead, their hypotheses may be informed by their (admittedly incomplete) knowledge of the past, but these hypotheses *yield empirical predictions about what we should expect to see in the modern world*. In other words, an evolutionary psychological hypothesis yields predictions about *what we should find when we test modern humans under condition X*. For example, if we want to test the hypothesis that disgust evolved to protect us from disease, we don't need to travel back in time, nor do we need to have perfect and complete knowledge of the past. Rather, testing this hypothesis requires that we go out and test *modern* humans to see if, for example, people show stronger disgust in response to more pathogenic items compared to less pathogenic ones ([they do](#)), whether those with higher disgust and greater contamination sensitivity are less likely to have gotten sick recently ([they are](#)), whether humans can detect sickness in others via body odor ([they can](#)), whether disgust is downregulated when caring for one's kin ([it is](#)), whether disgust is linked with mating behavior in the expected manner ([it is](#)), whether it activates an immune response ([it seems to](#)), whether it is upregulated during periods of immunosuppression ([it appears to be](#)) and whether priming people with pathogen salience makes them engage in the kind of behavior that reduces their likelihood of infection ([it does](#)). Yes, the hypothesis that disgust evolved to protect us from disease contains an implicit historical element. But testing the hypothesis does not require the researcher to travel through time or to peer into history—*testing it requires the researcher to derive novel predictions from the hypothesis and test those predictions in the modern day*.

This, I believe, is the crux of the issue. It is tempting to think that the partial historicity of evolutionary hypotheses renders them unfalsifiable, but this misunderstands the notion of falsifiability and the nature of hypothesis testing. As

long as evolutionary hypotheses yield predictions about humans that can be tested in the modern environment—and they do—[they are eminently falsifiable](#).

Conclusion

The point of this essay is not to suggest that evolutionary approaches to psychology are perfect. They are not, and there is certainly room for improvement. However, the widespread misconceptions discussed in this essay have impeded the field's acceptance among both academics and the general public. And given that these concerns are largely unfounded, many people's rejection of evolutionary psychology has little to do with its actual merits and limitations, and is predicated instead on a foundation of misconceptions.

Perhaps more importantly, these misconceptions impede the progress of psychology as a whole, because the science of mind and behavior cannot reach its full potential if it ignores evolution. There is simply no escaping the fact that our brains are a product of evolution, and that this has important consequences for how our minds work.

Scientists overwhelmingly agree that evolutionary theory is the integrative paradigm of the life sciences: it unites many different disciplines, explains a huge variety of known findings and predicts a dizzying array of new ones. Psychology is a life science too. It cannot help but fall under this umbrella.

Evolutionary approaches to psychology continue to make theoretical advances every year and yield new empirical discoveries every month. Instead of tilting at evolutionary psychological windmills, it's worth making a good-faith effort to engage with what researchers in the field are actually saying and doing. Readers who do so may be surprised to see that what they find is often strikingly different from the straw men one comes across so often in the secondary literature. They may also reap a wonderful theoretical and empirical harvest, and begin to understand human psychology in a new light.