

Evolved Psychological Mechanisms: The Roots of Human Behavior

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At a proximal level, evolutionary psychology is based on the hypothesis that, just like hearts, lungs, livers, kidneys, and immune systems, cognition has functional structure that has a genetic basis, and therefore has evolved by natural selection. Like other organs and tissues, this functional structure should be universally shared amongst a species, and should solve important problems of survival and reproduction. Evolutionary psychologists seek to understand psychological mechanisms by understanding the survival and reproductive functions they might have served over the course of evolutionary history.

While philosophers have generally considered human mind to include broad faculties, such as reason and lust, evolutionary psychologists describe EPMs as narrowly evolved to deal with specific issues, such as catching cheaters or choosing mates.

Some mechanisms, termed domain-specific, deal with recurrent adaptive problems over the course of human evolutionary history. Domain-general mechanisms, on the other hand, deal with evolutionary novelty.

Products of evolution: adaptations, exaptations, byproducts, and random variation

Not all traits of organisms are adaptations. As noted in the table below, traits may also be exaptations, byproducts of adaptations (sometimes called "spandrels"), or random variation between individuals. For more on these distinctions, see Buss, et al., (1998).

Psychological adaptations are hypothesized to be innate or relatively easy to learn, and to manifest in cultures worldwide. For example, the ability of toddlers to learn a language with virtually no training is likely to be an psychological adaptation. On the other hand, ancestral humans did not read or write, thus today learning to read and write require extensive training, and presumably represent byproducts of cognitive processing that use psychological adaptations designed for other functions.

One of the tasks of evolutionary psychology is to identify which psychological traits are likely to be adaptations, byproducts or random variation. George C Williams in his book *Adaptation and Natural Selection*, suggested that an "adaptation is a special and onerous concept that should only be used where it is really necessary". As noted by Williams and others, adaptations can be identified by their improbable complexity, species universality, and adaptive functionality.

Obligate vs. Facultative Adaptations

An important question to ask about an adaptation is whether it is generally obligate (relatively robust in the face of typical environmental variation) or facultative (sensitive to typical environmental variation)? The sweet taste of sugar and the pain of hitting your knee against concrete are the result of fairly obligate psychological adaptations -- typical environmental

variability during development does not much affect their operation. On the other hand, facultative adaptations are somewhat like "if-then" statements. For example, adult attachment style seems particularly sensitive to early childhood experiences. As adults, the propensity to develop close, trusting bonds with others is dependent on whether early childhood caregivers could be trusted to provide reliable assistance and attention. The adaptation for skin to tan is conditional to exposure to sunlight -- this is an example of another facultative adaptation. If a psychological adaptation is generally facultative, evolutionary psychologists are particularly interested in learning how specific types of developmental and current environmental inputs influence the expression of the psychological adaptation.

Cultural Universals

Evolutionary psychologists hold that behaviors or traits that occur universally in all cultures are good candidates for evolutionary adaptations. Cultural universals include behaviors related to language, cognition, social roles, gender roles, and technology.

Environment of Evolutionary Adaptedness

EP argues that to properly understand the functions of the brain, one must understand the properties of the environment in which the brain evolved. That environment is often referred to as the "environment of evolutionary adaptedness" (EEA).

The term "environment of evolutionary adaptedness" was coined by John Bowlby as part of attachment theory. It refers to the environment to which a particular evolved mechanism is adapted. More specifically, the EEA is defined as the set of historically recurring selection pressures that formed a given adaptation, as well as those aspects of the environment that were necessary for the proper development and functioning of the adaptation.

Human EEA

Humans, comprising the genus *Homo*, appeared between 1.5 and 2.5 million years ago, a time that roughly coincides with the start of the Pleistocene 1.8 million years ago. Because the Pleistocene ended a mere 12,000 years ago, most human adaptations either newly evolved during the Pleistocene, or were maintained by stabilizing selection during the Pleistocene. Evolutionary psychology therefore proposes that the majority of human psychological mechanisms are adapted to reproductive problems frequently encountered in Pleistocene environments. In broad terms, these problems include those of growth, development, differentiation, maintenance, mating, parenting, and social relationships.

The EEA is significantly different from modern society. Our ancestors lived in smaller groups, had

more cohesive cultures, and had more stable and rich contexts for identity and meaning. Researchers look to existing hunter-gatherer societies for clues as to how our hunter-gatherer ancestors lived. Since hunter-gatherer societies are egalitarian, the ancestral population may have been egalitarian as well, a social pattern different from the hierarchies found in chimp bands. Unfortunately, the few surviving hunter-gatherer societies are different from each other, and they have been pushed out of the best land and into harsh environments, so it is not clear how closely they reflect ancestral culture.

Evolutionary psychologists sometimes look to chimpanzees, bonobos, and other great apes for insight into human ancestral behavior. Christopher Ryan and Cacilda Jetha argue that evolutionary psychologists have overemphasized our similarity to chimps, which are more violent, while underestimating our similarity to bonobos, which are more peaceful.

Mismatches

Since an organism's adaptations were suited to its ancestral environment, a new and different environment can create a mismatch. Because humans are mostly adapted to Pleistocene environments, psychological mechanisms sometimes exhibit "mismatches" to the modern environment. One example is the fact that although about 10,000 people are killed with guns in the US annually, whereas spiders and snakes kill only a handful, people nonetheless learn to fear spiders and snakes about as easily as they do a pointed gun, and more easily than an unpointed gun, rabbits or flowers. A potential explanation is that spiders and snakes were a threat to human ancestors throughout the Pleistocene, whereas guns (and rabbits and flowers) were not. There is thus a mismatch between our evolved fear-learning psychology and the modern environment.

This mismatch also shows up in the phenomena of the supernormal stimulus- a stimulus that elicits a response more strongly than the stimulus for which it evolved. The term was coined by Nobel Laureate Niko Tinbergen to describe animal behavior, but Harvard psychologist Deirdre Barrett has pointed out that supernormal stimulation governs the behavior of humans as powerfully as that of animals. She explains junk food as an exaggerated stimulus to cravings for salt, sugar, and fats, and she describes how television is an exaggeration of social cues of laughter, smiling faces and attention-grabbing action. Magazine centerfolds and double cheeseburgers pull instincts intended for an EEA where breast development was a sign of health, youth and fertility in a prospective mate, and fat was a rare and vital nutrient.