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## Environment of Evolutionary Adaptedness (EEA)



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### Synonyms

[Ancestral environment](#); [Environment of evolutionary adaptedness](#); [Niche](#)

### Definition

The environment of evolutionary adaptedness (EEA) is the ancestral environment to which a species is adapted. It is the set of selection pressures that shaped an adaptation.

### Introduction

A central premise of evolutionary science is that forces in our distant past helped make us who we are today. The environment of evolutionary adaptedness (EEA) refers to a group of selection pressures occurring during an adaptation's period of evolution responsible for producing the adaptation (Tooby and Cosmides 1992). A selection pressure can be any factor in a population that impacts reproductive success. Physical, social,

and intrapersonal pressures from our ancestral past help to shape our current human design because all animals have heritable variations that are selectively favored or disfavored in accordance with reproductive success (Buss 1999). Each adaptation has its own EEA, or set of adaptive problems, that shaped it over evolutionary time.

### Not an Actual Place

The EEA does not exist as a single geographical location during a discrete period of time during human evolution. Rather it is a set of selection pressures that formed a given adaptation. For example, ancestral humans faced the adaptive problem of securing and digesting food to maximize energy. Taste buds were shaped in response to this adaptive problem. Our ancestors who showed a preference for salt, fat, and sugar were selectively favored over those individuals who did not have similar preferences. The acquisition of salt, fat, and sugar would have been challenging for our ancestors given the absence of agriculture and the inability to mass produce high concentrations of those items. The probability of survival and reproduction for individuals who showed a preference for those foods would have been greater than for those who did not. Our taste preferences were shaped in response to the problems posed by this environment.

Organisms living in different environments faced different sets of adaptive problems. Every species has a unique EEA – this is why not all animals are the same. Humans and turtles, for example, faced different reproductive problems and therefore have different adaptations. Even animals that coexisted in the same geographic space during a similar time period have different EEAs because they faced different reproductive challenges.

## Origins of EEA

The idea of EEA was first proposed by John Bowlby (1969) in the context of attachment theory. He described it as conceptual space – not a specific place – that describes the conditions and properties in which adaptation occurs: “In the case of biological systems, structure takes a form that is determined by the kind of environment in which the system has been in fact operating during its evolution. . . This environment I propose to term the system’s ‘environment of adaptedness.’ Only within its environment of adaptedness can it be expected that a system will work efficiently” (p. 47).

## Modern World and EEA Mismatch

An adaptationist approach to studying behavior involves understanding the environment in which the brain evolved. However, the modern industrialized world of today differs in many important respects from the EEA. This mismatch serves as a useful starting point for understanding the function and design of current psychological mechanisms. The list of novelties offered by our modern world but not present in the EEA includes agriculture, electricity, refrigeration, large-scale weapons, medicines, mass communication, effective contraceptive devices, and virtually unlimited access to all types of proteins and carbohydrates. We are navigating our current social and physical world with psychological mechanisms designed to solve problems associated with survival and

reproduction in an ancestral environment much different than the one we live in now.

Because adaptations evolved over many generations, they are said to be “in tune” with reliable features of the environment. It is possible for an adaptation to fail to perform properly (i.e., fall “out of tune”) if the environment changes. A behavior that is maladaptive in one environment may not be maladaptive in other environments. Returning to an earlier example, one could make the case that salt, fat, and sugar negatively impact health when consumed in large quantities over long periods of time. However, this is not evidence of maladaptivity in the EEA. Moreover, the “lack of fit” to the current environment does not change the intense desire for those substances formed in the EEA.

One approach to uncovering the selection pressures responsible for a trait is to use “reverse engineering” to figure out the adaptive problems the trait was designed to solve (Pinker 1997). In other words, “what in the EEA was this behavior designed to solve”? The function of a trait provides an indirect historical record of the selection pressures involved in shaping the trait.

The current universality of certain emotions can provide insight into the adaptive problems confronted by our ancestors. For example, the concepts of anger and aggression appear in every culture. This suggests that evolutionary pressures in our distant past selected and shaped the emotion of anger and the behavior of aggression in response to specific adaptive problems posed by the environment. Parental anger, for instance, can be triggered in a mother or father if offspring are being threatened. This emotional/behavioral response is adaptive in current environments and can be traced back to ancestral ones.

For the first 5 million years of hominid history, our ancestors lived in small, nomadic bands of hunter-gatherers. These groups were likely made up of no more than 30–50 individuals; thus many of our psychological adaptations are in tune with small communities. This psychological design poses a problem for tackling modern-day, large-scale global issue like environmental destruction, mass migration, and geopolitical conflict. Agriculture and modern city environments

were nonexistent for 99% of human history. Because these human inventions emerged only in the past 10,000 years, we are relying on psychological mechanisms shaped in our ancestral past to help us navigate the social and physical complexities of the world today.

There is a competition between the demands of selfish decision-making shaped in the EEA and the less selfish altruistic desire required to ensure long lasting peace and cooperation on a global stage. The needs of the individual end up competing against the needs of the larger group. Our psychological structure was designed to benefit the propagation of our genes through direct and indirect means and to promote non-kin reciprocal alliances in close proximity (i.e., the people we interact with frequently). For almost all of human history, we have not had to solve massive global population problems. Simply put, the EEA did not design efficient mental machinery for solving problems involving large groups of strangers we will never meet or see.

## Conclusion

The EEA for any species is the amalgamation of reproductive problems faced by members

of that species over evolutionary time and is an important concept for understanding the functional properties and organization of the brain. Many human preferences and behavioral decision-making algorithms are adapted to the EEA and not necessarily the modern environment.

## Cross-References

- ▶ [Developmental Evolutionary Psychology](#)
- ▶ [Evolutionary Equilibrium Models](#)
- ▶ [Evolutionary Perspective](#)

## References

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