

## **Erro, Ergo Sum: An Evolutionary Map for Consciousness, Cognition and Free Will**

**By Andrew W. Notier**

There is a truism that emerges time and time again from our reflections on humanity: Life appears to be unique in the universe in its ability to produce erroneous information, and human beings have the ability to generate these errors on a staggering scale. When a person acts in response to inaccurate information, this creates a condition in which there are behavioral changes resulting from something that is not real. The strangeness of this situation in a universe governed by the laws of physics is so normal to our experience as humans that remarking upon it seems like a platitude.

Although errors vary greatly in nature and degree, this discussion will focus on the most fundamental manners in which we might err, which will be referred to as perceptual errors. These occur when sensory information is either ambiguous or misinterpreted, and suffers an encoding error from which we derive an inaccurate picture of reality. The theory proposed is a framework in which consciousness, cognition and free will may have emerged from a single evolutionary adaptation to safeguard against these perceptual errors.

Perceptual errors are evidenced in all manner of living creatures misinterpreting their environment to various effects. A breeze on someone's arm can feel like a crawling bug and elicit a startled reaction. A cat may leap in terror at the sight of a surreptitiously placed cucumber. Dogs will raise their heads and howl along with the passing siren of an emergency vehicle. Predators and prey alike use camouflage to deceive the eyes, so that even though the visual information needed to perceive the creature is collected by the observer, it is misunderstood.

The consequences of these perceptual errors can range from zero to catastrophic, depending on the resultant behavioral change. The person who mistakes the breeze on their arm for an insect may simply cast a glance at the spot in question to see that there is no bug, and then go on about their business. A moth that does not understand the stick it is alighting beside is a praying mantis will find the consequence of its error fatal. It is the severe end of the consequence spectrum which is most relevant to our experience.

Given that behavioral changes elicited by perceptual errors can result in injury or death, it follows that an evolutionary adaptation that could serve as a safeguard against these mistakes would be selected for. A system that could interrogate sensory information for corrupted data would be a powerful tool for survival. But what would such a system need to consist of in order to be effective? An adaptation capable of carrying out this function would require four distinct features: *separateness*, *data access*, *evaluative*

*facility*, and *authority to act*. The necessity for the emergence of each of these four features and how they combine to provide a useful evolutionary tool is discussed below.

First, this evolutionary tool would have to develop as a discrete system from the ones it is designed to arbitrate. If the purpose of the adaptation is to intervene in the process that occurs between perception and behavior in order to avoid catastrophic mistakes, the system must stand outside of that process. It is from this requirement for *separateness* that we experience our own consciousness. A self-referential construct distinct from the other facets of our own minds emerged because this system of consciousness must stand between sensory information and potential catastrophe as the observer and evaluator of our own experience.

Second, this consciousness would require *data access* to two other systems of the brain: sensory information and memory. If its function is to evaluate sensory data for errors, it obviously must be able to retrieve these data. In order to perform an evaluative process of interrogating sensory data for validity, access to memories is required to use as a comparative framework. Although memories are clearly capable of being wrong, we do not seem to be very good at assessing our own memories for veracity. It follows then that access to memories serves as a reference library of knowledge and experience from which to draw conclusions about the sensory data we observe. We cannot access the information and processes stored in other areas of the brain because there is no reason for consciousness to interact with those systems in order to fulfill its purpose.

Third, this adaptation requires the ability to perform evaluations by comparing sensory data to memories and draw conclusions based on those evaluations. This *evaluative facility* is the root of cognition and reason. The most primitive forms of this process may involve a very simple comparative reference of sensory input and memory and resultant behavioral recalibrations. As this faculty evolves, we see increasingly sophisticated and deliberative reasoning techniques, followed by subsequently complex behavioral interventions. The most developed form of this *evaluative facility* presently culminates with human cognition.

The fourth and final element required of an adaptation that evolved to intervene in perceptual errors is the *authority to act*. This mental system of a conscious observer and evaluator can only be successful in avoiding catastrophe if it is granted the free will to act on the conclusions it draws. However, there is no evolutionary rationale for the exercise of free will to extend to every facet and function of the body. For this reason we find that the conscious mind is capable of motor control but does not participate in the production of red blood cells, for example. As with the access granted to sensory information and memory, only the controls necessary to avoid the negative consequences of perceptual errors are provided to the system.

This theory of the evolution of consciousness provides a conceptual framework which may confirm some of the most deeply held intuitions we have of ourselves as

human beings. That we are mistake-makers and truth-seekers. That, in a very literal sense, the quest for knowledge and understanding in order to limit suffering is the purpose of our conscious selves. Perhaps most importantly, that we are in possession of a free will to choose our behaviors in accordance with the truths we uncover.

### **Postscript: The Apple**

The existence of errors among living creatures bears further consideration, as humanity is clearly not unique in its ability to misinterpret their environment. It seems there must have been a primordial error at some point in history. A piece of information was somehow stored that did not accurately reflect reality. Imagine that a chemical reaction between organic compounds takes place. One of the reagents has somehow stored incorrect information about the world outside of itself, resulting in a perturbation in the response. How do the laws of physics predict what happens next? The question of the first error might be metaphorically thought of as the quest for the Apple of Eden. Only the Apple is not the inheritance of humankind alone, but all of life. Perhaps some time in the distant future, we will unravel all of the wrongs and in some fashion return to grace.

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Email: [awnotier@gmail.com](mailto:awnotier@gmail.com)