

Abstract

All too often, the debate about free will is lost in dichotomies. Determinists claim that all our actions are predetermined since the big bang. If physicists state that the universe is not deterministic, it is argued that random chance cannot be considered 'free' either. Biologists, in whose domain the inner workings of the brain, the organ endowing us with the capacity of choice, surely falls, have enjoyed more than 150 years of dichotomous discussions between determinism and chance. While it has taken society almost that long to accept and understand the tight collaboration between chance and necessity in evolution, rendering it a truly composite process, most biologists have long given up such dichotomous approaches. Today, the study of chance in biology is no longer confined to mutation or recombination, but plays a central role in studies of, e.g., stochastic resonance, or intra- and interindividual behavioral variability. In order to study the sources of intraindividual variability, it is paramount to exclude sources of variability arising from sensory processing, which may confound the interpretation of any experimental manipulations. Therefore, such experiments are conducted in preparations where behavioral choices are recorded in the absence of either sensory stimuli or sensory organs. These experiments provide evidence for nonlinear processes on the molecular level that appear evolved in order to generate exploratory behavioral variability in ethological circumstances where the most successful behavior cannot be predicted.