

Intertemporal choice in simulated robots

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After an initial emphasis on finding what mathematical model (typically a delay discounting function) would better fit the empirical data, current research on intertemporal choice has identified new priorities: most notably, the need to investigate the cognitive mechanisms that produce the observed behavioral patterns, and to trace their evolutionary roots. To this purpose, it is helpful to develop methods for studying the interaction between evolution, ecology and behavior directly and with significant control on all the relevant variables. In this paper, we discuss the viability of an approach based on evolutionary robotics. The basic idea is to evolve populations of simulated robots under specific ecological pressures, and then observe their behavior under laboratory conditions, with the aim of drawing interesting implications for the understanding of natural organisms faced by similar tasks. Let us label this methodology *experimental evolutionary robotics*, to stress the fact that these robots are studied not only in the ecology where they evolve, but also under artificial laboratory conditions. In particular, here we describe a series of studies where simple robots evolve in an environment containing different types of food, and then are required to make various intertemporal choices between such foods. Our results, albeit preliminary, will serve to highlight both strengths and weaknesses of this approach. Crucially, such strengths and weaknesses turn out to be complementary to those characteristic of behavioral studies in psychology, economics, and biology, thus arguing in favor of an integrated approach to decision making in both natural and artificial organisms.

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