

Models of Artificial Life: Herbert Simon and Evolutionary Computation

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Extended Abstract

Herbert Simon is justly regarded as the father of artificial intelligence and even of the fields of computer science and cognitive science as we currently conceive them. His Nobel Prize was in economics, but he also made significant contributions to philosophy, political science, psychology, public policy, and beyond. Among his nearly a thousand publications, were many that dealt with issues of causality, complexity, problem solving, the discovery process, learning, scientific theory testing, simulation and modeling, and even consciousness. Many of his research interests revolved around questions about decision-making under conditions of uncertainty, which he took to be the usual case for both organizations and individuals. Human beings have “bounded rationality” and so are not in a position to optimize their choices, but rather must “satisfice”. Notably absent from this amazing body of work, however, is much about biology. Though many of the ideas Simon investigated are directly or indirectly relevant to artificial life research, he never had the opportunity to consider what light his AI research might shed on ALife and vice versa. This is a significant loss, as ALife is an especially important case by which to consider Simon's theses about the “sciences of the artificial.” (Simon 1984) What might he have said about what each field could learn from the other? This article reviews some of Simon's distinctive notions about models and model-based reasoning in AI and outlines the beginning of an answer. In particular, it considers how current work in digital evolution builds upon, extends and in some cases overturns Simon's ideas about complexity, discovery, learning, intelligence and more. It concludes by highlighting how the ALife “bottom up” approach of digital evolution provides a radically different perspective on artificial intelligence that complements Simon's “top-down” approach and opens up promising new avenues of investigation.

References

Simon, H. A. (1984). *The Sciences of the Artificial* (2nd ed.). The MIT Press, Cambridge, MA.