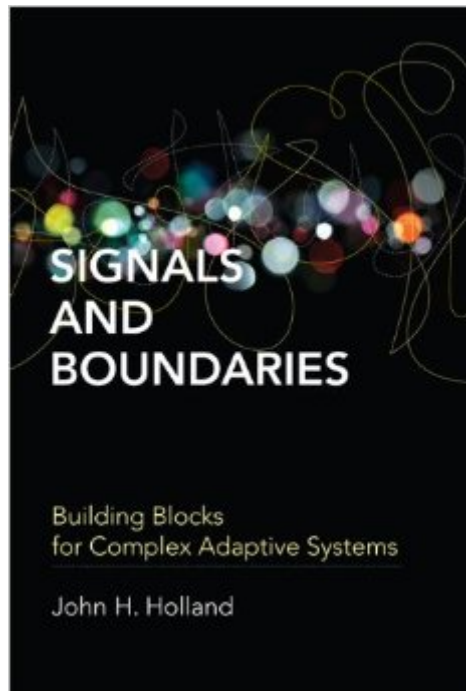


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# Signals And Boundaries: Building Blocks For Complex Adaptive Systems (MIT Press)



## Synopsis

Complex adaptive systems (cas), including ecosystems, governments, biological cells, and markets, are characterized by intricate hierarchical arrangements of boundaries and signals. In ecosystems, for example, niches act as semi-permeable boundaries, and smells and visual patterns serve as signals; governments have departmental hierarchies with memoranda acting as signals; and so it is with other cas. Despite a wealth of data and descriptions concerning different cas, there remain many unanswered questions about "steering" these systems. In *Signals and Boundaries*, John Holland argues that understanding the origin of the intricate signal/border hierarchies of these systems is the key to answering such questions. He develops an overarching framework for comparing and steering cas through the mechanisms that generate their signal/boundary hierarchies. Holland lays out a path for developing the framework that emphasizes agents, niches, theory, and mathematical models. He discusses, among other topics, theory construction; signal-processing agents; networks as representations of signal/boundary interaction; adaptation; recombination and reproduction; the use of tagged urn models (adapted from elementary probability theory) to represent boundary hierarchies; finitely generated systems as a way to tie the models examined into a single framework; the framework itself, illustrated by a simple finitely generated version of the development of a multi-celled organism; and Markov processes.

## Book Information

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## Customer Reviews

Can complex adaptive systems be steered? John Holland has two or three objectives in this book but his ultimate goal "is to tie these mechanisms (tags and conditional interactions between agents) into a single overarching framework that suggests ways to steer complex adaptive systems by modifying signal/boundary hierarchies". What Holland does better than anyone is to explain the process of building blocks for adaptation in complex adaptive systems. This work is true to his long held theory that finding the "rules of the game" will lead to making principled predictions and choices, "such as directing movement toward a desired outcome". But, does he make the case for steering complex adaptive systems in this book? My understanding has been that you can direct the movement of a living system by modifying the behavior of the agents in a current time frame but not over a long time frame as the whole will at some point revert back to its own purpose. He does not mention purpose as one of the characteristics of CAS as it is not something that can be measured or quantified. About the closest he will get to the concept of purpose is when he describes building blocks generating internal models in his earlier book, Hidden Order. These models are interior to the agent and they anticipate and implicitly predict a future state but this is a purpose for current time only. Holland focuses on tags and the building block process that is generated by the interactions between agents. Understanding the building blocks to emergence is challenged at every turn by nonlinearity but he is a guy who will only reflect on rules he can derive from measurement and verification.

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