Functions and Ecological Resilience

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Abstract

Session: Functions in Complex Systems (Gillian Barker, Zac Munroe, Martin Vezer) The systems view of functions seems well-suited for understanding ecological functions: It makes sense of several of their distinctive and puzzling features, in particular their appearance of possessing some but not all of the attributes of evolved organismal functions. But applying the systems view to ecosystem functions also presents distinctive problems whose resolution may cast useful light on the notion of function more generally. The systems view understands functions as linked to stability: to the maintenance over time or reproduction over generations of a particular system structure. If ecosystems are understood as stable systems characterized by negative feedback relationships that maintain equilibrium values for key variables, the systems view seems easy to apply. But the development of a more complex view of ecosystems, that recognizes that ecosystems are not simple equilibrium systems but are subject to chaotic change at various levels of organization, presents challenges for the systems view. Replacing the notion of stability (simple maintenance and reproduction) with that of ecological resilience provides a modified version of the systems view that can be applied to ecosystem functions. The picture that results offers an interesting perspective on broader issues concerning functions, including the relationship between functions at different levels or organization; the relationship between "natural" and "artificial" functions; and the role of functions not just in maintaining stability but in driving organic change.

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