

NETWORKING NETWORKS

ORIGINS, APPLICATIONS, EXPERIMENTS

EDITED BY MANFRED FÜLLSACK

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INTRODUCTION - NETWORKING NETWORKS

The network approach to scientific investigation is spreading. The last two decades experienced a dynamic diffusion of attention for network issues. Disciplines like physics, chemistry, biology, mathematics, computer sciences, sociology, economics, even geography, linguistics or historiography, left alone interdisciplinary endeavors like systems sciences or complexity research, swiftly adopted the approach and adapted it to their demands. This was accompanied by the need to reconsider fundamental assumptions of classical research. While analytics so far often focus on attempts to isolate objects under laboratory conditions in order to observe them unperturbed by the particularities of daily contexts, the network approach forces to respect interrelations. Networks make it difficult to regard objects on their own. Whatever is conceived as a node in a network is conceived in relation to other nodes. There is no single and thus relation-less node. Even if unconnected, a node has the *relation* of being unconnected to others. In some sense, in networks a node is always *to others*.

Of course, this raises difficult questions – for instance related to delimitations. Where does one network begin and where does another one end? Where does a chain of causations begin and up to where last its effects? What do the nodes of a network consist of? And what its links?

In addition, complex networks have their own peculiar ways. Their interactions tend to aggregate to what has been called “*more than the sum of their parts*”. Like *systems* in the classical sense, they create and follow an *eigen-behavior* and thereby tend to become *realities sui generis*. Therefore it seems legitimate to speak of *networking networks*, as Loet Leydesdorff (2012) suggests. The activity of a single protein might look different in the context of its interactome, in the same way as a simple text message might take on particular meaning when seen in its context of Tweets or a consumer decision might have different impact in the context of market transactions.

What is more, in its specificity the network approach asks for specific means. The relevancies of internet pages for instance, the interactions in social networks or the neuronal activity patterns in our brain ask for particular methods to be assessed. With one powerful instance of these methods being computer-based modeling, it seems natural that the *Viennese Network for the Simulation of Complex Systems* has dedicated a part of its activities to the topic of networks, their origins, their methods and their applications. This reader contains some of the presentations that were given by members of this network on the occasion of its regular meetings in the venue of the *Viennese Institute for Science and Art (Institut für Wissenschaft und Kunst, IWK)*. The presentations have been put together in order to document the proceedings of this research network and to provide an accessible, though compact overview on the scope that the network approach meanwhile developed. As its editor is affiliated to the Institute for Systems Sciences, Innovation and Sustainability Research (ISIS) at

the University of Graz, this reader also appears as part of the ISIS-Reports, i.e. the periodic publication series of this institute.
Special thanks go to Sandra Viczek for copy editing and formatting this reader.

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Leydesdorff, L. (2012). Is Communication Emerging or Sui Generis? Constructivist Foundation 8(1), p. 111.