

Complex Systems – notes

Olaf Sporns (2007), Scholarpedia, 2(10):1623.
<http://www.scholarpedia.org/article/Complexity>
[for complex systems from a dynamical perspective see Nicolis (2007) at
http://www.scholarpedia.org/article/Complex_systems]

1. no unified theory of complex systems yet
 - a. many partial analyses in different fields
2. first studied as a research field by Herbert Simon (1981)
3. Simons: Complex systems are ...
4. "made up of a large number of parts that have many interactions."
5. "in such systems the whole is more than the sum of the parts.."
6. "...given the properties of the parts and the laws of their interaction, it is not a trivial matter to infer the properties of the whole."

7. complex systems may contain components that can function independently
8. the components of complex systems may be complex systems themselves
9. complex system sets may comprise hierarchies of organization that are partly but not wholly independent in operation.
10. relations between multiple complex systems will be mediated by systems of communication
11. the systems of communication may be strong or weak
12. the systems of communication may be sparse or dense over time
13. such systems of communication between complex systems are critical to the behaviour of the whole

14. interactions between complex systems often result in the emergence of functions that are properties of the whole, not the parts.
15. dissection of complex systems into components will result in the loss of emergent properties.
16. complex systems when studied require the observation both of states and transitions between states.
17. there is a strong link between complexity and the nature of network structures
18. complex systems are sensitive to the topology of networks
19. complex networks can integrate separate and heterogeneous components, and accommodate specialized components
20. the existence and behaviour of complex systems may be central to what "Nature" actually is.

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- <http://thormay.net> (personal website)
- <http://independent.academia.edu/ThorMay> (articles & academic papers by Thor May)
- for some informal discussion of the consequences of complexity in language, see May (2013) "The Probable Language Brain"
http://www.academia.edu/2563032/The_Probable_Language_Brain