

The Wicked Nature of Social Systems

A complexity approach to sociology

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Abstract

This thesis investigates how the interdisciplinary field of Complexity Science can inform both sociological theory and methodological practice.

Non-linearity and complexity dynamics such as *emergence* and *positive/negative feedback* are central in many social phenomena, but have until recently not only been hard to grasp though intuition, but have been just as vexing for our social scientific theories and methods. These phenomena tend to defy deeply ingrained assumptions of regularity, linearity, and proportionality between cause and effect, as seemingly insignificant factors may set off avalanches of change. For instance, as in the case of Tunisia when the self-immolation of a street vender sparked a range of international revolts. Similarly, personalized memes in social media can spread like global electronic wildfires, reaching millions of people in a matter of hours.

Complexity science shows that patterns and system dynamics in complex systems cannot be understood only through the properties of system components, but emerge through the intricate interactions *between* these components. Complexity science is now a dominant perspective within the natural sciences and has proven useful to analyze complex systems ranging from flocks of birds to the financial market, traffic congestion and emergency evacuations.

The fact that complexity dynamics are general and can be found in many scientific fields and disciplines raises some pertinent and intriguing questions. Can complex social systems be approached in a similar way as complex systems in nature? Are methods such as computer simulations also useful within the social realm to investigate how collective patterns emerge from micro-level interactions? Or does the complexity of social systems resist reductionism to lower-levels, thus requiring us to acknowledge the causal power of higher-level social entities and social structures? And perhaps most importantly: can these approaches be combined?

This thesis addresses these questions and through four theoretical and empirical studies it explores different approaches to social complexity and show how they can be combined. **Paper I** critically engages the notion of complexity and introduces a theoretical tool that distinguishes between different types of complexity and charts the relation between systems, problems and methods. The notion of *wicked systems* is introduced to describe the category most social systems belong to. **Paper II** focuses on radical societal transitions that are driven by social movements. The paper develops an integrated theoretical framework by combining social movement literature with Transition Studies—an interdisciplinary field that focuses on large scale socio-technical transitions. This conceptual framework builds upon complexity-thinking and focuses on the type of multi-level causality that typically characterizes social change. **Paper III** develops a computer simulation to investigate the emergent network structural effects of *free social spaces* on the diffusion of social mobilization, thus illustrating the potential of integrating formal modeling in research on social movements. **Paper IV** investigates discursive connections between Islamophobia and anti-feminism in a corpus of 50 million posts extracted from an Internet forum. The paper develops a methodological synergy that combines *Critical Discourse Analysis* and *Topic Modeling*—a type of statistical model for the automated categorization of large amounts of texts. This is complemented with tools from *Social Network Analysis* to illustrate discursive connections.

By employing different approaches to social complexity, each of these studies contributes to answering open issues in its field and thus provides a concrete illustration of how a complexity-based inquiry can inform sociology. By discussing, elaborating and refining various theories and notions, the introductory chapter then provides a re-contextualization of these studies and illustrates how they constitute complementing approaches that can be combined. The main conclusion is that most social systems can be conceptualized as *wicked systems*: they are open, nebulous systems, characterized by multi-level causation which makes them recalcitrant to formalization and reductionism. This calls for a method-pluralist approach that combines individualist strategies such as computer simulations with process-based frameworks that address multi-level causation and the co-evolution of causal mechanisms on higher levels. This approach to social complexity thus enables a way of capturing parts of the analytical sociology position, but embedded within a critical realist ontology that acknowledges the social as an emergent reality with its own specific powers. It also offers a contribution to critical realism by enabling us to systematically explore emergent processes. Hence, complexity science furnishes what critical realism lacks by affording both conceptual and technical means to study the emergent interplay between human action and social structure.

Keywords: complexity science, social movement theory, complexity dynamics, critical realism, agent-based models, topic modeling, discourse analysis, digital/big data, automated text analysis