THEORIES OF COMPLEX SYSTEMS

Prof. dr. Lasse Gerrits

Description:
This seminar asks the simple question: what is a system? Technological challenges such as mobility, climate and change and energy generation, demand interventions in a complex whole of relationships between public and private parties, and social and technological infrastructures. Many authors have struggled with systems' theories. This theoretical seminar focuses on these philosophical ideas about the constitution and operations of society as a system or systemic whole(s). Following the work e.g. Schelling (1978), the guiding thread in this module will be the relationship between the individual and the collective and how systems emerge through this relationship. We will discuss the work of prominent thinkers, starting with the work of Von Bertalanffy, through the work of (among others) Parsons and Luhmann, to contemporary iterations by e.g. Holland and Flood.

Learning goals:
- To explain the dynamics of complex systems using theoretical concepts
- To assess various and sometimes contradictory system theories
- To develop a coherent systemic argument about governance issues
- To reflect upon one's own position regarding complex systems in the face of theoretical concepts

Method:
Each week, we will discuss one of the original thinkers in the realm of complex systems. Naturally, they have a considerable written legacy. Each session will feature a central question regarding their work. Students will be required to look up their publications and to select certain elements they would like to talk about in relation to the central questions. These elements should be written down in a short position papers (800 – 1000 words), to be submitted on each Wednesday prior to the actual session. All short position papers contribute to the final and graded paper (see below). Please note that this method requires students to actively search for literature online and in the library.

A sort of kind warning about this course: The course relies heavily on the input of students, who are expected to work independently and to come up with original contributions. The materials for this course are sometimes not easy to comprehend. As such, the course will have a steep learning curve and will only appeal to students who are in for a challenge. On the flipside: participating in this seminar is also one of the most awesome things you could do during your time at the university!

Test and grading:
Students will conclude the course with a paper in which they will revisit the original question: what is a system? The text should be clear, concise and comprehensive. The short position papers submitted for each session will all contribute to the final paper. *Deadline for the paper is July 23rd 2015*.

Instructor: prof. dr. Lasse Gerrits

Note: the seminar is taught in English

Literature (mandatory):
The course asks students to search and find literature each week. It is up to them to use original literature from the authors concerned or to use literature *about* those authors. Again, this course relies on the capacities of the students to develop a reasoned perspective on systemic theories.

Registration:
Registration will be done during the first session.

Speaking hours:
Thursday, 02:00-03:00 p.m.
Mail: lasse.gerrits@uni-bamberg.de

DETAILED PROGRAM

April 17th: Introduction of the subject and overview of the course

Does what is says on the can: we will talk about why systems matter and why it is necessary to obtain a better understanding of systems, the content of this course and procedures related to the method and testing.

April 24th: Emergence: Thomas Schelling and John Holland

Schelling and Holland have both identified the relationship between the micro level and the macro level to be of utmost importance in understanding the coming-about of structural properties of systems. Today we will talk about their ideas and the extent to which they can inform our understanding of systems.

Question: can emergence be observed in the real world?

May 2nd: General systems theory: Ludwig von Bertalanffy
Please note that this session is held on Saturday
Von Bertalanffy, an Austrian biologist can be credited for developing the first systemic framework with which society can be understood. Often forgotten, his work holds enormous potential for contemporary iterations of system´s theory.

Question: what can theories from biology contribute to a systemic understanding of social reality?

May 7th: Structural functionalism: Talcott Parsons

Talcott Parsons, an American sociologist, has played a tremendous role in the introduction of systemic thinking in the social sciences. His central thesis holds that society is made up of elements that all perform a function in making society function as a systemic whole, hence: structural functionalism.

Question: what explains the popularity and the downfall of his ideas?

May 16th: Soft Systems Methodology: Peter Checkland
Please note that this session is held on Saturday
Peter Checkland, a British engineer, already had a thriving career in engineering until he discovered that systems can´t be understood without understanding the most complex of all elements: humans. Focusing on sense-making and learning, he developed the so-called soft systems methodology.

Question: can SSM be considered a truly systemic theory?

May 22nd: Social Systems: Niklas Luhmann

Niklas Luhmann, a German sociologist, has spent his life developing a systemic theory of society and politics, focusing on the role of communication. His work is beautifully advanced, yet he doesn´t seem to have gained a lot of traction outside a relatively small circle of (mostly German) people.

Question: what is the value of Luhmann's work on social systems?

May 29th: Learning systems: Robert Louis Flood

Robert Flood, a British organizational scientist, looked at the ways in which systemic thinking informs concrete actions in organizations. In particular, he was very interested in the complex and adaptive properties of such systems, as humans in systems learn and adapt to new situations.

Question: can systems as a whole learn and improve their functioning?

June 5th: no session

June 12th: no session

June 19th: no session

June 26th: Systemic modeling: Jay Wright Forrester

Jay Wright Forrester, an American computer engineer, played a pivotal role in modeling and simulating systems, i.e. so-called system dynamics modeling. With the aid of computational power, he could generate tremendous insight into the way social systems work. His legacy continuous today as many scientists have developed increasingly advanced models of social systems. Yet, we should also question the usefulness of modeling such systems.

Question: Is modeling anything more than just toying around?

July 3rd: Co-evolutionary systems: Richard Norgaard

Richard Norgaard, an American biologist, postulated that social and biological systems are intertwined in such a way that they co-evolve over time. This provided a novel framework with which one can analyze reciprocal selection, mutation and retention processes between the two types of systems.

Question: can we justify treating them as discrete systems?

July 10th: Chaotic systems: Douglas Kiel

Douglas Kiel, an American professor in public administration, has done much work in transferring chaos theory to our domain. Chaos theory builds on the idea that minor variations in starting conditions can lead to different trajectories of social systems.

Question: social systems seem to feature chaotic processes but is it actually possible to track chaos as such?

July 16th: Feedback draft papers

Today´s session will be used to exchange feedback on your draft papers in preparation to the final paper.

Paper

To successfully conclude the course, students will be asked to submit a paper detailing their research. The paper should be clear, concise and comprehensive in reporting the motive for the research, the methodological set-up, the collected data, the analysis and the results. The paper will be graded and accounts for the final grade for this course. **Deadline is July 23rd, 2015**.