The Sociological Semantics of Complex Systems

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Doi:10.5296/jsr.v5i1.5953 URL: http://dx.doi.org/10.5296/jsr.v5i1.5953

Abstract

The concept of complex systems is one of the most common and abused by sociological semantics. Both complexity and system are epistemological terms which contribute to reshape the scientific research design and conceptual frames. Nevertheless, complexity and system are often used by everyday life in several misleading ways: for example complex is often meant by common sense as a synonym for difficult, complicate, hard to understand, obscure and system is used by common sense as a synonym of “way “ or mechanism and is often geographically rooted (the Italian political system, for instance). Common sense generates misleading uses and affects public opinion about the understanding of science. This paper is not focused on the history and evolution of the concept of complex system it rather is aimed at reconstructing this concept in the current sociological depistemology to let complex systems fully express their revolutionary and reconfigurational powers for social and political science research.

Keywords: Complexity, System, Variety, Density, Epistemology

1. Introduction

This essay is theoretical and provides a contribution to sociological epistemology by introducing a conceptual and semantic reconstruction of complex systems. Complex systems conceptually crash with the world taken for granted (Berger-Luckmann 1966, Berger-Berger-Kellner, 1973). To understand complex systems it is strategic to re-set a question Niklas Luhmann inspired: “how can an order be created that transforms the impossible into the possible and the improbable into the probable?” (Luhmann, 1990 : 87). Impossible and improbable are dramatically rejected by the world taken for granted of common sense that is why nothing relevant can derive from the so called “social reality” in its daily life shapes. Complex systems shape fluctuating and spiral-like orders (Imada, 2008: 21-23; 98-104) and they construct and evolve those second level orders which are the stargate to turn impossible and improbable into possible and probable due to “the capacity of sociologists to affect change in the common sense of the publics they address” (Burawoy , 2014:151). The contribution of complex system (sociological) theory is pivotal for two deconstructive reasons at least. 1) to enlighten the oddities, gaps, discontinuities through the
ages while non systemic sociology often tries to search for its key questions in the past creating the misleading illusion of a linear cause-effect link though the ages 2) to enlighten that empirical sociological research can be and often is misleading for a great evolution of sociology as a science. 2.1 Empirical sociology seems to ignore that data merely mirror the conceptual categories they derive from. It might seem a problem of deduction but inductive research has the same problem or rather induction is even more dramatic as in deduction conceptual categories are manifest while in induction they are latent. The problem that empirical data do not exist independently form conceptual formalized categories (in deduction) or by latent ideal value based categories (in induction) is evident in both qualitative and quantitative research. 2.2 Supposing the most accurate and methodologically transparent empirical research, most sociological findings are tendentially irrelevant for the evolution of complex systems. For example what public opinion and common sense define absurd after a survey(for example the idea man can fly before the Lindberghs’ invention) simply states that public opinion find it absurd but it means nothing for the further systemic evolution (flying is now common sense). Viceversa, if a survey investigates what the majority of public opinion think, the fact that the majority thinks something does not mean that it is the most functional and viable trend for systemic evolution.

Spiral –like fluctuating systems operate though trajectories and trends common sense very seldom can imagine. For Instance, common sense interacts with familiarity where everything is taken for granted (including the most irrational beliefs in religion, for example) while key social change on a large scale mostly depends on algorithmic reconfigurations of the converging patterns among strange agents (Seabright, 2010). The more sociological theory evolves through wider and wider horizon (just like Beck’s cosmopolitan vision, see Beck (2006) the more common sense sinks into a proletarian ,local and nationalistic view (Robyn, 2005) . Beck sharply describes the key features of the cosmopolitan vision as follows “As a counter-image to the territorial prison theory of identity, society and politics we can provisionally distinguish five interconnected constitutive principles of the cosmopolitan outlook:

First, the principle of experience of crisis in world society. The awareness of interdependence and the resulting civilizational community of fare induce by global risks and crises which overcomes the boundaries between internal and external, us and them, the national and the international; second, the principle of recognition of cosmopolitan differences and the resulting cosmopolitan conflict character and the (limited) curiosity concerning differences of culture and identity; third, the principle of cosmopolitan empathy and of perspective taking and the virtual interchangeability of situations (as both an opportunity and a threat); fourth the principle of the impossibility of living in a world society without borders and there consulting compulsion to redraw old boundaries and rebuild old walls; fifth the mélange principle, the principle that local, national, ethnic, religious and cosmopolitan cultures and traditions interpenetrate, interconnect and intermingle-cosmopolitanism without provincialism is empty, provincialism without cosmopolitism is blind”. (Beck, 2006: 7). Global systemic trends are cosmopolitan, common sense is local. One more example that sociological trends and social trends live parallel lives is the natural /artificial coding. For common sense, emotions are nature, the parenthood need is nature while writing an essay is
artificial, using a computer is artificial, IS-LM curve is artificial and so on. Sociological theory dramatically explained that human beings quit to be natural when they lightened their first fire on (Goudsblom, 1994).

1.1 Theory

Systemic sociology needs to be redesigned to manage the exceeding variety of emerging scenarios and high variety and high density complex evolutionary trends in which natural sciences and social ones converge in reframing the so-called “natural reality”. The natural reality is: something meaningless in se (since the first man ever switched a fire on and dressed. See Goudsblom, 1994) and systemically relevant merely as a thematic subject of positive and artificial self referential patterns.

This essay is about the place of sociology in the general science of complex systems from an interdisciplinary perspective starting from a social system (system/environment) paradigm to focus on psychic, systems, biosystems and social systems.

This essay subscribes the statement that “at the beginning of the twenty-first century we should consider the relevance of the physics of complexity for contemporary sociology/social sciences” (Urry, 2003: 120). Complexity, as a very basic definition can be considered the exceeding variety level which requires systemic selections to make sense. Variety must be also understood also expression of exceeding density which is even more hard to understand by common sense as it often confuses growth and development. Selecting variety contingently generates development, increasing and selecting density generates short term growth and mid-long term destruction as witnessed by the Malthus Trap, for instance (Pitasi 2011, 2012). The evolution of the concept of system though the XX century and the beginning of the XXIst one was featured by a rather sterile debate between the axiom that systems are mere epistemological criteria and the axiom that systems exist in nature, for real. These two axioms shaped two different systemic visions which in the beginning of the XXIst century were dramatically reshaped by the increasing convergence among Nanotechnologies, Robotics, Informatics, Genetics and Neurosciences the so called Convergent technologies (CT).

The two axioms powerfully merged in an immaterial, global constellation of energy and information in which digitalization shapes meaning and the sense making process. Communication becomes the only procedural form of systemic self-reproduction. As Luhmann brilliantly wrote: «for a theory of autopoietic systems, only communication is a serious candidate for the position of the elementary units of the basic self referential process of social systems». (Luhmann, 1990: 6).

Niklas Luhmann (1927–1998) died before digitalization replaced the idea that virtual and concrete items were separated entities: digitalization amazingly demonstrated everything and essentially science, technology and business first of all might be digitalized. Also the most concrete and physical items can be digitalized or rather are intrinsically digital. The paradigm shifts within the systemic approach summarized in the table below clearly show that P1 was featured by a very “physical reification of items such as nature, society, people and so on thus a very analogical, concrete narrowed minded approach to “reality”.

Luhmann’s contribution by introducing the system/environment code and then by the
autopoietic turn were pivotal to describe the new scenarios of globalization in which
dematerialization turns everything into communication flows which let circulate capitals in
real time with no place bounds. Once again, Luhmann’s writings anticipated the
understanding of emergence in the globalized age. Nevertheless, Luhmann’s vision was
completed before digitalization entered the global scale. The increasing variety and the
growing density, for example in demography, revealed that prescriptive, normative and value
based social ideologie no longer work as each of them falls in the ontology trap by which
each ideology consider itself right, real and sound and any other as a mere point of view.
Values usually shape taken for granted worlds but a great sociologist able to start social
change up would not work on values and subjective discourses inspired by politics or religion,
s/he would focus on a container theory of society (Beck, 2000: 23) serving as an operational
system expanding global platforms (Globus) to let circulate the enormous variety of memetic
catalogues named Mundus (Pitasi-Mancini, 2012).

2. Research design

Starting from the key four paradigms of the systemic approach, this essay underlines that
these paradigms do not describe a mere history of systemic thinking as they all four still
belong to the systematics of science and not to its history even if the four paradigms operate
at different levels of complexity: P3 and P4 evolve container theory thus operate at a higher
complexity level while P2, and P1 mostly, still mirror a concept of system still considered as
a omeostatic mechanism merely aimed at maintaining stability and equilibrium thus
considering complexity as a problem. Getting on, this essay provides a deductive theorem of
complexity and ease/complicatedness and simplicity of systemic evolution though the
variety/density patterning.

Table 1. The Systemic Approach Paradigm Shifts (Pitasi in Pitasi-Mancini, 2012, 22)

<table>
<thead>
<tr>
<th>THE SYSTEMIC APPROACH PARADIGM SHIFTS</th>
<th>PARADIGM (P)</th>
<th>KEY AUTHORS</th>
<th>KEY CONCEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1) Whole/Part</td>
<td>Ross Ashby</td>
<td>Culture, control, personality, integration, homeostasis, stability, wholeness, structures, parts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Norbert Wiener</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Talcott Parsons</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ludwig von Bertalanffy</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Anthony Stafford Beer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ervin Laszlo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P2) System/Environment</td>
<td>Heinz von Forester</td>
<td>Functional differentiation system, communication, order from noise</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Niklas Luhmann</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P3) Autopoiesis</td>
<td>Humberto Maturana</td>
<td>Self production of inner components, rhizome, complexity, functional equivalent fluctuation, horizont.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Francisco Varela</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Niklas Luhmann</td>
<td></td>
<td></td>
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</tbody>
</table>
Let’s start by conceptualizing the theorem definition:

“A theorem is a mathematical statement established by means of a proof” (Clapham-Nicholson, 2009: 781)

“a theorem is a statement which has been proved such as the Pythagorean theorem” (Downing, 2009: 350)

By comparing these two conceptions and applying them to sociological thinking we can consider that a theorem is:

a) a statement
b) in this paper I do not mean to shape a mathematical one but a sociological one inspired by a mathematical epistemology
c) the matter it is a sociological theorem and not a mathematical one does not eliminate the fact it must be proved
e) nevertheless the kind of proof is different even if not completely.

The theorem consists on showing up that the more complex a system is the easier its trajectories and trends the simpler a system is the more implosive it becomes due to its complicatedness. Variety and density are the two key pattern variables which shape the complexity level of the operational closure of the system.

P1 and P2 represent simple and complicate systems founded on “culture” meant as tradition à là Parsons and discourses à là Foucault. Complex and easy systems are basically conceptualized by P3 and P4 in which culture is no longer considered as it was in P1 or P2, it rather evolves into contingency as clearly described by Luhmann (1988) in his essay “Warum AGIL?” and then it implies that culture can be meant as the indefinite, enormous (Dennet, 2004), unpredictable (Barber, 2009:250) variety of the possible memetic ricombinations generated by neocortex symbolic production which turns in self reproducing, limitless communication flows transcending any single agent-both individual and collective. That is why Beck’s cosmopolitan vision is an exemplary case of the paradigm shift from P2 (the softest culture centered paradigm ) to P3 (the softest complexity based paradigm).

2.1 The Case: Sorokin’s Lost Lesson

Sorokin’s life and sociology were both inspired by great mobility. Just like many world class
scholars such as, for example, Ernst von Glasersfeld and Elias Canetti, his life was a non-stop
self construction/deconstruction/reconstruction and a paradigm for social mobility. In “one of
his lives” he was Parsons’ Department head at Harvard. When “Social and Cultural Dynamics
a Study in Change in Mayor Systems of Art, Truth Ethics, Law and Social Relationships”
appeared in 1957, Parsons’ *The Social System* was already six years old. Nevertheless in
Sorokin’s over 700 page work there is no question about Parsons. Considering the four,
actually five as I am going to describe, key sociological dimensions of sociology and social
change in mayor systems it is easy to understand why Sorokin ignored by purpose Parsons’s
work. Sorokin considers time, space, quantity and quality the four dimensions which
co-evolve through a fifth one: fluctuations. Fluctuations describe trends, trajectories and
shifting involvements among three very general kinds of system: idealistic, ideational and
sensate. These are the three key patterns of relentless recombination of variants (in his
semantics “mixed systems of culture”, Sorokin, 1957: 20) to reconfigure the five dimension
patters. Sorokin had already focused on a variety of systems and on modelling dimensions
which implied two reconfigurational features such as time and space (any book about
globalization is nothing but an essay about the convergence of time and space) and two
further dimensions (quantity and duality) which were the patterns to redesign the nonlinear
links between variety and density. Luhmann asked: “Warum AGIL?” while Sorokin implicitly
asked “why wasting time and energy discussing such a rigid and implosive idea of system
which was already obsolete at the Ancient Romans Time?”. Luhmann’s vision implied social
systems, contingency, variety ecc, thus a complexity level which AGIL was totally unable to
grab.

Sorokin’s systemic approach was open to variety, density, contingency. By Luhmann’s
demonstration of the contingency of AGIL and specifically of L (the cultural traditions
reproduction according to Parsons’) Luhmann, opens up to memetic complexity recombining.
Nevertheless Sorokin’s concept of culture (which anticipates Luhmann forseveral decades) is
more rigid than Luhmann’s but much more open and flexible than Parsons’s tradition-based
one. As a matter of fact, Sorokin states that “in the broadest sense it may mean the sum total
of everything which is created or modified by the conscious or unconscious activity of two or
more individuals interacting with one another or conditioning one another’s behaviour”
(Sorokin, 1957: 2). It was 1957 and Sorokin could not imagine that the 1980s on steps of
systemic theory would have clearly argued that human interactions merely produce noise and
only transcendental systemic coding of communication might produce sense. Nevertheless,
Sorokin’s concept of culture was already much more open to improbable and unusual than
Parson’s cultural tradition idea. What if Sorokin(1889-1968) and Luhmann (1927-1998) had
met and Parsons would have kept on serving as a biologist never turning into a sociologist?
One further key point of Sorokin’s systemic approach which has been apparently forgotten by
current sociologists is that data based research must operate at a level adequate to its
conceptual and theoretical range. That is why, for example, that great and global changes
cannot be observed and understood by merely collecting local, small research outputs. The
social construction of research design inspired by Sorokin’s lesson avoids:
a) Parsons’ limit to think his specific point of view were the system
b) Merton’s political escape into the middle range theory which is self defeating a sit implies
that a collection of middle range theories might provide a general systematization
c)Luhmann’s limit to ignore data and, for completely different reasons, Elias’ same decision
(Elias, 1969) in his book which crosses centuries and centuries of social change. Sorokin was
aware that data are theoretical construction just like other theories. There is no reason to
ignore data and, at the same time, there is no reason to consider data as something “real and
concrete” which can verify /falsify theoretical abstractions as shown below, data tables for
Sorokin are not other from theory, they are gears of the general convergence and consistency
of the systemic construction:

<table>
<thead>
<tr>
<th>LOGICAL SATELLITES</th>
<th>TYPES OF CULTURE MENTALITY</th>
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</thead>
<tbody>
<tr>
<td>Moral values and systems</td>
<td>Active Sensate</td>
</tr>
</tbody>
</table>
| absolute, transcen
dental, category, imperative, everlasting, and unchangable | relativistic and sensate; hedonistic, eudaemonistic, utilitarian; seeking maximum sensate happiness for largest number of human beings; "moral of rightly understood egotism" | both, with emphasis on the absolute and the external | no real moral values, except sensual, "Wine, women, and song"; amoralism; nihilism | no real moral values, except sensate masked by spiritual; cynicism, nihilism | no differential moral system, except apathetic and dull submission to fate, and sensual disapproval of hard blows and approval of easier times followed by vague ideas about the other world's justice |
| Aesthetic values | "ideational" subervient to the main inner values, religious, nonsensate | sensate, secular, created to increase joys and beauties of a rich sensate life | both, with emphasis on the non-sensate | narrow sensual; refining pathologic | sensate, masked with spiritual | undifferentiated and vague |
| Social and practical values | those which are lasting and lead to the ultimate reality; only such persons are leaders, only such things and events are positive, all others are valueless, or of negative value, particularly wealth, earthly comfort, etc.; principle of sacrifice | everything that gives joy of life to self and partly to others; particularly wealth, comfort, etc.; prestige is based on the above; wealth, money, physical might become "rights" and basis of all values; principle of sound egotism | both, with emphasis on spiritual | both, extremely emphasized; live and let live | narrow and extremely sensual; "après moi le déluge" | narrow and extremely sensual with a mask of spiritual values; Tartuffism |

Figure 1. As witnessed in his 1957 book

Sorokin was able to let very microtrends co-evolve through the ages whit no need to state a
rigid, stable equilibrium model as shown in Figure 1 and below in figures 2 and 3.
<table>
<thead>
<tr>
<th>MAIN ELEMENTS</th>
<th>TYPES OF CULTURE MENTALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acetic Iden~</td>
</tr>
<tr>
<td>1. Reality</td>
<td>ultimate reality, eternal, nonsensate, transcendental</td>
</tr>
<tr>
<td>2. Main needs and ends</td>
<td>spiritual</td>
</tr>
<tr>
<td>3. Extent of satisfaction</td>
<td>maximum</td>
</tr>
<tr>
<td>4. Method of satisfaction</td>
<td>mainly self-modification</td>
</tr>
</tbody>
</table>

LOGICAL SATELLITES

5. Weltanschauung

| Being (Sein): lasting value; indifference to transient values; imperturbability; statism | Becoming (Werden): transient values; full-blooded sense of life, joy, and grief; dynamism and endless readjustment (progress, evolution) | both, with emphasis on Being | both approximately equally represented | narrow and extreme Becoming, ("Carpe diem") | narrow Becoming, with a mask of Being | undifferentiated and not thought through, vague and fragmentary ideas (lack of integration) |

6. Power and object of control

| self-control, repression of the sensual man and of "self" | control of the sensate reality | both, with emphasis on self-control | both approximately equally represented | no real control of either self or milieu | control of assuming and putting on masks | no control: mere endurance of the effects of other forces acted on by external power |

Figure 2.
<table>
<thead>
<tr>
<th>LOGICAL SATELLITES</th>
<th>TYPES OF CULTURE MENTALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Acetic Ideational</td>
</tr>
<tr>
<td>7. Activity</td>
<td>introvert</td>
</tr>
<tr>
<td></td>
<td>highly integrated, spiritual, dissolved in the ultimate reality, aware of the sensual world as illusion or content of self; antimaterialistic</td>
</tr>
<tr>
<td>8. Self</td>
<td>develops insight into and cognition of the spiritual, psychical, immaterial phenomena and experiences; concentrates upon these exclusively; leads to arts of education and modification of man’s inner life</td>
</tr>
<tr>
<td>9. Knowledge</td>
<td>based on inner experience, “mystic way,” concentrated meditation; intuition and “revelation”; prophecy</td>
</tr>
</tbody>
</table>

Figure 3.
3. Final remarks and findings/conclusions

The concept of complex system is one of the most powerful and challenging in current interdisciplinary epistemology and scientific debate in which sociology is profoundly involved, nevertheless it is often misunderstood in public debates due to the negative semantic shades coming from past ideas of science much more linear causality based and by common sense (and mass media) current semantics which confuses complex and complicate and considers complexity as a subject thing, an item and not as an epistemological and methodological criterion. Complex systems requires and imply:

a) a high level of conceptual abstraction
b) a chaotic mathematics of variety/density dynamic ad instable “equilibria”
c) a container conception of theory
d) a transcendental approach to systems
e) radical de-materializing paradigm shifts
f) a convergent approach to theory and data as mutually modelling constructions

and further features all of them co-evolving through nonlinear trends.

References

