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THE STUDY OF SOCIETY AS A CHAOTIC SYSTEM

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Abstract

Systems approach in Sociology is a baggage that the social sciences have carried owing to their connection with other sciences such as biology. The organismic analogy of Durkheim and later Parsons seems to be the foundation on which the systems theory in Sociology could build its edifice. Elements and their myriad configurations seem to be the building blocks of a system. Thus there could be three types of system – deterministic, random or chaotic based on the various states of the system determined by the configurations assumed by constituent elements. Human society could be considered as one such system with its normative structure providing us with a somewhat reliable model of analysis. At the same time, the complexity encountered leads us to look at it as a chaotic system. The argument receives a challenging counter-argument from Per Bak (1996) who tried to distinguish between a complexity theory and chaos theory and ruled out the possibility of explaining human society from a chaos theory perspective. This article seems to review a section literature that seeks to establish the validity of chaos theory in the study of human society.

Keywords: System, Equilibrium, Chaos, Randomness, Society

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Introduction

The two terms, system and equilibrium have constantly featured in systems analysis in almost every discipline that has approached its problems from that perspective. The systems perspective seems to have evolved over a long period of time when the approach shifted from studying isolated bodies with an aim to decipher the laws that affect the body to the system of objects bearing constant relations with each other. In order to study all such systems, scientists and thinkers developed the concept of equilibrium to undertake a realtime analysis of a given system. Interestingly, equilibrium could be of many kinds – stable and unstable; static and dynamic; mechanical equilibrium, thermodynamic equilibrium, physico-chemical equilibrium and finally, social equilibrium. It's the last kind that forms the focal point of this study. The well-known thesis proposed by Heraclitus in the pre-Socratic era says that the entire universe is in a state of constant flux (Popper, 1963). How true! Even after centuries of research, physicists have been unable to discover a state of absolute rest. Most systems are in motion of one or the other kind. Similar is the case with society. What gets defined as social equilibrium, static in this sense, is nothing but another name for normalcy. For exact state of equilibrium is impossible in society. Things undergo change every moment. These minor changes eventually happen to feature in the chain of causal links that give rise to the phenomenon of social change. While the dominant practice of studying social change has been to study it at the macro level and look for causes that make themselves readily available, in this study, we look to introduce a new perspective with an entirely new approach, in fact a new method altogether.

The concept of chaos might have been developed by mathematicians, but it's nothing but a critique of the positivist perspective, at the same time standing up against too much of subjectivity. If it can be said that systems such as the human society is not governed by a set of social laws, it will be equally erroneous to believe that human nature is unpredictable to the extent that the society can only be studied based on subjective interpretation. For interpretation of one must coincide with others' interpretation in order for Sociology to qualify as a body of knowledge. Everything has a cause and so holds true for all that occurs as social phenomenon. The cause-effect relationship takes an interesting form when observed from the perspective of chaos. This will be the major endeavour of this study. Society shall be studied as a chaotic system instead of a random system.

Chaos could occur at many levels. It can be said to exist at three levels:

1. methodological;
2. at the level of ideas;
3. the degree of disconnect between ideas and empirical reality.

Both structural change in the social system as well change in individual personalities over a period of time could be studied using the new approach and links which would otherwise be lost shall be established as causes. It can be applied both at the micro levels such as 'Everyday Sociology' and behavioral sciences that focus on moods and short-term mental state of the human beings. It can also be applied to study macro phenomenon such as markets, bureaucracy, the legal system or more fluid events such as social movements and revolutions. The analysis at the micro level shall be different from Randall Collins's microstructuralism that deals with 'interaction ritual chains'. His idea seems to originate from Weber's theory of social action where the building blocks of social relationship are social interactions. One can afford to take a different view given the fact that interaction is the next step of what begins as simple relations which can be with inanimate objects surrounding us as well. How often we bear a strong relationship with a piece of furniture in our living room. It bears a strong impact on our psyche and most of the things we do in our daily routine, although sometimes we ourselves are not aware of the fact.

“But for the theory of action the organism is not a system, but a unit point of reference. The focus of interest for the theory of action is not in the internal equilibrating processes of the organism as a system, but in the equilibrating processes involved in its relations to an environment or situation in which other organisms are of crucial significance. It is this relational system which is the system of action, not the organism as a system” (Parsons, 1951, p.364). Hence, Parsons looks at the social system as an open system trying to maintain homeostasis (Cannon, 1932) with its environment. How do we account for the internal processes of the organism as an entity that produce large changes in the society, sometimes systemic, sometimes structural? Can every individual be considered a system? What maintains order despite disorder? In the realm of natural objects and phenomenon of turbulence (Ruelle, 1991), it is the 'strange attractor'. What performs similar functions in society? Is it norms, values, cultural traits or the over-arching concept called 'habitus'? (Bourdieu, 1976).

A critique of the use of systems analysis in Sociology

A full-fledged systems approach in Sociology could be attributed to the works of **Talcott Parsons**, especially to his 1951 book, The Social System. Parsons begins with the Weberian notion of social action that sets the foundation of the society. His action frame of reference tries to build the entire edifice with the elementary unit act acting as the starting point. The institutionalization of a number of such acts and the internalization of the wider norms and patterns of society gives rise to a social system with its various subsystems or parts collaborating with each other to form a whole. His concept of system seems to be influenced by the manner in which it has been conceptualised in the natural sciences, especially in physics and biochemistry. Henderson's (1935) application of the concepts utilising his perspective form biochemistry seems to loom large upon Parsons's mind. As a matter of common experience, one may begin with the proposition that there is nothing called system. It's just an abstracted model of a cluster of concepts and their mutual relations. It acts as a heuristic model to reflect a reality or a part of it as it appears to us through empirical observation. It has to be kept in mind that while maintaining a realist perspective, it's the human beings who must be considered as real and not the society as a concept. It is just a model to understand the ways in which humans thinks and act. Hence, in order to grasp the internal dynamics of a phenomenon, we prepare our own model of the phenomenon as a system that is nothing but an analogical construct of some real entities and some concepts we happen to experience through our sensory organs. Thus, a classroom can be studied as a system, while at the same time it can be studied as a subsystem of a larger system such as the university, which again could be studied as a part of the even larger concept of State. This hierarchical chain leads us to the final point of the Universe as a system which has no boundaries. Or, if there is to be discovered one, the chances are quite bleak. Thus the concept of boundary should attract one's attention. Parsons looks at the social system as well as its subsystems as boundary-maintaining systems. Experience goes on to show that such boundaries seldom represent an empirical reality. When can we actually be sure if a social action is purely political or economic or something else? If actions can't be compartmentalised, how can systems wherein they are performed could be? The question of boundary leads us to the system-environment dyad and the concept of equilibrium. The concept has been misapplied by Parsons in the sense that it seeks to consider the society a simple random system which it is not. The concept of 'moving equilibrium' explained by Parsons does not hold good when analyzed in the

light of the fact that it simply captures the state of the social system once a change has already occurred. It remains silent about the causes of such changes. The silence of Parsons's theory on this front renders the social system a random system. May be it's because Parsons did not have the perspective of chaos to aid his endeavour. There are minor, almost negligible changes in a dynamical system that cause huge changes of high order which, owing to the adoption of the common approaches in Sociology, can only be traced backwards and erroneously attributed to causes that might not have had any appreciable effect on the changes at all. The idea of social change from the systems perspective could be explained with the help of the moving equilibrium according to Talcott Parsons. In the following paragraph, Parsons explains:

"A good example of a changing sub-system within a larger system is the conjugal family. A fundamental part of this process of change is imposed by non-action variables, through the unfolding of the biological life cycle, thus though biological factors do not alone account for the birth of children, once born and accepted, their biological maturation proceeds inexorably. Thus because the parents are continually growing older and children are growing up, the family cannot be a statically stabilized system" (Parsons, 1951, p.338).

His argument here is based upon the change with respect to time as applicable to the aging patterns of the family members. It has nothing to say about the systemic and the accompanying structural change of the family as a social institution. Family is not a group of people living together on a contractual basis, insofar as a nuclear family is considered to be composed of a pair of spouses and their children. There is a strong kinship bond among the family members that cements them together. Even if the family is constituted on the basis of a contract through adoption, there exists a legal as well as emotional bond between the family members which is synchronic in nature. Although the physical and biological characteristics of the family members may change with time, their relations inter se remain constant. Parents are parents forever and children are children forever. Structural changes in the social system as a whole could be said to occur when these mutual relations between family members undergo change. Simply plotting change as a function of time does not take full grasp of the phenomenon of social change. The aging patterns coupled with the dynamics of the society as a whole might trigger small causes that finally produce large effects to alter the entire institution of family, sometimes even the

social system as a whole. It is these small changes that metamorphose the mutual relations of the family members that the sociologist should be concerned with while trying to understand the phenomenon of social change.

Pattern maintenance is not something that the social system achieves through its efforts. It's the inability of human beings to innovate constantly. If it were that simple, why do fads and fashions so easily violate the norms of society? How is counterculture to be accounted for? Is it change itself or a move towards social change? If pattern maintenance was so sacrosanct, counterculture would not have gained ground in almost every historical epoch of the human past.

Apart from Parsons, the other major systems theory of the society was propounded by **Niklas Luhmann** who, in his book, The Differentiation of Society published in 1977 constructed as three-pronged differentiated model of the society – Segmentation, Startification and Functional Differentiation. Luhmann looks at the society in terms of a complex system that seeks ways of reducing its complexity, of which, differentiation is the result. While the analogy drawn might be considered to be representative of the wider pheneomenon of social differentiation observed empirically, it seems rather contradictory with the Parsonian view that stability of the system is sought through institutionalization and internalization that seeks to arrest the phenomenon of further differentiation. Thus, the two models look at the concept of equilibrium from different perspectives. The overall idea comes close to looking at the society as a dissipative system. Thus is society a dissipative system?

When it comes to the application of the systems theory to the study of society, one can't stop short of appreciating the work of **Lawrence Joseph Henderson** who, in turn, was inspired by the work of Vilfredo Pareto. His book entitled Pareto's General Sociology published in 1935 looked at the society from a systems point of view much before von Bertanlaffy (1969) had proposed his 'General Systems Theory'. Henderson considered the society a system of interrelated parts just as Herbert Spencer did it in the nineteenth century. He emphasized upon both internal equilibrium as well the equilibrium of the system with respect to the environment that lies outside. Owing to his background as a scientist in biochemistry, he saw the society engaged in a constant quest to attain a state of equilibrium that was akin to physico-chemical

equilibrium through the exchange of material and energy between the system and its environment.

General System Theory by **Ludwig von Bertalanffy** published in 1969 tried to construct a set of general principles for looking at similar relations across phenomena from the single perspective of system. System represents a whole which is a sum of its parts, each related to each other based on a particular relationship which can be defined though mathematical equations. Although it might hold true for the world of inanimate objects, for human beings, the situation acquires enhanced complexity. Human interaction does not follow mathematical laws. Theoretically speaking, the spontaneity of human behaviour renders it unpredicatable under normal circumstances. However, practical experience shows that it's not completely unpredictable. There are set patterns of behaviour that carry high probability of being exhibited in a given situation. Hence, the social system could be seen as a system of millions of human interactions, each interaction following a particular protocol, not completely random in nature, but chaotic though. Systems can be either static or dynamical. In the context of its application to the human society, one needs to consider the latter. Society with its myriad complex processes causing it to change every moment must be studied as a dynamical system. **David Ruelle** in his book, Chance and Chaos published in 1991, based his argument on the works of Hadamard, Duhem and Poincare. He takes the game of billiards as an example of a chaotic system with the motion of the balls on the board showing sensitive dependence on initial conditions. The table being a bounded system comes close to being analogous to small groups in the society despite the fact that it deals with inanimate objects such as balls on a billiards table. The analogy could well be extended to the study of society.

Edward Lorenz in his The Essence of Chaos published in 1991 explains three types of dynamical systems - deterministic, chaotic and random. The difference lies in two phrases: 'only one thing can happen next' in case of a deterministic system or a chaotic system and 'anything can happen next' in case of a random system. While studying the dynamics of the society, one needs to study every bit of motion, both at the level of human behaviour as well as at the level of thoughts. The idea of 'unorganized complexity' leads to randomness whereas 'organized complexity' could be studied as a chaotic system. If the number of variables determining a

particular state of a dynamical system are very large but not infinite, the system displays organized complexity and hence, seems suitable to be studied as a chaotic system. The social system composed of living individuals could be considered to be one such system which has complexity but in an organized manner. The patterned ways of thinking actually cut down on the number of possibilities that human beings are expected to exhibit under particular conditions. For example, a player on the football field will definitely not fly in the air the next moment. He or she will concentrate on the ball that's played around. The motivation to score a goal cancels all other considerations in this case. Hence, the game could be studied as a chaotic system where one can fairly predict what's going to happen next, but the outcome shows sensitive dependence on initial conditions. The analogy could be extended to the society as a whole which is nothing but another game of football with more elaborate rules of interaction and complex ways of scoring a goal.

Analysis of the use of the term, Equilibrium

Talk about the concept of equilibrium and its application to social sciences, one must turn one's attention to the pioneering work by **Cynthia Eagle Russett** entitled The Concept of Equilibrium in American Social Thought published in 1966. Russett seemed to analyse the use of the concept in most of the sociological works produced since Pareto's The Mind and Society (1935). Pareto's definition of equilibrium has been taken as the benchmark by every sociologist after him and Russett was no exception. While she came up with a brilliant analysis of the concept of equilibrium, Russett fell short of the connecting the two domains well. Social equilibrium can be related to the concept of equilibrium as defined in the natural sciences only metaphorically. The problem lies in the fact that there can be many types of equilibrium – mechanical, thermodynamic, chemical etc. Russett fails to draw a perfect analogy and tell us exactly which kind of equilibrium it is that describes the social equilibrium. Parsons was well aware of the problem which he summed up in the following words: “We do not wish to quarrel about words, but we do submit that use of the biological terminology is frequently associated with genuine confusion of the frames of reference” (Parsons, 1951, p.364). The use of the term equilibrium in the context of human society poses a problem of this kind. There could be equilibrium of various kinds – mechanical, thermodynamic, physico-chemical, chemical etc., each with its own peculiarity. When it's applied to the human society, which of these flavours actually explains the

dynamics of society is hard to ascertain, thus the confusion that characterizes Parsons's and Russett's use of the term, social equilibrium.

The difficulty hidden in the term, equilibrium is clearly brought out by **Crane Brinton** in his book, Anatomy of Revolution published in 1938. In his own words, “This conceptual scheme of the social equilibrium is probably in the long run the most useful for the sociologist of revolution. It is for our purposes, however, a bit too ambitious. It needs for full success a more accurate grasp of more numerous variables than we can at present manage. Though it need not necessarily be formulated in precise mathematical terms, it ought to be formulated in terms more close to those of mathematics than we can honestly employ. In other words, it is better suited to a complete sociology of revolutions, or a "dynamics of revolution," than to our modest study of the anatomy of four specific revolutions. We are here attempting merely a preliminary analysis, attempting to classify and systematize at a relatively low level of complexity” (Brinton, 1938). It’s a clear argument in favour of our inability to consider the entire set of variables that define the state of equilibrium of a given social phenomenon.

The discussion that revolves around types of equilibrium must take into account the most general classification – stable and unstable equilibrium. Adopting a perspective of chaos theory, one can say that Parsons's erred in introducing the concept of 'moving equilibrium' which he still thought would be largely stable, thanks to his functionalist bias. But in reality society may be said to have an unstable equilibrium. **Edward Lorenz** in his book, The Essence of Chaos published in 1991 describes unstable equilibrium through the example of a pencil tip being made to stand erect. The probability of such a situation being realized is almost zero, but not zero. Such a state is called an unstable equilibrium when one knows that the equilibrium is bound to be disturbed. The point of analysis lies in the mystery that surrounds it. We know for sure that the pencil will fall, but it's almost impossible to predict which side it will fall. Such is the nature of human society as well. Things change rapidly and one is sure of the permanence of change, but what exactly will change and what shall be the nature of that change one finds hard to predict. Lorenz through his study of the weather systems tried to increase the predictability of weather with the help of the solution to his set of twelve equations, but how about society? Can it be explained through mathematical equations?

Some other approaches

The seeds of such doubt seem to be there in **Henri Poincare's** Science and Method published in 1908. Poincare, though not a sceptic with regard to science, introduced the brilliant idea of 'chance' in his book. He took a practical stand on the issue when he admits the limitations of the cognitive capacities of human senses as well as the physical constraints of human efforts to capture and explain each and every fact responsible for the causation of a given phenomenon. Thus, he emphasized upon the exercise of the selection of facts that should be carried out with care and caution. There is every chance that facts so selected miss the actual causal fact that bore the prime impact upon the phenomenon being studied. The idea clearly points towards a theoretical bias in favour of chaos theory. While Poincare was more concerned with examples from the natural or physical world, our focus shall shift to human society which could well be studied as a chaotic system.

An important way of interpreting social interaction could be witnessed in **Randall Collins's** Interaction Ritual Chains published in 2004. Collins explains the variation within society on the basis of the number of individuals involved in a given set of interactions. That turns out to be simplistic which does not differentiate between individuals. Every individual is considered to be similar to the every other in all significant aspects, irrespective of the differences that each carries owing to one's biographical past as well as the set of knowledge one possesses at the particular instant when an interaction takes place. These differences account for minute variations in the observable patterns of interaction that often get missed because we take into account just the number of individuals as if they are similar to the number of molecules in a gas chamber, each molecule being identical with other molecules. A new perspective in this regard would again look at the interactions based on these tiny variations that cause the outcome to show sensitive dependence on initial conditions.

Methodological inadequacy of the current approach

Why has the debate between objectivity and subjectivity sustained itself for tens of centuries? Why have we not found an end to it? It attained new forms in the dichotomies such as absolutism vs relativism and episteme versus doxa (Plato, 399 B.C.). It might be attributed to the reason that facts are many and our capacity to observe and comprehend them limited (Poincare, 1908).

Hence, we are forced to select facts. But what decides, rather what should decide our selection of facts? As it is impossible to collect all facts, there is a need to try and collect as many facts as possible. Thus, as a sociologist one must be aware of the need for continuity of observation. Continuous Sociology is what the new approach should be called.

Perception, Experience and Difference

Just as natural objects are subject to natural forces and the laws governing the nature in the form of gravitational and electromagnetic forces cause them to change in time and space, the human mind plays tricks with human beings causing them to be under a constant state of idealistic flux. Can we ever say that our mind is sleeping? If it does not sleep, it thinks and for every thought, there is a potential change that it may inject into the system of both ideas and the material world. This process is what Hegel called dialectics. Thus, the concept of Hegelian dialectics must form the core of the entire vision of the society as a dynamical system. Hegel's view that seeks to synthesize both man and nature seems to be a plausible argument in this regard. The only difference lies in the fact that human beings enter into a state of motion based on a different origin that propels them towards it, otherwise, the mechanics of their motion is not at all different from other objects we see around us. The laws of motion that control the velocity and acceleration of moving bodies do apply to all humanly motion as well. A human being running at a constant speed is no different from a car speeding at the same speed, especially in comparison to the effect the two movements have on their environment, that is, nature. Thus, there seems to be a synergy operating all around (Geddes, 1968).

The kind of rationality that is imposed upon human subjects in a society is not at all voluntary. While the functionalists have taken a cue from the utilitarians and classical economists in taking a voluntary look at human action, they have stopped short of asking a simple question. Is life voluntary in nature? A supplementary question would be: do we ask for a life ourselves? Given the current level of knowledge and scientific thought, the question can't be answered in the affirmative. Nobody asks for a life. Nobody wants to be born. It's the 'will to reproduce' among living beings (Schopenhauer, 1818) that becomes the cause of a new life. The question of will or 'free will' leads us to the concept of 'freedom'.

Freedom is a psychological condition that manifests itself in the social context as and when necessary. Thus there is an intertwining of idea and action through the exercise of freedom. Where does 'free will' come from? Right at the moment that consciousness gives itself to a subject, one starts perceiving things around oneself. There is a minor time lag between the moment we perceive and the moment we make sense of that perception. The faculty of cognition must be filled with a desire in order for the human mind to form a conception. The word, 'desire' is often explained from an empirical point of view with an object towards which it is guided. How about the desire to possess a desire? Can there be a thought without the desire of the subject to concentrate upon some object of appearance? The term, 'concentration' is itself a manifestation of the first desire of every living being in the quest to make sense of one's ontological experience. If there's anything that stands the test of coming close to 'free will', it is this first desire. Subsequent to this everything else is a transfiguration of what the world around us has to offer. How many times have we observed natural objects in perfectly geometrical shapes? Does the course of a river teach us what is straight? Does a mountain tell what a conical shape is? It is just an application of the human mind to various objects that it perceives in its everyday experience. In fact the world of experience seldom represents the shapes and figures that fit well into the scheme of Euclidean geometry. It displays a high bias towards fractals (Mandelbrot, 1982).

The first and foremost on the priority list of the free will appears 'happiness' which is both a mental state as well as an outward manifestation of the pleasure one experiences in the realm of one's somatic world. An object of beauty can only be perceived if the human mind is capable of discerning vital differences between the beautiful and the 'not-beautiful'. Thus, 'difference' forms a category of cognition that is of fundamental importance for everything that a living subject does and thinks over the course of one's life.

Difference owes its recognition to the human faculty of cognition that has the ability to perceive and distinguish between objects and ideas. The question is: why difference? It's the inability of the human mind to think all at once coupled with its limits of clear vision and understanding that causes it to draw boundaries between images and concepts right in its universe of pure reason. The same gets translated to the world of experience. Although objects of experience themselves

based on their intrinsic as well as extrinsic properties manifest themselves as different objects, it's the property of the human mind, the limits of its cognitive powers to pick a list of objects at a time in order to make sense of what one sees or feels. Classification is a natural consequence of the human capacity to recognize differences. What seems to be a tree is stored in one's memory. Next time one sees an object similar to the one that is stored in one's memory one relates and puts the newly seen object in the same class of trees. Although we have emphasized more on vision in the ongoing discussion, it's the same with other sense-perceptions as well. Hearing similar sounds, touching similar objects, smelling similar odour, all lead to classification.

However, the limits of classification are not known to the human mind. It is linearly increasing just as the number line. Differences do occur within the objects of one class. Essence of an object differentiates it from the other when it comes to identifying various classes of objects. But an object is nothing but an assortment and a set of statements corresponding to each of its properties. The human capacity to count and measure is an a priori condition. Everything that can be measured must have some magnitude. Thus, objects of the same class with different magnitudes of one or many of their properties stand to be differentiated from one another.

The term, experience has been accorded great importance on account of the works of empiricists such as Locke and Hume. But the question to be asked is: what gets counted or should be counted as experience? Simple perception of a phenomenon might be termed as that preliminary event that goes into constituting a piece of knowledge. But there's a lot of processing needed to translate an experiential bit into knowledge. Thus, there arises a difference in the processing that different minds employ as we can inarguably say that each human being by virtue of being, unique renders each mind to be unique. This uniqueness leads to the construction of a piece of knowledge that has similarities as well as differences with regard to what other minds would make of it. Undoubtedly, it is this process that is at the root of theory-building. All theories must have a common platform of understanding that brings the entire humanity on the same page, if there are such theories for to aid the understanding of human beings (Popper, 1959). What about those unique areas of disagreement? Under such conditions, every experience of the human mind can result in developing partial theories only. Thus, the vital question that emerges is: Is theory possible at all? If it is considered to be true that no theory is good enough to pass the test of

universality in terms of the uniqueness of each and every human mind, the inquiry must go deep into its reason. The simple reason is the precision that one looks to apply while processing a given piece of information. The points of disagreement owe to the fact that every mind applies different levels of precision in analysing a particular situation.

The Historical perspective and Chaos

The presence of a phenomenon and one's knowledge of it are two different things. The existence of the phenomenon might have affected one's conditions of living and thinking all the way without one even realizing the fact that such a phenomenon exists. What difference does it make to one's patterned ways of acting and thinking soon after one comes to know of something that has affected one for a long time? All historical incidents could be summed up under this question? Was the knowledge of the Roman Empire available to the western world forever? When did it form a defining theme of inspiration in their lives? Did Edward Gibbon's work enlighten the world about the Roman Empire more than anything else had hitherto done? Similarly, what effect has the translation and publication of Kautilya's Arthashastra caused to the Indian mind, and of course, to the western mind to some extent in the realms of politics and economics? The knowledge of the Indus Valley Civilization has shaped the entire world-view about our past in the Indian subcontinent. The earlier world-view never thought about a civilization that preceded the Vedic civilization. Nevertheless, one can hardly deny the fact that these civilizations and incidents of salience did have a strong impact upon the lives of the people directly and indirectly. Thus, something that causes an impact might not even be known to cause such effect. That surely erases the idea that everything has a beginning and an end. Things already have an impact and simply get inserted into the storehouse of knowledge from somewhere, on some fine day. They had their temporal beginning at some point which has nothing to do with our using them as bits of knowledge. This is one of the most chaotic aspects of the entire notion of knowledge based upon our appreciation of our past. Knowledge largely gets classified as academic and non-academic. The argument above mostly applies to academic knowledge that is well-documented preserved and is referred in discussions and debates as a standard.

On the other hand, there is non-academic knowledge that is based on short-term opinions and fashionable ideas. Such notions also display a chaotic behaviour. A sudden injection of a particular idea or opinion gives rise to a lot of unexpected reaction in the society. Again, the opinion made public suddenly might have lurked to affect those lives for a long time without their knowledge. A knowledge of it changes things, but to what extent and in what manner? Media reports are examples of such non-academic knowledge. All discussion encircling a disastrous earthquake quickly shifts over to a multi-million dollar business opportunity with the news headlines acting as the catalysing agents.

The perspective of Vitalism

The distinction between animate and inanimate objects with agency accorded only to the former needs to be seen in the light of chaos theory that suggests that even the presence of a speck of dust might cause an international deal to fail, how can we afford to overlook the impact of the millions of ways in which all that we have produced over the eons tend to affect our lives? The mechanism-vitalism debate in the philosophy of science finds it tough to tilt it in favour one or the other. The various inanimate structures we erect not only have an aesthetic effect on our senses but they also have a direct impact owing to their mere presence that causes minor variations of temperature and pressure with deep impact on our ways of thinking. The impact of the soul-like entity upon human behaviour and the ensuing series of events from one such act has been a subject of study right from the daysof Aristotle which gained considerable heights in Franz Brentano's project of building a 'science of the soul' (Brentano, 1874).

A constantly rotating ceiling fan in the room could be said to have an agency of its own. Of course we can claim ourselves to be the agency who supplies it with electrical power required to see it run. But once it's set into motion, can we stop the effect of one moving object in our vicinity? Is it not true that simple movements or even the presence of many such objects around us affect us in various ways? With time we develop a kind of predilection towards some of these objects and a dislike towards other objects. Do these inclinations not affect our emotions and hence, our ways of thinking? Thus, we must accept that it's not only human beings and human words that cause us to think and act in particular ways. Psychology is not just about the 'social self' (James, 1890). There is an organic self and a material self that seems to build a chaotic

system in the form of the human body. Are human emotions animate? They could be considered to be living only in the sense that living beings exhibit them. But as 'things', they affect us the most without being living objects.

Minor changes within the system tend to accumulate (both at the level of ideas and actions) and might result in a complete structural change of the system itself. Considering all structural changes to be caused due to external factors and owing to the environmental response is a mistake. William Ross Ashby's (1960) 'self-organizing' system needs to be analyzed in order to gain clarity over this issue.

A critique of our compartmental understanding of the world around us

We fall prey to our own conceptual edifice that seems to take us on a ride when it comes to making sense of the world and activities around us. We term these activities as economic, social, political etc. based on just one observation – the dominant mode of activity that takes place within a particular milieu. What we miss is the fact that every economic activity is an expression of some motivational act, an emotion that compels one to act in the manner one does. Thus, no matter what the macro concept one applies, the fact remains that it is human action guided by emotions that runs the entire cycle of the human world. Are human emotions chaotic? If yes, the society is inevitably a chaotic system. It is a system of systems, every individual being a unique system to begin with. All actions that individuals engage in have deep-lying motivational factors which have their outward manifestation as economic or political, but what takes place is a consequence of some emotion or a part of it. The boundary line that separates the individual and the collective seems blurred. The general scientific approach leads us to commit this mistake quite often. Since every individual appears to be one unit, we count it as one and continue to count an entire population as the sum total of the number of such individuals when an individual is nothing but a set of assorted ideas and a unit of knowledge, representing the views and opinions of the society in varying quantities as well as at different levels of quality. If every individual is considered to be a system, each system is a miniature society. The system becomes still more complex because each such system has the capacity to learn from its surroundings. Does such learning lead to order or disorder? Thus, the application of the systems approach to the society as a whole with the assumption that every individual is like any other needs a revision

in the light of the new approach. Although it might appear sometimes that one activity or a group of activities or one individual or a group of individuals might rise to prominence and apparently a major part of the society, even sometimes even the society as a whole might be apparently represented through such activities or individuals. It is all because of the process of 'progressive mechanization' or 'progressive centralization' (von Bertalanffy, 1969).

Precision, Prediction and Equilibrium

We accept that the subject matter of the science of society are human beings who have an agency of their own and not inanimate objects such as the celestial bodies in the universe. Hence, it's difficult to build a science of society just as physics and biology, any effort at doing so seems to get entangled in the mechanism-vitalism debate. True, but the problem is that we stop at this very point. The question to be asked is: Why do we consider it difficult or almost impossible? It's only because of our demands for prediction and precision. The precision with which one tries to find the value of the constant 'pi' is not the same as one tries to find out the reasons for chronic poverty in a given social arena. What keeps us away from the real issue is our inability to be precise enough. The techniques that the mathematicians employ are no doubt applied to objects that don't resemble human beings as moving objects. Primarily, it's the property of motion that injects the chaos in all that humans do. The same could be said to be true of the heavenly bodies. No matter how well we explain their orbits and time periods, we can't manipulate them. They move on their own 'agency'. All we do is merely devise a theory that fits well and explains the phenomenon to our satisfaction. Something similar has also been done in the case of sociological theories. We explain a phenomenon of which understand too little. We just adopt an attitude and approach that seems to be good enough resembling the concept of 'satisficing' propounded by Herbert Simon (Simon, 1957). Even for physical systems that seem to be governed by the laws of motion, everything does not get accounted for and measured. Predicting the exact course of moving bodies is not accomplished for such systems as well. Physicists often concentrate upon one aspect of a given problem and calculate the values of impacting variables based on assumptions, neglecting the factors that seem to affect it in one or the other way. The story remains unaffected as long as the factors neglected have a negligible effect on the final state of the system. But an entirely different world might present itself for analysis if the system shows sensitive dependence on these factors. An arbitrary value assigned to such variables determines

the final state of the system. A minor variation in the values of any of these variables, owing to the sensitive dependence of the system on initial conditions might produce a large difference in the final state of the system as compared to what it would have been without the minor change. The scientific view of causality might undergo revision under such conditions. 'Conservation causality' gets replaced with 'Instigation causality' (Mittasch, 1948, as quoted in von Bertalanffy, 1969).

Problem with the concept of boundary-maintaining system

In any case, the difference in the final state depends on the scale and the spatial characteristic of the boundaries of a boundary-maintaining system. Thus, if the society is considered to be a boundary-maintaining system, as argued by Talcott Parsons, where are the boundaries? Even if there is an abstract model that defines those boundaries, is it not characterized by fuzzy borders and overlapping boundaries? Thus, it could be said that if the system is too large in space and time as well as it has fuzzy boundaries, the concept of boundary-maintaining system (which is an transplacement of the biological concept as developed by Claude Bernard and Walter Cannon (1932)) collapses which is exactly the case with the social system. In addition to it, such boundary-less systems present a greater chance of becoming chaotic owing to their proclivity towards unpredictability. If there are no boundaries, one can't locate the extent of the system with satisfactory precision. An analogy could be drawn with the universe which is undoubtedly a system but a serach for its boundaries has been on for eons, all in vain.

Sensitive Dependence on Initial Conditions (SDIC)

Sensitive dependence on initial conditions could be imagined if we are to live on a 6-inch wide platform which is 20-feet high. Will there still be the same way of life that we now have? The extra caution that we would employ in trying to survive the fall will build an entirely different nature of society with radically different norms and rules. If the degree of uniqueness differs significantly for individuals, the social system is more likely to exhibit sensitive depedence on initial conditions.

Having said that, one ponders upon the question: if there are wide similarities between uncertainties involved in both natural sciences as well as in social sciences, why do natural sciences lay a greater claim to being scientific than social sciences? Probably, it's simply because

they provide better predictability. A system as chaotic as the weather can also be predicted with fair precision with the help of meteorological science, which is actually an interdisciplinary exercise. The arrythmatic heart beats are normally not a concern for most of us, but yes, they represent chaos which can be fairly studied making use of normal tools developed by medical science. But, what happens to the studies that try to predict social phenomenon such as social mobility? Why is it that neither do we have a convincing conceptual model that defines the term nor a suitable technique that predicts one's chances and direction of social mobility over a given period of time? Here one should look to utilize Poincare's concept of 'phase space'. In a phase space, every state could be explained with the help of finite values of all the variables involved. If one is able to identify all variables that affect a particular phenomenon, the phase space of the phenomenon can be easily bulit and explained assigning values to all such variables. Thus, the inability to explain something like social mobility has nothing to do with the problem of Sociology studying human subjects with an agency of their own. Rather it's because of the hangover of the scientific approach that has preponderantly lurked upon our rationality for over two centuries now. A simple explanation of the velocity with which a cricket ball flies after being hit by a bat in a game of cricket could be based on the principle of conservation of momentum. But is it actually that simple? What effect do atmospheric variables such as temperature, pressure, and wind direction have on the velocity of the ball? Taking everything into account, what if a variation in the values of any of these parameters is a result of some chaotic behaviour such as a spectator's sunglasses reflecting sunlight in a particular manner that caused a change in the parameters on the pitch resulting in a difference in the velocity of the cricket ball from what it would normally be if simply calculated according to the law of conservation of momentum? Similarly, our inability to identify and explain each and every variable in the context of the problem of explaining something such as social mobility owes to the fact that we are unable to take into account the entire list of variables that bear an impact on it. The phase space remains unexplained and hence, the emergence of the partial explanation with which we are forced to satisfy ourselves.

This line of argument might send our heads reeling over the thoughts of infinitude of factors that probably affect social mobility in the long run. But nature is not that cruel. It's benevolence is always visible in the ways it helps us with minor breakthroughs in times of crisis. Something as

turbulent as turbulence itself has a 'strange attractor' (Ruelle and Takens, 1971) that renders it easier to be understood and explained. All one needs is to find such strange attractors in the case of social phenomena. That definitely shows us the passage out of the problem of getting caught up amidst the problem of infinitude. Strange attractors definitely reduce the complexity involved in explaining the phase space of the social phenomenon.

Action and Behavior

"The issue of "behaviorism" then really boils down to that of whether it is possible to handle the more differentiated levels of the frame of reference of action with the precision and care which the scientist attempts to attain. As in other branches of science "the proof of the pudding is in the eating." (Parsons, 1951, p.366).

The list of variables can never be infinite for a discernible system, for a system with infinite variables finds it hard to maintain its state for any appreciable period of time that renders itself apt for human observation. If there are infinite variables, at no point of time there is a definite state of the system that can be explained. Such rapid change is not chaos, rather it's randomness. Effect of infinite variables on a dynamical system needs to be analyzed in detail.

If a conservative dynamical system with m degrees of freedom is subject to k geometrical constraints, it may be treated as such a conservative system with **m-k** degrees of freedom. That solves the problem of infinitude to some extent. Every factor affecting a particular phenomenon does not only contribute towards adding to its degrees of freedom but it also introduces constraints that limit the number of degrees of freedom.

The problem lies in our approach of not being able to define our categories to the requisite precision levels. Any real system with absolute unpredictability is a result of our inability to study it in the right manner. If we arm ourselves with the right categories and define them to precision, we find ourselves at an entirely different level of comfort when it comes to explaining the dynamical system.

The property of periodicity is not only witnessed in the case of inanimate heavenly bodies, rather the very periodicity of the heavenly bodies introduces the character of periodicity in our lives owing to the occurrence of days and nights, not to forget the seasonal variations that it causes. Based upon our understanding of dynamical systems, one can say with some conviction that periodicity reduces the probability of randomness. Thus although it might appear to be so, human action is not random. Then, what it is? Is it chaotic?

A critique of the positivist bias in almost all research

Methodologically speaking, it's not sufficient to be adopting the approach of a physicist or a mathematician and apply the principles of scientific experiments and positivism in order to study the society. The Durkheimian (1895) advice must be supplemented by an approach that seems to explain the utmost regarding the phenomenon at hand. Until we have completely grasped the various aspects of a given social phenomenon, we can simply not proceed to erroneously relate to other phenomena, again understood partially that multiplies the chances of our erring in the end, and that too of an exponential order. Parsons admits: “The central methodological principle of our theory is that of the interdependence of a plurality of variables.” (Parsons, 1951, p.332). Thus, one must try and explain the term, 'plurality of variables'. What are these variables? How are they detected, explained and measured?. A given state of any system, especially a dynamical system is completely defined by a set of n real variables. To make things simpler in sociological terms, the term, 'real' must be substituted with empirical, something that can be proved to exist ontologically. Have we so far been able to describe at least one such state corresponding to a single social phenomenon that completely explains the state with the help of the complete set of variables defining the state? Of course not, and hence hovers the cloud of confusion over our level of understanding. There's confusion regarding the methodological standpoint one needs to adopt while conducting a sociological study, or rather while one simply engages with the discipline called Sociology. The debate between positivism and interpretive Sociology has not led us too far from where we began about three centuries ago. In the Comtean (1822) scheme of the progress of knowledge, we can consider ourselves still entangled in the bush of metaphysical knowledge. Without being able to completely define and refine the concepts and categories, we make use of them to explain the various phenomenon in the society and draw conjectures and build models that mostly lie far from reality, not to mention their inability to successfully explain

the dynamics of the real society to satisfactory levels. Thus, before taking our project further we need to re-establish its main tenets and refine the concepts to be made use of. Every particular definition should coincide with the reality it tries to explain.

The problem of analogy as a technique of representation and explanation

"The means whereby to identify dead forms is Mathematical Law. The means whereby to understand living forms is Analogy. By these means we are enabled to distinguish polarity and periodicity in the world." (Spengler, 1927). Analogies can only be drawn if one adopts an essentialist standpoint. Concepts from one category or a group of categories are applied in order to explain a phenomenon that involves an entirely different set of categories. Concepts between the two groups could be said to be analogous if and only if there are proven similarities among them. Isomprphism is what aids in taking help of analogies. For example, the flow of a river and the flow of a gas are analogous quite clearly, at the same time being isomorphic as well. Similar is the flow of time which is something that can be seen to be progressing unidirectionally and irreversibly. But which of these is homologous and which is analogous has to be identified with caution. The division of labour among the bees and the division of labour in a factory setting could be rated as homologous. But the study of the human body as a system along with parallels drawn with the society as a system of interrelated and interdependent parts is an analogy. While the homologous comparisons don't pose a problem as the concepts used are similar, analogies involve concepts that have similarity as well as differences. Hence, every analogy has to be employed with great care in order to avoid mis-explanation. The entire method of using analogies for explanation needs to be revisited.

The notion of space and time in chaos

In light of the whole gamut of the idea of chaos, there needs to be a reconsideration of notions of space and time. Do these concepts mean the same thing for everybody? Have they been meaning the same forever? How do we plot time as a concept against time as a real variable? Absolute time is now a matter of the past. Ever since Einstein discovered that time is relative with everyone carrying their own clock, the idea of absolute time has been buried forever. The Kantian notion of time emphasizes the fact that it's the succession of events that aids us in perceiving the time elapsed between two events. Were it not for us to discern differences and,

hence, changing states of nature that go down as different events, there would be no perception of time. But, even if we could not perceive time, photons would have travelled with the same velocity of 'c'. Hence, there would always have been that source which presents us with the notion of time. Therefore, it's impossible to imagine a material existence sans time. Nevertheless, the mental pictures (Wittgenstein, 1921) formed of the idea of time depending on the time elapsed between two successive events could probably depend upon the number of changed states of nature that happens to present itself to the observer. Hence, in a society that has so many simultaneous events occurring might instil a different notion of time in the minds of its members than the society wherein things rarely change. It can also be taken to acquire some truth when it comes to comparing different epochs in history. The notion of time in the ancient times with men leading a pastoral way of life was seemingly vastly different than our notion of time in the techno-mediated age of ours. This might inject chaos when it comes to the inferences drawn on the basis of social research. Considering all time as the same might not hold good for some research that was conducted at a particular period of time. Things might have changed since then. The complexity of the situation gets multiplied owing to the fact that the rate of such change is hard to be calculated. It can't be explained in seconds and minutes and hours. One minor change might result in a difference that causes it to be something that differs from our time by a thousand years. How do we account for such chaotic situation?

Conclusion

Having witnessed the enormous complexity that one is faced with while trying to analyze the human society, one is bound to confess that neither structural, nor deterministic theories seem to explain the myriad ways in which social forces operate while making the society work in the manner it does. Hence, it’s high time we moved ahead a bit from the classical systems approach in Sociology (in fact in other social sciences as well) and adopted the chaos way of looking at the social system.

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