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The Quantum Dependence in the Social Behavior

Poghosyan G.A.*, Poghosyan R.M.

ORCID - 0000-0001-8094-1289

Address for corresponds:

Dr. Poghosyan G.A.; Professor of Sociology

Institute of Philosophy, Sociology and Law, Armenian National Academy of Sciences.

Yerevan, 0019 Armenia.

Abstract

This article deals with the problems of studying communication links in a digital society. An analysis is made of the heuristic possibilities of the classical causal model for describing the dependencies of social phenomena. In the world of quantum phenomena, however, any measurement affects the system. The mere fact that we measure, for example, the location of a particle, leads to an unpredictable change in its speed. The same phenomena can be observed in the social system: any empirical study of social phenomena automatically produces in itself, some changes in this system. Modern physics has discovered the quantum structure of the material world. And human beings, as material objects, really are quantum. Therefore, social life requires a quantum structure for its proper understanding. This means that we need to develop a “quantum social science”. The principles of quantum mechanics are relevant for social theory, and therefore quantum theory cannot be ignored in the social sciences.

The quantum effect can be described as the propensity of certain individuals to modify their conduct due to their consciousness of being observed. This effect refers to the fact that people will modify their behavior simply because they are being observed. The new approaches are proposed for using the quantum dependence model of theoretical physics in relation to the human phenomena in the modern digital space.

Keywords: quantum dependence, digital society, social fragmentation, social theory.

Introduction

Nowadays many social scientists elaborating the new approaches to the creating a quantum perception of the social changes. They argue that we need to be open a new paradigm for social phenomenon. Karen L. O'Brien from University of Oslo draw attention to the emerging field of quantum social theory [1]. The new quantum social theory considers how the concepts and understandings from quantum physics could relate to the social issues. “The quantum social theory can be described as an emerging field of research that considers the wider, macroscale social implications of quantum theory” [1]. Such new theory could support social scientists for better understanding of relationships between social structures and human activity. Speaking in general, the social sciences are “pre-quantum sciences - languages, approaches, and methods. If they are lucky, one can at best say that the social sciences are relativistic” [2].

Existing social theories that explained the previous model of society have become inadequate in explaining the new social realities in the conditions of social atomization. The internet, for example, has changed human behavior. Forms of human interaction spent working or free time with mutual contacts and acquaintances have undergone major changes. New social phenomena have appeared in our lives, such as online internet communities, which are made up of people who have never met face to face, but nonetheless have a strong connection. Thus, sociologists are faced today with the challenge of developing a new ‘quantum social theory’ capable of reflecting the new realities of this fragmentizing society. The two most prominent American proponents of this new vision were Karen Barad [3,4] and Alexander Wendt [5]. The books of both scientists are revered as pioneers of “quantum social theory” [6]. The theory, which can be described as an “emerging field of research that considers the wider, macroscale social implications of quantum theory” [6]. Such a quantum social theory will have to move away from the typical cause-and-effect relationships and will have to develop a new concept of social causation based on a ‘principle of uncertainty’ of social interaction. Wendt, however, argues that “if human beings really are quantum, then classical social science is founded on a mistake, and social life

will therefore require a quantum framework for its proper understanding” [5]. What is needed, according to Wendt, is a “quantum social science” [5]. According to the quantum theory, even a small event that happens in one part of this interconnected globe can have an unexpected impact on the processes elsewhere.

Quantum Connection

Quantum connection - or as Albert Einstein [8] called ‘spooky action at a distance’ - is a quantum mechanical phenomenon in which the states of two or more objects become interdependent. This interdependence persists even if the objects are kilometers away from each other.

When quantum mechanics was first developed in the early 1920s, the problem of uncertainty was first recognized by the young German physicist Werner Heisenberg. Starting from complex mathematical formulas describing the world at the subatomic level, Heisenberg gradually came to a simple formula that gives a general description of the effect of measurement tools on measured objects in the microscale level. As a result, he formulated the principle of uncertainty, named after him, as the ‘Heisenberg uncertainty principle,’ which expressed: it is impossible to simultaneously determine the coordinates and velocity of a quantum particle [7]. In 1935, Albert Einstein, together with his colleagues, came up with a proof that particles have a certain speed and position, but we simply cannot measure them all at the same time [8]. This echoed Heisenberg’s explanation: since the measuring tool is commensurate with the object of measurement, then by accurately measuring the speed, we introduce a perturbation that does not allow us to simultaneously and accurately measure the position, or vice versa. In the ordinary world, when measuring the position and speed of a physical body in space, we practically do not influence it. Thus, ideally, we can simultaneously measure both the speed and the coordinates of the object absolutely and accurately. In the world of quantum phenomena, however, any measurement affects the system. The mere fact that we measure, for example, the location of a particle, leads to an unpredictable change in its speed. The same phenomena can be observed in the social system: any empirical study of social phenomena automatically produces, in itself, some changes in this system. Thus, the Hawthorne effect can be described as the propensity of certain individuals to modify their conduct due to their consciousness of being observed [9]. The Hawthorne effect refers to the fact that people will modify their behavior simply because they are being observed. The term ‘Hawthorne effect’ was coined by Henry A. Landsberger in 1958 while he was analyzing some studies conducted from 1924 to 1932 in a Western Electric plant called the Hawthorne Works in Cicero, Illinois [10, 11]. The society, for example, as an intangible object of sociology is the quantum phenomena. Due to this we can say that sociologists have already made a “quantum turn” in their attempts to describe society . Some questions have been raised since F.Toennies’ classic work “The Critique of Public Opinion”, concerning to “whether the people have firm opinions on anything until an opinion is demanded of them by a pollster, who comes with a specific set of question and answer options” [12].

Impact of Observation

Thus, the quantum effect of the impact of observation on the behavior of the observed object can be seen in many sociological surveys of public opinion. For example, in one of the latest sociological surveys conducted in Armenia, an example was given of how people’s views on their own values and preferences change over time. As known, in 2018 a ‘velvet revolution’ took place in Armenia, as a result of which the highest political power in the country was replaced. The revolution got its name because, during the days of mass protests, the change of power took place without firing a shot - without violence and strong clashes. The results of a sociological survey conducted in Armenia in May 2023 among 1,100 respondents were presented by the Gallup International Association.¹ Respondents were asked if they took part in the 2018 revolution. 91 per cent of respondents in 2018 said they took part in it; in 2023, only 37.4 per cent of respondents said so. It is obvious that 91 per cent of the population in any country cannot take part in any revolution. This is a fantastic exaggeration, which clearly demonstrates the impact of the exact fact of observation (sociological survey) on the behavior of the observed object (respondents’ answers). Here, we are dealing with the effect of people’s involvement

¹ www.gallup.am (access date: 03.04.2025)

with a significant historical event. Respondents who did not take part in the event, or even were absent from the country during the event, wanted to show themselves as accomplices, precisely because they were asked during the survey about this event. The conduct of the survey itself had an impact on the answers of the respondents. There are many such examples of the impact of observation on the behavior of a social object in the social sciences. This is really looking like exactly quantum effect, specific for quantum mechanics. Of course, in the majority of science publications the quantum social theory used as an analogy. In our article we do the same. But there are many special investigations recently appeared, in which the quantum theory were used with concrete tools for the analysis of the data. [13, 14]. A few interesting quantum models for describing social objects were constructed by Fabio Bagarello and co-authors [15, 16, 17]. Russian scientist A.K. Guts proposed the simplest (local) version of axiomatic quantum sociology, in which he gave in detail specific examples of calculations of behavior of social objects using the apparatus of quantum mechanics. In particular, in his work he showed how the Schrödinger equation works for describing such specific social phenomena as the migration of the population from Africa to Europe and the processes of ethnogenesis [18].

Digital Modernity

Modern geopolitical and social-digital challenges to humanity were caused by the crisis of the existing model of the world, the transition from a unipolar to a multipolar world, and the processes of hybridization of reality. This put forward the need for a new concept of the world order and a new concept of causality in sociological theory. As American sociologist Edward Tiryakian [19] noted, modern intracivilizational challenges affect all human life practices in a non-linear way, and this requires the development of fundamentally new types of modernization.

In the context of the transition from traditional to industrial society, and then from modern to post-modern, our society existed in the form of a more or less stable human community. Sociology has so far studied the nature of this relatively unified life and tried to describe it within the framework of certain 'objective' regularity of social development. However, subsequent modernization processes led to the gradual intellectualization of technology, which for a long time, was presented as some material and technical substance independent of us. Over time, the expanding processes of digitalization and the active development of artificial intelligence have brought the possibility of a step-by-step 'humanization' of robots and cyborgs closer. Sociologists were seriously alarmed by these increasingly complex dynamics of social development.

Jean Baudrillard [20] stated that there is no longer a 'pure' society, and that, in essence, this leads to the 'end of the sociality.' Sociologists began to turn to interdisciplinary concepts that consider modern trends in the non-linearity and complexity of the new world order within the context of a hybrid, digital format.

In modern sociology, attempts have been made to comprehend new non-linear directions in the development of society. Considering the 'contradictory, turbulent and deformed nature of social processes,' Russian sociologist Zhan Toshchenko [21] suggested using the generalizing characteristic of contemporary society as a 'society of trauma.' English sociologist John Urry [22] suggested that the hybridization of social and material worlds leads to their complete interweaving, which contributes to the 'alternativeness of future societies,' the multiplicity of variations, and the emergence of new catastrophes.

The experiments of Alain Aspect [23], a French physicist and awardee of the 2022 Nobel Prize - in the early 1980s led to a startling result: measurements made in one place instantly affect measurements made in any other place through space. As a result of the Big Bang, the universe arose from a single point, thus, everything is connected at the quantum mechanical level and what we do in one place is instantly reflected in all other places. Chinese scientist Danah Zohar noted "Separation is an illusion. We live in what quantum scientists call "an entangled" universe, where everything and everyone is connected to and affects everything and everyone else, a world of Zero Distance" [24].

The probability wave combines all possible pasts that could have preceded a given observation. So, our reality can have at least two equal alternatives for its realization, which again leads us to the concept of the multiverse. It is obvious that in the realities of the current global and fragmentizing world, the linear model of social interactions is not adequate. Thus, we need to develop some kind of quantum theory of social interactions.

Perhaps this phenomenon has something in common with the alternativeness of future worlds and the multiplicity of variations. It is appropriate to recall the so-called ‘Giddens paradox,’ according to which there is an effect of complicating risks and their interference in the coordinates of space and time [25]. Its essence is that issues which are invisible and intangible at the level of the immediate sense may well be massive in their effects and impacts. The accelerating dynamics of nature and society can give rise to manmade risks with unforeseen negative consequences delayed in time. People do not act on an incrementally growing threat until it becomes visible, at which stage action may be too late. Indecisiveness in managing current risks (i.e., postponing reforms and corresponding humanistic innovations), in fact, significantly complicates them, especially in terms of increasing aggravating consequences.

New Generation and AI

Currently, the process of comprehending a new sociology for the digital society is underway. Over the past decade, the use of the internet and information technology, especially among the young generation, has increased dramatically. According to sociological research, the most common social networking site in Armenia is Facebook. Among the main sources of the news information for 75 per cent of the Armenian population is the public television channel H1; social networking sites and the internet are already in second place [26]. It is no coincidence that this generation of young people has been called by sociologists as the ‘digital generation.’ Today, it is already becoming popular among young people to use the capabilities of artificial intelligence (AI), in particular through communication with ChatGPT4. The professions of IT specialists, freelancers, and ‘digital nomads’ are becoming more popular. It includes a quantitative and qualitative analysis of online communities and lays the foundations for building the theories of people’s behavior on the internet. We receive large quantitative data thanks to the development of big data technology—this is exactly why there is an even greater need for qualitative analysis. While access to data is no longer a problem, their understanding is becoming more and more problematic. ‘The opening of the social sciences to Big Data has led to a ‘wild interdisciplinary nature of research’ [27]. There is a feeling that the social in a diluted form is everywhere, but in its pure form, nowhere. Thus, neither science nor society remained unchanged enough to fulfill the promises of strict ‘socio-logy’ [27].

Big data—referring to the use of predictive analytics, user behavior analytics, or some other advanced data analysis technique—has loudly declared its potential in the social sciences. These are data sets whose size or type does not allow them to be selected, managed, and processed with minimal delay using traditional relational databases.

Big data analysis allows researchers to see repeating patterns or other forms in large arrays of unstructured data. However, it does not give a valid answer to the question of why these patterns exist. Whereas traditional sociology studies the real world, digital sociology studies the virtual one. So far, the question on the interaction between traditional and digital sociologies has not been raised. The sociologists have suggested studying the relationships between people on the internet. The intersection of online and real interactions can be perceived in terms of additional reality. They are influenced by perceived digital and online identities, narratives, and self-presentations. Young people acquire a lot of knowledge and skills through the opportunities offered by the internet. Therefore, it becomes important to investigate the formation of social connections on the internet, as well as their impact on changing relationships in real life.

Multiple Worlds

French researcher Bruno Latour [27] believes that it is possible to rely on the basic intuitions of the social sciences, but in doing so, he identified some uncertainties. Latour chose ‘uncertainties’ as a weak allusion to the ‘uncertainty principle’ because it is still impossible to understand whether uncertainty is rooted in the observer or in the observed phenomenon.

In retrospect, giving up the fixed frame of coordinate systems provided by the ether for physicists looks easier than giving up what sociologists would have to give up if they were to give actors the freedom to deploy their own activity on creating worlds [27]. Latour believes that modernity establishes a boundary with the help of science between nature and culture, reason and belief, and man and ‘inhuman.’

The collection of works by one of the leading contemporary theorists of historical sociology, Johan Arnason [28] proposes the concept of multiple worlds, which emphasizes the possibility of various and contradictory space-temporal combinations of components of modernity, one of which is capitalism. Being in a productive dialogue with Shmuel Eisenstadt, who developed the concept of multiple modernity, Arnason developed the so-called relational approach to the study of civilizations. Eisenstadt [29] was the first to use the term ‘multiple modernization.’ He put forward this concept based on the idea that modernization and Westernization are not the same at all, as the Western model is only one of the options, and modernization in different countries and cultures can take different paths. Eisenstadt concluded that all modernization revolutions took place in the so-called ‘axial civilizations’ or ‘those civilizations that crystallized over the course of a thousand years from 500 BCE, before the first century AD’. In his works, Eisenstadt revealed a new vision of modernization and modernity: ‘People have witnessed the transition of one modern civilization into a multitude, namely, to several modern civilizations. The theory of modernization has ceased to be regarded as final’. It also means that the examples of modern European civilization have spread to the societies of other civilizations. The basis of this concept was that Eisenstadt stood on the positions of the axial civilizations of Karl Jaspers, which are understood as centers of attraction for various societies in certain historical periods. According to Jaspers [30], ‘axial civilization’ denotes a period of simultaneous development at new, different points in the direction of a civilizational vision that asks the question of new civilizations. The modern civilizations and the modern societies they create are diverse, have different paths to modernity, but altogether form a civilization of modernity. Axial civilizations are civilizations with new thinking in religion and philosophy—such is the modern civilization. It appeared in modern times, much later than the previous axial civilizations identified by Jaspers: India, China, Egypt, Mesopotamia, Ancient Israel, Ancient Greece, and Iran. The further spread of modernity began to take place in such countries and regions like Russia, Eastern Europe, India, China, and Vietnam, as well as Asian, Latin American, and African countries.

Conclusion

The world we can observe is only a finite space-time of the infinite universe; it consists of visible self-moving objects (living objects), visible lifeless objects, and invisible objects whose ensemble is called ether. Perhaps the thoughts of people shape their fate. Scientists studying the quantum world say that the whole world is energy. All particles are everywhere at the same time—this is a paradox of the so-called quantum uncertainty. All elementary particles change their state from a simple observation of them, that is, human expectations always affect the outcome of the experiment. The law of quantum phenomenon is that one always gets the result they expect. Every moment, when making a choice, we create our reality, thoughts and assessments only color it.

Sociologists soon will have to take into account the more complex structure of social reality, the virtual component of the new, so-called additional reality, which will increasingly fill the space of the digital society. The new generation of young people, which sociologists call the millennials (Generation Y) and even more, the Generation Z, are, in fact, digital generations. These are young people who, we can say, grew up with the internet, went through their socialization in the digital space, and sometimes are even better at navigating the virtual space than real life itself. This is the generation of young people who are increasingly opting to work as freelancers or, better yet, as ‘digital nomads.’

Digital sociology is gradually moving into the internet through conducting online surveys and exploring the behavior of people in the virtual community. In this space, there are somewhat different social ties and other patterns. Social interaction can be recorded, stopped, repeated, or even reversed. In the virtual or internet space, the virtual community communicates in completely different spatial dimensions. One can overcome geographic distances that separate two or more people almost instantly, at a speed close to the speed of light. In other words, the barrier of remote space is overcome with incredible ease, unlike the real, physical space. Geographical remoteness, however distant, loses all meaning; space is compressed to a small fragment on the screen of your gadget or other electronic device, and the time factor ceases to be an irreversible fatality. In the digital format, time is overcome with the same ease as virtual space. The dimension of time becomes a controlled variable. In this sense, digital society turns out to be a more complexly structured virtual reality. Here, the forms of cause-and-effect relationships familiar to the real environment are deformed and quantum forms of causality come into force—an insignificant event can unexpectedly have a completely unpredictable significant impact on the network.

Sociologists who intend to study the patterns and features of social ties in the digital society will be forced to develop completely new methodological research approaches.

Martin Heidegger [31] in his well-known work, *Prolegomena to the History of the Concept of Time*, noted: 'Time is not something external, a kind of matrix for the events of the world' or just as little something inside in our consciousness. He noted that the movement of the things of nature, which we define as time-space, does not occur 'in time,' as such, they are completely timeless and meet only when they enter 'in' time.

Karl Jaspers [30] argued that 'the present is accomplished on the basis of the historical past... On the other hand, the accomplishment of the present is also determined by the future hidden in it.' Jaspers perceived world history as a chaotic accumulation of random events, as a chaotic heap, or as a whirlpool of the abyss, where everything intensifies, and one whirl turns into another—one event is replaced by another.

As a paraphrase of the principle of quantum uncertainty, we can formulate a kind of 'principle of historical uncertainty.' It is when, for example, the exact date of a historical event is known, but there is no unambiguous and clear description of it; or, conversely, when there is a reliable description of the event, but there is no exact dating. Sometimes it so happens that there is neither the first nor the second, while in some cases, there is both the first and the second. Much depends on how far the historical event is removed in time from the observer or the historian who describes it. In the case of digital reality, the events taking place in the digital society are subject to the regularity of quantum causality, and we must develop a completely new methodology for studying these phenomena of the virtual world.

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