European Proceedings of
Social and Behavioural Sciences
EpSBS
www.europeanproceedings.com
e-ISSN: 2357-1330

DOI: 10.15405/epsbs.2021.05.381

ISCKMC 2020
International Scientific Congress «KNOWLEDGE, MAN AND CIVILIZATION»

NETWORK AFFILIATES IN INTELLECTUAL NETWORKS: THE IDEA OF GENERATING THEORETICAL KNOWLEDGE

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Abstract

A new period of research in the field of theoretical knowledge being generated in scientific environment is associated with the fact that researchers' reflections accumulated here either insufficiently explore its possible mechanism or completely remain off the radar. Numerous studies show that research programs held by researchers and their various interactions in scientific communities have a decisive impact on the development of theoretical knowledge. It seems that one of possible mechanisms for theoretical knowledge to arise in science can be network affiliates, inherent in intellectual networks in which researchers are either immersed or consider themselves to be involved. Intellectual networks are herein understood as a unique format of interaction between thinkers, based on intra-network exchange of results of their scientific reflections, practices, references to their ideas, hypotheses, perspectives, and acting as a medium for generating and broadcasting new ideas. Such intellectual networks seem to be formed directly by participants in research schools, groups, communities and have a "synchronous-diachronic" nature. This aspect is seen in the ability of networks to receive and transmit scientific knowledge "here and now" (synchrony), as well as through generations and epochs (diachrony). Addressing the idea of "network affiliate" is a kind of response to the challenge coming from a changeable scientific society, in terms of innovations in acquiring modern views on best practices of knowledge generation and transfer.

Keywords: Intellectual network, theoretical knowledge, network affiliates

https://doi.org/10.15405/epsbs.2021.05.381
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Selection and peer-review under responsibility of the Organizing Committee of the conference
eISSN: 2357-1330

1. Introduction

A multifaceted and in-depth analysis of approaches to the development of scientific theories showed that they all deal with similar idealizations (abstract object, theoretical diagram, paradigmatic model, disciplinary matrix) and arise in the process of "relying" both on each other and within disciplinary discourses. Natural questions arise as to whether it is possible to identify and describe formats of this "inception", to comprehend who and by what means used to interact before and has carried out research communication so far, where this fine line is, separating representation techniques and their capacity to explain such "inception". Aside from the above, a thought of theorizing will inevitably lead to the fact that the entire corpus of practices behind the developemtn of theorizations accumulated by epochs is nothing more than a written history of scientific relationships. In this respect, irreplaceable assistance is provided by the famous scientist Collins (2002), who, in his greatest view, turned to the "network paradigm" and intellectual networks for the transfer of theoretical knowledge. His concept of "intellectual networks" is filled with a "high level of theoretical generalization", and the idea to show heuristic capital of network paradigm, its analytical capabilities and methodological principles for theorizing is very ambitious and large-scale. It is obvious that the idea of intellectual network can be interdisciplinary and widely used in research coalitions.

2. Problem Statement

The origin of theoretical knowledge in science is an evolutionary and inevitable process. Each disciplinary area produces a number of its own theories, research programs, etc. into a scientific environment. What is more, there is an appeal of some sciences to others, heuristic capital cultivated by native theories due to the occupation of categorical apparatus of other disciplines. In this situation, a problematic situation arises, consisting in the absence/lack of clarity in this origination.

Open sources indicate that science features the formation of different directions (vectors) of theoretical knowledge: general scientific, natural-scientific, technical, and social-humanitarian. For example, a general scientific segment takes its rise from Kuhn (2001). History shows that T. Kuhn, in building his "scientific paradigm", repeatedly reached out to various researchers, in particular J. Maxwell, A. Einstein, J. Piaget and his experiments on "different types of perception at different stages of child development, and the transition process from one type to another". Kuhn (2001) "argued" with Popper "if only a serious failure is sufficient to refute the theory, then Popper's followers will need some criterion of "improbability" or "degree of falsifiability" (p. 110).

A natural-scientific direction for the development of theories is associated with the value of publications by Stepin et al. (1999), confirmed by a huge number of interdisciplinary researchers who approached them. Stepin, voicing the major challenge of "generating natural-scientific theoretical knowledge", addressed the procedure for searching for the structure of this knowledge, the reflection of "scientific landscape of the world". Plunging into this problem, the scientist highlights the names of researchers from other eras who laid down certain components of theorizing practices, self-sufficient and based on empirical data. Stepin (Stepin et al., 1999) repeatedly refer to the ideas of Kuhn (2001) and gets into "mediated discourse" with him through scientific papers. Stepin reasonably and in a well-argued

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manner criticizes T. Kuhn's "paradigm and scientific revolution". This discourse and Stepin's standpoint are shared by Nikiforov (2013) and Mamchur (2013), objecting to T. Kuhn (2001), notes: the paradigm is discarded, but the resulting technology of experimentation and industrial production is preserved and adopted by a new paradigm (Nikiforov, 2014). Despite a paradigm shift, technology is improving, thus serving as a clear evidence of science marching" and joins Stepin's standpoint. A particular interest in the concept of Stepin (Stepin et al., 1999) was shown by B.G. Yudin, who "articulated that science could be analyzed in two dimensions – "from science" and "from culture"... "Stepin analyzes science "from science". It is known that Stepin "reacted positively to Yudin's remark, being particularly impressed by "the image of cultural forms as monads, resonating with each other in the process of development" proposed by Yudin". Stepin received an interesting empirical impulse towards methodological issues of physics from Tomilchik (2015). Stepin was able to extend them in his writings, which resulted in a joint book "The Practical Nature of Knowledge and Methodological Problems of Modern Physics" (Tomilchik, 2015).

A prevailing number of scientific research in the field of cognition and development of technical scientific knowledge belongs to two contemporary outstanding scientists, Cheshev and Gorokhov. Open sources suggest that both researchers drew their scientific inspiration from such scientists as M. Heidegger, once imbued with his explication of technology as an ontological problem, E. Kapp and his concept of representing technology as organ projection, "performed by a person in the course of an active transformative attitude to nature" (Cheshev, 2016, p. 105), L. Mumford, Spengler (1998) and his "priests of the machine", and Ivanov (1977). Gorokhov, in his cooperative effort with M.A. Rosov, disputed with a famous scientist V.S. Stepin on the philosophy of science and technology (Stepin et al., 1999). As shown by a comparative analysis of V.S. Stepin and V.G. Gorokhov, conducted by Dorosheva (2012) – a critically comprehended reconstruction of content-methodological analysis of science (V.S. Stepin) and technology (V.G. Gorokhov) quite adequately reveals a tendency that can be traced clearly on specific examples towards science and technology gradually merging into a single whole, which is proposed designate as technoscience – scientific and technical continuum (Dorosheva, 2012).

A social-humanitarian layer for cultivating theoretical knowledge can result from scientific views of Lektorsky (2012) and those who support the theory of knowledge, classical and non-classical epistemology (Mamchur, 2013).

Though seemingly isolated, the generation of segmental (disciplinary) theoretical knowledge and affiliates of researchers is interdisciplinary either in an explicit or implicit format. However, the very mechanism of this disciplinary interaction remains / does not stand out in an explicit form.

3. Research Questions

Insights into these originations of general scientific, natural-scientific, technical and social-humanitarian knowledge presuppose a search for a methodological basis for studying the methods and mechanisms of their ontogenesis, which in turn will make it possible to identify not only established practices, but also to put forward forecasts and assumptions.

Theoretical reflections on the objects of cognition definitely do not come out of thin air, but result from historical transmission of scientific experience from generation to generation, from one scientific

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school to another. Collins (2002) put forward universal and adaptive model of intellectual change, formation of theorizations. This concept can be applied to the problems of theoretical reflection towards constructing theoretical interpretations of objects of knowledge. The author shares Rozov's (2002) viewpoint stating that "neglecting what Collins did means failing to use a new space of reflection, a new generalization of the development of heterogeneous philosophical traditions and corresponding ideological possibilities" (p. 22).

4. Purpose of the Study

The paper is aimed at originations of interdisciplinary theoretical knowledge and rationale for the applicability of the concepts of "intellectual networks" and "network affiliates".

5. Research Methods

A study suggests a promising direction to address the generation of theoretical knowledge – interdisciplinary design of intellectual networks in which it originates. A methodological basis is built both on general scientific methodological grounds, including systems analysis, historicism, etc. to track the evolution of theoretical knowledge and streamline it, and on particular methodology referring to the concept of R. Collins, the theory of graphs. An appeal to the concept of R. Collins on the functioning, accumulation and generation of knowledge in intellectual networks, allows for a research algorithm for the construction of interdisciplinary theoretical knowledge by implementing patterns of transmission networks and accumulating reflections of scientists who pioneered the construction of theoretical interpretations.

6. Findings

Remarkably, Collins (2002) postulated: "the intellectual network is made up of both individual thinkers and their prospective coalitions, and the intellectual capital of previous eras on which they rely" (p. 15). In addition, he believed that "intellectual communication takes place at the intersection points of intellectual networks – the translation of cultural capital and the exchange of ideas, both within one area and between them." The paper shares Collins's message and his network concept ("network" representation format) within theorization of scientific knowledge. With this in view, theoretical knowledge can appear as a "knowledge interface", strewn with intellectual networks of scientists who were first to generate theoretical knowledge. Obviously, R. Collins, as well as other luminaries generating theoretical knowledge, like Kuhn (2001), Lakatos (1995), Stepin (Stepin et al., 1999), Cheshev (2016), Lektorsky (2012) and others refer to the so-called abstract models of cognition (otherwise referred to as network diagrams). Collins (2002) calls them "nodes" and "relations", which, in our opinion, puts Collins (2002) "on one design-research position" theorizing together with other theoretical scientists. He puts forward scientists-thinkers as "nodes", whereas "attitude" is "a special intellectual communication, enabling to generate fresh ideas." In other words, the so-called intellectual networks appear.

The paper perceives intellectual network as a format of interaction between key researchers – "progenitors" who initiated the generation of interdisciplinary theoretical knowledge, based on intra-network exchange of results of their scientific reflections, practices, references to their ideas, hypotheses, perspectives, and acting as a space for generating and broadcasting new ideas. Whereas, a question comes up as to whether true and potential bonds, properties, relationships and patterns, found to be present in "scientific groups", "scientific schools", "invisible colleges", "scientific cliques", "scientific alliances", are examples of network affiliates to result from constructing theoretical knowledge? In this perspective, network affiliates are viewed as a natural and organic connection-need of scientists in a constant search for like-minded people in the scientific community. It is expressed in their need for communication and building scientific contacts of any kind in order to express and/or defend their own scientific opinion. In other words, we are dealing not just with horizontal interactions of researchers, scientific communities, schools, etc., but with network affiliates and scientific network maps (affiliated intellectual networks).

The scientific environment is filled with an array of research papers devoted to the construction and development of scientific theories, research programs, interdisciplinary theoretical knowledge. In the vastness of theorizing, one can clearly see that the depth and range of various disciplinary (natural-scientific, technical, etc.) areas are very multivariate, from solving particular theoretical problems to building fundamental knowledge. The paper takes up the position of a "meta-researcher" and limits the construction of network theorization maps to two parameters: disciplinary clusters and the rate of scientist's activity (scientific community, scientific work) in solving a corresponding scientific problem. These parameters will underpin the basic design and research concept, but not "get lost" in private theoretical calculations, hypotheses. Network interaction is viewed as both communication and intellectual exchange of accumulated scientific expertise, ideas, practices, etc. Presuming that theoretical knowledge was born and formed not within general paradigmatic formats alone, but also natural-scientific, technical, and social-humanitarian "research fields", there can be four main dimensions of constructing theoretical knowledge: general scientific, natural-scientific, technical, and social-humanitarian clusters.

While tailoring the diagrams of affiliated intellectual networks for the construction of theoretical knowledge, a very significant emphasis is essential. Within each cluster, a network diagram is built along a "diachronous-synchronous" interpretation. It is possible to trace who "stood" at the origins and "excited" this or that idea of theorization earlier (another era) or at a given moment in time. A similar approach to building a network can also be found in R. Collins, who analyzed "intergenerational networks" as "chains of outstanding teachers and students" and, on this basis, identified "two types of networks: "vertical" (teacher-student) and "horizontal" (societies of like-minded people, associations competing with each other)".

This intellectual chain forms the basic principle in the "network paradigm" of accumulation and continuity between generations. R. Collins wrote that "sociocultural experience from previous generations to subsequent is transferred via networks; ideas and achievements are exchanged in various fields of knowledge". The paper implies by "sociocultural experience" the practice of constructing theoretical knowledge. The main interaction within "our" networks is carried out indirectly, with ideas, representations, and practices to "move", rather than personal communication that takes place, but does not prevail. Collins's (2002) vision that breakthrough scientific ideas are not generated in the minds of single scientists, but are an accumulative mental product of scientists united by intellectual networks

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("thinkers do not precede communication, but the communicative process itself creates thinkers as its nodes") is clear in the light of constructing different theorizations, which is one of the objectives of the paper. Transposing Collins' (2002) idea of intellectual networks, the author will attempt to recreate affiliated intellectual networks of scientists-researchers solving the major problem – the construction of theoretical knowledge. Calling upon "network paradigm" at the theoretical level of knowledge generation is attributed to high frequency of feedback communication links forming its basis. Theoretical researchers produced concepts, constructs and main aspects while generating their theories. The scale of scientists' names and ideas, the depth and completeness of scientific reflections led to the idea of building the author's version of affiliated intellectual networks of scientific knowledge theorization by assembling it from an array of dominant disciplinary practices. The cognitiveness of the data of affiliated intellectual networks will consist in the fact that in the future one can refer to two tools for additional reflection of the resulting networks: visualization of network diagram and evaluation of bonds and relationships being formed within.

Heading into the task of clustering the practices of constructing scientific theories by discipline, the author introduces the concept of "disciplinary cluster" in the paper. Let us clarify the scope of this concept within the ideology deployed hereby in order to comprehend the process of generating theorizations. A disciplinary cluster is an association of scientists, scientific schools into affiliated intellectual networks that exist within one scientific concept, theoretical provisions, constructs. Any disciplinary cluster (natural-scientific, technical, etc.) is based on founders' names and the general concept of scientific knowledge generation, which subsequently leverages the task of building intellectual networks.

To visualize the diagrams of affiliated intellectual networks, the paper relies on interdisciplinary conceptual apparatus employed by network analysis and its main construct – the graph. Visualization as an additional way of representing knowledge generation provides a more comprehensive idea of the process, both semantic and graphical (Vikhman, 2019). The analogy between the "tops" from graph theory and "Collins" "nodes" is obvious, as well as between the "edges" and "links". To avoid strengthening and multiplying the conceptual apparatus, the paper, similarly to scientists of social sciences and humanities, deals with two main constructs: "node" and "links" between them. The network hereby consists of "nodes" – scientists, scientific schools, associations, communities and "links" – communication, exchange of practices, ideas, etc. Let us specify right away that the author is not aimed at building a global intellectual network to ensure the generation of disciplinary theoretical knowledge based on a mass sample of data about scientists, their practices, etc. The main idea of addressing the concept of "intellectual network" by Collins (2002) is to demonstrate its adaptability and efficiency for the development of a concise version (demo version) of the intellectual network of theoretical scientific knowledge. To solve this problem, it is enough to highlight the main "nodes" and "links".

Thanks to the concepts of "intellectual network" and "network affiliates", it becomes possible to find and substantiate the methods for constructing theoretical representations of any interdisciplinary social phenomena (Vikhman, 2020).

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7. Conclusion

The above studies have made a significant contribution to the development of the methodology for obtaining theoretical knowledge in the scientific environment. With all the significance of the researchers mentioned, who were first to generate disciplinary theoretical knowledge (natural-scientific, technical and social-humanitarian), unfortunately, the question remained unclear concerning the very mechanism of its generation in an interdisciplinary format. Beyond the publications mentioned, the questions remained intact pertaining the methods of researchers' affiliation and the dissemination of scientific knowledge.

The results obtained within the paper have potential practical significance. The approach towards theoretical knowledge generation in network categories can also be applied to other tasks and types of theoretical knowledge, in particular, theorizations of social phenomena.

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