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# Scientific Social Networks as A Subject of Sociological Research: Theoretical And Methodological Aspects

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## Abstract

The paper concerns the analysis of scientific social networks as a subject of sociological research. The significant theoretical and methodological foundations and focal points that form the conceptual framework of socio-humanitarian understanding of scientific social networks are given in the paper. Among them, the ambivalence of integration and differentiation processes in scientific social networks, a special status of the categories "group" and "community" under the conditions of social network communication, the complex nature of network and academic mobility, the dialectical unity of individual and collective, a variety of configurations of individual, group and institutional capital, the importance of research emphasis on social actors, their connections and resources are considered. It is concluded that it is necessary to apply these guidelines to direct empirical research of scientific social networks.

**Keywords:** Scientific Social Networks, Science, Scientific Knowledge, Methodology.

## Introduction

Modern information and communication (or more broadly, digital) technologies determine the appearance of civilization, influencing the transformation of various social institutions and practices (Aseeva et al (2021); Grimov and Kamensky (2019); Kamensky (2020); Mayakova and Grimov (2020)). Owing to digital technologies, new formats of social interactions and social subjectivity are being formed. It should be noted that the pace of technology development and the social changes caused by it are significantly ahead of scientific and even user reflection experience. A special place among modern technologies and innovations is occupied by a variety of social media that serve as a means of network social communication; at the same time, there is a tendency towards the development of social networks that are as general as possible in terms of functional features, as well as to the specialization of them. One of the most dynamically developing social networks is scientific social networks that have a significant social and communicative potential, being both a space of scientific communication and its tool. Scientific social networks have already become the subject of sociological research (Boudry and Durand-Barthez (2020); Lee et al (2019); Ostermaier-Grabow and Linek (2019)), however, the general methodology of the humanitarian study of scientific social networks is not fully formed, and the theoretical framework in which this research should be carried out is not fully defined. The present paper is aimed at filling these gaps. Further on, as we think, we will consider important theoretical and methodological foundations for the study of scientific social networks, as well as various related aspects.

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## Results and Discussion

Scientific social networks contribute to both the integration of the scientific community and its differentiation. The integration of the scientific community is based on the broad communication capabilities of the corresponding web resources. The cooperation of scientists, the exchange of experience within the framework of research projects ensures the cohesion of individual scientists and scientific groups both within individual countries and on an international scale. However, the very architecture of scientific social networks is based on the use of numerous metrics that are used to establish and maintain a system of user ratings. Numerous indicators used in this case reproduce the logic of academic capitalism, inspired by the desire for growth of both real and conditional scientific capital. The calculated rating is determined by the author's publication activity, his participation in the communicative practices provided for by this scientific social network (leaving comments, sharing scientific materials, communicating with other users, participating in discussions, forming a list of recommendations, leaving requests for posting a full-text version of an article, etc.) Such indicators are in many ways similar to the system of academic ratings calculated in modern scientometric systems and abstract databases, and can also be "falsified" (that is, they are subject to hype – for example, the Hirsch index example; some companies advertise services on the Internet to increase this index, which partially levels its status). The rating system leads to a partial simulation (in the spirit of the postmodern interpretation of this concept (Baudrillard (1981)) of genuine scientific capital. Social stratification on the basis of scientific capital can be perceived differently within the social networks themselves and cause complex combinations with real scientific status and capital. Moreover, the rating system can be used to establish unequal conditions for access to scientific files, content, and, more broadly, to the using the functionality of the scientific social network as a whole. The developed social hierarchy contradicts the stable image of scientific social networks as a space free from commerce and corresponding to the ideal of free open science. It is worth noting, however, that such commercialization is not typical for all scientific social networks.

The logic of building a scientific community in scientific social networks is largely reduced to the definition of the boundaries of classical sociological concept of "community" or "group", especially in the context of the virtual network space. The ontology of scientific communities in scientific social networks is associated with possible scenarios when a virtual network group precedes an existing one offline and vice versa, when an offline group serves as a means of forming an online group. Which of them is a primary one? In each specific case, the answer may be different; however, an empirical study should provide an answer to the question of the statistical repeatability of these scenarios and the logic of scientific social groups formation.

The concept of digital or network mobility, presented, among other things, in the works of J. Urry (2007), turns out to be relevant for the description of scientific social networks and can be considered in two aspects. A scientific career and a change in scientific status in the context of the scientific social network itself (that is, directly in its structure – on the site itself, in its rating system) or with its help in a broad academic context - reflects the dynamics of movements in the social field of science (for more information about the concept of a field in sociology, see more in detail (Bourdieu (1980))) and focuses on those resources that are used for this. Also, the architecture of scientific social networks itself widely requires a variety of virtual practices, activities that require the mobile participation of the user (scientist) for successful self-presentation in the academic environment. Overcoming spatial constraints and building a single (albeit uneven in terms of social and scientific capital) space of scientific social networks, as well as (formally) initially equal conditions for all network participants also reflect the mobility of scientific networks themselves.

It is worth mentioning that, like most social network services, scientific social networks mainly cultivate not a collective, but an individual beginning. Attention is focused on the needs, goals and values of the individual, which largely confirms the point of M. Castells (2001) about "network individualism" in modern social structures. Undoubtedly, in scientific and academic resources, the possibility of group participation, creation and development of collaborations is implied and is very essential. But the initial element, a kind of atom, is the individual account of a scientist, his/her goals for scientific self-presentation, search for scientific content, and satisfaction of his/her scientific needs. The main methodological question is in what combinations two similar orientations – individualistic and collective – can be connected. In this article, the initial assumption forming its conceptual framework is the idea of three levels of communicative practices of a scientist in the structure of social network communication in scientific social networks. Undoubtedly, each scientific social network may have unique characteristics, but the overall framework will be the same. These levels include:

- the level of technological capabilities of the scientific social network. At this level, the personal profile (account) of a scientist is built, as well as possible strategies for his/her self-presentation and communication are formed. This level is understood by us as the initial one, ontologically determined by the functional characteristics of the scientific social network, its properties and resource potential. The communicative format of a specific scientific social network sets imperative conditions for a scientist (affordances according to B. Latour's (2005)) of possible self-presentation and communication strategies that he/she can build;
- the level of direct communicative practices of a scientist: self-presentation, communication with other users, search and placement of information. Together, we refer to them as networking – an activity for the development of our own scientific network, including both other scientists (network users) and objects of knowledge;

- the level of academic mobility as the resulting activity of a scientist based on his/her communicative activity in a scientific social network.

Thus, a truly collective subjectivity is formed only at the highest level associated with genuine group interactions. It is the personal subjectivity of a particular scientist that is the main initial emphasis. Group and/or organizational interactions are possible, but do not always manifest themselves.

An important aspect of the topic under consideration is the concept of "capital". Various analysis strategies are possible here. The intellectual and scientific capital of a scientist is considered as the most important starting indicator aimed at the development of a scientific network (networking), the popularization of scientific knowledge. It is the artifacts of scientific and intellectual capital that make up and form the content that fills the network. Another important parameter is social capital, which can be identified both in the individual dimension and in the general institutional context. In the individual context, social capital is determined by the social connections within the network that a particular scientist has, his/her social and communicative resources that he/she can use to create scientific groups, develop collaborations, distribute and popularize scientific content. The general institutional capital reflects the level of cohesion and unity of the entire scientific community within the scientific social network (or its largest and most influential groups and communities), the degree of their group affiliation and identification. It is this capital that indicates a high level of group or institutional subjectivity. It is also important to study the influence that the scientific community has on society as a whole, based on the level of general institutional capital. The symbolic and reputational capital of a scientist also plays an important role in the overall structure of his/her social and group capital.

Scientific social networks occupy a special place among many other WEB 2.0 communication services focused on communication and self-presentation of users. Moreover, they can rather be attributed to the resources of WEB 3.0., proclaiming the paradigm of highly intelligent content produced by the expert community. However, not only scientific social networks are a space for localization of scientific communication and scientific content. In this regard, it is necessary to pay attention to the functional characteristics that scientific social networks have. They can be used as one of the communication platforms or services, but they cannot be the only services used in scientific communication. To meet the corresponding need, various messengers (Viber, Telegram), online conference services (Skype, Zoom), etc., which allow solving the issue of fast and mobile communication, have been widely used (especially during the COVID-2019 pandemic).

It is worth noting that the concept of "social network" had appeared long before the means of Internet communication and is an important sociological concept that was intuitively worked out at the stage of forming sociology as a science (see, for example, Barnes (1954)). In this case, the social network is considered as a structure of social connections of objects of various kinds (individuals or social groups – but necessarily identical objects within a specific analyzed network). In relation to a scientific social network, such analysis optics speaks about communication channels, networks of social connections between users and the features of moving resources through these channels. Such resources include: information, reputation, and influence, in some cases - financial resources (if the scientific social network is monetized). A complex network of direct personal connections and contacts (as close as possible to personal acquaintances) is superimposed on the network formed in the scientific space between scientists, regardless of their place and, in some cases, even the time of residence, through the following practices:

- co-authorship
- quoting
- reviewing
- consultation, etc.

Numerous networks form a special social space of scientific knowledge (about the logic of knowledge development in network structures, see Basov (2014)), in which communication is carried out between various actors (not only human modality), which corresponds to the spirit of the actor-network theory (Latour (2005)): a polymodal material-semiotic network is built. It should also be noted that this is a kind of embodiment of those macrosocial scientific networks that R. Collins (1998) studied.

## Conclusions

The theoretical and methodological foundations considered in the paper represent significant provisions and certain accents that form the conceptual framework for understanding the phenomenon of social and communicative practices in scientific social networks. We refer to such aspects, which are important from a methodological point of view, the following ones:

- ambivalence of integration and differentiation processes in scientific social networks;
- the special status of categories "group" and "community" under the conditions of social network communication;
- the complex nature of network and academic mobility;
- dialectical unity of individual and collective;

- a variety of configurations of individual, group and institutional capital;
- the importance of a research focus on social actors, their connections and resources.

A crucial task of further work is to adapt the designated theoretical and methodological foundations and guidelines for conducting empirical research of scientific social networks.

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