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# Special issue on "Cultural and cognitive dimensions of innovation" edited by Petra Ahrweiler and Riccardo Viale

## Introductory Article

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**Abstract** The Special Issue is started with the observation that the tension of mind and society, i.e. cognitive and sociological/cultural dimensions in knowledge production and innovation, is a well-known topic of academic discourse in Science and Technology Studies. The introduction mentions some historical hallmarks of the involved perspectives and discussions to outline the background of the Special Issue. The purpose of its contributions, which are briefly presented at the end of the introduction, is to review this long-existing tension of cognitive and cultural dimensions in knowledge production and innovation in the light of the cognitive and societal changes that have just begun and will have a huge impact in the future.

**Keywords** Cognitive and social dimensions · Knowledge production · Innovation networks · Science and technology studies

## 1 Introduction

Early German Sociology of Knowledge started the twenties of the twentieth century with a provoking statement: reality formation is relative to the mental contexts of human beings (Mannheim 1969: 54f). The mental contexts are determined by the different and ever-changing social contexts, which work as media separating people from any direct contact to the world. The social contexts mediate all experience and generate, produce, and prepare the world we know. This is why we need to consider knowledge always as dependant on the social context of the person who knows.

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Knowledge is inherently social. There is no exempt position outside social contexts for any human observer, which would guarantee a universal claim to knowledge.

Many positions in Philosophy of Science rejected the idea that social or historical factors have any relevance for achieving knowledge (Blalock 1969 summarising reasons). In realistic approaches, knowledge is justified true belief. Truth is a relation between elements of language statements, which is secured by a connection between language symbols and objects represented by those symbols. Objects in reality have their counterparts in language symbols, "thus, a system of symbols, linked to the world in this way, can be said to be a representation of reality—a mirror of nature" (Lakoff 1987: 162). Any influence of empirical factors on the relation between the representing symbols and the represented outer world has to be rejected from this position: "according to the objectivist paradigm, true knowledge of the external world can only be achieved if the system of symbols we use in thinking can accurately represent the external world. The objectivist conception of mind must therefore rule out anything that can get in the way of that: perception, which can fool us; the body, which has its frailties; society, which has its pressures and special interests" (Lakoff 1987: 183). Neither does it count to co-observe processes of knowledge generation and the processing system, nor is it interesting who or what is carrying out these processes. Knowledge is not *produced*, but *discovered* or *achieved*. "Knowledge is knowledge, regardless of how it is organized, processed, or remembered" (Lakoff 1987: 166). At best, it is confirmed that social factors influence scientific knowledge in cases of errors, mistakes etc. (cf. Lakatos 1970; Laudan 1990). The wrong and the false can be accounted to social factors—they are responsible for any "noise", or the muddying of representation processes; true and justified knowledge is generated by (correct) representations of objects. The "Impartiality or Causality Tenet" of Sociology of Knowledge (Bloor 1976), where not only errors and mistakes, but everything must be accounted to social factors, is not an option for these positions.

Interdisciplinary Science and Technology Studies (STS) inherited the difficulties of pointing out the importance of social dimensions for knowledge production, and is still divided into two camps. The first one just continues work in the logical vacuum "at pains to emphasize that they embrace relativism wholeheartedly" (Nicholas 1984: 265; also Knorr-Cetina 1989: 93). The second one committed in the eyes of their colleagues "a betrayal of their disciplinary standpoint" (Bloor 1976: 1), because they decided to revise the statements of Sociology of Knowledge. Looking especially at knowledge production in science, they concentrate on organisational issues of science as a social institution. The task has slightly changed: abstracting from cognitive claims and contents of knowledge produced, analyses focus on how for example social conditions such as group memberships and education paths influence the organisation of academic disciplines etc. Many of these approaches deal empirically with the question of influencing factors for scientific knowledge. For example, constructivist laboratory studies (Knorr-Cetina, Latour and Woolgar) show how the data stream to be investigated by the lab-using sciences is generated with the help of the lab and how it is—again with the help of the lab—evaluated and interpreted. Knowledge production and scientific theory formation are communicated as lab-internal constitution processes of meaning

concerning self-produced data. In these approaches, knowledge creates the object, not vice versa. Following this perspective, it is futile to ask for influencing factors of knowledge: "realizing these goals renders the social/cognitive dichotomy obsolete. Distinctions between the cognitive and the social […] are constantly blurred and redrawn in the laboratory" (Knorr Cetina 1981: 23). Furthermore, also the normative dimension, the question concerning the claims and validity of the knowledge produced, is finally dismissed: it has to be transferred to micro-sociological analyses concerning the consensus practice of small social communities, here the laboratory community of practice (cf. Pickering 1992).

The social organisational form of the conceptual compatibility or incompatibility of knowledge claims is originally that of rational, interdisciplinary discourse. The contemporary forms of the production of knowledge and technology even find their place in a more heterogeneous cultural environment: "the communicative intercourse of multiple agents constitutes the parameter toward which the production of knowledge must orient itself" (Weingart 1997: 20). Michael Gibbons, Camille Limoges, Helga Nowotny, Simon Schwartzman, Peter Scott and Martin Trow (Gibbons et al. 1994) have diagnosed a new, sophisticated mode of knowledge production for modern societies that appears to demonstrate the following characteristics: The so-called "Mode 2" of knowledge production transcends disciplinary boundaries; knowledge is developed close to users; and the organisation of this production is non-hierarchically and weakly institutionalised. Participants from different areas will participate from the beginning and will define novel criteria for the quality control of the produced knowledge. The need for reflection by all participants will persist throughout the process of knowledge production; knowledge production will be socially evaluated and publically reviewable. Other authors speak in regard to the same phenomenon of "post-academic science" (Ziman 1996) or "post-normal science" (Functowicz and Ravetz 1993, Elzinga 1997). Gibbons et al. take this change in the production of knowledge to be fundamental. The provocative novelty of *Mode 2* affects more than just the sciences: "the emergence of Mode 2, we believe, is profound and calls into question the adequacy of familiar knowledge-producing institutions, whether universities, government research establishments, or corporate laboratories" (Gibbons et al. 1994: 1).

The collaborative nature of today's knowledge production processes is mirrored by the network arrangements we observe for innovation, the creation of new, technologically feasible, commercially realizable products, processes and organizational structures (Schumpeter 1912; Fagerberg et al. 2006). Here, heterogeneous organizations generate and exchange knowledge, financial capital, and other resources in networks of relationships that are embedded in institutional frameworks on the local, regional, national and international level (Ahrweiler 2010).

The new forms of knowledge and technology production trade since long under the nickname of "Innovation Networks". They were seen as "quasi-social technology", answering to the opacity of the market and to the uncertainties in relation to the material and financial feasibility of a new product (Kowol and Krohn 1995: 90). As Kowol and Krohn describe it, the central evolutionary "mechanism is procedurally self-organizing and structurally network-forming: the common

achievement of formation and processes of learning will be organized through networkesque relationships between the technology generating, using, and regulating social systems. In comparison to formally bounded organization these innovation networks possess a higher degree of openness, permeability and space for ambiguity and authorize systemic as well as inter-organisational processes of agreement—something between science, economics and politics. In the language of self-organization theory: Networks make possible recursive closure through informational openness" (Kowol and Krohn 1995: 78).

Sociological examination of the functions and institutions of comprehensive negotiation networks shows that the once distinct dimensions of knowledge production, dissemination and use are being fused via quasi socio-technological means. In this process the possibility of and readiness for participants'continual "side-changing adoption of perspectives" plays a decisive role. The achievement of integration, calculated specifically for each problem and innovation, seems to require that "each sphere takes on some of the role of the other" (Etzkowitz et al. 1998). According to Alfred Schütz, each actor reconstructs and adopts the situation specific perspective of another relevant actor (in tune with classifications of the situation and the actors), with which a sort of "exchange" is carried out (cf. Schütz 1974: 137ff). The side-alternating adoption of perspectives and roles by the actors of modern knowledge production manifests itself in their changed self-understanding as underlined by new terms such as "entrepreneurial university" or "open-source products".

The objective of this Special Issue is to analyse the cognitive and social dimensions, which shape the economic, technological and political innovation agenda today. It contains theoretical and empirical contributions.

The theoretical part starts with a paper authored by Marian Adolf, Jason L. Mast, and Nico Stehr, which analyses innovation as the outcome of a process of cognitive displacement for which a bundle of social and cognitive competencies is required. Jason L. Mast continues this theoretical trait by investigating the spaces for invention and innovation in Cultural Theory. It is in line with this approach of cognitive displacement, when Nancy Nersessian and Miles MacLeod later state that what is driving innovation is a determination to construct new cognitive niches. Lorenzo Magnani even reconstructs scientific innovation as "eco-epistemic warfare" taking advantage of recent results coming from the area of distributed and abductive cognition. Andrea Lavazza and Riccardo Manzotti further emphasise that creativity is more than just a symbolic reshuffling or a moment of semantic extension, but that it has an internal and an external aspect. Petra Ahrweiler and Mark Keane, finally, suggest a framework for modelling the component interactions between cognitive and social aspects of scientific creativity and technological innovation.

Most of the empirical articles in this Special Issue aim at focusing on the cultural sources of economic value creation coming from science, arts and the creative industries with a special focus on new emerging digital technologies. For example, Anne Beaulieu, Matt Ratto, and Andrea Scharnhorst analyse the processes and reflections about interdisciplinary work around simulation-building, and propose a tool to facilitate discussions. Scott Dexter and Aaron Kozbelt discuss how Free and

Open-Source Software can act as a model domain for answering "Big Questions" about creativity and innovation. Emanuele Bardone and Ilya Shmorgun show that Multitouch Smartphones cannot be separated from their cognitive ecology, but that it is precisely the way in which they become permeable to the context that allows us to potentially come up with new uses and in so doing improve our ability to solve problems.

A continuous increase in products or services with a particularly symbolic or aesthetic value can be observed in economic value creation accompanied by a strong growth in employment in comparison to other economic sectors. Creative industries are defined as combining the classical "cultural industries" such as art, architecture, design, music, film and literature with "new" creative industries such as advertisements and software/games/multimedia. Papers addressing these areas are the one authored by Alkim Almila Akdag Salah and Albert Ali Salah on creating and sharing arts in an online social network site, the one by Nona Schulte-Römer on arts and culture festivals as sites for technical innovation, and by Christian Barrère for the case of Taste Industries.

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