Эпистемология и философия науки
2016. Т. 49. № 3. С. 55–69
УДК 167.7

Epistemology & Philosophy of Science
2016, vol. 49, no. 3, pp. 55–69
DOI: 10.5840/eps201649351

TOWARDS THE UNITY OF SCIENCE AGAIN? REDUCTIONIST THINKING AND IT´S CONSEQUENCE FOR A SOCIAL PHILOSOPHY OF SCIENCE

Alexander Ruser –
Ph.D. in Philosophy.
Zeppelin University. Am Seemooser Horn 20, 88045 Friedrichshafen, Germany;
e-mail: Alexander.Ruser@zu.de

At first glance the Idea of the "Unity of Science" seems to be of interest for historians of science only. However, given the expectations especially social scientists face today, to provide simple answers and feasible solutions to pressing social problems a revival of the idea is not unlikely. In particular "reductionist" ideas, aiming to adopt theoretical and methodological insight from the natural sciences thrive. This puts not only the project but also the very idea of a social philosophy of science in jeopardy. For, in consequence two of its main pillars, (1) considering the social and historic circumstance of knowledge production and (2) the need for developing a philosophy of the social sciences are equally rendered irrelevant. This contribution focuses on the fundamental flaws and shortcomings of such reductionist models, argues in favor of the disunity of science and thus defends the idea of a social philosophy of science.

Keywords: unity of science, philosophy of science, micro-reduction, Huxley´s Problem

НАЗАД К ЕДИНСТВУ НАУКИ? РЕДУКЦИОНИСТСКОЕ МЫШЛЕНИЕ И ЕГО СЛЕДСТВИЯ ДЛЯ СОЦИАЛЬНОЙ ФИЛОСОФИИ НАУКИ

Александр Рузер – Ph.D. (философия). Университет Цеппелина. Am Seemooser Horn 20, 88045 Фридрихсхафен, Германия;
e-mail: Alexander.Ruser@zu.de

На первый взгляд, идея единства науки представляет интерес только для историков науки. Тем не менее, если учитывать те ожидания, которые социальные исследователи связывают сегодня с поиском возможных решений социальных проблем, возобновление интереса к этой идее кажется вполне предсказуемым. В частности, речь идет о редукционистских концепциях, стремящихся заимствовать теоретические и методологические средства естественных наук. Это обстоятельство ставит под угрозу не только проект, но и саму идею социальной философии науки. В равной мере оно касается двух ключевых элементов этой дисциплины: 1) анализа социальных и исторических условий производства знания; 2) необходимости разработки философии социальных наук. В данной работе анализируются фундаментальные недостатки подобных редукционистских моделей, приводятся аргументы в пользу отсутствия единства в науке и, таким образом, отстаивается идея социальной философии науки.

Ключевые слова: единство науки, философия науки, микроредукция, проблема Хаксли

Introduction

Proponents of a social philosophy of science tend to emphasize the fundamental differences between the social and the natural sciences. Drawing on insights from the philosophy of social sciences they claim that inquiry in these disciplines – albeit some similarities with the natural sciences – is unique and demands special consideration from philosophers of science. However, as naturally as such claims seem to be today, one must not forget that the social sciences where born in the spirit of positivism and that August Comte didn't envision a "sociology" but "social physics". In short: While philosophers of science are used to the concept of the disunity of science nowadays, the initial idea behind the development of all science was the Unity of Science.

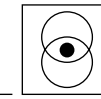
Keeping this in mind is not only important for the history of science but should inform the contemporary thinking about the philosophical foundations of the social sciences. Faced with societal expectations regarding their "scientificity" social science have adopted concepts and methods from the natural sciences. "Twentieth-century economics are derived from nineteenth-century physics" [Galbraith, 2014, p. 98]; behavioral genetics explore the impact of the genetic makeup on human behavior [Plomin, Caspi, 1990] and entomologists inform political thinking with knowledge about insect societies [Seeley, 2010]. In all cases, the social sciences objects are "simplified" to allow the application of epistemological models of the natural sciences: The idea of a unified science is still viable.

After a brief discussion of the content and the historical roots of idea itself, the focus will shift to the model of micro-reduction as proposed by Oppenheim and Putnam. Subsequently the conceptions of unifying science will be contrasted with claims for the disunity of sciences in order to discuss the respective consequences for the philosophy of the social sciences and subsequently for the project of a social philosophy of science.

The Idea of a Unified Science

The Idea of a Unified Science has been described as "Ionian Enchantment"[1]. The conviction rests on the assumption "that the world is orderly and be explained by a small number of natural laws" [Wilson, 1998, p. 3] If there is any credible chance that science heads towards unification,

[1] Thales of Miletus (living in Ionia) was the first to express a belief in a principle unifying all branches of sciences. Of course he was convinced that all matter ultimately consists of water and that, logically all science must be, ultimately "water science". Apart from the apparent wrongs of his assumption his theories can be seen as a early attempt to formulate unifying principles of the natural world [Wilson, 1998, p. 3].



that scientists working in different fields, facing different questions and addressing different issues may come to agree on some common amalgam of arrangements and mechanism or even "turn the science into a 'perfect' system of thought, which by sheer weight of evidence and logic is made resistant to revision" [Wilson, 1998, p. 3] the resulting epistemic culture, the way 'how we know what we know' would eventually transgress disciplinary boundaries.

The idea of the unity of science was predominant with the enlightenment, a period obsessed with classifying the world. The 17th and 18th century can be aptly described as a time of dictionaries and encyclopedias [McRae, 1957, p. 27]. The ultimate goal of science and scientific reasoning, as it was seen in these times, was the production of universal knowledge. Descartes "cogito" indicates already the beginning of a slow recoloring of 'mentality so that modes of thought, which in former times were exceptional are now broadly spread through the educated world' [Whitehead, 1925, p. 2]. 'Rationality' became the cornerstone of scientific inquiry. The emerging "optimistic doctrine of rationality" [Agassi, 1974], was not only the driving force for scientific progress but ultimately described the means by which people could emancipate from "self imposed immaturity" [Kant, 1784]. This doctrine was later portrayed "as a doctrine of total proof – in principle of all truths – of total control – in principle of all circumstances – and of total propriety – in principle of all conduct" [Kant, 1974, p. 407][2].

However, the possibility to root the spread of scientific thinking in this doctrine mustn't imply that the conception of a unified science has itself gone undisputed:

For instance René Descartes and Francis Bacon (and later Gottfried Wilhelm Leibniz) shared the belief in the unity of science but differed considerably in their conception of a unified science [McRae, 1957, p. 34]. Descartes deducts the unity of science form the *unity of human reasoning*. For him all sciences require the same cognitive exercise regardless of whether actual reasoning is concerned with theoretical or practical questions and regardless of the concrete scientific field of inquiry: "The first aspect of the unity of the science consists, then, in the unity of the human mind which is identical with itself whatever it knows" [McRae, 1957, p. 36]. This basic premise is particular prominent in pure mathematics which serve as a general model for Descartes thinking of scientific reasoning:

"Those long chains of reasoning, simple and easy as they are, of which geometricians make use in order to arrive at the most difficult demonstrations, had caused me to imagine that all those things which fall under the cognizance of man might very likely be mutually related in the same fashion" [Descartes cited after McRae, 1957, p. 36]. McRae

[2] Furthermore, it is this general optimism towards rational thought that inspired both, Bacon´s conception of a "universal sapience" as well as Descartes idea of "universal Wisdom", which for him meant "the sciences taken all together" [McRae 1957, p. 34].

concludes that Descartes "conceives of the totality of the sciences as comprising a single deductive system" [ibid.]. The unity of science in Descartes view stems from the unity of the operation of the mind, from the fact that "reasoning is everywhere identical" [ibid., p. 35]. It is important to note, that science is not differentiated by distinct subject matters but is regarded as a deductive system or reasoning in general. Descartes stresses the particularity of scientific reasoning) in order to portray science in general as a venture driven by the specific "capacity to form a sound judgment" [ibid., p. 39].

In contrast Bacon as well as Leibniz focus on the product, the knowledge produced by scientific reasoning and envision a "logically ordered system of the sciences [that] would constitute a demonstrative encyclopedia" [ibid., p. 43]. The idea is a perfect hierarchical system, which would allow a complete classification of all scientific branches[3]:

> Each science in the encyclopedia having been reduced to its primary propositions and related appropriately to any other science to which it was subordinate, it would be possible then from its elements alone taken together with the rules of the 'art of discovery' to extract at will the science in its entirety out of the encyclopedia [ibid., p. 43].

The imagination that science can be classified, that it can be reduced to some fundamental principles (or: primary propositions) and its disciplines arranged in a prefect hierarchical order was echoed in 19th century positivism:

This is particularly visible in August Comte´s attempt to outline the theoretical framework for a "positive philosophy as a philosophical basis for its subsequent project, the outline of a 'social physics'". At the very beginning of his major theoretical work "Positive Philosophy" he formulates a fundamental law of how knowledge progresses:

[3] However, Bacon and Leibnitz were by no means the last to propose such a classificatory system. Rudolf Carnap´s conception of a unified science "is substantially almost identical with Bacon´s" [Agassi, 1975, p. 409]. Carnap together with an illustrious group (including Otto Neurath, Charles W. Morris, Niels Bohr, John Dewey, Bertrand Russell, Leonard Bloomfield, Victor F. Lenzen, Ernest Nagel, J.H. Woodger) was planning a comprehensive *International Encyclopedia of Unified Science*. The project was discusses at the 'First International Congress for the Unity of Science' in Paris in 1935 [cf. Morris, 1960, p. 517] and was planned to consist of at least eight Volumes (each including several monographs). The ambitious project should start with two introductory volumes and then proceed to cover the "nature of logic and mathematics", "physics", "biology and psychology", "the social and humanistic sciences" and conclude with the "history of the scientific attitude" [Morris, 1960, p. 520]. Otto Neurath described the overall structure of the encyclopedia: "The Encyclopedia is to be constructed like an onion. The heart of this onion is formed by twenty pamphlets which constitute two introductory volumes". Thus, although these two volumes are to be able to stand by themselves, they are planned so that they may form an introduction to the later "layers" or additional volumes which will "deal with more specialized problems" [Cohen, 1942, p. 721].

> From the study of the development of human intelligence, in all directions, and trough all times, the discovery arises of a great fundamental law, to which it is necessarily subject, and which has a solid foundation of proof, both in the facts of our organization and in our historical experience. The law is this: that each of our leading conceptions – each branch of our knowledge – passes successively through three different theoretical conditions: the Theological, or fictitious; the Metaphysical, or abstract; and the Scientific, or positive [Comte, 1855, p. 25]

Of particular interest here is the finale stage, the positive state. It is at this stage that truly scientific reasoning is established as the only means of producing valid knowledge: "Reasoning and observation, duly combined, are the means of this knowledge" [ibid., p. 26]. It is also at this stage that science is finally capable of setting out to fill the void of ignorance with secured scientific knowledge: "What is now understood when we speak of an explanation of facts is simply the establishment of a connection of between single phenomena and some general facts, the number of which continually diminishes with the progress of science" [ibid.] Consequential Comte was envisioning the advent of a true social science for which he invented the term "sociology" [Comte, 1855a, p. 444]. Such a positive social science would resemble in all relevant aspects the natural science allowing him to describe this new discipline as "social physics" [ibid.] The primary task of social physics would be to terminate "the revolutionary period by the formation of a system uniting order with progress" [ibid., p. 406] Comte´s teleological understanding of scientific progress leaves no alternative to the fact that "we shall find that there is no chance of order and agreement but in subjecting social phenomena, like all others, to invariable natural laws <…> in other words, introducing into the study of social phenomena the same positive spirit which has regenerated each other branch of human speculation" [ibid., p. 455].

Entering a positive stage is therefore not only inevitable in Comte's view, but also an accessible goal for the social sciences. By formulating the most basic principle for social physics he draws a parallel between the subject of study of the social and the natural sciences and treats social phenomena as equivalent with natural phenomena: "The philosophical principle´ of the science being that social phenomena are subject to natural laws, admitting of rational prevision, we have to ascertain what is the precise subject, and what the peculiar character of those laws" [ibid., p. 457].

Why Laplace´s Demon would make a lousy sociologist

Even though such ideas seems distant today the idea of unified science still carries a little weight today. At least Science must be uniformly be distinguishable form non science. According to Agassi [Agassi, 1975, p. 404] this is because science is often taken 'as synonymous with, or at least as a paradigm of, rationality'.

Both the idea of the unity of science and the idea of rationality stem form the same underlying concept, the principle of universalizability. If science can be reduced to some universal laws, concepts, theories and methods, those laws, concepts, theories and methods could be "proved by arguments that all rational men must accept" [ibid., p. 405]. Even if one admits that different branches require distinct theories and methods the optimistic doctrine of rationality must hold, for as an universal doctrine no branch of science could be excluded.

Essential, the linkage between the idea of the unity of science, universalizability and rationality can be explained by referring to the classical expression of scientific determinism: the demon of Laplace.

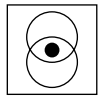
In his seminal "Philosophical Essay on Probability" (first published in France in 1814 as *Essai philosophique sur les probabilities*) French mathematician and astronomer Pierre Simon Laplace argued for a universal cause-effect relationship as the underlying principle of everything in the universe. This axiom, called "principle of sufficient reason" by Laplace [Laplace, 1902, p. 3], states that "a thing cannot occur without a cause producing it" [ibid.]. Accordingly, in order to explain a present 'thing' it is necessary to uncover the causes leading to its existence. And then again it has to be asked what caused the causes to add to the understanding of the "thing" in question.

> Given for instance an intelligence which could comprehend all the forces by which nature is animated and the respective situations of the beings who compose it – an intelligence sufficiently vast to submit these data to analysis – it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it nothing would be uncertain and the future, as the past, would be present to its eyes [Laplace, 1902, p. 4].

Here again we find the optimistic doctrine of rationality. However, the reference to Laplace demon also underlines that the doctrine of rationality works best with the explanation of causal relations. Laplace´s demon would be able to derive secure knowledge of present and future events because it not only knows all the 'facts' but also the underlying principles and laws.

At the same time the doctrine of rationality and the example of Laplace´s demon cast some first doubts on the concept of a unified science: The conception of an all-explaining entity that is itself completely separated from its object of study is hardly thinkable in the social sciences. Laplace demon was conceptualized as an "indifferent observer" of the world a passive collector and interpreter of data. Such a conception is clearly at odds with more recent ideas. It is particularly visible in the deviation from the rationalistic model of scientific inquiry as formulated by Max Weber:

> Sociology <…> is a science concerning itself with the interpretative understanding of social action and thereby with a causal explanation of its course and consequences. We shall speak of 'action' insofar as the



> acting individual attaches a subjective meaning to his behavior – be it overt or covert, omission or acquiescence. Action is 'social' insofar as its subjective meaning takes into account of the behavior of others and is thereby oriented in its course [Weber, 1978, p. 4].

Given this definition, it is at least questionable, whether the demon of Laplace would make a good sociologist. Likewise it must be further examined whether the rationalist doctrine would be a sufficient basis for the social sciences. Dealing with these questions of important for two reasons:

First, as the development and the flourishing of the social sciences in the 150 years since Comte demonstrates, social sciences have deviated dramatically from positive philosophy. Second, with the demand to provide applicable and secure knowledge in modern knowledge society is growing social scientists are increasingly confronted with a positivists understanding of their respective discipline; the social desire to be informed by social scientists for whom "nothing would be uncertain and the future, as the past, would be present to [their] eyes".

Let´s (micro) reduce!

Apparently the social sciences don´t fit too well into the general theorizing about science. Some philosophers of science, like Paul Feyerabend (1974) or Mary Poovey (1998) explicitly try to consider the "embededness" of science in a given society and focus on the social and historical contexts of scientific progress.

However, at the same time there are developments within the social sciences, which could indicate deliberate attempts to "dis-embed" it from the particularities of their respective social and/or historical background. The aim is to *reduce* key aspects of inquiry to arrive at generalizable findings:

Complex and at times contingent human behavior is explained along narrow concept of rational behavior developed in the economic sciences. "Genetic dispositions" are employed to explain patterns of social inequality and advice for efficient organization is derived from the observation of complex animal "societies". While these examples are disparate and sketchy, they illustrate the common idea, that social science knowledge might be able to put aside the particularities of specific "cases" and uncover general laws and relations.

Of particular interest here is that these examples (unwittingly) take up on an established model for *unifying* science.

This model was proposed in a Paper titled "Unity of Science as a Working Hypotheses" by Oppenheim and Putnam in 1958. It outlines the idea of "micro-reduction", which ultimately allows to "reducing" social sciences to more fundamental principles of the natural sciences. The model rests on a firm distinction of different concepts of Unity of Science. In the

weakest sense unity could refer to a *Unity of Language* that is that "all terms of science are reduced to the terms of someone discipline" [Oppenheim, Putnam, 1958, p. 3]. In contrast the concept of a *Unity of Laws* which "is attained to the extend that to which the laws of science become reduced to the laws of someone discipline" [ibid., p. 4] refers to the Unity of Science in a much stronger sense. For Oppenheim and Putnam Unity of Science in the strongest sense is achieved "if the laws of science are not only reduced to the laws of someone discipline, but the laws of that discipline are in some intuitive sense 'unified' or 'connected'"[ibid., p. 4][4].

The model of "Micro-reduction", ultimately aims at establishing Unity in the strongest sense. This state is reached, when one branch of science can be "reduced" to another branch of science (the authors give the example of reducing chemistry to physics) that is, if some (or all) of the theories of the first branch (B_1) are reducible to theories of B_2. The overall prerequisites are described as follows: "This approach presupposes (1) the familiar assumption that some division of the total vocabulary of both branches into theoretical and observational terms is given and (2) that the two branches have the same observational vocabulary" [ibid., p. 5–6]. Additionally there are three principal requirements for a theory (T_2) to be reducible to another theory (T_1) [ibid., p. 5]:

(1) The vocabulary of T_2 contains terms not in the vocabulary of T_1

(2) Any observational data explainable by T_2 are explainable by T_1

(3) T_1 is at least as well systematized as T_2

Each branch of science refers to a "specific universe of discourse" and constitutes a "part-whole relation" [ibid., p. 6]. One can speak of a micro-reduction if the objects of the discourse universe of B_1 as wholes can be decomposed into proper parts which belong to the discourse universe of another branch of science, say B_2. While this sounds complicated, Oppenheim and Putnam give a simple example to outline the basic 'mechanism' of their model:

"[L]et us suppose B_2 is a branch of science which has multicellular living things as its universe of discourse. Let B_1 be a branch with cells as its universe of discourse. Then things in the universe of discourse of B_2 can be decomposed into proper parts belonging to the universe of discourse of B_1" [ibid., p. 6]. This example can be easily applied to the natural sciences. The branch of biology dealing with particular species of animals can be reduced to cell biology for example. Such micro-reduction is *always* seen as a step in the direction of a Unity of Language [ibid.]. Additionally, for the authors it is also a step towards the Unity of Law "for it 'reduces'

[4] According to Oppenheim and Putnam, Unity of Science could also refer to the *Unity of Method* as an expression of the conviction that 'all empirical sciences employ the same standards of explanations, of significance, of evidence etc.' [Oppenheim, Putnam, 1958, p. 5].

the total number of scientific laws by making it possible, in principle to dispense with the laws of B_2 and explain the relevant observation by using B_1" [ibid., p. 7].

The model of micro-reduction and particularly the claim that it can be used to arrive at the Unity of law can be criticized: The authors themselves admit that "one manifestly cannot explain human behavior by references to the laws of atomic physics" [ibid.]. However, the main problem is not seen in the attempt to draw the connection itself but rather in the "skipping [of] intervening branches of science" [ibid., p. 7]. For them it "is not absurd to suppose that psychological laws my eventually be explained in terms of the behavior of individual neurons in the brain; that the behavior of individual cells – including neurons – may eventually be explained in terms of their biochemical constitution; and that the behavior of molecules – including the macro-molecules that make up living cells – may eventually be explained in terms of atomic physics. If this is achieved, then psychological laws will have, in principle, been reduced to laws of atomic physics, although it would be nevertheless be hopelessly impractical to try to derive the behavior of a single human being directly form his constitution in terms of elementary particles" [ibid., p. 7].

Is it hopelessly impractical or yet impossible to derive social behavior from the behavior of elementary particles?

The authors provide us with a stage model It distinguishes between six levels each of them being reducible to the level below:

Level	Main Object
6	Social Groups
5	(Multicellular) living things
4	Cells
3	Molecules
2	Atoms
1	Elementary Particles

Source: [Oppenheim, Putnam, 1958, p. 9]

The concept is strikingly straightforward. If read from bottom to the top it simply expresses that elementary particles form atoms, which in turn form molecules. Cells are made of molecules and multicellular living things consist of cells, albeit only for logical reasons. Since no one would doubt that social groups comprise a number of living things the model seems to work.

However, it is seriously flawed in one important aspect: For there is no explanation given why the fourth level should be reducible to the third: While it is true that all cells consist of molecules not all molecules assemble to *living* cells!

The model of micro-reduction neglects the problem of the emerging qualities of live and mind, or more precisely it inevitably runs into "Huxley´s Problem". Huxley assumed that living beings could be treated as "automata". Accordingly consciousness and mind must be explainable by physical laws. However even if, "it may be assumed <…> that molecular changes in the brain are the causes of all states of consciousness <…> [is] there any evidence that these states of consciousness may, conversely cause molecular changes which give rise to muscular motion?" [Huxley [1874] cited after Popper 1978, p. 349]. For Huxley the answer is easy: "Consciousness appears to be completely without any power of modifying the working of the body, just as the steam-whistle of a locomotive engine is without influence upon its machinery" [ibid.]. This interpretation, referred to as the "identity theory of body and mind" [ibid., p. 351], offers a simple 'solution' to the problem of emergent qualities: "For according to the identity theory, the world of physical objects or states is closed. All causation is physical causation" [ibid., p. 351]. The only problem with the proposed solution is that, consciousness and mind might actually *have* the power to influence the body and that *not* all causation must necessarily be physical causation.

Obviously the identity theory cannot hold. Instead, it is now widely accepted that the emergence of life and mind indicate an important *qualitative leap*. The emergence of the mind enables (some) of Huxley´s automata to do creative things, allows for true social action. To conduct social sciences is therefore fundamentally different from the fields of inquiry of the natural sciences. For social scientists "it would be no sort of explanation to attribute to atoms or to molecules" [ibid., p. 352].

This being said, it becomes evident why the model of micro-reduction is bound to fail. For it neglects not only an important but also the decisive aspect of the social sciences. For instance, while it is surely true that all social groups consist of multicellular living things not all groupings of multicellular living things (e.g. humans) form a social group. And in any case the presence of multicellular living things would be a necessary but not a sufficient condition. Social Science knowledge wouldn't stop with stating that a certain quantity of people just happen to be present, but would have to explain why (and how) this particular persons formed a group or agreed on certain rules of behavior.

To summarize: the excurse on the potential to unify natural and social sciences has underlined the fundamental and lasting differences between the two branches of science. Models to "reducing" branches or disciplines to other branches or disciplines are not capable of bridging the gap between

the natural sciences and scientific disciplines predominantly occupied with explaining the consequences of emergent qualities such as sentient life. Such models neglect the qualitative leap, which renders any reduction attempt obsolete.

Return of the automata? Reduction in contemporary social sciences

Has this excurse demonstrated anything significant? After all, the presentation of the problem so far could be reproached for creating a paper tiger rather that dealing with a substantial dispute in philosophy of science. However, even when the reductionist models are not explicitly addressed, attempts to unify scientific vocabulary, method and (to a degree) theory can be noticed. The shadow of reductionist thinking is particularly visible in two aspects:

The first refers to a tendency to apply methods and concepts of the natural sciences to issues and problems of the social sciences *by* natural scientists.

The second process refers to the 'borrowing' of concepts from the natural sciences by social scientists.

A prominent, yet a little ludicrous example for the first type can be found in Thomas D. Seeley´s 2010 book "Honeybee Democracy". In the introductory paragraphs Seeley explains:

> Honeybees are sweetness and light – producers of honey and beeswax – so it is no great wonder that humans have prized these small creatures since ancient times <...> [B]ut honeybees also provide us another great gift, one that feeds our brains rather than our bellies, for inside each teeming beehive is an exemplar of a community whose members succeed in working together to achieve shared goals. We will see that these little six-legged beauties have something to teach us about building smoothly functioning groups, especially ones capable of exploiting fully the power of democratic decision making [Seeley, 2010, p. 3]

The claim is that Honeybee communities and Honeybee "decision-making" can actually inform scientists occupied with the task of understanding collective human action. The problem is that the collective action of honeybees, while appearing to be "social", are no true social actions. The claim repeats the mistake of the micro-reductionists.

The example of the honeybee could be dismissed as an entertaining scurrility. It is highly informative though, since it not only repeats the mistakes of the above model, but it also indicates a "second coming" of reductionist thinking thereby linking today´s debate to the discussion in the formative years of social sciences (see below).

In other cases, most notably those of the second type consequences can be more important: For instance the expansion of natural science concepts (primarily from theoretical physics) into post World War II economic thinking [cf. Mirowski, 2002] has fundamentally altered economic thinking and is beginning to influence social science inquiry in general[5].

Disunity of science and social philosophy of science

This argumentation supports the disunity of science, a sharp distinction between the natural and social sciences. This in consequence, underlines the urgency for a social philosophy of science.

Max Weber and C. Wright Mills can fill the role of warrantors for such the concept of disunity of science: For Weber, Seeley´s work explains next to nothing. However he was confronted with the same claim[6]. While he admits that "there are <…> various forms of social organization among animals" [Weber, 1978, p. 16] including "states" he´s convinced that "a contribution to the understanding of human social action is hardly to be expected from this quarter" [ibid., p. 17]. The reason for this skepticism is that Weber rejects the underlying assumption of the model of micro-reduction:

> Action in the sense of subjectively understandable orientation of behavior exists only as the behavior of one or more *individual* human beings. For the cognitive purposes it may be useful or necessary to consider the individual, for instance, as a collection of cells, as a complex of bio-chemical reactions, or conceive his psychic life as made up of a variety of different elements, however these may be defined. <…> But the behavior of these elements, as expressed in such uniformities is not subjectively understandable [ibid., p. 13].

This skepticism is shared by C. Wright Mills. He admits 'that the epistemological models of philosophers of natural science have such an appeal as they do [Mills, 1959, p. 119] but isn't too enthusiastic about the prospects of unifying working styles in the social sciences. In fact he opposes the idea to "unite the larger problems and theoretical work of the nineteenth century, especially that of the Germans, with research techniques predominant in the twentieth century, especially that of the Americans" [ibid.].

---

5 Interestingly, when describing the shortcoming of 20th century economics James Galbraith focused on it´s ignorance of the second law of thermodynamics which lead to the systematic underestimation of the entropic developments within economic systems and in turn to unrealistic models of a market equilibrium rather than on the borrowing of concepts from physics per se [cf. Galbraith, 2014, p. 97–98].

6 Weber reacted to Karl Escherichs 1909 monograph *Termiten oder die weissen Ameisen. Eine biologische Studie,* in which 'Ant Societies' where presented as models for human societies [cf. Max-Weber-Gesamtausgabe: Band I/23 'Wirtschaft und Gesellschaft'].

His reservation doesn't stem from any general doubt in the feasibility of the task, but doubted that the whole undertaking would improve the explanatory power of the social sciences. Instead of trying to simulate natural science or place ones hope in the convergence of social science theories and methods he argues in favor theoretical and methodological pluralism. In his view the ideal social scientists is neither in need of a theoretical paradigm, nor does she need to rely on a defined set of methods:

> To have mastered 'method' and 'theory' is to have become a self-conscious thinker, a man at work and aware of the assumptions and the implications of whatever he is about. To be mastered by 'method' or 'theory' is simply to be kept from working, form trying, that is, to found out about something that is going on in the word [ibid., p. 121].

Conclusion

Finding out about something that is going on is not enough to meet the standards of modern social sciences. Having to bear the comparison with the natural sciences it is tempting to use reductionist models to apply methods and concepts for causal explanation and the uncovering of general laws. This development could as well indicate a return of the "automata" (e.g. genetically programmed or rational agents), that is social actors whose behavior can be reduced and explained by a limited set of '"decisive factors".

In the long term such developments could lead to a revival of the idea of a unified science or even a second coming of positivist thought in the social sciences.

However, there are important arguments in favor of the disunity of science. The price for a unified, "reduced" social science would be high: One would lose insight of much of the complexity and contingency of the social world. Moreover trying to unify social and natural sciences might obscure the peculiarities of the social sciences. But it are exactly these particularities which justify and form the starting point for a philosophy of social sciences and a social philosophy of sciences. Since the latter is concerned with the social conditioning of science it has two reasons to engage itself with the idea of the unity of science. First, a revival of the idea would itself indicate a significant change in the social conditioning. And secondly attempts to mimicry natural sciences would have important consequences and could affect the philosophical foundations of the social sciences. Dealing with idea of a unified science – as remote as it may at times seem – is therefore important to carve out the development a social philosophy of science.

Список литературы

Agassi, 1975 – *Agassi J.* Science in Flux // Boston Studies in the Philosophy of Science. Vol. XXVIII. Dordrecht; Boston: D. Reidel Publishing, 1975. 560 p.

Borchert, Hanke, Schluchter, 2013 – *Borchert K., Hanke E., Schluchter W.* Max Weber Gesamtausgabe. Band I/23 Wirtschaft und Gesellschaft. Soziologie. Unvollendet. 1919–1920. Tübingen: Mohr Siebeck, 2013. 847 p.

Comte, 1855 – *Comte A.* Positive Philosophy of Auguste Comte. Part 1. N.Y.: Calvin Blanchard, 1855. 340 p.

Comte, 1855a – *Comte A.* Social Physics: From the Positive Philosophy of Auguste Comte. N.Y.: Calvin Blanchard, 1855. 73 p.

Cohen, 1942 – *Cohen B*. Review: International Encyclopedia of Unified Science Vol. I and II // Isis. 1942. Vol. 33. No. 6. P. 721–723.

Feyerabend, 1978 – *Feyerabend P.* Science in a Free Society. L.; N.Y.: Verso, 1978. 221 p.

Galbraith, 2014 – *Galbraith J*. The End of Normal. N. Y.; L.: Simon & Schuster, 2014. 304 p.

Laplace, 1902 – *Laplace P*. A philosophical essay on probabilities. N.Y.; L.: J. Wiley, 1902. 225 p.

McRae, 1957 – *McRae R.* The Unity of Science: Bacon, Descartes and Leibniz // Journal of the History of Ideas. 1957. Vol. 18. No. 1. P. 27–48.

Mills, 1959 – *Mills C.W*. The Sociological Imagination. N. Y.k: Oxford University Press, 1959. 248 p.

Mirowski, 2002 – *Mirowski P.* Machine Dreams. Economics becomes a Cyborg Science. Cambridge: Cambridge University Press, 2002. 655 p.

Morris, 1960 – *Morris C.* On the History of the International Encyclopedia of Unified Science // Synthese. 1960. Vol. 12. No. 4. P. 517–521.

Oppenheim, Putnam, 1958 – *Oppenheim P., Putnam H.* Unity of Science as a Working Hypothesis. // Minnesota Studies in the Philosophy of Science. Vol. 2 / Ed. by H. Feigl. Minneapolis: Minnesota University press, 1958. P. 3–36.

Plomin, Caspi, 1990 – *Plomin R., Caspi A.* Behavioral Genetics and Personality// Handbook of Personality / Ed. by L.A. Pervin, O.P. John. N.Y.: The Guilford Press, 1990. P. 251–276.

Popper, 1978 – *Popper K.* Natural Selection and the Emergence of Mind // Dialectica. 1978. Vol. 3. No. 3–4. P. 339–355.

Poovey, 1998 – *Poovey M.* A History of Modern Fact. Problems of Knowledge in the Science of Wealth and Society. University of Chicago Press, 1998. 436 p.

Seeley, 2010 – *Seeley T. D.* Honeybee Democracy. Princeton: Princeton University Press, 2010. 271 p.

Weber, 1978 – *Weber M.* Economy and Society.Vol. 1 / Ed. by G. Roth and C. Wittich. Berkley; Los Angeles; L.: University of California Press, 1978. 1712 p.

Whitehead, 1925 – *Whitehead A. N.* Science and the Modern World. N.Y.: Macmillan, 1925. 345 p.

Wilson, 1998 – *Wilson E.O*. Consilience. The Unity of Knowledge. Boston: Abacus, 1998. 364 p.

References

Agassi J. Science in Flux. *Boston Studies in the Philosophy of Science*, vol. XXVIII. Dordrecht, Boston: D. Reidel Publ., 1975. 560 p.

Borchert K., Hanke E., Schluchter. W. *Max Weber Gesamtausgabe. Band I/23 Wirtschaft und Gesellschaft. Soziologie. Unvollendet. 1919–1920.* Tübingen: Mohr Siebeck, 2013. 847 p.

Comte A. Positive Philosophy of Auguste Comte. Part 1. New York: Calvin Blanchard, 1855. 340 p.

Comte A. *Social Physics: From the Positive Philosophy of Auguste Comte.* New York: Calvin Blanchard, 1855. 73 p.

Cohen B. Review: International Encyclopedia of Unified Science, Vol. I and II. *Isis,* 1942, vol. 33, no. 6, pp. 721–723.

Feyerabend P. *Science in a Free Society.* London, New York: Verso, 1978. 221 p.

Galbraith J. *The End of Normal.* New York, London: Simon & Schuster, 2014. 304 p.

Laplace P. *A philosophical essay on probabilities.* New York, London: J. Wiley, 1902. 225 p.

McRae R. The Unity of Science: Bacon, Descartes and Leibniz. *Journal Of the History of Ideas,* 1957, vol. 18, no. 1, pp. 27–48

Mills C.W. *The Sociological Imagination.* New York: Oxford University Press, 1959. 248 p.

Mirowski P. *Machine Dreams. Economics becomes a Cyborg Science.* Cambridge: Cambridge University Press, 2002. 655 p.

Morris C. On the History of the International Encyclopedia of Unified Science. *Synthese,* 1960, vol. 12, no. 4, pp. 517–521.

Oppenheim P., Putnam H. Unity of Science as a Working Hypothesis. In: Feigl H. et al (eds.). *Minnesota Studies in the Philosophy of Science*, vol. 2. Minneapolis: Minnesota university press, 1958, pp. 3–36.

Plomin R., Caspi A. Behavioral Genetics and Personality. In: L.A. Pervin, O.P. John (eds.) *Handbook of Personality*. New York: The Guilford Press, 1990, pp. 251–276.

Popper K. Natural Selection and the Emergence of Mind. *Dialectica*, 1978, vol. 3, no. 3–4, pp. 339–355.

Poovey M. *A History of Modern Fact. Problems of Knowledge in the Science of Wealth and Society.* University of Chicago Press, 1998. 436 p.

Seeley T. D. *Honeybee Democracy.* Princeton: Princeton University Press, 2010. 271 p.

Weber M. *Economy and Society*, vol. 1, ed. by G. Roth and C. Wittich. Berkley, Los Angeles, London: University of California Press, 1978. 1712 p.

Whitehead A.N. *Science and the Modern World.* New York: Macmillan, 1925. 345 p.

Wilson E.O. *Consilience. The Unity of Knowledge.* Boston: Abacus, 1998. 364 p.