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John P. Burgess untersucht in *Die unwirkliche Zeit* (1978) zwei Auffassungen von undeterministischer Logik, wie Prior sie unterscheidet: die »aktualistische« (»Ockhamsche«) und die »antaktualistische« (»Peircesche«) Auffassung, die sich vor allem darin unterscheiden, ob der Begriff der wirklichen Zukunft akzeptiert wird oder nicht. Burgess beschäftigt sich außerdem mit den Voraussetzungen und Möglichkeiten zum Ausbau einer quantifizierten undeterministischen Zeitlogik.

Einen großen Teil des Buches (fast 140 Seiten) nimmt die Dissertation *Indeterministische Zeitlogik* Kimio Haradas ein, die 1993 an der Universität von Heidelberg angenommen wurde (Doktorvater: B. Kienzle) und nun zum ersten Mal erscheint. Harada vertritt den Standpunkt eines »Semiaktualismus« und widmet sich in einer breit angelegten Untersuchung den aktualistischen und antaktualistischen Zeitlogiken sowie dem Versuch Thomasons, diese zu überwinden. Hierbei möchte er (im Unterschied zu Thomason) die zweiwertige Logik bewahren. Jede Formel wird aus der Sicht der Gegenwart bewertet. Harada zeigt, daß der Semiaktualismus als »Grenzfälle« Aktualismus und Antaktualismus aufweist und daß er eine Art »Brücke« zwischen ihnen darstellt, denn jetzt könne man sie so verstehen, als betrachteten sie die Welt vom Ende bzw. vom Anfang der Zeit aus. Letztlich wird eine semiaktualistische Quantorenzeitlogik aufgebaut, nachdem mehrere allgemeine zeitlogische Systeme untersucht worden sind. Harada schlägt die Einführung eines Operators vor, den er »Skoperator« (»bestimmter Gegenstand«) nennt. Hierbei möchte er, im Unterschied zu Prior, der Semantik Vorrang geben vor der axiomatischen Methode.

IV. Die beiden letzten Texte behandeln ein Problem, das nach Meinung des Herausgebers in der Zeitlogik nicht ausreichend beachtet wurde: gemeint sind Sätze, die Ereignisse behandeln.

Der erste Text stammt von Antony Galton und lautet *Logik des Vorkommens* (engl. *occurrence*, 1987). Zeitoperatoren reichen aus, um Zustände auszudrücken, nicht jedoch auch, um Ereignisse (engl. *event*) auszudrücken. Hierzu gibt es im Englischen etwa folgende Sätze: »Alexandra has been eating/will be eating/has eaten/will eat an apple.« Daher führt Galton ein »Ereignisradikal« ein, das mittels Aspektoperatoren (»Perfektiv-«, »Progressiv-« und »Prospektivoperatoren«) sowie Zeitoperatoren Formen

gibt, mit denen formal Sätze zum Vorkommen von Ereignissen in der Zeit dargestellt werden können.

Bertram Kienzle setzt mit seinem Text *Ereignislogik* (Erstveröffentlichung) an Galtons Ideen an und ist wie dieser der Meinung, daß die Zeitlogik durch eine Aspektlogik erweitert werden müsse (wie Galton auch will er sich nicht mit einer »Intervallsemantik« abfinden). Auf diese Weise möchte er eine *indeterministische* Ereignislogik ausbauen (in erster Linie eine Semantik). Dabei spricht Kienzle vom »Satzradikal« (statt vom »Ereignisradikal«), das er aus dem substantivierten Verb und dem Genitivsubjekt bildet.

Das hier besprochene Buch geht über den Rahmen einer gewöhnlichen Einführung in die Zeitlogik hinaus wofür ein einheitlicher, von einem ungeteilten Standpunkt aus geschriebener Text geeigneter wäre als eine Sammelchrift. Im ganzen betrachtet, ermöglicht dieses Buch außerdem ein erweitertes Studium der umstrittenen Fragen der Zeitlogik sowie der Hauptwendepunkte in ihrer bisherigen Entwicklung. Es ist hier von der Verbindung eines systematisch-problemgemäßen und eines geschichtlichen Zugangs die Rede, verwirklicht durch die besonnene Auswahl und Anordnung klassischer sowie neuer, hier erstmals im Druck erschienener Texte. Heutzutage, da die Logik selbst einen weitverzweigten Forschungsbereich darstellt, sind solche Bücher äußerst willkommen und werden mit großem Gewinn gelesen.

Srećko Kovač

(Aus dem Kroatischen von
Silvia Stadler)

R. H. Silvers (ed.)

Hidden Histories of Science

New York Review, N. Y., 1995

Behind the large advertisements of the renowned newspaper »The New York Review of Books« there stands a relatively humble booklet for the book that bears the title *Hidden Histories of Science*, consisting of five articles by prominent authors. The booklet contains the following articles: »Going Unconscious« by neuropsychologist Johnathan Miller from the University of Sussex; »Ladders and Cones« by Stephen Jay Gould, a

biologist from Harvard; »Pursuing the Unpopular« by Daniel Kevles, director of the program for science, ethics and politics at the California Institute of Technology; »Genes, Environment and Organisms« by the renowned genetic scientist Richard Lewontin; and »Scotoma: Forgetting and Neglect in Science« by the popular neurologist from Einstein College, Oliver Sacks. These authors are undoubtedly excellent and famous writers, popularisers of their sciences, and their articles on the pages of »The New York Review« carry an interesting cargo-load. But what functions in one medium does not function in another. It appears to me that the undertaking of editor Robert Silvers did not reap the expected results for several reasons:

1. The title *Hidden Histories of Science* only partly portrays the general themes of the aforementioned articles. Only Miller's and, in a more essential sense, Sacks' articles really consider the hidden, namely neglected, parts of the history of science.
2. The theme of *Hidden Histories of Science* is not especially original. In the philosophy of science, this theme, following the recognition that a unique rational reconstruction of the history of science (from Kuhn onwards) does not exist, has been reworked innumerable times in order to demonstrate that various, often murky, hidden and contradictory paths can lead to good scientific results. The sociology of science for some time now, convinced that a unique rational science, a history of scientific discoveries, does not exist, has concentrated on precisely »hidden« histories of science, erroneous and forgotten theories, »irrational« doctrines, the influence of global philosophical conceptions for the choice (and forgetfulness) of certain research programs: its object is, to a great extent, investigations into the reasons that scientists cite for rejecting and forgetting certain well-formulated theories. There are numerous monographs on the same theme, and even a long standing journal devoted to this theme (*JSS*). Precisely because of this, the editorial endeavour that reworks this theme, according to my judgement, must have differently formulated goals from the ordinary collection of good scientific-journalistic articles.
3. Finally, in order for this type of editorial project to have substance, it must, with the aid of a certain quantity, testify to the relevance of claims that science in fact does have its white stains which should be particularly investigated.

Instead of that (always keeping in mind that all the articles are in themselves interesting and well written), Kevles simply recites a story on research into oncogenes and the causes of cancer during this century (a story that cannot in any way be considered a »hidden history«). Lewontin expounds his own mini-theory on the »construction of the environment« with the aid of organisms and their reversed influence on genotypes, that is, on the interaction of genotypes and the environment – a theory that we cannot call particularly original, and especially not hidden. Stephen Jay Gould deals with an iconistic presentation of scientific theories, and criticises pictorial representations of the theory of evolution in the form of scales and trees; in other words, he deals with »revealed« and not »hidden« aspects of the history of science.

Miller's article »Going Unconscious« really does examine a hidden and neglected part of science: the history of hypnosis, healing through unknown energies (animal magnetism) and investigations into the unconscious. His hidden history begins with a story of a medical student, a »researcher« from the 18th century, Franz Anton Mesmer of Konstanz, who during the prerevolutionary period had great success in healing with hypnosis and »animal magnetism« in Vienna, Paris and London. Mesmerians sought the reason for success in the »magnetic fluid of the nervous system«. Why have scientists from the beginning been and remain sceptical of Mesmerian results? Why was Mesmer's success always pushed to the side and proclaimed a pseudo-science? And why is that still the case today?

Miller reconstructs the social history which stood behind the rejection of Mesmer's results very well. He also reconstructs the indirect influence (on Dupotet, Ellitson, Collins, Braid, Laycock, Carpenter, Hamilton and others) which these results had on research into the nervous system, the brain and the unconscious, but its story ends too early with the claim that »the role of hypnosis in developing this distinctively enabling view of the Unconscious has been regrettably overshadowed by its contribution to the more widely recognized Freudian Unconscious« (p. 28). The history of hypnosis and the unconscious ends precisely here, in spite of Miller's attempts to »enliven« it with the aid of the debate between Chomsky and behaviourists in linguistics. The real question, therefore, is not even posed: »Why is it that the phenomena of hypnosis and the unconscious

are today marginal objects of study, if they were relevant and achieved medical results in a certain moment in history?« »Why is it that science, which has already revealed so many facts about the furthest depths of the universe, has not offered an understandable picture of the ordinary, everyday phenomenon of sleep?« In short, we can say that the very choice of the theme is a good instance of a »hidden history«, because answers to the posed questions are more frequently being sought in »pseudo-science« due to scientific neglect. But Miller is not concerned by that question.

Sacks' article, »Scotoma: Forgetting and Neglect in Science«, is the only one to explicitly discuss what is contained in the title of the entire collection: apart from the fact that he is the instigator of the editorial undertaking, this article represents the only attempt in the collection to offer a relevant answer to the question on the »hidden histories of science« and their relevance for progress in science. Instances of hidden (neglected) histories are examined in Sacks' numerous books: for example, migraines, Lourret's syndrome, the synthetic conception of numbers in Goethe. Scotoma (darkness, shadow) is a neurological concept which »denotes a disconnection or hiatus in perception, essentially a gap in consciousness produced by a neurological lesion« (p. 150). But apart from neurological »scotoma«, there also exist historical and cultural ones, »memory holes« (p. 151).

Sacks offers several explanations for cultural-historical »scotoma«. One of them is »prematurity«. Many scientists lived »before their times«, they researched or gave results that their contemporaries could not follow. »But 'scotoma' involves more than prematurity, it involves the *deletion* of what was originally perceived, a loss of knowledge, a loss of insight, a forgetting of insights that once seemed clearly established, a regression to less perceptive explanations... are surprisingly common in all fields of science. They raise the deepest questions about why such lapses occur« (p. 159). The following are answers: »the uncarefulness or neglect of negative instances of theories«, the attacks of authority, the lack of courage of scientists to resist their opponents. Sacks cites several very plastic examples (stories) for every »scotoma«.

In his theorisation, Sacks repeats formulas that are familiar to the philosophy of science. His story is skilfully expressed in the philosophy of science of Kuhn and Lakatos (even though he does not explicitly cite them), and

he applied it to the field of neurology. »Do there exist deeper formulas behind these contingencies?«, asks Sacks. Sacks finds deeper formulas in the exchange of the period of research explosion and research consolidation and weariness (p. 170), in phases that are unusually similar to Kuhn's period of »revolution and normal sciences«. A formula can also be found in »these new concepts (which) must be synthetic in nature, expressing general principles of large-scale, global organization, which bring unity to the seemingly fragmented observations of micro-science« (pp. 175-176), that is, in Kuhn's linguistic matrixes or paradigms.

When we say that Sacks retells and applies parts of Kuhn's philosophy, this should not be understood as a criticism. Sacks is also renowned, among other things, for his good retelling and popularisation of the solutions of others. But if Sacks' article is the only one to offer an attempt at theorising »hidden histories« in the aforementioned booklet, then that essentially determines the value of the collection. And that value is the following: A collection of five good accounts is offered to the wider public; experts from specific fields can read an individual article which briefly summarises the history of their field or problems; but the theoretician who is interested in a wider perspective or some theoretical contribution (some general conclusion or perhaps a new classification of problems) will be rightly disappointed.

Darko Polšek

(Translated by
Damian Butevin)

Heinz Paetzold

The Discourse of the Postmodern and the Discourse of the Avant-Garde

Jan van Eyck Akademie and
Heinz Paetzold, Maastricht, 1994

Heinz Paetzold is one of those personalities in contemporary philosophy, especially in social philosophy and aesthetics, who systematically examines the theory of modernity, out of which emerges postmodernity. He also constantly questions the avant-gardist heri-