

## WHO'S WHO AND WHAT'S NEW

## Philosophy of science in The Netherlands

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**Abstract** *Conditions for philosophy of science in the Netherlands are not optimal. The climate of opinion in Dutch philosophy is unsympathetic to the sciences, partly because of the influence of theology. Dutch universities offer no taught graduate programmes in philosophy of science, which would provide an entry route for science graduates. A great deal of Dutch research in philosophy of science is affected by an exegetical attitude, which fosters the interpretation and evaluation of other writers rather than the development of original theories. Doctoral candidates in particular should be trained to greater originality and assertiveness. Nonetheless, much good research in philosophy of science is conducted in the Netherlands, both in philosophy faculties and in institutes dedicated to the foundations of the special sciences. Distinguished work is done also in the neighbouring disciplines of logic, history of science, and social studies of science.*

**Introduction**

Popular interest in philosophy is relatively strong in the Netherlands. The Internationale School voor Wijsbegeerte (International School of Philosophy) at Leusden, founded in 1916 (Heijerman & Van den Hoven, 1986), gives courses on topics such as philosophy for managers and Socratic dialogue as well as hosting scholarly conferences. The glossy monthly *Filosofie Magazine*, launched in 1992, which publishes philosophical articles, news of the profession, and announcements of events, sells around 7000 copies in the Netherlands and Belgium. Several philosophy practices or surgeries have opened in recent years in the Netherlands, offering advice about moral dilemmas, mental and cognitive ailments, and similar subjects.

The natural sciences too have a high profile. All the principal national daily newspapers publish sophisticated weekly science supplements. A series of interviews with scientists by Wim Kayzer (1993), broadcast by VPRO, have been among the most widely discussed television programmes of recent years. The Dutch national research funding agency, the Nederlandse Organisatie voor Wetenschappelijk Onderzoek (NWO), sponsors two popular annual events: laboratories hold open days and demonstrations during the Wetenschapsweek in October, whereas the Wetenschapsquiz in December—a national competition to solve a series of science puzzles—often gives rise to lengthy discussion in the press.

However, interest in the natural sciences is not equally strong among Dutch

philosophers, many of whom show indifference or hostility towards the sciences. This attitude is engendered by several factors.

One is religion. Dutch philosophy has been heavily influenced by religious doctrines throughout its history (Sassen, 1967; Struyker Boudier, 1985-); indeed, Dutch philosophy until recently was for the most part *domineesfilosofie* or clergyman's philosophy (Duyvendak, 1995). Work in philosophy at the three confessional universities—the Catholic universities of Nijmegen and Brabant at Tilburg, and the Calvinist Free University at Amsterdam—is affected by their religious affiliations. Even at the philosophy faculties of the non-confessional universities there are several *bijzondere leerstoelen* or special professorships in the control of religious foundations. The climate of opinion in Dutch philosophy is thereby shaped by religion, to the disadvantage of science. A few Dutch philosophers side explicitly with science against religion: for example, Herman Philipse's *Atheïstisch manifest* (*Atheist Manifesto*, 1995) argues in the light of the findings of cosmology and evolutionary biology that morality cannot be grounded in religious belief. But such a stance is unusual.

Antipathy for science is fuelled further by the Continental school in philosophy, to which many Dutch philosophers belong: some Continental approaches portray the sciences as merely technical practices, devoid of intellectual interest. Forms of environmentalism, which are also popular among Dutch philosophers, hold science and technology responsible for despoiling nature and dehumanising society and culture.

Partly in consequence of these factors, the position of philosophy of science in the Dutch academic world is not strong. There are at present some 25 members of staff and 15 doctoral candidates working in philosophy of science at Dutch philosophy faculties. Two of the largest faculties, those at the University of Amsterdam and at Utrecht, now conduct virtually no research or teaching in philosophy of science, and show little inclination to reestablish the subject.

### Philosophy of science in the Dutch university

Work in philosophy of science requires familiarity with science as well as expertise in philosophical analysis. The training of philosophers of science thus depends on opportunities being offered to students to pursue both subjects.

The organisation and degree programmes of Dutch universities are regulated by national legislation. Philosophy was once a subdivision of the faculty of letters: this arrangement emphasised the literary aspects of philosophy and weakened its connections with the sciences. In 1961, responsibility for research and teaching in philosophy was transferred to a new and unique institute within the university structure, the *centrale interfaculteit* (central interfaculty unit), independent of the faculties (Weijers, 1995). This reform aimed to counter the increasing specialisation of knowledge and fragmentation of culture. It was envisaged that the centrale interfaculteit would provide conceptual and methodological training to students throughout the university and collaborate on foundational problems with researchers in the special sciences. This plan might have considerably increased the weight of philosophy of science within both philosophy and the university. The links with the special sciences never developed on the intended scale, however, and in any case philosophy worldwide was itself increasingly being practised as a specialism, pursuing issues and approaches in which other disciplines had little interest. In 1987, the centrale interfaculteit was converted into the faculty of philosophy, on a par with the other faculties. The failure of this experiment is still mourned by some Dutch philosophers.

Nowadays the opportunities to combine study of a science and of philosophy are comparatively scarce in the Dutch university curriculum. A few students take first degrees in both subjects, but this has become more difficult after recent cuts in student funding. Many degree programmes in the natural and especially the social sciences include a course in methodology, but this is often of a low standard. Students who have completed the *propaedeuse* or first-year programme in another subject may transfer to philosophy by following the *inhaal* (catch-up) programme in philosophy; but the *propaedeuse* provides only a basic grounding in a science, and many students who take this option drop out. A development more beneficial for philosophy of science is the degree programme in *wijsbegeerte van een bepaald wetenschapsgebied* (philosophy of a particular academic field), introduced in 1993 and now offered by all Dutch philosophy faculties. This degree programme combines courses in philosophy and in one of the natural and social sciences or humanities. (The Dutch word *wetenschap* has the same extension as the German *Wissenschaft*.) It takes five years, and not four like the degree programme in philosophy; since it consequently entitles students to a fifth year of state financial support, it will probably grow in popularity.

In Britain and North America, philosophy of science and other hybrid subjects benefit from the existence of one- and two-year taught graduate programmes leading to a master's degree or equivalent: many philosophers of science take a first degree in a science subject and acquire philosophical training in a master's programme before embarking on a doctorate in philosophy of science. Dutch universities offer few taught graduate programmes, and none in philosophy. Under Dutch law the *doctoraal* or first degree (not to be confused with the *doctoraat* or doctorate) has the status of a master's degree: if they remain in the Netherlands, students aiming at an academic career proceed from a first degree to doctoral research, usually in the same discipline. The introduction of taught graduate programmes in philosophy of science would, I believe, considerably strengthen the subject in the Netherlands: such programmes would attract the many science students who become interested in foundational and methodological issues, and some of these students would choose to remain in philosophy of science. Furthermore, since students are more willing to go abroad for a master's programme than for a first degree or a doctorate, such programmes might attract foreign students, of whom there are currently very few at Dutch philosophy faculties.

Doctoral research too has a distinctive organisation in the Netherlands. At present almost all doctoral candidates hold the post of *assistent in opleiding* (trainee assistant), funded by a university, or of *onderzoeker in opleiding* (trainee researcher), funded by the appropriate division of the NWO—in the case of philosophy, the Stichting Filosofie en Theologie (Foundation for Philosophy and Theology). Holders of these four-year posts are not students, but employees of their funding institution: for instance, they acquire pension rights and are entitled to *wachtgeld*, unemployment pay for which an employer is liable for a period after the termination of a contract. This is an expensive way of producing doctorates. Consequently, Dutch philosophy faculties have fewer doctoral candidates than departments of comparable size in Britain or North America: the nine Dutch philosophy faculties have approximately 150 professors and lecturers but only 75 doctoral candidates. Since they also have no taught graduate programmes, Dutch philosophy faculties lack the vibrant graduate school that is the focus of many British and North American departments. The lack affects philosophy of science more than other branches of philosophy, since a graduate seminar in philosophy of science can attract participants from other faculties. In an effort to reduce the cost of doctoral training, recent legislation has given universities the option of appointing doctoral

candidates to the position of *beurs-promovendus* (bursary doctorand), which carries a university stipend without conferring the privileges of employee. This new position may increase the number of places for doctoral candidates at Dutch universities.

Some years ago, the Dutch government adopted the policy of creating a national *onderzoekschool* (research school) in each of the principal academic subjects, to coordinate research at university faculties and organise teaching for doctoral candidates. The Onderzoekschool Wijsbegeerte was officially established in 1996 after some years of informal operation. Its current members are six of the Dutch philosophy faculties and the Hoger Instituut voor Wijsbegeerte of the Catholic University of Leuven, Belgium. The Onderzoekschool has four departments, including one for philosophy of science, with which currently 22 full faculty members and nine doctoral candidates are affiliated. The scientific director of the Onderzoekschool is at present Professor P. van Haute, of Nijmegen; the head of its philosophy of science department is Professor H. Parret, of Leuven. Most of the Onderzoekschool's doctoral candidates (90 out of 144 in the year 1996–97) are at Leuven.

In the course of its five-yearly assessments of Dutch university departments, the Vereniging van Samenwerkende Nederlandse Universiteiten (Association of Universities in the Netherlands, VSNU) has recently evaluated the research (VSNU, 1995) and teaching (VSNU, 1996) at philosophy faculties. In its research assessments, the VSNU appraises the output not of staff members individually, but of research programmes on which typically four or five full faculty members and doctoral candidates work. All research in philosophy of science carried out within a faculty is allocated typically to one programme. Each programme is described as pursuing a particular theme, and is assessed by the VSNU on internal coherence among other criteria; but many programmes are formulated solely for the purposes of the assessment and contain heterogeneous lines of research.

### The exegetical attitude

The branch of philosophy that enjoys the highest prestige in the Netherlands is history of philosophy: it is considered the most scholarly form of philosophical inquiry and accounts for a large share of the output of Dutch philosophers. Its status is so dominant as to shape the way in which all philosophy is regarded and practised in the Netherlands.

History of philosophy has a distinctive ethos. The writings of the important philosophers of the past are a scarce, authoritative, revered, complex, and enigmatic resource. The historian's task is to reconstruct sensitively the assumptions, theories, and arguments that these writings contain, and interpret them faithfully to the present-day reader. The relation between the historian of philosophy and the philosopher whom he or she studies is thus markedly asymmetric: the philosopher's writings are a datum to which the historian responds. This ethos is found also, in a strong form, in Continental philosophy, where the writings of authors such as Edmund Husserl and Martin Heidegger are regarded as a privileged source of insights, elucidating and responding to which is the task of subsequent scholars.

In the ethos of systematic philosophy, in contrast, all philosophers are peers in the investigation of philosophical problems. The writings of past philosophers, even the greatest, are regarded as contributions to this investigation on a par with one's own publications. Whereas a systematic philosopher may comment on or reply to a colleague, the relationship between them is symmetric, unlike that between a historical source and its interpreters.



In the Netherlands, the ethos of history of philosophy is embraced wholeheartedly by historians of philosophy, as one would expect. What is more surprising is that this ethos also dominates branches of philosophy generally considered systematic. In consequence, a great deal of Dutch work in systematic philosophy has the appearance of historiography (Boomkens, 1996, pp. 37–38). This holds for Dutch philosophy of science too. Nowadays, research in philosophy of science takes the form of a worldwide debate aiming to develop novel solutions to problems pertaining to science. However, many Dutch philosophers of science seem reluctant to enter this debate as full participants. Instead, they study the debate as historians would, following it from the outside and commenting on its progress. They strive not primarily to originate novel solutions to the problems under discussion, but rather to point out features of the solutions suggested by others. They tend consequently to focus on writers and texts rather than on topics and problems: many Dutch publications and doctoral dissertations in philosophy of science, both in Dutch and in English, take the form of a summary, elucidation, and evaluation of the theories and arguments of a given writer. I call this the “exegetical attitude”. This attitude, and especially the tendency to elevate texts to the status of authority, may be a consequence in part of the influence of theology on Dutch philosophy.

The exegetical attitude has a few beneficial consequences. It fosters receptiveness, sensitivity, and knowledge of the literature; and Dutch philosophers of science exhibit all these qualities. Self-evidently, however, the exegetical attitude stifles ambition and creativity. Dutch philosophers of science generally do not envisage taking the lead in the debates that they study, any more than a historian could imagine taking the lead in a debate that ended centuries ago. In consequence, Dutch work in philosophy of science has much less impact on the subject than it might have.

Here are some illustrations of the exegetical attitude in Dutch philosophy of science. After a lecture series by Paul M. Churchland in Leiden in 1992, the leading Dutch philosophical quarterly *Algemeen Nederlands Tijdschrift voor Wijsbegeerte* (ANTW) published a special issue on Churchland’s work containing articles by several Dutch philosophers of science (Derksen, 1993a). Collections of papers dedicated to a particular philosopher are produced in all countries, of course; but the best such papers presume that their author and subject have equal status as interlocutors in a debate. In contrast, the papers in the ANTW Churchland issue are mostly expository; the fact, moreover, that they are in Dutch suggests that they are intended to interpret Churchland’s work for a local audience rather than to advance the worldwide discussion of the issues.

Similarly, in his book on naturalism in philosophy of science, Werner Callebaut (1993) reports his conversations with prominent exponents of this doctrine. He thereby conveys the impression that there are two classes of philosophers of science: the front-line researchers, by whose efforts the subject is advanced, and his own readers, who are spectators of the enterprise. While promising to reveal “how real philosophy of science is done”, Callebaut suggests above all that real philosophy of science is done by others.

The strength of the exegetical attitude in Dutch philosophy of science today is due partly to the Onderzoekschool Wijsbegeerte. The principal activity of the Onderzoekschool’s philosophy of science department is an annual symposium that in most years is dedicated to a prominent present-day philosopher: for example, Rom Harré in 1992, Ruth Garrett Millikan in 1994, Bas C. van Fraassen in 1996, and Lynne Rudder Baker in 1997. The Onderzoekschool’s doctoral candidates are invited to give papers at

the symposium on aspects of the featured philosopher's work. In most years, moreover, they prepare for the symposium in a reading group or seminar series in which they develop and compare their interpretations of the philosopher. The Onderzoekschool thus trains its doctoral candidates not primarily to construct theories of their own but to generate interpretations of the theories of established philosophers.

The result is evident in publications originating from the Onderzoekschool, such as the collections of papers on scientific realism edited by A. A. Derksen (1994) and Paul Cortois (1995). Contributors to the latter volume, most of whom are young scholars affiliated with the Onderzoekschool, state the purpose of their papers in such terms as the following: "In this article I have explicated, elaborated and defended the strategy which Nancy Cartwright and Wesley Salmon take to defend scientific realism" (p. 57); "Van Fraassen has been developing his position to ever more sophistication. In this article I will follow some of these developments" (p. 59); "In this paper I will discuss Dennett's position in the realism/antirealism controversy concerning the ontological status of Folk Psychology and propositional attitudes" (p. 190). The authors doubtless offer ingenious interpretations of their chosen subjects; but their considerable talents should rather be directed at developing positions of their own.

As one of the national custodians of the subject, the Onderzoekschool's philosophy of science department could and should have greater ambition for Dutch philosophy of science. It should educate its doctoral candidates to think of themselves as the equal of any scholar in the world, and to strive to shape the agenda of the subject. As a first step, it could use its annual symposium to reward original work on systematic problems rather than the interpretation of established philosophers. The conference *Recent Advances in the Philosophy of Science* organised by Jon Dorling and Maarten Franssen at the University of Amsterdam in 1991 could serve as a suitable model: as its title suggests, this conference was based on the assumption that its participants were full members of the worldwide debate who had personally achieved advances in their subject. Dutch philosophy of science would greatly benefit if such assertiveness became more widespread.

### **Areas of research in philosophy of science**

A great deal of Dutch work in philosophy of science escapes the exegetical attitude, of course. The research programme in philosophy of science that received the highest rating in the recent assessment by the VSNU (1995, p. 31) is the one at Groningen, led by T. A. F. Kuipers. The Groningen group lays claim to a distinctive approach, which it calls "cognitive studies of science" (Kuipers & Mackor, 1995). This approach is intended as an alternative both to traditional philosophy of science, which the Groningen group regards as excessively abstract and sterile, and to the approach of social studies of science, which fails to acknowledge the centrality of the notions of rationality and empirical success. The aim of Groningen's cognitive studies of science, like that of traditional philosophy of science, is to explicate the structure and development of scientific knowledge; but the intended methodology is empirical, like that of social studies of science.

Much of the output of the Groningen group may be viewed as extended responses to the work of Karl R. Popper and some of his followers. The intellectual background of Popper's philosophy of science has been studied by Michel ter Hark (1993), who emphasises its psychological components. Kuipers (1987, 1992) has formulated increasingly sophisticated quantitative measures of truthlikeness, or distance from the truth—

a line of research that stems from Popper's attempt in the 1960s to define the concept of truthlikeness, later demonstrated inadequate. Kuipers (1995, 1996) also contrasts the method of truth approximation with alternatives such as falsificationism. Other members of the Groningen group work on the logic of evaluation and justification, the analysis of science in terms of research programmes in the style of Imre Lakatos, and the explication of psychological intuitions.

At the faculty of philosophy at the Free University, Amsterdam, Hans Radder (1988, 1996) has developed an interesting view of science and technology based on the concepts of realisation and nonlocality. The former term refers to the fact that the epistemic and practical results of science and technology must be realised in the world. However, some features of science and technology have a significance that goes beyond their local realisations: for example, experimental outcomes are assumed to be replicable at all places and times. Building on these concepts, Radder intends to trace a middle road between philosophical accounts which traditionally emphasise the universality of science and technology, and sociological accounts which draw attention to their contingent and variable aspects. Radder's approach and that of the Groningen group illustrate a characteristic of Dutch philosophy of science, namely that it tends to be moderate and conciliatory, seeking common ground between opposing views—in these cases, between philosophical and sociological approaches to science. Also at the Free University, P. P. Kirschenmann (1994) has written on the anthropic principle and other subjects.

Nijmegen and Tilburg jointly conduct a research programme on rationality and realism. At Nijmegen, A. A. Derksen writes on such topics as the nature of rationality (1992a), the scientific credentials of psychoanalysis (1992b), and pseudoscience (1993b); Pamela Kribbe (1991) works on Richard Rorty's thesis of radical theory-ladenness of observation and Hilary Putnam's internal realism. At Tilburg, H. C. D. G. de Regt (1994) is involved mainly in the defence of scientific realism against Bas C. van Fraassen's constructive empiricism, and A. W. M. Meijers (1994) has examined John R. Searle's views on intentionality. These two faculties have considerable influence in Dutch philosophy of science: Nijmegen trained many of the philosophers of science who now hold posts at Dutch universities, and the Nijmegen-Tilburg group plays a leading role in the *Onderzoekschool Wijsbegeerte's* philosophy of science department, organising symposia and editing publications such as those mentioned in the previous section.

Leiden has become the principal Dutch centre for philosophical research in cognitive science with the work of T. C. Meyering (1989, 1994) and J. J. M. Sleutels (1994); it has strengths also in broader areas of epistemology and its history (Philipse, 1990, 1994).

Jaap van Brakel worked until recently at the faculty of philosophy at Utrecht. His many publications are on such topics as natural kinds (1990, 1992), the colour categories (1993), and probability (1991). Since his departure for Leuven in 1994, however, the Utrecht faculty has virtually ceased work in philosophy of science, with the exception of the research of Arno Wouters (1995) into functional explanation.

Finally, nothing could be further removed from the exegetical attitude in philosophy of science than the work of Jon Dorling. He is engaged primarily in demonstrating how philosophical problems pertaining to science can be solved by statistical and other mathematical approaches, and thereby in showing that standard patterns of scientific inference have a much more solid rational foundation than many philosophers assume. Dorling's publications treat such topics as the interpretation of quantum mechanics (1987), the implications of Bayesian inference theory for the realism-instrumentalism

dispute (1992), and the cogency of "deduction from the phenomena" (1995), but many other papers of his are as yet unpublished. Dorling worked at the faculty of philosophy at the University of Amsterdam until a few years ago, when that faculty decided that it should no longer be active in philosophy of science. The decline of the subject at Amsterdam and Utrecht has been a severe setback for Dutch philosophy of science.

### Research into foundations of the sciences

In its latest assessment of research in philosophy, the VSNU (1995, p. 10) criticises Dutch philosophers of science for not involving themselves more deeply in actual science:

One might wish that Dutch philosophers were in closer touch with developments in scientific research and would feel more challenged to submit these to philosophical reflection. As things now stand, the philosophy of science at Dutch universities is, on the whole, somewhat wanting in spirit and creativity in this respect.

However, the remit of the VSNU evaluation was limited to philosophy faculties. Some Dutch science faculties have research groups dedicated to foundational problems of the special sciences (Van Peursen & Van Dijk, 1972): as well as being in close contact with scientific research, their work includes some of the best done in philosophy of science in the Netherlands.

At the Department of History and Foundations of Mathematics and the Natural Sciences at Utrecht, an innovative, productive and influential group led by Dennis Dieks works on the foundations of physics. Dieks (1989, 1994) has advanced a modal interpretation of quantum mechanics. Modal interpretations aim to satisfy the desiderata of realism by interpreting the standard quantum mechanical formalism in terms of properties of physical systems rather than merely measurement outcomes. This approach attempts thereby to avoid the so-called measurement problem: measurements are interpreted as physical interactions which bring about a correlation between the properties of an object and those of a measuring device. There is considerable and growing interest in this approach, shown for example in the conference *The Modal Interpretation of Quantum Mechanics* organised at Utrecht in 1996 (Dieks & Vermaas, forthcoming).

The Utrecht group conducts research also into other foundational problems of quantum mechanics (Muller, forthcoming); into the foundations of statistical physics, especially the relation between thermodynamics, statistical mechanics, and classical and quantum mechanics (Uffink, 1995); and into the foundations of space-time theories, especially the relation between symmetries, covariance, and invariance in special relativity theory (Budden, forthcoming). Lastly, H. W. de Regt (1996) has studied the extent to which physicists' philosophical commitments influence their scientific work; he is now analysing notions of intelligibility in physical theory, especially *Anschaulichkeit* and representability in space and time.

Also active in philosophy of physical science is Peter Kroes at the Technical University of Delft, who has worked on time (1985) and on relations of physical analogy (1989) as well as on the methodology of engineering science (1992).

At Leiden, a group at the Institute for Evolutionary and Ecological Sciences, headed by D. J. Kornet, works on the foundations of evolutionary biology, especially phylogenetic systematics. Kornet's work aims to contribute to the solution of current



problems in biology. One of these is the species problem, which consists in the challenge to provide a rigorous definition of species that is consistent with established techniques of phylogeny reconstruction. Kornet (1993; Kornet *et al.*, 1995) has shown that internodons, or parts of the genealogical network of organisms contained between two consecutive permanent splits, constitute equivalence classes in the network but are too short-lived to satisfy biologists' intuitions of species. Kornet's "composite species concept", which holds a species to be a succession of internodons, yields species that are both rigorously defined and applicable in cladistic analysis.

*Wijsgerige biologie* or "philosophical biology" at Leiden has a long history. The zoologist C. J. van der Klaauw, who founded the Institute of Theoretical Biology in 1957, determined that it should contain not only a department of mathematical biology but also, more unusually, a logico-philosophical department in which fundamental biological concepts would be analysed and formalised (Kornet, 1995, pp. 14–19). This was one of the earliest units in the world dedicated to foundations of biology.

Also working in philosophy of biology is W. J. van der Steen (1993, 1994; Van der Steen and Kamminga, 1991) of the Free University, Amsterdam, and former students of his, such as P. B. Sloep (1993) of the Open University. This group conducts mainly retrospective methodological assessments of lines of research in evolutionary biology and ecology.

The Faculty of Economics and Econometrics at the University of Amsterdam has a strong group in philosophy, methodology, and history of economics, established by J. J. Klant and Neil De Marchi, and led since 1992 by Mary S. Morgan. This group's main research at present is into economic modelling (Boumans, 1995; Kim *et al.*, 1995). It collaborates with the Centre for the Philosophy of the Natural and Social Sciences at the London School of Economics on a research project on models in physics and economics, and held a conference on *Models as Mediators in the Practice of Economic Science* in Amsterdam in March 1996. Morgan (1993, 1995) works also in broader issues in philosophy and history of economics, while J. P. Cohen (1995) works on utility theory and measurement theory.

A second philosophy of economics group is at the Erasmus Institute of Philosophy and Economics at the Erasmus University, Rotterdam. There, for example, J. J. Vromen (1995) studies attempts to give evolutionary accounts of the development of economic institutions.

### Textbooks and popular books

The requirements of teaching have naturally fostered the publication of Dutch-language textbooks in philosophy of science. *Wetenschap of willekeur* (*Science or Arbitrariness*), by A. A. Derksen (1992c), develops and defends a naturalistic view of science. The author argues that such a view is to be preferred to competing accounts, such as those of Karl R. Popper, Imre Lakatos and Thomas S. Kuhn. Along the way, the book treats issues including the demarcation of science from pseudoscience, the theory-dependence of meaning, and the theory-ladenness of observation. Derksen has little sympathy for sociological approaches to science: he confines his discussion of them to the Strong Programme, which he describes as "the latest attack on the rationality of science" (p. 123). First, while the Strong Programme was perhaps the latest development in social studies of science at the time of this book's first edition in 1985, it had been joined by other approaches, such as actor-network theory, well before the publication of the second edition in 1992. Second, while it is of course not necessary to agree with them,

such approaches raise pertinent and interesting questions about the nature of rationality and objectivity which deserve balanced discussion in an introductory textbook.

More sympathy to sociological and anthropological approaches to science is shown in *De ontwikkeling van wetenschap* (*The Development of Science*), by G. H. de Vries (1995a). The opening chapter outlines the rise of the modern natural and social sciences and the intellectual origins of 20th-century philosophy of science; the remaining three chapters are devoted to Popper, Kuhn and Bruno Latour, alongside figures to whom de Vries attributes lesser roles. Although described in the subtitle as an introduction to the philosophy of science as a whole, this book discusses only theories of the dynamics of scientific practice: foundational and structural issues are not treated except where raised by Popper, Kuhn, or Latour. Furthermore, the book's personalised treatment embodies a strong form of the exegetical attitude, which it risks reproducing in students.

A more challenging textbook is *Ideaalbeelden van wetenschap* (*Ideal Images of Science*), by Peter Kroes (1996). This devotes chapters to the difficulty of defining "science", the interrelation of the sciences, the aim of science, and the demarcation of science from pseudoscience; to logic, definition theory, and axiomatisation; and to the concepts of evidence and rationality. This book makes an excellent introduction to conceptual analysis for science students.

There are also Dutch-language books on philosophy of science intended for the general reader. One collection of articles, edited by Louis Boon and G. H. de Vries (1989), is devoted mainly to sociological approaches to science; another, edited by Jaap van Brakel and Diederick Raven (1991), treats scientific realism. Such books by Dutch scholars are generally of high quality, offering an accurate and balanced view of recent developments in philosophy of science.

### Neighbouring disciplines

Finally, some remarks about three disciplines with which philosophy of science has close relations: logic, history of science, and social studies of science.

The Dutch school of logic has been influential throughout the 20th century: its most notable members have been L. E. J. Brouwer, who founded logical intuitionism as well as making important contributions to topology, and E. W. Beth (Sassen, 1960, pp. 178–200). Today, the Netherlands occupy a leading position in areas such as the formal analysis of natural language (Van Benthem, 1991, 1995) and modal logic. Unlike Beth, however, who was active also in philosophy of science, present-day Dutch logicians devote little attention to the empirical sciences.

The profile of history of science in Dutch academic life is surprisingly low, in view of the country's strong tradition in the natural sciences both in the early modern era and in the 20th century (Snelders, 1987). The landmark work remains *The Mechanization of the World Picture* by E. J. Dijksterhuis (1950), a biography of whom was recently published by Klaas van Berkel (1996). The only substantial centre for history of science is to be found at Utrecht. There, H. A. M. Snelders works on such topics as the history of chemistry (1993) and science in the Romantic period (1994); H. J. M. Bos (1992, 1993) on the history of mathematics; and F. H. van Lunteren (1991) on conceptions of gravitation.

For the rest, historians of science in the Netherlands are few and scattered. At Groningen, John D. North (1988, 1994) continues his life's work on the history of astronomy and cosmology. At Twente, H. F. Cohen (1994) has published a survey of the historiography of the scientific revolution in which some elements of the exegetical

attitude may be discerned (pp. 2, 7). A biography of Christiaan Huygens has been written by C. D. Andriess (1993); and a study by I. H. Stamhuis (1995) of the geneticist Tine Tammes, the second woman to gain a university professorship in the Netherlands, was awarded the 1996 History of Women in Science Prize by the US-based History of Science Society. There is interest too in the history of the human sciences: for example, Douwe Draaisma (1995) works on the evolution of metaphors of memory and H. F. Vermeulen (1995) on the origins of anthropology. Important archives and collections of scientific instruments are at the Teylers Museum, Haarlem, the oldest museum in the Netherlands, founded in 1778, and at the Boerhaave Museum, Leiden, the national museum of the history of science and medicine, opened in 1931.

Social studies of science currently attract a great deal of attention in the Netherlands. The Department of Science and Technology Dynamics at the University of Amsterdam is an important centre, and the quarterly *Kennis en methode* (*Knowledge and Method*) publishes articles mainly in this field. The work of W. E. Bijker (1995) on the social regulation of technological development is well known. Dutch scholars further contribute to the debate on topics such as the merits of social constructivism (Hagendijk, 1990; Bijker, 1993); the knowledge content of science (Leydesdorff, 1992); the appropriateness of relativist attitudes in the social study of science (De Vries, 1995b); and the rationale of symmetry principles in the analysis of scientific claims (Pels, 1996). Dutch contributions to social studies of science, like those to philosophy of science, are generally moderate and conciliatory; they do not always escape the exegetical attitude. The Onderzoeksschool Wetenschap, Technologie en Moderne Cultuur (Graduate School of Science, Technology and Modern Culture), a counterpart of the Onderzoeksschool Wijsbegeerte, was officially established in 1995; its scientific director is at present Professor G. H. de Vries, of Maastricht.

### Acknowledgements

I am grateful to Jon Dorling, D. J. Kornet and Herman Philipse for comments on a previous draft of this article, and to Dennis Dieks and Mary S. Morgan for information about their research groups.

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