not only informative, but suggests that a history of logic courses and logic textbooks would make a worthwhile, informative, and interesting study.

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Erik Heijerman & H. Walter Schmitz (editors), *Significs, Mathematics and Semiotics. The Signific Movement in the Netherlands. Proceedings of the International Conference Bonn 19–21 November 1986*, Nodus Publikationen: Münster 1991 (= *Materialien zur Geschichte der Sprachwissenschaft und der Semiotik* 5); 208 pp., ISBN 3-89323-305-9.

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In 1986 philosophers, mathematicians, linguists, and communication specialists met in Bonn to take part in the conference "Significs, Mathematics and Semiotic — the Signific Movement in the Netherlands" held at the Institut für Kommunikationsforschung und Phonetik. The conference had been organized by Erik Heijerman, Jacques van Niewstadt and Hans W. Schmitz, host at the institute, and author of a full scale study on the signific movement, published in [*1990*].

The volume under review gives the proceedings of that conference containing, as Schmitz writes in his introduction, "some results of a renewed historical and systematic interest in the signific movement in the Netherlands," which sunk into oblivion after its disintegration at the end of the fifties, at least outside of the Netherlands. Schmitz, however, emphasizes that before that time "significs was an important pendant to the Unity of Science movement and to Morris' theory of signs, the significians also being active in the fields of epistemology, semantic analysis and the theory of signs" (7). The volume is of some interest for the readers of this journal because several authors cover the relation between language and mathematics, thus contributing especially to the philosophical foundations of intuitionism.

Besides Schmitz's excellent introduction (7–18), the volume comprises twelve papers, ordered in four sections. The first section bears the rather irritating title, "Significs as a Starting Point of Research." Its four papers deal with the philosophy of mathematics:

Christian Thiel, "Brouwer's Philosophical Language Research and the Concept of the Ortho-Language in German Constructivism," 21–31; Dirk van Dalen, "Brouwer's Dogma of Languageless Mathematics and its Role in his Writings," 33–43 (a supplementary article, not delivered at the conference); Erik Hejerman, "The Validity of Mathematics as a Pseudo-Problem,"45–56; Gerard Alberts, "Significic Consultation — David van Dantzig's Dream of a Practical Significs," 57–76. These four papers, and the paper of Henk Visser on "Significs in Linguistic Philosophy" (133–143) will be reviewed here in greater detail.

The other contributions are the following: Section 2 "On the History of Significs" contains Klasien Horstman's rather general paper, "Victoria Welby, a Moralistic Pragmatist!" (79–88), and a detailed study by L.J.M. Bergmans on "Otto Friedrich Gruppe as a Precursor of the Significians" (89–104), describing Gruppe's (1804 – 1870) pioneer philosophy of language that influenced not only Frege and Wittgenstein, but also philosophers in the Netherlands via the eccentric Gerardus Bolland.

The third section entitled "Significs compared," contains Visser's paper and two other articles: Achim Eschbach compares the theories of signs of "Charles W. Morris and Gerrit Mannoury — a Juxtaposition" (107–119); Norman Martin handles "Significs and Logical Empiricism" (121–132) mixed with a good deal of personal recollections. Martin, a student of Carnap and Morris, visited the Netherlands from September 1949 to September 1950 and participated in the work of the International Society for Significs.

Section 4 "On the Topicality of Signific Methods for Analysis" contains three papers of mainly linguistic interest: H. Walter Schmitz, "Empirical Methods of Signific Analysis of Meaning: Transformation and Exhaustion of Linguistic Acts," 147–159; Adriaan D. de Groot, "Signific Concept Analysis," 161–186; and Fester L. Medendorp, "Rethinking Signific Issues," 187–197. The volume closes with a "Summary of the Final Discussion" by Erik Heijerman, and with a name index.

In his "Introduction" (7–18), Schmitz gives a short description of the movement's history and its main aims. Schmitz dates the beginning of the signific movement in the Netherlands at about 1917. As to the contents, however, its origins can be found in the significs of Victoria Lady Welby (1837 – 1912) which was developed in close connection with Charles S. Peirce's semiotics and gained influence in the Netherlands through the Dutch psychiatrist, poet and social reformer Frederik van Eeden (1860 – 1932). Prominent figures in the movement were Luitzen Egbertus Jan Brouwer (1881 – 1966) and Gerrit Mannoury (1867 – 1956), both mathematicians with a vivid interest in philosophy and especially the philosophical foundations of their science.

But what is significs? In 1953 David Vuysje wrote (9, i.e., [Vuysje *1953*, 228*f.*]):

> Signific aims at an investigation of the acts of communication, i.e., of acts by which living beings try to influence the behaviour and the activities of other living beings. In a somewhat narrower acceptation it may be described as the scientific study of the mental associations

> underlying the human acts of communication, excluding the more specific departments of the science of language in the proper sense, like philology, etymology, semantics.

Among the topics of significs are the relation between mathematics and language and questions concerning what the mathematician does when he is doing mathematics, and the mathematician's tools for convincing his collegues of his results. These were exactly the themes in which Brouwer and Mannoury were engaged before they joined the movement. Already in his *Leven, kunst en mystiek*, published in *1905*, two years before he received his doctoral degree, Brouwer examined language thoroughly and laid the philosophical grounds of his intuitionistic mathematics. Gerrit Mannoury, Brouwer's teacher and friend, and later the leading thinker of the movement, treated problems of language and meaning as early as 1903 in his early studies on the foundations of mathematics.

Schmitz sketches the significs movement's attempts to reach the status of an institutionalized science by founding the International Institute for Philosophy in Amsterdam (1917 – 1922), the Significs Circle (1922 –1926), and the International Group for the Study of Significs in the 1930s. This last group cooperated closely with the Vienna Circle and logical empiricism. Some members of the group were Otto Neurath, Friedrich Waismann and Josef Schächter. After World War II the International Society of Significs was founded. From 1936 to 1963 *Synthèse* was the principal journal of the movement. After the deaths of Mannoury and van Dantzig and the reorganization of *Synthèse* in 1963, the movement came to an end. Schmitz writes that "more recent attempts to revive the movement have appeared to be quite unrealistic and unfruitful" (14). He stresses, however, that the study of the movement does not only satisfy a historiographical interest, but can also be "a favourable starting point for studies of comparison and contrast" (15).

The first two essays of the proceedings are concerned with L.E.J. Brouwer's philosophy of language providing the philosophical base of his intuitionistic mathematics. Christian Thiel, successor to Paul Lorenzen's chair of philosophy in Erlangen, compares Brouwer's philosophy of language with that of German constructivism, a reasonable comparison, since both directions advocate effective logical systems denying the general validity of the law of the excluded middle, and both propagate several language levels in the philosophy of science.

Thiel remarks at the beginning that "Brouwer's general philosophical position and world view remained remarkably stable and recognizable from the time of the unaccepted portions of his dissertation until his retrospect in his own work" (21). This opinion is confirmed by van Dalen who states that "the general content of Brouwer's basic philosophy is fairly invariant through the years" (35). Thiel shows that Brouwer's early sceptical attitude towards language as a source of evil was later combined with "the attitude to corrective intervention into the effects of language as a cause of human suffering" (22). Brouwer's considerations were incorporated in the significs movement's language critique

and analysis. Brouwer and the significians distinguished five levels of language: (1) the basic language, (2) the emotive language, (3) language of interaction, or better: utility language, (4) scientific language, and (5) symbolic language.

Thiel contrasts this conception of language levels with the ortholanguage model of German constructivism. It is one of the merits of Thiel's article that it offers for the first time a historical survey of this portion of constructive philosophy of science that is central for constructive logic as well. "Ortholanguage" is, according to Oswald Schwemmer's definition, "a methodologically constructed language in which each word or symbol is expressly provided with a circle-free introduction" [Schwemmer *1984*, 1099]. It is distinguished from the "paralanguage" which "serves for the exposition and grounding or justification of the ortholanguage." This concept goes back to writings by Paul Lorenzen published by *1969*. The first systematic construction of an ortholanguage was published in *1973* by Paul Lorenzen and Oswald Schwemmer. Thiel resumes that reconstruction of particular scientific languages, i.e., projects reconstructing the corresponding ortho-languages "have shown that what we presently find can only be used as signposts or direction markers, and not as detailed road maps and directions to be followed" (30). Nevertheless, in his latest book [*1987*] Paul Lorenzen again considers symbolized languages in order to reconstruct them and "to move on as quickly as possible into the disciplinary language" (30). Although there are striking similarities between the philosophies of language of constructivism and intuitionism, such as language criticism, language levels, and the attempt to create an ideal language, Thiel cannot give evidence that there was any direct historical influence on these issues.

In the second article Dirk van Dalen, presumably the most competent expert on L.E.J. Brouwer's life and work, discusses Brouwer's dogma of languageless mathematics and its role in his writings. He is curious about Brouwer's involvement in the signific circle in regard to his reported claim that "mathematics is a languageless activity." This claim is accompanied by harsh criticism on language and logic which van Dalen "boils down to" (34),

1. Logic comes after the establishment of (intuitionistic!) mathematics.

2. The traditional laws of logic are not reliable (in particular the principle of the excluded third is not universally valid).

Van Dalen discusses Brouwer's dogma of a languageless mathematics using two examples: the impossibility of communicating lawless sequences such as choice sequences to other persons, and Brouwer's conception of a proof as a mental construction. Although Brouwer writes very little about this topic, van Dalen quotes a "spectacular *locus*" where Brouwer elaborates his notion of a proof (p. 37, i.e., [Brouwer *1927*, 64]:

> Just as in general, well-ordered species are produced by means of the two generating operations, from primitive species, so, in particular, mathematical proofs are produced by means of two generating operations from null elements and elementary inferences that are immediately given in intuition (albeit subject to the restriction that there always occurs a last elementary inference). These *mental* mathematical proofs that in general contain infinitely many terms must not be confused with their linguistic accompaniments, which are finite and necessarily inadequate, hence do not belong to mathematics.

The last topic of van Dalen's paper is a historical fact that might sound amazing especially to most of those working everyday in intuitionistic logic: Brouwer's scepticism towards logic. Van Dalen provides evidence from Brouwer's writings that he regarded logic only in terms of medieval logical principles and syllogism, and that he remained unfamiliar with the logical developments of his time even years after the successful formalization of intuitionistic logic by Arend Heyting.

Erik Heijerman's paper, "The Validity of Mathematics as a Pseudo-Problem," is devoted to Gerrit Mannoury's philosophy of mathematics which is connected with the question "what is the relation between mathematical language and the mental activity of the mathematician?" (45). Mannoury's position was a relativistic one. For him there was no certain knowledge in mathematics, thus mathematics was not an exact science. For Mannoury, like for Brouwer, mathematics was a mental activity (mathematical thought), expressed by a formal language with a formal meaning, containing, however, elements of emotion, volition and indication. In Mannoury's truth concept the validity of mathematics was a pseudo-problem insofar as it can only be expressed in a physicalistic "it-language" whereas mathematical thought as a mental activity belongs to the autopsychological "I-language". The "pseudo-problem" arises by confusing both languages.

Gerard Alberts discusses in his paper, "Signific Consultation," David van Dantzig's (1900 – 1959) attempt to develop mathematics as a science of society, especially through statistical consultation at the Mathematical Centre in Amsterdam. Alberts gives the context of these attempts by sketching van Dantzig's biography and presenting his main contributions to significs and to mathematics.

In his paper, "Significs in Linguistic Philosophy," Henk Visser constructs the connection between Russell's and Frege's philosophy of logic and a "linguistic philosophy" which is understood as "a discipline in which philosophical problems are approached by means of an analysis of the formulations of these problems" (133). These connections are presented by discussing two aspects: (1) the elimination problem (understood in a rather unusual manner as "eliminating other than indicative aspects from speech acts") and (2) the problem of primitives.

In conclusion, the book provides several interesting insights into the relation between language and mathematics, especially concerning the linguistic foundations of intuitionism.

The volume reflects excellent editorial skill. It is a pity, however, that the publisher did not give the volume a more professional appearance.

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