

REVIEW ARTICLE

FREGE IN CONTEXT

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Gottfried Gabriel und Uwe Dathe (eds). *Gottlob Frege. Werk und Wirkung*. Paderborn, Mentis, 2000, pp. 313. Pb. DM 30. ISBN 3897850850

REWRITING FREGE'S BIOGRAPHY

English-speaking philosophers know little about Frege's life. In 1972 T. W. Bynum published 'On the Life and Work of Gottlob Frege', an introduction of fifty-four pages to his translation of the *Begriffsschrift*, in which various facts about Frege's life were cited. These notes are still being used as a guide to Frege's biography today – as in Anthony Kenny's recent book *Frege* (see Kenny 1995, p. 1 n.). Apparently, many writers on Frege have never heard about a complete revolution in investigating Frege's biography that took place in the 1990s in Germany, falsifying almost every sentence in Bynum's piece.

The two volumes under review – I shall refer to them as *Spurensicherung* and *Wirkung* for brevity – which are the outcome of two symposia on Frege held at the University of Jena, form the pinnacle of this biographical makeover. Indeed, from 1979 on, four such symposia had already taken place in Jena, resulting in three volumes of proceedings in each of which new data pertaining to Frege's biography were contained. What is new in

¹ I use the term 'East German' here, following the tradition established during the Cold War, when Germany was divided into two parts, usually known in English as East and West Germany. Geographically, historically and linguistically, however, the provinces in which Frege was active, Mecklenburg and Thüringen, pertain to Central Germany (*Mitteldeutschland*).

these two later proceedings, and especially in *Spurensicherung*, is that they offer an integral new picture of Frege's personality.

This revolution in our knowledge of Frege's biography was the result of research carried out, above all, by East German philosophers – which is no surprise, since Frege himself was, in a sense, an East German philosopher.¹ Its undisputed champion is Lothar Kreiser, now emeritus professor of the University of Leipzig, who started his investigations into Frege's personal and academic biography as early as the late 1960s. It was he who found Frege's grave in Wismar in 1967; he also delivered the only memoir of Frege's non-academic acquaintance, his tenant Frau Schön (see Kreiser 1974, p. 523). In a paper published as an Appendix to the second edition of Frege's *Nachgelassene Schriften*, Kreiser described the attitude of Frege's colleagues at the University of Jena and the university authorities to Frege's work (see Kreiser 1983, pp. 327 ff.). After the reunification of Germany, this philosopher continued to work in this area, as can be seen from his three contributions to *Spurensicherung* and *Wirkung*. As he himself points out, these articles were written in preparation for his long-awaited book *Gottlob Frege: Leben – Werk – Zeit* (see *Wirkung*, p. 23, n. 13), which is due to appear in Felix Meiner Verlag, Hamburg, in the near future.

At the core of *Spurensicherung* lies a doctoral dissertation by Kreiser's pupil Uwe Dathe, *Frege in Jena*, on which this young author began to work in the GDR but defended in reunified Germany in 1992. Dathe is the co-editor of *Wirkung* and the author of an exhaustive annotated Bibliography of eleven pages (pp. 149–59) on Frege's Jena environment and from Frege's Jena environment in *Spurensicherung*, as well as of two papers in the first, and of another two in the second collection.

A third East German philosopher, Werner Stelzner, who recently published a short, mainly biographical, book on Frege (see Stelzner 1996), contributed a paper to *Wirkung*, and another one to *Spurensicherung*.

The revolution in assessing Frege's biography has mainly two sources. On the one hand, it was nourished by the flood of new material that was unloosed after the archives of various kinds were opened to the public in the former East Germany. On the other hand, it emerged from the encounter of East German philosophers with their colleagues in the West. Above all, here I have in mind the appointment of the co-editor of the two books under review, Gottfried Gabriel, – who was instrumental in editing all possible variants of Frege's *Nachlass* since 1969 – to the Chair of Logic and Scientific Theory at the University of Jena in 1994. *Spurensicherung* can indeed be seen as a volume celebrating this event. *Wirkung*, by contrast, is a collection of essays delivered at a symposium organized to celebrate the 150th anniversary of Frege's birth, held on 4–7 November 1998 with the support of the re-established Ernst Abbe Foundation.

FREGE'S LIFE AND WORK

In this section, I want to make various corrections to Bynum's picture of Frege's life, closely following the newly discovered facts set out in the two books under review.

Biographical Data

Frege's father, Alexander Frege, studied protestant theology and founded a private girls' 'high' school in Wismar on the Baltic Sea, 'high' referring to the educational standard; religious education took priority in this institution. In 1846 he married one of the teachers, Auguste Bialloblotzky, who was descended from the old Polish aristocratic family of Ogonceyk, which left Poland for Germany in the seventeenth century as a result of religious persecution. While in Germany, they intermarried with descendents of Phillipp Melanchton (*Spurensicherung*, p. 71). After her husband's death in 1855, Auguste directed the school until she joined her son Gottlob in Jena in 1879–80 when she sold her school in Wismar, and so helped Gottlob to finance the building of a new house of 181m² at 29 Forstweg in Jena, the second floor of which he, at least after 1912, rented to a family with four children.²

Frege attended *die Große Stadtschule zu Wismar* for fifteen years, and finished his schooling at the age of 20½, which is one year later than was usual at the time. Kreiser's suggestion is that the young Gottlob fell ill in an epidemic that broke out in 1868 and had to stay at home for a year (p. 35 f.). In the same year, 1868, a young teacher came to Auguste Frege's school – the mathematician Leo Sachse (1843–1909). He was impressed with Frege's abilities in mathematics, which he apparently had the opportunity to witness during private lessons. Sachse knew who could help to develop these abilities further – his Jena professors of mathematics, Ernst Abbe, Hermann Schäffer and Karl Snell. It was on his advice that Frege matriculated at the University of Jena in April 1869. The young Gottlob rented the same room in which Leo Sachse stayed when he studied there (p. 36).

We know from Carnap that Frege 'was of small stature' (Carnap 1963, p. 5), and from Wittgenstein that he 'was a small neat man' (Anscombe and Geach 1961, p. 130); now we learn that he was about 165 cm tall (*Wirkung*, p. 11). He led a sedentary life, which, however, cannot be compared with that of Kant. As already mentioned, at 20½ Frege left his hometown of Wismar for Jena; two years later he moved to Göttingen, where he stayed another two-and-a-half years. After he received his PhD in Göttingen, Frege returned to Jena in 1874; here he defended his second dissertation

² cf. Wittgenstein's memoir: 'When I arrived [at Frege's house] I saw a row of boys' school caps and heard a noise of boys playing in the garden.' (Anscombe and Geach 1961, p. 129.)

(*Habilitation*) and was elected a non-salaried *Privatdozent*. On occasions, he made small trips, such as at Whitsun 1877, when he ventured to travel for a couple of days to Chemnitz (some 100 km to the east of Jena) together with his teacher Ernst Abbe. During his long Jena years, Frege regularly travelled to his hometown Wismar and its surroundings for the summer vacations.

Frege received decisive support in his career from Ernst Abbe, who was one of his teachers in Jena. The young Gottlob had shown himself an industrious student; Abbe was particularly impressed with his precision and ability to follow him in the most difficult subjects (*Wirkung*, p. 11, *Spurensicherung*, p. 17). In the spring of 1874, Abbe left university teaching in order to become a brilliant forerunner of the first wave of the German *Wirtschaftswunder*. To cut a long story short, in brief space of time, he made big money through high tech. The firm for which he worked and later managed, Carl Zeiss in Jena, applied the newest achievements in mathematics and physics to the production of the best microscopes of the world – a commodity in very high demand in the last decades of the nineteenth and the first decades of the twentieth century.

This, however, is only the first part of the Ernst Abbe story. The second was that he saw his activity as an industrialist as something which made it possible to realize his political visions: securing the economic balance of different groups in society (*der soziale Ausgleich*). Abbe was convinced that ‘the industrialist has a public function, which consists in administrating the national labour power in the economic activity of the people’ (*Spurensicherung*, p. 11). For this reason, in 1886–96 he set up the Carl-Zeiss foundation, from which, as we are going to see in a moment, Frege profited most.

Abbe’s retirement from his teaching post put the University of Jena in a difficult position – at a time of severe financial difficulties, its authorities had to find a new lecturer in mathematics. The solution came promptly: the young Frege. This explains why Frege’s *Habilitationsschrift*, as well as his appointment as a *Privatdozent* came through so quickly in 1874. In 1879, after publishing his *Begriffsschrift*, the philosopher Rudolf Eucken applied for his appointment as an extraordinary professor; the application was supported by the positive review of the book by Kurt Lasswitz. Interestingly, in his recommendation, Abbe expressed disappointment with Frege’s first book, although he was very positive about Frege as a lecturer (*Wirkung*, p. 20 f.).

In the years of his extraordinary professorship, Frege received a very low salary, which increased from 300 Mk (*Reichsmark*) in 1881 to 700 Mk a year in 1885, the average salary in Jena at the time being 1300 Mk. In addition, from 1886 he started to receive, anonymously, an annual subsidy of 1300 Mk a year from the newly-founded *Ministerialfonds für wissenschaftliche Zwecke*, a project set up by Ernst Abbe and the first step in setting up the Carl-Zeiss Foundation. This increased his salary to 2000 Mk annually. In this way Frege reached ‘the low level of the middle class’ (p. 23). In 1896 he

was appointed ordinary honorary professor of the Carl-Zeiss Foundation with increased payment, which toward the end of his career reached 5000 Mk. The appointment was suggested by Johannes Thomae, and was supported by positive references to Frege's works by Peano and Dedekind. Formally, the post was arranged by Abbe, who used his connections in the relevant ministry of the Grand Duchy of Thüringen in Weimar for this purpose (p. 25).

In 1887 Frege married Margarete Liesberg (1856–1904), who came from a little town near Wismar. They had no children. In 1908 he received, through his relative, the Reverend J. von Lübke, the guardianship (*Vormundschaft*) of two children, Alfred (b. 1903) and Toni (b. 1905) Fuchs. Alfred grew up with Frege, while his sister lived in a vicarage (*Pfarrerhaus*) near Jena. Between August 1921 and August 1922, Frege adopted Alfred (then 19) officially, so that the boy became his legal successor (*Spurensicherung*, pp. 69–70). Between 1923 and 1929 Alfred Frege studied at the Technische Hochschule Berlin-Charlottenburg (where Wittgenstein studied between 1906 and 1908), after which he worked as an engineer in Braunschweig and Berlin. He was killed in World War II shortly after D-Day on 15 June 1944 near Paris. Toni Fuchs died in 1990. After 1902 Frege had a housekeeper, Meta Arndt (b. 1879), also from Mecklenburg.

When he retired in 1918, Frege sold his house in Jena, and bought a house in Bad Kleinen (the financial donation of Wittgenstein that Frege received anonymously at the beginning of 1918 was also helpful in this (p. 77)), some 25 km south of Wismar, on the beautiful Lake Schwerin. Between the sale of the Jena house and the move into his new house, he lived in lodgings for two years – first in Jena, then in Neuburg, near Wismar. Toward the end of his days Frege decided, apparently because of financial difficulties caused by hyper-inflation, to sell his new house in Bad Kleinen and to move into a rented house at Pastow, near Rostock (p. 73 n. 18). After Frege's death, his housekeeper moved there and lived in the house until her death in 1942.

Social Life

Frege students know Leo Sachse from '17 Key Sentences to Logic' and 'Dialogue with Pünjer on Existence'. As already recounted, he was a real person, who studied mathematics and pedagogy between 1863 and 1868 in Jena. In the area of pedagogy he was deeply influenced by Karl Stoy who, in turn, studied under Herbart in Göttingen. We have already mentioned that in 1868 Leo Sachse was appointed a teacher in Auguste Frege's school in Wismar. When a grammar school was founded in Jena in 1876, Sachse was offered a teaching post there; in 1882 he was promoted to professor in the same school (p. 48). This was a time of his closest friendship with Frege.

From 1876 on, Leo Sachse was a member of the *Gesellschaft für Medizin und Naturwissenschaft*. Frege was a member of the same society, and also

of the *Mathematische Gesellschaft*, founded by his teacher, H. Schäfer. These two societies were formal, their aim being the presentation of lectures, some of which were subsequently published in Proceedings. A further group to which Frege belonged and apparently felt at home in was Karl Snell's Sunday circle, which met until 1880. This was a discussion group held for fun. The university teachers in Jena of the time were organized in three such informal clubs: that of the mathematician Snell, another of the philosopher Kuno Fischer, and the third of the zoologist, and later popular philosopher, Ernst Haeckel. Frege, together with his teacher Abbe, was a member of Snell's group. The group was influenced by Schelling and the German romanticists, and through the philosophy professor Fortlage, had contacts with the Kuno Fischer group, which was influenced by Kant and Hegel (*Wirkung*, p. 13).

This type of symbiosis between mathematics, science and philosophy was characteristic of the German universities in the middle of the nineteenth century. Its objective was the conciliation of theology and science, in a fierce fight against 'plain' materialism. In this sense, the spiritual life of the mathematics professors in Jena of the late 1870s can be seen as a microcosm that corresponded to the macrocosm of the German universities of the time, where many university teachers, like Hermann Lotze, who was *habilitatus Dr.* (*habilitiert*) both in medicine and philosophy, had deep interests both in science and in philosophy (*Spurensicherung*, pp. 53 f.).

The Crisis of 1902–5 and Its Effects

Frege's work as a university teacher was judged differently over time. In the beginning, it was highly praised; in his later years, it was sharply criticized. The negative tendency grew after the worst crisis in his life in the mid-1900s: in 1902 he had seen that his logic was inaccurate; in 1904 his wife died; in 1905 Ernst Abbe died. In the same year, he had serious nervous symptoms for which he had to undergo a cure. As a result, his lecturing suffered.

Not only this. In a paper on Frege's relationship with Johannes Thomae in *Spurensicherung*, Uwe Dathe brings to light a quarrel dating from 1906 between these two colleagues (and neighbours!) who worked together for twenty-six years in the mathematical seminar in Jena (1879–1906). This event affected Frege's reputation in Jena additionally. Frege and Thomae were indeed often engaged in discussion, which was especially intensive in the mid-1880s. In *Grundlagen* for instance, Frege criticized Thomae's formalism and subjectivism; and even more so in his paper 'On Formal Theories of Arithmetic' (1885), which, in spite of the fact that he did not mention Thomae's name, is apparently directed against his conceptions. These discussions, however, didn't affect their personal relations. This is clear from the already mentioned fact that in 1896 Thomae proposed Frege for the post of ordinary (honorary) professor.

The 1906 discussion was different. It began with Thomae's printed remark 'Thoughtless Thinker: Holiday *Causerie*', continued in Frege's angry 'Reply to Mr. Thomae's Holiday *Causerie*', to which Thomae published an answer, after which they stopped communicating socially for years.

One of the effects of these developments was that the authorities of the University of Jena grew increasingly critical of Frege. Its trustee, H. von Eggeling, wrote for example in October 1906, in connection with a proposal to celebrate Frege's sixtieth birthday in 1908: Frege 'was never a good university teacher' (p. 99). This opinion was to last. In 1922, a new University trustee, Max Vollert, wrote: 'As a university teacher Frege was out of the question. He had only a very small number of students. His lectures were cancelled repeatedly because no students came to them.' (*Wirkung*, p. 31) Kreiser explains this as being due to the 'rational', as opposed to the 'psychological', style of Frege's teaching, which he took over from Abbe. That is, Frege's lectures followed the logic of the subject, and so excluded any dialogue with the students (see Carnap 1963, p. 5). In truth, Frege's lectures were difficult to follow, but quite good in their logical quality, which is confirmed by the fact that Frege's fellow professors sent their sons to study with him – for example, the sons of the most eminent philosophers of the time in Jena, Otto Liebmann (in 1895–6) and Rudolf Eucken (in 1904).

Political Beliefs

Politically, Frege was, together with his friend Leo Sachse, an admirer of Bismarck and his national-liberal party. His ideal was 'a strong Germany, an iron regency, a strong army and a powerful fleet to guarantee security so as to develop the economic, technical and cultural power of Germany, as well as to keep social democracy, the most dangerous enemy at home, under control' (*Wirkung*, p. 22).

This belief brought him into conflict with his teacher, friend and patron Ernst Abbe, who was devoted to the ideals of 1848. The latter hated Bismarck, who, with the war against Austria in 1866, had made the unification of all German countries, based on democratic principles, impossible. Similarly to Frege, Abbe was against the social democrats, opposing to the principle of class struggle the already mentioned economic balance of the social groups. He, however, was vehemently against the persecution of social democracy, as well as against any form of anti-Semitism (p. 29).

Frege's draft 'Suggestions for an Electoral Law [*Vorschläge für ein Wahlgesetz*]', only discovered in the summer of 1998 by Uwe Dathe and now published in *Wirkung*, shows that his notorious political *Notebooks* of 1924, in which he expressed sympathy with Adolf Hitler and a radical form of anti-Semitism, were the product of a terminally ill man who was also facing financial ruin. The draft was written, as it is clear to see from one of his letters to

Hugo Dingler, before October 1918. Its tone was, on the one hand, liberal. Frege's project proposes the introduction of a new mode of elections, which is to take into account every single vote; in this way, all political streams are to be represented in the elected body. The rationale was to reduce the power of the parties, and to increase the freedom of the electorate.

On the other hand, Frege meant it as a specifically German project. Above all, according to the draft, only married men would have the right to vote; bachelors and women would not. The reason was that in Germany, the family, not the individual, was the political atom. Furthermore, only men who had served in the army were to have the right to vote. The citizens of Germany were to earn their political rights; these were not automatically given through their birth (p. 291 f.).

Frege had serious political ambitions with this draft. Indeed, he sent type-copies to some members of the local assembly. Unfortunately, he received only one positive, but non-committal, answer. Clemens von Delbrück, a leading politician in Jena at the time, with whom Frege was personally acquainted and in whose support he put great hopes, showed no reaction at all. One reason for this new debacle of Frege's was that around 1918, the discussion of the general right to vote was not of any interest. What was of current interest, the discussion of the Prussian three-class electoral system, remained beyond Frege's sphere of attention.

TWO MYTHS IN FREGE STUDIES

There are two widespread claims regarding Frege which these two books disprove: (a) that he was not influenced by anyone at all and started on his own from scratch; (b) that 'up to, say, 1950, the influence of Frege upon analytical philosophy . . . had been largely at second hand', above all, through the works of Russell and Wittgenstein (Dummett 1978, p. 440).

The Myth that Frege's Works were Forgotten until the 1950s

Scholars well acquainted with the literature know that in the early 1930s a Frege renaissance was on the rise in Europe. In 1931 both S. Leśniewski (see Leśniewski 1927–31, pp. 7–8) and H. Scholz (see Scholz 1931, p. 57) wrote that Frege's *Grundgesetze* are the most important contribution to logic since Aristotle's *Organon*. In 1934 a second edition of the *Grundlagen* was published.

(a) Now we learn that it was only by accident that Frege's *Nachlass* was not published in the late 1930s. In June 1936 Heinrich Scholz received a subsidy from the *Deutsche Forschungsgemeinschaft* of 600 Mk, plus a grant for his associate Hermann Schweizer, for the purpose of bringing out Frege's *Kleine Schriften* in three (two plus one) volumes, of 300 pages each. Unfortunately, late in the same year Schweizer was called to the army, and

another associate of Scholz's, Friedrich Bachmann, received a post in Marburg. Scholz, who was the spirit of the project, apparently didn't have the will to realize it himself, and so failed to do the small amount editing that still remained undone (*Wirkung*, pp. 269 f.).

The authors who recount this story, K. F. Wehmeier and H.-C. Schmidt am Busch, put in question the belief that Frege's *Nachlass* was destroyed in the bombardment of Münster on Palm Sunday, 25 March 1945. This assumption was based on a letter written by H. Jansen, who was a librarian at the University of Münster at the time, in which he informed Scholz about the event. The authors now show that Jansen was not in Münster in the months around March 1945, so he couldn't have witnessed it. Their hypothesis is that Frege's original *Nachlass* was removed from the library in 1942. What was destroyed on 25 March 1945 was apparently Scholz's preparatory work for publishing Frege's works, as well as the copies of the latter, not Frege's *Nachlass*. This hypothesis must of course be seen as encouragement to continue searching for the *Nachlass*.

(b) From Sluga's book on Frege (see Sluga 1980, pp. 53 ff.) we know that the latter considerably influenced his colleague in Jena, Bruno Bauch. Now we learn from Uwe Dathe that Frege had another admirer in Jena – Paul Linke (1876–1955). Linke studied philosophy in Munich under the phenomenologist Theodor Lipps. In 1907 he came to Jena, where he taught until the end of his days. Linke had many personal conversations with Frege, and soon became an adherent of his. His judgement on Frege changed over time. In a paper published in *Kant-Studien* in 1916, Linke saw Frege's investigations of mathematical objects as a branch of phenomenology (pp. 230 f.). Around 1920 he turned against Husserl and toward Bolzano–Brentano. Now he saw Frege as connected to the Austrian objectivists. Linke indeed believed that Frege had discovered intentionality, independently from Brentano. Starting in 1937, Linke gave seminars on Frege and his logicism.

Frege and Other Philosophers and Logicians

Some twenty years ago, Michael Dummett was still able to state that 'of all philosophers, perhaps of all theorists of any kind, Frege pursued, in his work, the most extraordinarily single-minded course' (Dummett 1981, p. 6). In the last two decades, this belief has been brutally disproved. Now it is clear to all that Frege's logic emerged in the context of the German philosophy and logic of the time. This is the main argument of the books under review, and is stated by Gottfried Gabriel this way:

Frege's writings teem with implicit or hidden references. These need to be picked out with the aim of narrowing the historical gap between the author and the reader of today. The current view that we can understand Frege without apprehending him historically must be resolutely opposed.

(*Spurensicherung*, p. 63)

Hans Sluga's book *Gottlob Frege*, already cited above, as well as his article 'Frege, the Early Ears' (Sluga 1984), identified many points of similarity between the writings of Frege and those of Leibniz, Kant, Gauss, Trendelenburg, Kuno Fischer, Lotze and Bruno Bauch. Revealing though these investigations were, they failed to state which leading philosophical intuition Frege did in fact follow. Gottfried Gabriel tried to rectify this omission in his seminal article 'Frege als Neukantianer' (Gabriel 1986; see also Gabriel 1989a, 1989b). His thesis was that Frege is to be treated as a Neo-Kantian who was decisively influenced by Lotze. Three articles in *Wirkung* discuss this interpretation of Gabriel's.

(a) Volker Peckhaus sees Frege's relation to the neo-Kantians as rather problematic. Above all, there is no evidence that any neo-Kantians influenced Frege directly. Nor is the philosophy of the neo-Kantians compatible with Frege's understanding of logic as calculus, or with his programme of logicism (*Wirkung*, p. 195). Peckhaus's conclusion is that it is misleading to call Frege a neo-Kantian. Frege was as much influenced by the neo-Kantians as Wilhelm Dilthey, Max Weber, Ernst Troeltsch or Georg Simmel were. He can be characterized rather as an eclectic Kantian, who, as shown by I. Angelelli, was also influenced by the Aristotelian-scholastic tradition.

Unhappily, Peckhaus forgets two things in his arguments. First, Frege insisted that his formal logic is also the logic of thought, of content. Secondly, Gabriel connects Frege with the south-western neo-Kantians, especially with Windelband, who first introduced the concept of truth-value in logic. Peckhaus, in contrast, compares Frege above all with the Marburg neo-Kantians, as well as with the neo-Frisians Leonard Nelson and Kurt Grelling, who showed an interest in Frege's antinomies around 1908.

(b) Gottfried Gabriel's *Wirkung* paper criticizes what George Boolos has called *Fregecentrism*s – the belief, expressed once by Quine, that the publishing of Frege's *Begriffsschrift* in 1879 marked the beginning of the new logic. As a matter of fact, modern mathematical, or formal, logic began with Boole years before Frege was born.

Rather, Frege was the founder of the programme for logicizing mathematics. In this, he followed Kant's efforts, and those of the neo-Kantians, to outline the foundations of human knowledge. Similarly to Kant, he believed that this can be done by analysing our mathematical knowledge. More precisely, his arithmetic was what metaphysics was to Kant: an a priori science that extends human knowledge. The difference between the two was that whereas to Kant all metaphysical knowledge is a product of reason made out of sense-data, Frege accepted that only the truths of geometry are of such a nature. In arithmetic, he accepted what Kant has called 'intelligible objects', relapsing in this way into the rationalist metaphysics of Leibnizian type (p. 34). Only toward the end of his days did Frege embrace Kant's belief that not only geometry but arithmetic too is based on pure intuition (p. 35).

(c) Christiane Schildknecht investigates Frege's criticism of psychologism and the consequences it had for his logic. In this critique Frege had three

predecessors, who advanced quite different variants of anti-psychologism (p. 127). Christoph Sigward and Wilhelm Wundt, on the one hand, accepted that logic is different from psychology since it is normative, not descriptive. In this, it is similar to ethics, which is, in fact, the normative discipline proper. An absolutely new form of anti-psychologism was suggested by Hermann Lotze. It was based on the difference between genesis and value: whereas psychology deals with the genesis of our thoughts, logic deals with their value. Frege developed this idea further, adding to it that the laws of thought have proof as their object, whereas it is of no interest in psychology. In this way he produced the most radical separation of logic from psychology. This radicalism, however, was so strong that it was to be compensated for with non-propositional elements in logic such as colouring, winking, etc. (p. 129).

(d) In the literature it has already been pointed out that Frege's concept of existence had its sources in Herbart (see Schmit 1985, Frank 1993). It has been shown too that Frege also accepted from Herbart the understanding that propositions about numbers are propositions about concepts (see Sullivan 1990). This explains why, and how, arithmetic enlarges our knowledge. Now in *Spurensicherung* Gabriel shows that Frege became acquainted with Herbart via Leo Sachse's pedagogical writings. That is why in *Grundlagen* he quoted passages from Herbart's *Umriss pädagogischer Vorlesungen* (p. 64).

Of course, in *Grundlagen* Frege went a step beyond Herbart: he accepted that numbers are independent objects, which are to be understood as extensions of concepts (*Begriffsumfänge*). However, when this assumption was brought down after 1902, he played again (e.g. in '[Notes for Ludwig Darmstaedter]', 1919) with the idea from the 'Dialogue with Pünjer on Existence' that numbers are concepts (p. 67).

(e) In *Spurensicherung* Christian Thiel discusses Paul Natorp's criticism of Frege's concept of number, whereas Volker Peckhaus examines Frege's criticism of Hermann Hankel's formalism. In *Wirkung* Eva Picardi compares the positions of Frege and Peano on definition, while Joachim Schulte comments on Michael Dummett's well-known article, 'Frege and Wittgenstein' (see Dummett 1991, pp. 237–48).

SOME THEORETICAL PROBLEMS

(a) The subject of Erich H. Reck's contribution to the *Wirkung* is Frege's Platonism. Indeed, Frege never spoke of 'Platonism'. Nevertheless, it is apparent that he followed a form of it. The problem however is, what form exactly? In order to make this clear, Reck discriminates between Platonism A and Platonism B. According to the former, logical objects are in a way similar to physical objects: they have names, properties, etc. In contrast, Platonism B accepts as logical objects the truth of judgements and the value of inferences only. Reck insists that Frege accepted Platonism B (p. 86).

(b) Wolfgang Kinzler's paper in *Spurensicherung*, 'What are *Grundgesetze*?', points out that the title of Frege's *magnum opus*, *Basic Laws of Arithmetic, Deduced through a Conceptual Notation*, does not describe this work; its point is rather to articulate the main characteristics of Frege's project in logic in general. This explains why the phrase 'basic laws of arithmetic' was never used once in the whole work. Besides, the basic laws of arithmetic cannot be deduced. In fact they, or more precisely, the basic laws of logic, were already laid out in *Begriffsschrift* (sections 14–22) from which now, in *Grundgesetze*, the theorems of logic are to be deduced (p. 132).

Kienzler's *Wirkung* paper on Frege's laws and rules casts more light on this point. Frege was, above all, a scientist situated in Leibniz', not in Kant's, tradition. In this sense, he 'investigated systematically the realm of numbers and the way of life of its denizens' (p. 41). The subjects of Frege's 'science of logic' are the laws of arithmetic and logic, which are objective, similar to the laws of science. In contrast to these, the *rules* of logic (for example the differentiation between function and argument, the inferences of *modus ponens*) are only instructions for calculating. Unfortunately, the rules, which are more fundamental than the laws, cannot be substantiated. If, however, Frege accepts that what is most fundamental in logic, the rules, cannot be substantiated, in what, then, does his difference from the formalists consist? His answer was: formalists cannot explain the infinite number. He, by contrast, does explain it, accepting it to be the single object of his 'natural theology' (pp. 53 f.).

(c) Marco Ruffino's *Wirkung* paper asserts that by 1893 Frege had accepted two fundamental types of logical objects: truth-values and extensions of concepts; all other objects are reducible to them. In section 10 of *Grundgesetze* he goes further, reducing the truth-values as objects to extensions of concepts. This means that extensions of concepts are objects *par excellence* – they are entities, and not just abstract objects; they are the sign of logicity. The reason for this assumption is that to Frege, logic treats concepts which can be apprehended – because of language, which is dominated by proper names – only through objects that stand for them (p. 61).

This is also the reason why Frege accepted truth-values as objects: since his logic is based on objects, accepting that truth-values are objects as well makes it much simpler. This means that (i) the conception of truth-values as objects is accepted on pragmatic, not on logical grounds – it merely makes the system clearer and simpler; (ii) Frege's introduction of truth-values as objects followed the introduction of extensions of concepts. In his *Spurensicherung* paper, M. Ruffino advances the hypothesis that Frege embraced this understanding, and the differentiation between sense and reference connected with it, long before 1890, after he wrote some first drafts of the *Grundgesetze*; in these drafts he didn't make use of truth-values as objects.

(d) Michael Astroh's *Wirkung* paper investigates the way in which Frege accepted that the forms which are grasped in pure thought are put into a picture – into symbols – which can be recognized by intuition. Frege tried

to solve this problem already in his early writings, more precisely, in his *Habilitationschrift*. He accepted that the unity of the forms of thinking, on the one hand, and of the symbols that express them, on the other, is secured through the magnitude which is common to both. This explains why pure thought can be recognized in symbols only in outline, not in detail (p. 116).

(e) In *Spurensicherung* Olaf Neuman shows that Frege's *Habilitationschrift* of 1874 made an important contribution to the theory of groups, while Detlef Gronau adds in *Wirkung* that in this writing Frege made contributions that foreran important achievements in iteration theory made a century later. Werner Stelzner points out that Frege was discussed in Russia as early as 1913, in a book by the Russian logician S. A. Bogomolov, while Christian Thiel discusses Frege as analytical methodologist. Finally, Rainer Stuhlmann-Laeisz shows that in *Grundlagen* Frege used four different variants of the context principle.

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