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preface and introduction to
*Essays on Gödel's Reception of
Leibniz, Husserl, and Brouwer*
(Dordrecht: Springer, 2015)

Mark van Atten*

I Preface

This is a collection of most of the essays on Kurt Gödel that I have authored or co-authored. In their publication over the past decade, these essays have been dispersed, as they address various topics for various primary audiences: philosophers of logic and mathematics, phenomenologists interested in science, and historians of modern philosophy. The rationale for bringing them together here is that, not so much in spite as because of this variety, they show a coherence predicated on that of the many-sided project of Gödel's that they collectively analyse: the project of using Husserl's phenomenology to reconstruct and develop Leibniz' monadology as an axiomatic metaphysics, and then to provide a Platonistic foundation for classical mathematics starting from the metaphysics thus obtained. Brouwer's intuitionism serves as a foil. In choosing the title of this book, I have preferred descriptive accuracy to other, perhaps greater, qualities.

At times these essays go into issues internal to Leibniz', Husserl's, or Brouwer's thought that Gödel made few explicit comments on, or none at all. But in an evaluation of Gödel's reception of other philosophers this is only to be expected: A judgement to what extent the various ideas Gödel appeals to fit together and suit the purpose he has for them de-

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pendents not on the web of Gödel's remarks, but on the web of ideas to which those remarks point.

I have chosen to leave the papers in their original form, and not to rework them into one continuous narrative. Naturally, this entails some repetition and overlap, but I hope that this at the same time facilitates access to the book as a whole. My consideration has been twofold. First, the continuous narrative would have been the form of choice for the more organic and comprehensive analysis that an intellectual biography of Gödel calls for; but, although the essays collected here may be read as preparatory steps for a biography of that type, they cannot, in their limitation to this one particular project, be more than that, and more should not be suggested. (In the Introduction, I give some examples of how these essays refrain from establishing connections to other parts of Gödel's life of the mind.) Second, it is intrinsic to Gödel's project to be of interest from different perspectives and to different audiences; a form of presentation that explicitly responds to these differences is therefore not inappropriate.

For the occasion of their reprint in this volume, the essays have been recast in a uniform format, including uniform bibliographical references, and citations and translations have silently been added where missing. Spelling and punctuation have been standardised to British where appropriate. But otherwise I have followed what I consider to be the good practice of not revising papers when collecting them. Occasionally I have added a content footnote to these reprints, flagged as such; and the citation footnotes that were required by some journals have been deleted in favour of citations in the main text. As a consequence, the footnote numbering in these reprints in general diverges from that in the original publications. To be able to make the chapters available separately, as is required for the electronic edition, each comes with its own list of references; with an eye on the paper edition, a cumulative bibliography has been added, as well as a subject index and an index of authors and citations. In quotations, translations are my own, while emphasis stems from the author quoted, except where noted otherwise.

The acknowledgements specific to each chapter, the details of its original publication, and an acknowledgement of the permission to reprint it in this volume, are included in the chapters themselves. Words of thanks that do not have a natural place there are those to my co-authors Robert Tragesser and Juliette Kennedy; it was a pleasure to write the two respective joint papers included here with them. Also, I am indebted to William Howard for his generous and good-spirited email letters about Gödel and related topics, in an exchange that occurred after most of the essays had been written.

More generally, I wish to thank the following persons for frequent or occasional, but in any case extensive discussion of Gödel and Gödeliana over the years: Eric Audureau, Matthias Baaz, Paul Benacerraf, Julien Bernard, Marc Bezem, Paola Cantù, Pierre Cassou-Noguès, Thierry Coquand, Gabriella Crocco, Dirk van Dalen, John and Cheryl Dawson, Michael Detlefsen, Igor Douven, Jacques Dubucs, Eva-Maria Engelen, Fernando Ferreira, Juliet Floyd, Jaime Gaspar, Warren Goldfarb, Yannick Grannec, Leon Horsten, Piet Hut, Shinji Ikeda, Nuno Jerónimo, Aki Kanamori, Juliette Kennedy, Roman Kossak, Georg Kreisel, Nico Krijn, Paolo Mancosu, Per Martin-Löf, Amélie Mertens, Mitsu Okada, Marco Panza, Charles Parsons, Jan von Plato, Adrian Rezuş, Robin Rollinger, the late Gian-Carlo Rota, Philippe de Rouilhan, Rudy Rucker, Wilfried Sieg, Hourya Sinaceur, Göran Sundholm, Steven Tainer, Richard Tieszen, Robert Tragesser, Anne Troelstra, Jouko Väänänen, Albert Visser, and Palle Yourgrau. (In spite of its compactness, this list may not be complete; I apologise to anyone I may have failed to include.)

At the Historical Studies-Social Science Library of the Institute for Advanced Study in Princeton, Marcia Tucker, Christine Di Bella, and Erica Mosner have always been most helpful and forthcoming in all matters concerning the Gödel Papers. Likewise, I thank the staff of the Department of Rare Books and Special Collections at the Firestone Library of Princeton University, where the Gödel Papers are actually held, for their efficiency and kindness.

Generous institutional support during the writing of these essays came from the Department of Philosophy at the University of Leuven; the Institut d'Histoire et de Philosophie des Sciences et des Techniques (CNRS / Paris I / ENS), Paris; the Institute for Advanced Study, Princeton; and Sciences, Normes, Décision (CNRS / Paris IV), Paris.

Many thanks are due to Shahid Rahman and John Symons for accepting this volume in their series *Logic, Epistemology, and the Unity of Science*. At Springer, Ties Nijssen and Christi Lue were helpful and efficient editors. Springer also engaged a reader who commented on the manuscript as a whole, which I much appreciated. I prepared the manuscript for printing using Donald Knuth's typesetting system \TeX and Leslie Lamport's extension \LaTeX , editing my files with Rob Pike's editor Acme. I am grateful to the authors of these very useful and interesting programs, and to the internet communities dedicated to them for their advice and examples.

Without the love and patience of my wife and son, this book could not have been completed.

This volume is dedicated to the memory of Leen Stout, who, in his history class at the Erasmiaans Gymnasium in Rotterdam, oversaw my first writing on Gödel.

Saint-Germain-en-Laye,
May 2014

MvA.

2 Introduction

I have been trying first to settle the most general philosophical and epistemological questions and then to apply the results to science.

*Gödel to Cohen, 1967*¹

There is no definite knowledge in human affairs. Even science is very prejudiced in one direction. Knowledge in everyday life is also prejudiced. Two methods to transcend such prejudices are: (1) phenomenology; (2) going back to other ages.

*Gödel to Wang, early 1970s*²

Abstract. After a statement of the subject and aim of the book, three aspects of Gödel's philosophical methodology are discussed: Gödel's commitment to phenomenology from about 1959 to the end of his life, the religious component in phenomenology, and the pragmatic value of Husserl's and Gödel's historical turns in philosophy. Finally, an overview is provided of the essays that follow.

1. Gödel 2003, 386.

2. Wang 1996, 308. Wang does not give the exact date; p. 326 suggests it is 1971. But if comments 9.3.22 and 9.3.23 (the one quoted here) were made in the same session, then it seems it should be 1972, as Gödel made the suggestion to change 'structural factualism' to 'factual substantialism' in 1972 and on p. 144 Wang says these comments were made after that renaming. Of course, the appropriateness of the motto does not hinge on this.

2.1 Subject and aim

Far from considering past philosophers irrelevant to actual systematic concerns, Kurt Gödel³ embraced the use of historical authors to frame his own philosophical perspective and work. The subject of this book is a project of his defined by reference to Leibniz and Husserl, consisting of two stages:

1. Use Husserl's transcendental phenomenology to reconstruct and develop Leibniz' monadology into an axiomatic metaphysics,
2. Apply the metaphysics thus obtained to develop a Platonistic foundation for classical mathematics.

By 'Platonism', I here mean the view that, to adopt one of Gödel's own formulations, 'mathematical objects and facts (or at least something in them) exist independently of our mental acts and decisions';⁶ I will not

3. For readers wishing to form a picture of Gödel as a person, I refer to the biographies Dawson 1997 and Yourgrau 2005; the accounts by Kreisel (1980) and Rucker (1983, 164–171) of their respective personal contacts with him;⁴ and the extant snippet of film footage of Gödel at <https://www.youtube.com/watch?v=aq9X-ERgnuY> (Gödel appears from 1:05 to 1:25).⁵ There are now also various dramatisations in novels or theatre plays; the one whose portrayal of Gödel I prefer is Grannec 2012 (whose main character is actually Gödel's wife, Adele).

4. In his blog, Rudy Rucker has now made available scans of his handwritten conversation notes: <http://www.rudyrucker.com/blog/2012/07/31/conversations-with-kurt-godel/> (note the misspelled 'conversations'). There is also a reprint of the text of his 1983 account at <http://www.rudyrucker.com/blog/2012/08/01/memories-of-kurt-godel/>

5. According to the text at <http://www.cosmolearning.com/videos/einstein-dirac-godel-selberg-harish-chandra-in-princeton-1947-1125/> (paired to a likewise impressive, but different video), the film was made in 1947 by the mathematician Abe Gelbart. Gelbart was a member of the IAS in 1947–1948.

6. Gödel, *1951, 311. For a discussion of Gödel's Platonistic views throughout his career, see Parsons 1995.

be concerned with the familiar question to what extent Plato's own views were Platonistic in this sense.⁷

The aim of this book is to analyse historical and systematic aspects of this project of Gödel's, and to assess its feasibility. The emphasis is on its second stage, and, to that end, also the discussion of the first stage is oriented towards pure mathematics; correspondingly, my assessment will be a partial one, as I will have relatively little to say about the feasibility of the first stage.

Towards the end of his life, Gödel was willing to admit in print that he had not succeeded in completing the first stage. In a text of 1976 called 'Some facts about Kurt Gödel', Hao Wang's written record of an account that Gödel gave him of his own intellectual development, and that Gödel permitted Wang to publish after his death, we read that

In philosophy Gödel has never arrived at what he looked for: to arrive at a new view of the world, its basic constituents and the rules of their composition. (Wang 1987, 46)

Moreover, Wang reports elsewhere that

Gödel did not think that he himself had come close to attaining the ideal of an axiomatic theory of metaphysics. He said several times that he did not even know what the primitive concepts are. (Wang 1996, 294)

The fact that, at a given point, one has not attained the ideal, is of course no argument that this cannot be done. As Gödel had remarked to Wang a few years before, in 1972:

7. For discussion of that question, see, e.g., Burnyeat 1987; Moravcsik 1992, Chap. 7; and Pritchard 1995. A wider-ranging book-length discussion of Platonism in contemporary mathematics is Panza and Sereni 2013.

It is not appropriate to say that philosophy as a rigorous science is not realizable in the foreseeable future. Time is not the main fact [factor]; it can happen any time when the right idea appears. (Wang 1996, 143)

Indeed, perhaps the right idea will appear, and the first stage of Gödel's project will be completed. The upshot of my final chapter, however, will be that the second stage is bound to fail. The reasons for that failure will turn out to be internal to transcendental phenomenology as Husserl developed it, rather than due to some twist that Gödel put on it. This means that, if my argument there is correct, its range of application is wider than just the case of Gödel's project.

The essay in this volume that would serve well as an extended introduction to Gödel's project, and hence also to this book, is 'On the philosophical development of Kurt Gödel' (written with Juliette Kennedy). The reader looking for such a longer introduction is advised to start there. If I have nevertheless not put that paper before the others, it is because I have preferred the alternative of an arrangement congruent with the inner logic of Gödel's project: Start with Leibniz (Part II), modify and develop using Husserl (Part III), compare with Brouwer (Part IV), and, finally, assess (Part V). But not much is at stake here, as the essays can be read in different orders.

The comparison with Brouwer is occasioned by the fact that his intuitionism is, to my mind, the principal foil for Gödel's project: the close affinities between phenomenology and intuitionism – conceptual affinities, and to some extent also historical ones – set the bar for Gödel's attempt to use phenomenology in quite the opposite, non-constructivistic direction. Ample attention is given therefore not only to Gödel's reception of Leibniz and Husserl, but also to his lifelong, vivid interest in Brouwer's intuitionism and the challenge that that alternative foundation poses to his project.

Gödel obviously had many other philosophical interests besides the

project under discussion, e.g., Plato,⁸ medieval philosophy,⁹ Kant,¹⁰ other varieties of post-Kantian German Idealism than transcendental phenomenology, the relation of the monadology to (modern) physics and biology, and Sheldon, Royce, and Hartshorne.¹¹ I make no attempt here to analyse any of these interests; in a more general work on Gödel and philosophy that would of course be required.

And although I occasionally make essential use of material from Gödel's pre-phenomenological *Max-Phil* notebooks (Gödel Papers, 6b/63–72), filled from the late 1930s to 1946 and then, much more sporadically, until about 1955, I make no systematic effort to relate these notebooks to the project under discussion. It is clear from the partial transcription of *Max-Phil* that is presently available that various ideas recorded there remained dear to Gödel, who for example in the 1970s repeated them in conversations with Hao Wang and with Rudy Rucker. But it is, certainly in hindsight, evident that Gödel had grown discontented with the philosophical approach he had taken in those notebooks, and that to some extent the turn to phenomenology was meant as a new start.¹² These is-

8. See, e.g., Toledo's notes of her conversations with Gödel (Toledo 2011) and the comments on them in Franks 2011. Also Yourgrau 1989, 394–395; 397–403; 405; 407–408; and Yourgrau 1999, 196–200.

9. See, e.g., Engelen 2013. One particular aspect of Gödel's interest in medieval philosophy will play a role in 'Monads and sets' (Chap. 3, Sect. 3.4.3).

10. See, e.g., Yourgrau 1999, Chap. 5; Kovač 2008; and Parsons 2010. A work that one would have expected to find notes to in Gödel's archive is *Husserl und Kant* (Kern 1964), which appeared as Vol. 16 of the series *Phaenomenologica*, available at the Princeton University Library. (Gödel's archive does contain reading notes to Vols. 2 and 4 of that series, together with a note on Vols. 1 to 23; Gödel Papers 9c/22.)

11. These are the three he mentions when asked by Wang 'to name some recent philosophers whom he found congenial' (Wang 1996, 141).

12. Gödel had clearly been looking for such a new start. In a letter of April 20, 1967, Kreisel said to Gödel that the 'pregnancy' of the latter's formulations in a letter on Feferman's work had reminded him of a conversation in 1956, in which Gödel had mentioned to him that he was going to write a book on philosophy (Gödel Papers 01/90, 011233).

sues can probably not be tackled before the transcription of *Max-Phil* has been completed.¹³

Finally, I should mention Gödel's philosophical correspondence with Gotthard Günther (Gödel 2003, 456–535). It took place precisely in between the period of the *Max-Phil* notebooks and Gödel's turn to phenomenology (1954–1961; Gödel's last letter is from 1959). In his Introduction to that correspondence in the *Collected Works*, Charles Parsons arrives at the following conclusion:

[Gödel] was evidently prepared to entertain the possibility that post-Kantian idealism, to which he had apparently not had a lot of exposure, would be a source of illumination. He found Günther a clear expositor of ideas from that tradition. But he does not seem to have been disposed to work out himself a line of thought in which self-consciousness is a central concept, and when Günther did not pursue what Gödel thought the most promising direction, he lost interest. Not long after his last letter he began his study of Husserl, whose version of idealism he seems to have found much more satisfactory. (Gödel 2003, 475–476)

As I think that that conclusion is correct, and that Günther's thought did not significantly contribute to Gödel's project either as a source or as a foil, I will not treat of it here. That is not to say, however, that I think that Günther's work and his exchange with Gödel are without systematic and historical interest for idealistic philosophy.

13. That work is currently being done in a group led by Gabriella Crocco (Université d'Aix-Marseille), of which I am a member.

2.2 Gödel's commitment to phenomenology

The project described here was central to Gödel's philosophical thought from about 1959, when he began his serious study of Husserl,¹⁴ until the end of his active career. The best known of Gödel's (implicit or explicit) recommendations of phenomenology is of course the posthumously published essay of 1961, 'The modern development of the foundations of mathematics in the light of philosophy' (Gödel, *1961/?). Others are:

1. His remark in a letter to Bernays of August 11, 1961, about Kreisel's work purporting to show that ϵ_0 is the exact limit of finitary mathematics:

I find this result very beautiful, even if it will perhaps require a phenomenological substructure in order to be completely satisfying. (Gödel 2003, 193)¹⁵

2. Gödel's remark in a draft for the supplement to the 1964 reprint of his Cantor paper, left out from the published version:

Perhaps a further development of phenomenology will, some day, make it possible to decide questions regarding the soundness of primitive terms and their axioms in a completely convincing manner. (Gödel Papers 4/101, 040311, 12)

14. That is the year he mentions to Wang in 1976 (Wang 1987, 46; Wang 1996, 88). Among the first items Gödel studied was the 1959 volume of the *Zeitschrift für philosophische Forschung*, of which the first two issues contained a number of contributions on Husserl, on the occasion of the latter's 100th birthday. The library request slip in Gödel's archive is stamped October 21, 1960 (Gödel Papers 5/22, 050111).

15. 'Ich finde dieses Resultat sehr schön, wenn es auch vielleicht eines phänomenologischen Unterbaus bedürfen wird, um voll zu befriedigen.' (Gödel 2003, 192)

3. His recommendation to some logicians in the 1960s, reported by Wang, ‘that they should study the sixth investigation in *Logical Investigations* for its treatment of categorial intuition’ (Wang 1996, 164).
4. Kreisel’s strongly expressed wish, in a letter to Gödel of June 12, 1969 (Gödel Papers 1/92, 011266), that, in one of their future conversations, Gödel give him examples of detailed phenomenological analyses. This indicates that in their exchanges at the time Gödel had continued to advocate phenomenology.¹⁶
5. Gödel’s arrival at the view of the Dialectica Interpretation as an application of phenomenology in the late 1960s. Details are presented in ‘Gödel and intuitionism’ (Chap. 11). The work on the revision of the Dialectica paper is surely Gödel’s deepest response to his reading of Husserl. (Note that this work had begun before Kreisel’s letter mentioned in the previous item; apparently, but if so, not uncharacteristically, Gödel had refrained from bringing it up in their conversations.)
6. Gödel’s statement in a draft letter to Gian-Carlo Rota of 1972 that

I believe that his [i.e., Husserl’s] transc[endental] phen[omenology], carried through, would be nothing more nor less

16. An advocacy that had not been lost on Kreisel. In that same year, Kreisel published his one recommendation of phenomenology that I know of:

What this shows is, at most, that the notions considered [of subset and powerset] are difficult to analyze, not that they are dubious ... Coming back to set theory, probably the first step is: to recognize the objectivity of the basic notions (subset, powerset) mentioned above; and then, if possible, to give a phenomenological analysis of these notions. (Kreisel 1969, 97)

It is clear that in fact the whole paper is strongly influenced by Gödel.

than Kant's critique of pure reason transformed into an exact science, except for the fact that the result (of the 'critique') would be far more favourable for human reason. (Gödel Papers 1/141, 012028.7)

7. Wang's report that 'in his discussions with me in the 1970s he repeatedly urged me to study Husserl's later work' (Wang 1996, 164).¹⁷
8. Gödel's statement to Wang in these same discussions that

Husserl's is a very important method as an entrance into philosophy, so as finally to arrive at some metaphysics. Transcendental phenomenology with epoche as its methodology is the investigation (without knowledge of scientific facts) of the cognitive process, so as to find out what really appears to be – to find the objective concepts. (Wang 1996, 166)

Even when Gödel acknowledged to Wang that

Phenomenology is not the only approach. Another approach is to find a list of the main categories (e.g., causation, substance, action)

17. In *From Mathematics to Philosophy* (Wang 1974, 189), Wang also writes:

With regard to the task of setting up the axioms of set theory (including the search for new axioms), we can distinguish two questions, viz. (1) what, roughly speaking, the principles are by which we introduce the axioms, (2) what their precise meaning is and why we accept such principles. The second question is incomparably more difficult. It is my impression that Gödel proposes to answer it by phenomenological investigations.

I have not included this passage in the list above because Wang here only reports his impression, not what Gödel said. Its content is similar to that of item 2 in the list.

and their interrelations,

he continued

which, however, are to be arrived at phenomenologically. The task must be done in the right manner.

It is true that Gödel, like many, had some qualms with Husserl's writings. For example, Wang recounts (Wang 1996, 320):

Even though Gödel usually praised Husserl's work, he did occasionally express his frustration in studying it. I have a record of what he said on one of these occasions.¹⁸

I don't like particularly Husserl's way: long and difficult. He tells us no detailed way about how to do it. His work on time has been lost from the manuscripts.

And a conversation note by Sue Toledo from 1975 reports that Gödel said about the Husserliana volume *Analysen zur passiven Synthesis*:

Material of Vol. XI of Husserliana (passive constitution) should have been interesting but doesn't appear to be so.

Work published during Husserl's lifetime appears more interesting. (Toledo 2011, 206)

But such qualms are perfectly compatible with a commitment to phenomenology as a body of thought. Also the occasional criticism of Husserl does not change this, as when, for example, Gödel says to Toledo in 1972 that

18. *Note MvA*. The date is 1976; see Wang 1996, 168.

His analysis of the objective world (e.g., p. 212 of *From Formal to Transcendental Logic* [sic]) is in actuality universal subjectivism, and is not the right analysis of objective existence. It is rather an analysis of the natural way of thinking about objective existence. (Toledo 2011, 202)¹⁹

Likewise, the fact that Gödel never published anything on (or using) phenomenology does not, by itself, indicate a reservation on Gödel's part about the validity of phenomenology. Kennedy (2013) sees the fact that the 1961 essay does not appear on either of Gödel's two lists 'What I could publish' (*Was ich publizieren könnte*) found in the archive²⁰ as one step towards the view that 'judgement on this point [i.e., Gödel's commitment to phenomenology] should perhaps be left open'. But that fact is wholly consistent with a characteristic trait of Gödel's, here exemplified for his views on mind and matter (Wang 1996, 5):

In commenting on a draft of this paper,²¹ Gödel asked me to add the following paragraph:

Gödel told me that he had certain deep convictions regard-

19. *Note MvA*. Husserl's analysis on p. 212 (in the pagination of the original edition of *Formale und transzendente Logik*, Husserl 1929; p. 240 in the translation Husserl 1969) begins as follows: 'Let us start from the fact that for us – stated more distinctly: for *me* qua ego – the world is constituted as "Objective" (in the above-stated sense: there for everyone), showing itself to be the way it is, in an intersubjective cognitive community.' ('Gehen wir davon aus, daß die Welt für uns, deutlicher gesprochen, daß sie ja für *mich* als Ego konstituiert ist als "objektive", in jenem Sinn der für Jedermann daseienden, sich als wie sie ist in intersubjektiver Erkenntnisgemeinschaft ausweisenden.')

20. Gödel Papers, 4/108, 040360 and 040361. These have not yet been published, but Cheryl Dawson has transcribed them. Gödel is reported to have sent a third list of this type to Oskar Morgenstern (Gödel 1995, v note a).

21. *Note MvA*. Wang 1978.

ing mind and matter which he believed are contrary to the commonly accepted views today. The reasons for his convictions are of a very general philosophical nature and the arguments he possessed are not convincing to people with different convictions. Hence, he had chosen to state only those parts or consequences of his convictions which are definite even without reference to his general philosophy.

All things considered, then, there is no question but that from 1959 until the end of his active career Gödel was not only studying phenomenology, but moreover was committed to it, seeing it not as a finished doctrine laid down in any single text, but as a research program, to be developed, applied, and modified in the light of further reflection and experience. This is of course the only way in which commitment to a body of thought can make philosophical sense. Husserl himself had seen it that way, as Gödel, and any attentive reader of Husserl's work, was well aware:

According to Gödel, Husserl just provides a program to be carried out. (Wang 1996, 164)

Given Gödel's strong commitment, it is regrettable that, much as Gödel scholarship owes to Hao Wang,²² Gödel did not, as far as I have been able to determine, discuss phenomenology also with someone who was more interested in it and better prepared. I am thinking of William Howard in particular, who recounts:

In the fall of 1972 I am having lunch in the Institute cafeteria, and in walks Hao Wang. We know each other from ASL meetings in past years.

22. For a comprehensive appraisal of Hao Wang as a logician and as a philosopher, see the collection Parsons and Link 2011.

Hao Wang: ‘I come in once every two weeks, from New York, for a meeting with Gödel. He is making me read various parts of Husserl’s writings, which I don’t particularly want to do,²³ and then, at the meetings, he makes me discuss what I have read.’

I told this to my friend Tennenbaum, and he said, ‘Gödel is one of the greatest living authorities on Husserl’. I decided that I should take advantage of this, so I went to the Princeton University bookstore and looked for books by Husserl. There was one called *Cartesian Meditations*. I decided that, since I was an expert on meditation, this was down my alley. I was right. So I studied this and also the two books by Husserl that Hao Wang told me Gödel was making him read.²⁴ When I felt I was sufficiently prepared (early spring of 1973), I tried to get Gödel to talk about Husserl. No dice! Gödel had decided that Husserl was not on the agenda for any of our meetings, and that was that. (Howard, story 1, p. 80)²⁵

One may wonder what Gödel’s intentions were at the occasion. Wang has made the following observation on the dynamics of (his) conversation with Gödel:

23. *Note MvA*. Hao Wang writes, for example: ‘Gödel had recommended Husserl’s *Ideas* to me, and I tried to read it. Not being sufficiently motivated, I found it too long-winded.’ (Wang 1996, 142)

24. *Note MvA*. According to prof. Howard (in the email referred to in the next footnote, and a second one of March 9, 2013), the two texts in question were the two that, in Quentin Lauer’s English translation, are included in Husserl 1965: ‘Philosophy as a Rigorous Science’ and ‘Philosophy and the Crisis of European Man’. The latter is Husserl’s Vienna Lecture of 1935, ‘Die Philosophie in der Krisis europäischen Menschheit’ (Husserl 1954, 314–348).

25. As related, with minor editorial changes, in an email from William Howard to MvA, March 7, 2013. Later, in a letter of August 2, 1973, in which he requested a fourth meeting, Howard asked Gödel specific questions about intentionality and also about the relation of phenomenology to Indian philosophy.

Now and then Gödel mentioned things of interest to me which seemed related to what we had discussed on some previous occasion. When I asked him why he had not said these things before, he would reply, 'But you did not ask me'. I interpret this response to imply that, since he had so many ideas on so many things, he preferred to limit his remarks to what was strictly relevant to the immediate context. One consequence of this was that he avoided topics and views on which he did not believe there was a shared interest, or even some empathy.

Gödel's reply to Wang reminds one of a dictum of the 14th-century monk Kenkō, which suggests a different explanation than Wang's, or, depending on Gödel's psychology, a complementary one:

It is impressive when a man is always slow to speak, even on subjects he knows thoroughly, and does not speak at all unless questioned. (Kenkō [1330] 1967, 69)

Howard's case, however, was the opposite of Wang's, for he was interested in phenomenology, and he did ask. Gödel's refusal must have been a frustrating experience for Howard, as it is, indirectly, for me today.²⁶

More generally, the regrettable fact seems to be that there is no record

26. In an email of March 7, 2013, William Howard adds:

I did not feel that he was brushing me aside; it was just that he had a list of topics that he wanted to discuss with me, and Husserl was not on the list. When I say 'list', I mean it literally: When I arrived for our meetings, he would have a sheet of paper on his desk before him, a sort of memorandum to himself concerning the topics for our meeting. I had a list of topics that I wanted to discuss (not on a sheet of paper but firmly in my mind); but he had his own questions, which he would ask me one after the other; it was hard for me to get any of my questions in edgewise!

left of anyone's conversation with Gödel on phenomenology at the level of expertise that his remaining reading notes and bibliographical memoranda on the topic indicate he was capable of.

2.3 The religious component in phenomenology

In *Reflections on Kurt Gödel*, Hao Wang suggests a difference between Gödel and Husserl that, to my mind, would strongly limit the extent to which Husserl's phenomenology could be used to realise the first stage Gödel's project, if it indeed exists:

In addition, G looks for an exact or axiomatic theory in philosophy and thinks that it is also Husserl's aim. But G's conception of metaphysics as first philosophy includes centrally the concepts of God and soul.²⁷ It appears clear that this religious component is not part of Husserl's conception of philosophy. (Wang 1987, 161)

27. *Note MvA*. There is of course Gödel's remark in 1970, reported by Oskar Morgenstern in a diary note for August 29, 1970, that he feared that publishing his ontological proof of God's existence would lead people to think 'that he actually believes in God, whereas he is only engaged in a logical investigation (that is, showing that such a proof with classical assumptions (perfection, etc.), correspondingly axiomatized, is possible.)' (Gödel 1995, 388, translation modified).²⁸ But, besides to Wang (e.g., Wang 1996, 88), over the years Gödel expressed an unequivocal belief in God in a number of places. To mention three: the *Max-Phil* notebooks; a series of letters to his mother in 1961 (Gödel 2003, 428–439); and a draft reply of 1975 to a questionnaire of the sociologist Burke Grandjean where he specified that 'My belief is theistic not pantheistic (following Leibniz rather than Spinoza)' (Gödel 2003, 448). It seems safe to say, then, that Gödel believed in God more often than not. See also Chap. 10, footnote 4 in this volume.

28. 'Über sein ontologischen Beweis – er hatte das Resultat vor einigen Jahren, ist jetzt zufrieden damit aber zögert mit der Publikation. Es würde ihm zugeschrieben werden daß er wirkl[ich] an Gott glaubt, wo er doch nur eine logische Untersuchung mache (d.h. zeigt, daß ein solcher Beweis mit klassischen Annahmen (Vollkommenheit usw.), entsprechend axiomatisiert, möglich sei)', as quoted in Dawson 1997, 307.

Does the last sentence of this quotation reflect Gödel's view or Wang's?²⁹

It is, in any case, not difficult to see what may have suggested that view.

In his published works Husserl speaks about God very rarely, and when he does so in Sects. 51 and 58 of *Ideas I* (Husserl 1976), it is to say that God can neither be a mundane object nor have His being as an episode in consciousness (Sect. 51), that God transcends both the world and absolute consciousness (Sect. 58), and that God therefore falls outside the scope of phenomenology as Husserl defines it there.

Yet, in a letter to William Ernest Hocking of July 7, 1912, so from the time Husserl was writing *Ideas I*, Husserl writes that

Even if I have made it my life's task to found a philosophy 'from below' at least for myself, to my satisfaction (which is very difficult to gain!), I nevertheless strive unceasingly from this 'below' upwards into the heights. In the last years, metaphysical considerations, and especially the idea of God, have entered ever more powerfully into the horizon of my studies. (Brainard 2002, 251–252n80)³⁰

29. In the articles on Husserl in the volume of the *Zeitschrift für philosophische Forschung* that Gödel borrowed in 1960, mentioned in footnote 14 above, it is made very clear that Husserl believed in God and that this plays a central role in his later philosophy. See in particular Diemer 1959, 248–250 (who also notes the contrast between Husserl's published work and his correspondence) and Ingarden 1959, 462. There are various other such places in the early literature on Husserl after 1945 that Gödel is likely to have seen, but the present example is documented and already strongly suggests that the view Wang states in this quotation is not Gödel's. Note that, in a perceptive comment on Gödel's 1961 essay, Wang remarks that 'His proposed solution appears to be Husserl's phenomenology, and he says nothing explicitly about its relation to religious concepts ... Elsewhere he suggests that Husserl's method may be applicable to metaphysical or religious concepts as well' (Wang 1996, 162).

30. 'Habe ich es mir zur Lebensaufgabe gemacht eine Philosophie "von unten" mindestens für mich, zu meiner (sehr schwer zu gewinnenden!) Befriedigung zu begründen, so strebe ich doch unablässig von dem "Unten" hinauf in die Höhen. In den letzten Jahren sind metaphysische Erwägungen und ist insbesondere auch die

Indeed, in research manuscripts and correspondence from 1908 (predating *Ideas I*) until the end of his life,³¹ kept reflecting on God and metaphysics in relation to phenomenology, against the background of Leibniz. (Gödel would have been sensitive to this contrast between Husserl's published and unpublished writings.) For example, a text from 1908 has the title 'Teleology, God, the possibility of an all-consciousness, transcendental-phenomenologically founded metaphysics and teleology'.³² In it, Husserl presents a conception of God as the universal consciousness, which creates the finite monads and unifies all the contents of their consciousnesses. That can certainly be seen as an interpretation of Leibniz' concept of the central monad; similarly, a later text, probably from 1922, considers, as its title indicates, 'The possibility of fusion of monads; the possibility of a highest (divine) monad'.³³

But it is important to note that for Husserl these are questions, possibilities and convictions that he ponders as such; he does not present full phenomenological analyses leading to conclusions. And to the philosopher Husserl, as distinct from the faithful Christian that he also was,³⁴

Gottesidee immer stärker in den Kreis meiner Studien getreten.' (Husserl 1994a, 3:160)

31. A highly interesting report on conversations with Husserl on religion in the last years of his life is Jaegerschmid 1981a and Jaegerschmid 1981b. For a biographical perspective on Husserl's religiosity, see Karl Schuhmann's introduction to Husserl's correspondence (Husserl 1994a, 10:33–36). For systematic considerations, the most important reference here is of course part III of Husserl 2013, 'Metaphysik: Monadologie, Teleologie und Philosophische Theologie'. See also Hart 1986, Iribarne 2000, Lo 2008, and Ales Bello 2009.

32. 'Teleologie, Gott, Möglichkeit eines All-Bewusstseins. Transzendentalphänomenologisch fundierte Metaphysik und Teleologie' (Husserl 2013, 160–168).

33. 'Möglichkeit der Verschmelzung von Monaden. Möglichkeit einer (göttlichen) Übermonade' (Husserl 1973, 300–302).

34. Husserl was a Jew by birth, but was not raised as a practising one. As a student he read the New Testament, decided to convert to Christianity, and was baptised Lutheran (as Gödel would be, and Leibniz had been). But Husserl (again like Gödel, and like Leibniz) was not a churchgoer. Brouwer (presumably) was baptised Dutch

it remained essential to follow the right methodology.³⁵ As he writes in a letter of 1933,

The philosophical problems disclose themselves in their genuine meaning as transcendental-phenomenological ones in an essential systematic series of steps. On these occasions it becomes manifest that the religious-ethical problems are problems of the highest level. ... This is precisely the reason why in my writings I kept silent about the problems of philosophy of religion. (Spiegelberg 1981,

Reformed, as this was the denomination of his parents. When he had just turned 17, he decided to enter the Remonstrant Church, a more progressive variety of Protestantism, and wrote a highly personal profession of faith for the occasion. He was no churchgoer either, but while Leibniz, Husserl, and Gödel liked to read the Bible, we do not have such evidence in Brouwer's case. In one of his student notebooks he even claims that 'one's conscience ... is not nourished by Plato or the Bible, but it is by Kant' ('het geweten ... van Plato en de bijbel wordt het niet gevoed, wel van Kant'). – For these facts on Brouwer, see van Dalen 1999, 17–22, which includes a full translation of the profession, and Brouwer Archive, Notebook III, 31; on Gödel, Wang 1996, 27 and Dawson 1997, 4–6; on Husserl, Husserl 1994a, 3:432; on Leibniz, Guhrauer 1846, 1:1, 2:332.

35. When Husserl received a copy of Rudolf Otto's *The Holy* (*Das Heilige*, Otto 1918), he wrote in a letter to its autor (and his friend and former colleague in Göttingen) of March 5, 1919, that he much appreciated the book for its description of religious phenomena, but criticised its philosophical elaboration as follows: 'The metaphysician (theologian) in Mr Otto has carried, so it seems to me, the phenomenologist Otto away on his wings and for an image I think here of the angels who with their wings cover the eyes' (Husserl 1994a, 7:207; 'Der Metaphysiker (Theologe) in Herrn Otto hat scheint es mir den Phänomenologen Otto auf seinen Schwingen davongetragen u[nd] ich denke dabei als Gleichnis an die Engel, die mit ihren Schwingen die Augen verdecken.'). Husserl's reference is to Isaiah 6:2.

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Moreover, in a letter of a few months earlier, Husserl did estimate that he had made progress in being able to frame the questions in the right manner. About the question of God as ‘indeed the “highest and final question” in the system-building of the phenomenological method’³⁸ he writes:

I am grateful enough that I have been able to develop the method and explicitly carry on with it to see the theoretical locus of the problem as a phenomenological one: first of all as the problem of the possibility of the transcendental Totality.³⁹

Indeed, Husserl wrote in probably Summer 1934, this is where philosophy intrinsically leads:

An autonomous philosophy, such as the Aristotelian was and such as remains an eternal demand, will necessarily arrive at a philosophical teleology and theology – as a non-confessional way to God.⁴⁰

36. Husserl to E.P. Welch, June 17/21, 1933; ‘Die philosophischen Probleme erschliessen sich mit ihrem echten Sinn als transcendental-phänomenologische in einer wesensmässigen systematischen Stufenfolge. Es zeigt sich dabei, dass die ethisch-religiösen Probleme solche der höchsten Stufe sind. ... Eben darum schwieg ich mich in meinen Schriften über religionsphilosophische Probleme aus’ (Husserl 1994a, 6:459).

37. A similar attitude is found in the work of Michael Dummett; see for example his introduction to *The Logical Basis of Metaphysics* (Dummett 1991).

38. ‘die in der Tat im Systembau der phänomenologischen Methode “höchste und letzte Frage”’

39. Husserl to Father Daniel Feuling, March 30, 1933, in Husserl 1994b, 7:87f. ‘Ich bin dankbar genug, dass ich die Methode soweit durchbilden und explizit fortführen konnte, um den theoretischen Ort des Problems als eines phänomenologischen zu sehen: zunächst als des Problems der Möglichkeit der transcendentalen Totalität.’

40. ‘Eine autonome Philosophie, wie es die aristotelische war und wie sie eine ewige

The purpose of presenting the quotations from Husserl above is to show that, contrary to what the passage from Wang suggests, a religious component was very much present in Husserl's conception of philosophy; from a systematic point of view there is, ultimately, no mismatch between Gödel's and Husserl's aims in philosophy on this account.

I had hoped to find in Gödel's archive reading notes to Dietrich Mahnke's 'Eine neue Monadologie' (1917), essentially a rewriting of Leibniz' tractate in phenomenological terms. Gödel thought highly of this work by Mahnke, assessing it as 'sensible!' (*vernünftig!*; Gödel Papers 5/25, 050120.1); the paragraphs on God in it are closely related to (but not the same as) Husserl's ideas on the topic.⁴¹ The task of broadening the contextualisation of Gödel's project as presented here should start, I believe, with an analysis of Mahnke's work on the monadology. It would be very interesting if it could be determined whether Gödel's thoughts on the matter were, in effect, closer to Husserl's or to Mahnke's.⁴²

Likewise, one could reflect on Gödel's version of the ontological proof in this context. A key question here is whether Gödel saw that proof as making merely a logical point⁴³ or took that proof indeed to establish the existence of God; as Parsons observes,

For that, it would be necessary for him to have confidence in the specific conceptual apparatus and premises of the proof. I suspect that if questioned about that, he would have said that he had not developed his philosophical views to a sufficient extent to have that level of certainty. (Parsons 2010, 186)

Forderung bleibt, kommt notwendig zu einer philosophischen Teleologie und Theologie – als inkonfessioneller Weg zu Gott.' (Husserl 2013, 259)

41. See also Chap. 6, Sect. 6.4.1 in this volume.

42. For a list of differences between their positions, prepared by Husserl's assistant Eugen Fink in 1933, see Husserl 1994a, 3:519–520.

43. As the remark taken down by Morgenstern suggests; see footnote 27 above.

One way of trying to obtain that level of certainty would be to develop a phenomenological critique of that conceptual apparatus and the premises. It is not clear to me whether or not Husserl at some point meant to go that way. In 1892/93, Husserl lectured on proofs of God's existence (Schuhmann 1977, 34), but no lecture notes seem to remain, and in any case this was long before Husserl's development of the transcendental phenomenology that interested Gödel. A relevant reminiscence about the transcendental Husserl, one of the few pieces of evidence on the topic, can be found in the memoirs of the biologist and philosopher Hans Driesch. On a very long conversation he had with Husserl at a conference in April 1914, he notes:

Of particular interest to me was a specific point in our conversation. I asked H[usserl] whether I was right to see the ontological proof of God – which from the 'essentia', i.e., the conceptual 'essence' of God, wants to conclude to his 'existentia' – as the final goal of his logical investigations. He answered yes to this question, but he has, as far as I know, never gone into it in his writings.⁴⁴

The qualification 'as the final goal' is crucial; certainly Husserl would not, after his transcendental turn, accept, in a philosophical sense, God's existence without further phenomenological ado. A forceful statement to this effect in relation to proofs of God's existence was made by Husserl almost twenty years later, in a letter of 1932 to Father Erich Przywara. Having stated his methodological priority of an exhibition and transcendental cri-

44. Translated from the quotation in Schuhmann 1977, 186: 'Von besonderem Interesse war mir ein bestimmter Punkt unserer Unterhaltung. Ich frug H[usserl], ob ich im Recht sei, wenn ich den ontologischen Gottesbeweis – (der aus der "essentia", d.h. dem begrifflichen "Wesen" Gottes, seine "existentia" ableiten will) – als letztes Ziel seiner logischen Untersuchungen ansahe. Er bejahte diese Frage, ist aber meines Wissens nie schriftstellerisch auf sie eingegangen.' The original is in the posthumous Driesch 1951, 153–154.

tique of the evidence again, and having confirmed that this also applies to religious evidence, Husserl continues:

That will help the theologians some day, although at first it will seem as if this results in bad heresies.⁴⁵

Any wish to commit myself to theism in the Scholastic tradition – in the usual interpretations of its intentions – I decidedly dismiss. Of course this is said against Mr Keilbach and his proofs of God's existence that I (according to things I am supposed to have said in conversation) allegedly hope for.^{46,47}

45. *Note MvA*. See also this passage in *Formal and Transcendental Logic*, written three years earlier: 'Even God is for me what he is, in consequence of my own productivity of consciousness; here too I must not look aside lest I commit a supposed blasphemy, rather I must see the problem. Here too, as in the case of the other ego, productivity of consciousness will hardly signify that I invent and make this highest transcendency.' (Husserl 1969, 251) ('Auch Gott ist für mich, was er ist, aus meiner eigenen Bewußtseinsleistung, auch hier darf ich aus Angst vor einer vermeinten Blasphemie nicht wegsehen, sondern muß das Problem sehen. Auch hier wird wohl, wie hinsichtlich des Alterego, Bewußtseinsleistung nicht besagen, daß ich diese höchste Transzendenz erfinde und mache', Husserl 1974, 258).

46. Husserl to Przywara, June 15, 1932, in Husserl 1994a, 7:237. 'Den Theologen wird das einmal helfen, obschon es zunächst scheinen wird, dass dabei arge Ketzereien resultieren. Mich auf den Theismus der Schultradition – in den üblichen Auslegungen seines Sinnes – festlegen zu wollen, lehne ich entschieden ab. Natürlich ist das gegen Herrn Keilbach gesagt und dessen vermeintlich von mir (nach angeblichen Gesprächsausserungen) erhoffte "Gottesbeweise".'

47. Husserl here has in mind this passage in Keilbach 1932, 213:

We also know for a fact, that Husserl in 1926 made the following oral profession: '... That the solution to the teleological problem can only be found in the theological conception, is something I too believe. But it will take a 100 years before my school can carry through an exact proof of God's existence. ('Wir wissen auch genau, daß Husserl im Jahre 1926 mündlich folgendes Bekenntnis ablegte: "... Daß die Lösung des teleologischen Problems nur im theologischen Begriff gefunden werden kann, das glaube ich auch. Aber es wird noch 100 Jahre dauern, bis meine

In absence of evidence on specifically phenomenological-theological ideas such as Gödel may have had, I cannot attempt to develop this theme any further.⁴⁸

2.4 The pragmatic value of Husserl's and Gödel's historical turn

Not addressed in these essays is an aspect of transcendental phenomenology that is nevertheless of direct importance to Gödel's project: the later Husserl's insistence that a turn to history is not only of pragmatic value to systematic philosophy, but is necessary to it, without philosophy thereby becoming a form of historicism. Husserl argues for this position in *The Crisis of European Sciences and Transcendental Phenomenology* (Husserl 1954), a work that Gödel owned and knew well; besides to the *Crisis*, I refer the interested reader to the analyses by Carr (1987, Chaps. 3 and 4) and Hopkins (2010). I do not have much to add to their discussion, and, as far as I can see, neither would Gödel have had. But I should like to make some comments here on what the pragmatic value of a historical turn consists in; to Gödel, interested in the history of philosophy from his student days,⁴⁹ Husserl's discussion in the *Crisis* and related texts will have been a reinforcement and a development of a view he already held.

The study of earlier positions and their development may clarify and sharpen our own ideas in various ways:

1. They may show interesting contrasts to our own position that al-

Schule einen exakten Beweis für das Dasein Gottes wird führen können."')

Keilbach does not cite a source. Also noteworthy is that there is no offprint of Keilbach's article in Husserl's personal library at the Husserl Archive in Leuven.

48. Wang says that he is 'sure' that 'Gödel's tentative thoughts about religious metaphysics ... did not ... make much use of Husserl's method' (Wang 1996, 163).

49. In 1925, Gödel attended Heinrich Gomperz' course 'Übersicht über die Geschichte der europäischen Philosophie'; the notes he took have been preserved (Gödel Papers 3/72.5, 030100.4).

low us to arrive at a richer articulation of it;

2. They may reveal presuppositions of our own position;
3. They may enrich our own position by showing us motivations, arguments and approaches that we had not, or not sufficiently, been aware of may be available to us as well.

The study of an earlier philosophical system may turn not only to the questions and arguments that that system has, as a matter of historical fact, dealt with, but also to alternative questions and alternative arguments, which, for one reason or another, were not actually taken up. (Such reasons may themselves have been philosophical ones, but need not.) This study of the systematical possibilities and limits of a historical position is nowadays known as ‘doing philosophy historically’.⁵⁰ It leads to a better understanding of a historical position and, through comparison, of our own. When doing philosophy historically, one may, and indeed should, freely use philosophical and other (e.g., mathematical) knowledge that was developed only after the historical position being studied. As Parsons has written to justify his use of modern knowledge of the foundations of logic and mathematics in a paper on Kant,

Experience shows that one does not get far in understanding a philosopher unless one tries to think through the problems on their own merits, and in this one must use what one knows; second, if one is today to take Kant seriously as a philosopher of mathematics, one must confront him with modern knowledge. (Parsons [1969] 1983, 110–111)

Taking Leibniz and Husserl seriously as philosophers of mathematics this

50. See, e.g., Piercey’s paper of that title (2003), and Ameriks’ monograph *Kant and The Historical Turn* (2006) – with emphasis on Karl Leonhard Reinhold as a pioneer of this approach.

way is part of the very design of Gödel's project. (For an anecdote on how Gödel integrated the monadology and modern set theory into one topic, see footnote 1 of Chap. 3.)

2.5 Overview of the essays

The four central essays are 'Monads and Sets' (Chap. 3), 'On the philosophical development of Kurt Gödel' (Chap. 6), 'Gödel and intuitionism' (Chap. 11), and 'Construction and constitution in mathematics' (Chap. 12).

'Monads and Sets' analyses and criticises Gödel's attempt to justify, by an argument from analogy with the monadology, the reflection principle in set theory. The direct importance of that chapter for my present purpose is that my counterargument proceeds in such a way that it at the same time lends support to the belief embodied in the first stage of Gödel's project, the belief that the monadology needs to be reconstructed phenomenologically.

'On the philosophical development of Kurt Gödel' studies Gödel's reading of Husserl, its relation to Leibniz' monadology, and its influence on his published writings. A much greater influence of phenomenology, however, was overlooked when writing 'On the philosophical development'; this is addressed in the following paper.

'Gödel and intuitionism' discusses how on various occasions Brouwer's intuitionism actually inspired Gödel's work, in particular the *Dialectica Interpretation*, which Gödel in an unpublished note once characterised as 'a new intuitionistic insight ... based on phenomenological reflection'. Although we will see (Chap. 12) that Gödel abandoned this particular attempt to construe the *Dialectica Interpretation* as intuitionistic in the noetic sense, the shift to the notion of reductive proof employed in the even further and better known revision still depended on phenomenology, and still marked a rapprochement to Brouwerian intuitionism. The work on a revision of the *Dialectica* paper shows that Gödel was not only

studying Husserl and recommending his work to others, but also tried to advance the phenomenology of mathematics by working on a concrete problem that was at the same time of great technical interest. For reasons I explain in the next paper I will mention, I do not think it is a coincidence that Gödel's deepest response to his reading of phenomenology lies in an elaboration not of Platonistic, but of constructivistic ideas.

'Construction and constitution in mathematics' addresses the question whether classical mathematics admits of the phenomenological foundation that Gödel envisaged. It proceeds by arguing that phenomenology rather leads to intuitionistic mathematics. That view is not only contrary to Gödel's, but also to that of recent authors on the topic like Føllesdal, Hartimo, Hauser, Liu, Rosado Haddock, and Tieszen.⁵¹ What I find wanting in Gödel as well as in the authors mentioned is, briefly, an appreciation of the way the transcendental Husserl developed his thought about categorial objects and categorial intuition in *Formal and Transcendental Logic, Experience and Judgement*, and related manuscripts from that period, as compared to the earlier *Logical Investigations* and *Ideas I*. In this paper, I describe that later doctrine in detail, drawing particular attention to its contentions that the objects of pure mathematics are productions in the ontic sense, and that all possible rational subjects can in principle produce the same purely categorial objects. This means that the kind of mathematics compatible with Husserl's variety of transcendental idealism is constructive mathematics, and that classical mathematics cannot be conceived of as constructive mathematics for a higher (in particular: ideal) mind. Anyone concerned with developing a Platonistic foundation for classical mathematics under reference to Husserl's later works therefore should argue that Husserl was wrong to develop his doctrine of categorial objects and intuitions that way, and strive to give a detailed phenomenological account of Platonism based on a new, altern-

51. E.g., Føllesdal on p. 372 of his introduction to Gödel, *1961/?; Hartimo 2012; Hauser 2006; Liu 2010; Rosado Haddock 1987; Tieszen 2011.

ative development of the doctrine of categorial intuition. None of this is to be found in Gödel or the mentioned recent authors; but to use the later Husserl in support of a metaphysics of mathematical objects that exist independently of our mental constructions is perverse. Clearly, exegesis of Husserl is no idle matter at this point. I will leave in the middle here whether the conclusion of this chapter should be taken as an objection to classical mathematics or to phenomenology. In either case it entails that Gödel's project cannot succeed.

The essays surrounding those four central ones have been included for further details and context.

In the 'Note on Leibniz and infinite wholes', I defend the claim that Leibniz' famous argument against the existence of infinite wholes is not only incorrect, as Russell has shown, but incorrect even on Leibniz' own terms. This is relevant to Gödel's project because it shows that, should there be an obstacle to integrating Cantorian set theory within a Leibnizian philosophy, as Gödel wished to do, it will not be this.

'Gödel's Dialectica Interpretation and Leibniz' shows that there was a direct influence of Leibniz' ideas about proofs on Gödel's revision of his Dialectica Interpretation. Seen together with his description of that work, quoted above, as 'a new intuitionistic insight ... based on phenomenological reflection', we see that Gödel at that late stage of his career was willing to experiment with elements adopted and adapted from each of Leibniz, Husserl, and Brouwer.

'Mathematics' is a general discussion, with examples, of the phenomenology of mathematics.

'Gödel, mathematics, and possible worlds' provides a phenomenological unification of Gödel's Platonism and the Leibnizian idea of possible worlds, thus rejecting Hintikka's view on the motivation of Gödel's Platonism. Although this chapter belongs just as much in the part on Gödel and Leibniz, I have chosen to put it in the part on Gödel and Husserl: the question it addresses has its home in the Leibnizian context, but the argument it develops wholly depends on transcendental phenomenology.

‘Two draft letters from Gödel on self-knowledge of reason’ discusses unpublished remarks from the 1960s in which Gödel connects his Incompleteness Theorem to idealistic philosophy, of which transcendental phenomenology is a particular form. As far as their content is concerned (not necessarily Gödel’s intentions), these remarks could be read as notes for a continuation of his 1961 essay.

‘Rivaling brothers’ looks at Gödel’s relation to Brouwer and shows that, besides deep disagreements, there are also deep agreements between their philosophical ideas.

‘Mysticism and mathematics’ (written with Robert Tragesser) compares Gödel’s and Brouwer’s explorations of mysticism and its relation to mathematics. It is, of course, the essay farthest removed from the discussion of Gödel’s project as such, in which mysticism plays no rôle at all; it has been included because it complements ‘Rivaling brothers’ and ‘Gödel and intuitionism’.

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