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ON THE PHILOSOPHICAL DEVELOPMENT OF KURT GÖDEL

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Dedicated to the memory of Karl Schuhmann (1941–2003)

CONTENTS

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§**1. Introduction.** It is by now well known that Gödel first advocated the philosophy of Leibniz and then, since 1959, that of Husserl.[1] This raises three questions:

1. How is this turn to Husserl to be interpreted? Is it a dismissal of the Leibnizian philosophy, or a different way to achieve similar goals?
2. Why did Gödel turn specifically to the later Husserl's transcendental idealism?
3. Is there any detectable influence from Husserl on Gödel's writings?

Regarding the first question, Wang [96, p.165] reports that Gödel '[saw] in Husserl's work a method of refining and consolidating Leibniz' monadology'. But what does this mean? In what for Gödel relevant sense is Husserl's work a refinement and consolidation of Leibniz' monadology?

The second question is particularly pressing, given that Gödel was, by his own admission, a realist in mathematics since 1925.[2] Wouldn't the uncompromising realism of the early Husserl's Logical investigations have been a more obvious choice for a Platonist like Gödel?

The third question can only be approached when an answer to the second has been given, and we want to suggest that the answer to the first question follows from the answer to the second. We begin, therefore, with a closer look at the actual turn towards phenomenology.

Some 30 years before his serious study of Husserl began, Gödel was well aware of the existence of phenomenology. Apart from its likely appearance in the philosophy courses that Gödel took,[3] it reached him from various directions.

First, Gödel will have heard about phenomenology at the meetings of the Vienna Circle. Members and other attendants of the Circle's meetings critically discussed Husserl's epistemology, in particular his conception of a priori knowledge. Several of them had been, or were, in closer contact with phenomenology. Carnap studied with Husserl in 1924–1925 [82, p.281],

[1]As introductions to phenomenology, we recommend Husserl's The idea of phenomenology [53]—as we will see, a 'momentous lecture' according to Gödel—and Kockelmans' annotated edition of Husserl's article for the *Encyclopaedia Britannica* [61], an article that Gödel also studied. The first is work from before, the second from after the appearance of the less transparent *Ideas I* [49]. For an accessible historical treatment, see [87], a work of which Gödel owned and read the earlier, second edition from 1965.

[2]The Grandjean questionaire, printed in [96, p.18 and p.20].

[3]'Die Systeme der großen Denker', taught by Moritz Schlick, WS 24/25; 'Übersicht über die Hauptprobleme der Philosophie I' ('Overview of the main problems in philosophy I'), by Heinrich Gomperz, WS 24/25, and its sequel in SS 25, 'Übersicht über die Hauptprobleme der Philosophie II' ('Overview of the main problems in philosophy II'); 'Philosophische Übungen' ('Philosophical exercises'), by Rudolf Carnap, SS 28; no data on SS 29 and WS 29/30 available. Source: Universitätsarchiv Wien, as reprinted in [62, pp.145–146]. These are the 'inskribierte Vorlesungen'; he may have attended courses for which he did not register, such as Schlick's 'Logik und Erkenntnistheorie' ('Logic and Theory of knowledge'), WS 25 [62, p.135].

Husserl's work had been discussed and criticized by Schlick in his *Allgemeine Erkenntnislehre* (*General theory of knowledge*) of 1918;[4] and Felix Kaufmann was at the same time a practicing phenomenologist who moreover was personally close to Husserl.[5]

Second, within the specific context of mathematics, Gödel attended Heyting's talk at the Königsberg conference in September 1930. Brouwer's foremost student presented the intuitionistic point of view there and explained the concepts of proposition and proof in terms of Husserl's concepts of intention and fulfillment. Gödel will have read the relevant remarks again in the published version of Heyting's talk [32], of which he published a review [24, pp.247–248]. In between, he encountered phenomenology when reviewing a paper by Husserl's student Oskar Becker of 1930, 'Zur Logik der Modalitäten' ('On the logic of modalities') [3]; Gödel's review is [24, pp.216–217].

There is a possibility that Gödel heard Husserl lecture in those years, when on May 7, 1935, Husserl gave a lecture in Vienna which, because of the large audience it drew, he was asked to repeat on May 10.[6] Wang [96, pp.97–98] mentions that Gödel was in Vienna then, but goes on to say 'Presumably G did not attend these lectures, since his interest in certain aspects of Husserl's work came much later'. However, in the Gödel archive there is a library slip dated July 27, 1935 [GN folder 5/62],[7] requesting Husserl's *Vorlesungen zur Ph.*[*änomenologie*] *des Zeitbewusstseins* (*Lectures on the phenomenology of inner time consciousness*) [34]. This slip suggests a transitory interest in phenomenology on Gödel's part. Perhaps Husserl's presence in Vienna had made Gödel curious, whether or not he heard the lectures.

Despite these various contacts in the 1930's, Gödel did not come to feel close to phenomenology. In 1975, responding to a question in a letter from Barry Smith [GN folder 01/167, 012358], Gödel wrote that

> I can say that my conceptual realism, which I am holding since about 1925, was in no way brought about by phenomenology. I have a high regard for Husserl, but I did not get acquainted with his writings before many years after I emigrated to the U.S. [GN folder 1/167, 012359]

Indeed, around 1959, Gödel's distance from phenomenology made place for a strong interest in the work of Husserl. It is not so clear, however, what

[4]Husserl criticized Schlick's discussion in the introduction to the second edition of the *Logical investigations* [50, 535-536]; Schlick replied in the second edition of the *Erkenntnislehre* of 1925 [81, pp.127–128n.3].

[5]On Kaufmann, see [88]. His correspondence with Husserl is in [52, IV].

[6]Edmund and Malvine Husserl to Husserl's former student Roman Ingarden, July 10, 1935 [52, III, p.302].

[7]In general, references of the form [GN folder $x/y,z$] refer to item z in folder y in series x of the Gödel *Nachlaß* in the Firestone Library, Princeton.

influence on his published writings this interest had. Wang, for example, writes

> G's own interest in Husserl's work probably derives from his belief that Husserl's "methods" will play an important role toward realizing his goal. However, I have not been able to detect Husserl's influences in G's available philosophical work. [96, p.221]

A few years later, however, Wang wrote that 'there are traces of Husserl's influence in some of Gödel's very limited number of available writings after 1959' [97, p.61]; but Wang does not give any examples. We believe that such influences as Wang meant indeed can be shown in Gödel's published work. In order to adduce these, we first have to come to a concrete understanding of the goal Gödel hoped to reach using Husserl's methods. With this understanding in place, we will then present three examples of Husserl's influence that can be detected in Gödel's published work.

With our discussion, we hope to complement work by Wang and by Parsons [77], to build further on Tieszen's [90], and to cast some doubt on interpretations of Gödel that downplay or dismiss the direct influence of Husserl.[8] A different case is that of Maddy [73]. She lets herself be inspired by Gödel's philosophical remarks, but is explicit that her naturalistic project is not Gödel's [73, pp.75–80,178]; it therefore falls outside the scope of our attempt at reconstructing Gödel's thinking behind his words.

§2. Gödel's position in the 1950's—a stalemate.

2.1. Inconclusive arguments. We now note some of the broader themes appearing in Gödel's general position in the 1950's, just before his turn to Husserl in 1959. In 1951, Gödel delivered the Gibbs lecture, titled 'Some basic theorems of the foundations of mathematics and their implications' [26, pp.304–323]. Charles Parsons has remarked of it that it 'seems to complete for Gödel the process of avowing his platonistic position' [77, p.55]. It is true that all the basic elements of Gödel's Platonism are in place, yet at the end of that lecture Gödel concedes that the arguments he gives in favour of that position are not conclusive:

> Of course I do not claim that the foregoing considerations amount to a real proof of this view [i.e., Platonism] about the nature of mathematics. The most I could assert would be to have disproved the nominalistic view, which considers mathematics to consist solely in syntactical conventions and their consequences. Moreover, I have adduced strong arguments against the more general view that mathematics is our own creation. There are however, other alternatives to Platonism [...] In order to establish Platonic

[8] For example, those of Köhler [15, pp.341–386], and Hintikka [33]. For specific criticism of the latter interpretation, see [1].

> realism, these theories would have to be disproved one after the other, and then it would have to be shown that they exhaust all possibilities. I am not in a position to do this now. [26, pp.321–322]

By end of that decade, nothing had changed; Gödel is still 'not in a position to establish Platonic realism', in spite of his years-long efforts, as he explains in a letter to Schilpp of February 3, 1959. He there comments on his inability to finish his paper 'Is mathematics syntax of language?' that he had begun six years before:

> The fact is that I have completed several different versions, but none of them satisfies me. It is easy to allege very weighty and striking arguments in favor of my views, but a complete elucidation of the situation turned out to be more difficult than I had anticipated, doubtless in consequence of the fact that the subject matter is closely related to, and in part identical with, one of the basic problems of philosophy, namely the question of the objective reality of concepts and their relations. On the other hand, because of widely held prejudices, it may do more harm than good to publish *half done* work.' [28, p.224, emphasis ours]

Lurking behind Gödel's dissatisfaction with the paper was the fact that a standard of philosophical argumentation to which he adhered, was not met in the Syntax paper: this standard of 'rigour' in philosophy we will discuss below (section 2.2). For now, we note that Gödel knew that, in this case, he did not have such a rigorous argument and rather had to settle for partial justifications: negative ones in the form of arguments against alternative views, and positive ones in the form of plausibility arguments.

In particular, as Warren Goldfarb has noted in his introduction to the Syntax paper, there is no positive epistemological account:

> On the question of how we gain knowledge of the mathematical realm, Gödel has little to say except that we do it by our faculty of mathematical intuition, which he also calls 'mathematical reason' and sometimes simply 'reason' [...] He gives no further details about its structure; nor does he consider whether aspects of it are involved in other regions of our cognition, as would certainly be suggested by calling it 'reason'. Here perhaps it is perhaps most glaring that Gödel failed to arrive at the sort of 'complete elaboration of the situation' that he sought. [26, pp.333–334]

Equally lacking is a positive ontological account of the objects. This is related to the epistemological shortcoming, as the ontological status of the objects and the nature of mathematical intuition mutually constrain each other in so far as the objects are to be accessible to intuition. The less we can say about the one, the less we can say about the other. An example of a certain ontological wavering can be seen when, having given one of his arguments that 'the objects and theorems of mathematics are as objective and independent of our free choice and our creative acts as is the physical world', he qualifies the argument by adding that

> It determines, however, in no way what these objective entities are—in particular whether they are located in nature or in the human mind or in neither of the two. These three views about the nature of mathematics correspond exactly to the three views about the nature of concepts, which traditionally go by the names of psychologism, Aristotelian conceptualism and Platonism. [26, p.312n.17]

This underdeterminacy is typical of the arguments in the 1950's.[9]

2.2. Realism and rationalism. Even discounting the self-described lack of rigour [26, p.311] in Gödel's arguments in the Gibbs lecture, there is a more serious conflict in Gödel's position in the 1950's, arising from his being committed to two theses, seemingly opposed: (Platonic) realism, or Platonism, and rationalism. There is much to say about what these terms precisely meant to Gödel, as well about what the nature and strength of his commitments to these were. We will not pursue many of these larger issues here (though we will discuss the nature of Gödel's rationalism below), but simply take note of Gödel's position at this point, which was, roughly, as follows: while he did not want to abandon realism, it did not appear possible to give a proof of the validity of realism, on any rational understanding of the term 'proof'. In the letter to Schilpp of 1959, the project announced in the Gibbs lecture of 1951 had come to a halt.

An early symptom of this perceived impossibility may have been Gödel's enigmatic remark in a lecture in 1933 (enigmatic because of all of Gödel's remarks on Platonism, this is the single one which is negative):

> The result of the preceding discussion is that our axioms, if interpreted as meaningful statements, necessarily presuppose a kind of Platonism, which cannot satisfy any critical mind. [26, p.50]

By the early 1950's, Gödel evidently thought the situation had changed somewhat, as he then, in the letter to Schilpp, says that he does have arguments in favour of realism that are 'weighty' and 'striking'. So they presumably would go a certain way to satisfying a critical mind. Still the situation had not essentially changed—his arguments evidently do not meet his own standard of rationalism, the kind of standard indicated by his remark, at the end of the Russell paper, that Leibniz' project of the characteristica universalis was not

[9] For further discussion of problems with Gödel's arguments, see Köhler [15, pp.341–386]. We entirely disagree, however, with the positive interpretation developed there, in section 4.3, of Gödel as a conventionalist of a particular kind: we claim this is neither historically nor systematically correct.

utopian. That this standard has not been lowered in the meantime is clear from Gödel's list of fourteen items that comprise his 'philosophical viewpoint', which was probably drawn up around 1960 [97, pp.315–316]. One there finds beliefs such as '3. There are systematic methods for the solution of all problems (also art, etc.).' and '13. There is a scientific (exact) philosophy and theology, which deals with concepts of the highest abstractness' [97, pp.315–316].

Before turning to the nature of Gödel's rationalism, we note that it is clear that at every stage of his thought, rationalism was a core belief of Gödel's—it emerges in almost all of his philosophical conversations, and extensively in his writings, both published and unpublished. Even so, he never argued for it, nor did he go any distance toward offering a critique of the attitude as a whole. If only from his reading of Kant, Gödel will have been aware of the questions concerning the general validity (the transcendental possibility) of science. But pre-phenomenologically, these do not seem to be questions with which Gödel was explicitly preoccupied. In contrast to Platonic realism, which was a conviction (doxa) of Gödel's and therefore in need of proof if it is to count as established (episteme), for Gödel, rationalism as such seems to have required no proof of its own validity.

So what did rationalism amount to for Gödel in the 1950's? In the Gibbs lecture of 1951, when turning to the philosophical implications of his incompleteness theorems, he gives as the reason why his audience 'must not expect these inferences to be drawn with mathematical rigour' that this is 'a consequence of the undeveloped state of philosophy in our days' [26, p.311].[10] Also, Gödel explains at the end of the lecture, 'after sufficient clarification of the concepts in question it will be possible to conduct these discussions with mathematical rigour' [26, p.322]. So Gödel's model for philosophical argumentation was that of mathematics, as it had been for Leibniz. Philosophy should be a demonstrative or deductive science. But then what could a 'philosophical theorem' be like? If the mathematical standards are paradigm, as the language Gödel uses here suggests, then two prominent features of mathematical propositions should be cited. The first is the feature that all the terms occurring in mathematical propositions either have a fixed definition within a (more or less) fixed language, or are primitive terms like 'set'. The other important property mathematical propositions enjoy is that they are attached to transparent verification procedures. Simply put, they are provable in a more or less precise sense of the term 'proof'. Thus, by analogy, philosophical propositions will involve primitive terms, to be arrived at, undoubtably, by a kind of conceptual analysis; moreover these propositions are 'provable' or verifiable via some inferential means. Rationalism

[10]This remark echoes the final paragraph of the Russell paper, e.g., 'How can one expect to solve mathematical problems systematically by mere analysis of the concepts occurring if our analysis so far does not even suffice to set up the axioms?' [25, p.140].

demands that such a notion of philosophical proof be developed; philosophical propositions can then be treated exactly, and conclusions become 'results'.

Much later, Gödel gave the basic picture to Wang in *A logical journey*, naming the important desiderata that the primitive terms should be 'simple', and few in number:[11]

> The beginning of physics was Newton's work of 1687, which needs only very simple primitives: force, mass, law. I look for a similar theory for philosophy or metaphysics. Metaphysicians believe it possible to find out what the objective reality is; there are only a few primitive entities causing the existence of other entities. [97, p.167,5.3.11]

And:

> Philosophy aims at a theory [...] In a theory concepts and axioms must be combined, and the concepts must be precise ones.—Genetics is a theory. Freud only gives a sketch of a developing theory; it could be presented better. Marx gives less of a theory. [97, p.306,9.3.10][12]

To Gödel, then, the (main) difficulty in carrying out the project of philosophy as an exact theory may have been specifying the primitive terms. To Sue Toledo he said in 1972:

> There is a certain moment in the life of any real philosopher when he for the first time grasps directly the system of primitive terms and their relationships. This is what had happened to Husserl [...]

[11]Gödel's emphasis on simplicity has to do with a particular moral and aesthetic view of the world which finds its inspiration in Leibniz, an important issue which we have not pursued in this paper.

[12]The phrase we have omitted from the quotation, 'Phenomenology does not give a theory', we take to mean that phenomenology is primarily a method (to isolate what is intuitively given), and not itself a theory. As Husserl said,

> If philosophy has any stock whatever of "essentially necessary" fundamentals in the genuine sense which, according to their essence, can therefore be grounded only by an immediately presentive intuition, then the controversy concerning them is decided not only independently of any philosophical science, but of the idea of such a science and of the latter's allegedly legitimated theoretical content. [49, p.34] ['Hat überhaupt Philosophie einen Bestand an "prinzipiellen" Grundlagen in dem echten Sinne, die also ihrem Wesen nach nur durch unmittelbar gebende Anschauung begründet werden können, so ist ein Streit, der diese betrifft, in seiner Entscheidung unabhängig von aller philosophischen Wissenschaft, von dem Besitz ihrer Idee und ihres angeblich begründeten Lehrgehaltes' [37, p.41] = [47, p.40]. Gödel owned [37], but the preferred edition is its revision [47]. For convenience, we will always mention the page numbers in both editions.]

Of course, when applying this method one obtains propositions, and it is in this sense that Husserl presents, in section 60 of the *Cartesian meditations*, 'metaphysical results' ('metaphysische Ergebnisse'). See also Brainard's discussion of this point [11, section 2.1].

> The analytic philosophers try to make concepts clear by defining them in terms of primitive terms. But they don't attempt to make the primitive terms clear. Moreover they take the wrong primitive terms, such as 'red' etc., while the correct primitive terms would be 'object', 'relation', 'will', 'good', etc. [92, 3/24/72, pp.1–2]

These remarks to Wang and Toledo were made in the 1970's. It is to be noted that at the earlier stage which is our present concern, the pre-phenomenological stage of the 1950's, Gödel had no concrete method for arriving at what the primitive terms should be; nor is there evident an explicit notion of what a conceptual treatment of them would be like. This had to await 'sufficient clarification'.

Gödel was taken to task over this conception of philosophy by Boolos in his introduction to this lecture:

> The suggestion with which he closes the lecture may seem utterly strange [...] Gödel's idea that we shall one day achieve sufficient clarity about the concepts involved in *philosophical* discussion of mathematics to be able to prove, mathematically, the truth of some proposition in the philosophy of mathematics, however, appears significantly less credible at present than his Platonism. [26, pp.303–304; original emphasis]

An assessment of Gödel's suggestion (particularly in relation to Leibniz' universal characteristic) would have to consider what exactly he meant by 'mathematical rigour'. This will certainly not have been the type of rigour exhibited by formal systems. At the very least such systems will be subject to Gödel's own incompleteness theorems (as Gödel of course knew). Indeed Wang reported Gödel as saying:

> The universal characteristic claimed by Leibniz (1677) does not exist. Any systematic procedure for solving problems of all kinds would have to be nonmechanical. [GN folder 1/209, 013184, p.1]

Gödel, in pencil, amended the first sentence to read

> The universal characteristic claimed by Leibniz (1677) if interpreted as a formal system does not exist.[13]

One might rather think that 'informal rigour', as Kreisel called it, was what Gödel had in mind. And this does not mean the impossibility of Leibniz' characteristic; it just means that, as Gödel said to Carnap in 1948, while the system cannot be completely specific, it may still give sufficient indications as to what is to be done [96, p.174]. This suggests that the system is 'mathematically rigorous' to the extent that its indications are 'sufficient'. Boolos seems to suggest that the characteristica should 'mathematically prove', but that would be asking for too much.

[13]Note that this alteration is not present in the version Wang gives in [97, p.202]. However, Wang mentions the idea in [96, p.174].

Boolos may have been premature in dismissing Gödel's rationalism, but we suggest that in the years following the Gibbs lecture, Gödel himself became aware that he needed a different, deeper notion of rationality. Although Gödel anticipated Husserl in a strong sense in arriving at a version of rationality on his own, still Husserl's notion of 'philosophy as a strict science' [48] went further than the notion Gödel had in the 1950's. Nevertheless it is clearly the 'mature' version of Gödel's view.[14]

2.3. Epistemological parity. We now note another theme underlying Gödel's thinking overall, before as well as after the turn to phenomenology, which functions as a regulative principle and, in particular, qualifies and complicates any 'naïve' realist beliefs he may have had. We will call it here 'epistemological parity': the idea that, regarding physical objects on the one hand and abstract or mathematical objects on the other, from the point of view of what we know about them, there is no reason to be more (or less) committed to the existence of one than of the other. After his turn to Husserl, Gödel will have found Husserl's version of epistemological parity in *Ideas I*:

> No conceivable theory can make us err with respect to the principle of all principles: that every originary presentive intuition is a legitimizing source of cognition, that everything originarily (so to speak, in its 'personal' actuality) offered to us in 'intuition' is to be accepted simply as what is presented as being, but also only within the limits in which it is presented there. We see indeed that each <Theory> can only again draw its truth itself from originary data. Every statement which does no more than confer expression on such data by simple explication and by means of significations precisely conforming to them is [...] actually an absolute beginning called upon to serve as a foundation, a principium in the genuine sense of the word. [49, p.44][15]

[14]A concise encapsulation of how Gödel's concept of rationalism had evolved under Husserl's influence (from 'deciding' philosophical propositions to 'clarifying' them) can be seen from the following note to himself [GN folder 6/43, 060571], likely from after 1961: 'Perhaps phenomenology combined with foundational research will someday ~~decide~~ clarify those questions in an absolutely convincing manner.'

[15]'Am Prinzip aller Prinzipien: daß jede originär gebende Anschauung eine Rechtsquelle der Erkenntnis sei, daß alles, was sich uns in der "Intuition" originär (sozusagen in seiner leibhaften Wirklichkeit) darbietet, einfach hinzunehmen sei, als was es sich gibt, aber auch nur in den Schranken, in denen es sich da gibt, kann uns keine erdenkliche Theorie irre machen. Sehen wir doch ein, daß eine jede ihre Wahrheit selbst wieder nur aus den originären Gegebenheiten schöpfen könnte. Jede Aussage, die nichts weiter tut, als solchen Gegebenheiten durch bloße Explikation und genau sich anmessende Bedeutungen Ausdruck zu verleihen, ist also wirklich [...] ein absoluter Anfang, im echten Sinne zur Grundlegung berufen, principium.' [37, p.52] = [47, p.51]

Gödel's most striking formulation of the view appears in a footnote to the Syntax paper, in the context of arguing against empiricism: 'It seems arbitrary to me to consider the proposition "This is red" an immediate datum, but not so to consider the proposition stating modus ponens.' [26, p.347n.34]

But the principle, in another form, is already in the Russell paper from 1944: 'It seems to me that the assumption of such objects is quite as legitimate as the assumption of physical bodies and there is quite as much reason to believe in their existence.' [25, p.128]. It also continued to preoccupy Gödel through the 1960's, e.g., the idea in some form occurs in a note to himself in the folder titled 'Phil[osophische] Varia' (mostly after 1961):

> It should also be noted that even a statement like 'this is red' *if there is to be a valid motive for making it* presupposes that something besides the independent sense experience is given. [GN folder 12/43, 060572; emphasis ours]

As Gödel explains in the footnote from the Syntax paper that we just quoted, there are varieties of evidence—in the two cases, different types of relations between different types of relata are perceived—but each should be taken as or for what it is. According to Gödel, notwithstanding all the differences, e.g., of meaning, between the two propositions, au fond, they both express perceptions. There is no good reason, then, to accept one as given and not the other. That is to say, the epistemological problems generated by the assumption of the existence of physical objects are neither less nor more problematic than those generated by the assumption of the existence of abstract or mathematical objects. If one adheres to the principle of epistemological parity, then the question how the varieties of evidence and, correspondingly, the varieties of objects they are evidence for, are connected, becomes secondary (a theme echoed much later in Wang's 'substantial factualism', when he tries to make a case for the 'overwhelming importance of existing knowledge for philosophy' by pointing out, among other things, that 'We know more about what we know than how we know what we know' [95, p.1]).

Epistemological parity pulls in the direction of realism as well as of rationalism: acknowledgement of abstract evidence pushes one a certain extent in the direction of realism about abstract objects, and it would be irrational to neglect evidence.

Epistemological parity is related to skepticism. If 'skepticism wishes to avoid dogmatism, the hasty conviction that goes beyond what can legitimately be asserted' [86, p.46], then there are two ways of going beyond what can be legitimately asserted: by asserting too much or by being too restrictive (which is just making too many negative assertions). In Gödel's thinking, both corresponding skeptical forces are at work: against, e.g., empiricism for asserting too little; against naïve Platonism, for asserting more than it can hope to justify rationally. A principle of epistemological parity such as Gödel holds serves as an antidote to both. But precisely to the extent that the principle of epistemological parity is an antidote to various excesses, it is intrinsically a limitative principle: while making the question of a philosophical account of what actually is given more urgent, it does not suggest how to answer it. For that, Gödel had to look elsewhere.[16]

As an aside, we note that epistemological parity must have placed Gödel at odds with the pragmatic and naturalistic turns of philosophy that were made around him. In particular, the principle goes against causal accounts of knowledge as well as of reference, accounts which came to exercise much influence in the philosophy of mathematics (the locus classicus is Benacerraf's 'Mathematical truth' [7]). This influence put realism (in mathematics) under attack. For one may correctly observe that we do not interact causally with mathematical objects; but then, on such accounts, if realism were correct, we could have no knowledge of such objects—which amounts to having no mathematical knowledge. But that would contradict our intuition that we clearly do have such knowledge. Thus realism is untenable. Moreover, Benacerraf asks, if we take causal accounts to be correct for empirical knowledge, how could an account of mathematical knowledge be continuous with our account of empirical knowledge?

It is not the purpose of the present paper to judge causal accounts on their merits; instead, we note that the environment that gave rise to such programs was an uncongenial one for Gödel, and moreover, one which sometimes led to serious misunderstanding of Gödel's outlook. Not only did Gödel not participate in the late 20th century project to carry out the reduction of mathematical terms to the allegedly epistemologically prior domain of empirical terms, because of epistemological parity it could never have been a legitimate project for him in the first place. Also, if it is 'arbitrary'—if there is no good reason, that is—to consider empirical propositions as being more secure than principles like modus ponens, on what basis should we insist that the accounts for the latter kind of knowledge be uniform with accounts of the former?[17]

[16] As Kant wrote in the *Critique of pure reason* (A761/B789), 'Scepticism is thus a resting-place for human reason, where it can reflect upon its dogmatic wanderings and make survey of the region in which it finds itself, so that for the future it may be able to choose its path with more certainty. But it is no dwelling-place for permanent settlement.' [58]; 'So ist der Skeptizismus ein Ruheplatz für die menschliche Vernunft, da sie sich über ihre dogmatische Wanderung besinnen und den Entwurf von der Gegend machen kann, wo sie sich befindet, um ihren Weg fernerhin mit mehrerer Sicherheit wählen zu können, aber nicht ein Wohnplatz zum beständigen Aufenthalte.' [57].

[17] Tait [89, section 7] raises the same objection. Maddy's set theoretic realism, on the other hand, is one attempt to bring mathematical objects 'into the world we know' [73, p.48] by reconstructing the perception of mathematical objects along causal lines. Thus 'set(s) participate in the generation of [. . .] perceptual beliefs in the same way that my hand participates in the generation of my belief that there is a hand before me when I look at it in

In any case, that is Gödel's contemporaries notwithstanding, the letter to Schilpp from 1959 marks a kind of stalemate in Gödel's philosophical evolution: he wishes to retain as much as he can of his earlier realist views, however this became increasingly difficult in view of his other, core, commitments to rationalism and to epistemological parity.

2.4. A way out? Gödel sensed fairly early that there may be a way out of the conflict we have attributed to him. In a letter dated June 30, 1954, to the German immigrant philosopher in the United States, Gotthard Günther, Gödel explained

> The reflection on the subject treated in idealistic philosophy (that is, your second topic of thought), the distinction of levels of reflection, etc., seem to me very interesting and important. I even consider it entirely possible that this is 'the' way to the correct metaphysics. However, I cannot go along with the denial of the objective meaning of thought that is connected with it, ⟦although⟧ it is really entirely independent of it. I do not believe that any Kantian or positivistic argument, or the antinomies of set theory, or quantum mechanics has proved that the concept of objective being (no matter whether for things or abstract entities) is senseless or contradictory.[18] When I say that one can (or should) develop a theory of classes as objectively existing entities, I do indeed mean by that existence in the sense of ontological metaphysics, by which, however, I do not want to say that abstract entities are present in nature. They seem rather to form a second plane of reality, which confronts us just as objectively and independently of our thinking as nature. [27, pp.503,505][19]

a good light' [73, p.58]. Whether or not Maddy is proposing the reduction of mathematical terms to physical ones in that work—and we think it can be argued that she is—we note that her proposal falls into the category of moves to which, we are suggesting, Gödel would have been opposed. We hasten to add that Maddy readily acknowledges this point of disagreement between herself and Gödel, and she is aware that her naturalist interpretation of Gödel's remarks would not have been his own, as we have noted above.

[18] [footnote Gödel] Of course I don't wish by that to claim that naïve thought already grasps objective being correctly on all points, as ontological metaphysics often seems to suppose.

[19] 'Die in der idealist. Phil. behandelte Reflexion auf das Subjekt (d.h. Ihr II Thema d. Denkens), die Unterscheidung von Reflexionsstufen etc. scheint mir sehr interessant u. wichtig. Ich halte es sogar für durchaus möglich, daß dies 'der' Weg zur richtigen Metaphysik ist. Die damit verbundene (in Wahrheit aber davon ganz unabhängige) Ablehnung der objektiven Bedeutung des Denkens kann ich aber nicht mitmachen. Ich glaube nicht, daß irgend ein Kantsches oder positivistisches Argument oder die Antinomien d. Mengenl., oder die Quantenmechanik bewiesen hat, daß der Begriff des objektiven Seins (gleichgültig ob für Dinge oder abstrakte Wesenheiten) sinnlos oder widerspruchsvoll ist. [footnote: Damit will ich natürlich nicht behaupten, daß schon das naive Denken das objektive Sein in allen Punkten richtig erfaßt, wie die ontol. Metaphysik vielfach anzunehmen scheint.] Wenn ich sage, daß man eine Theorie der Klassen als objektiv existierender Gegenstände entwickeln kann

We will come back to this letter more than once. Here, we wish to draw the following conclusion from it: Gödel obviously believes that Platonism should be a consequence of 'the correct metaphysics', and he in addition believes that some form of idealistic philosophy will lead to the correct metaphysics. We reconstruct his reasoning behind this latter suggestion as follows. In so far as a Platonic realm of objects is thought to be problematic, this will not least of all be because of the concomitant epistemological problem how our subjective thought grasps these objective realities. The question of the exact sense of the notion of a Platonic realm is therefore just as much a question of the exact sense of the notion of subjectivity. From this perspective, it is not surprising that Gödel turned to idealism.

Yet in the Gibbs lecture and the Syntax papers, he did not make any effort to argue from idealistic premises. Indeed, at one point in the Gibbs lecture, he says that

> This whole consideration incidentally shows that the philosophical implications of the mathematical facts explained do not lie entirely on the side of rationalistic or idealistic philosophy, but that in one respect they favor the empiricist viewpoint. [26, p.313]

But it should be noted that this remark is put in a different perspective in the footnote added to it:

> To be more precise, it suggests that the situation in mathematics is not so very different from that in the natural sciences. As to whether, in the last analysis, apriorism or empiricism is correct is a different question. [26, p.313n.20]

Unlike the main text, this footnote does not suggest that the philosophical implications support empiricism rather than rationalism or idealism. Be that as it may, the letter to Günther shows that even in 1954 Gödel had yet to find a version of idealism that he found congenial. Pending that, he had to settle for (or continue to employ) a notion of rationality that is not idealistically informed. In this light, Gödel's failure during the 1950's to produce a rational account of Platonism might be taken to indicate the failure of his notion of rationality at the time to be sensitive to the role of subjectivity. What Gödel needed, then, to bridge the gap between his realist convictions and the rational arguments he was able to find to support them, was an account of subjectivity that integrates rationality and Platonism. We will suggest below that this was the issue that provoked his 'conversion' to phenomenology.

(oder soll), so meine ich damit durchaus Existenz im Sinne der ontol. Metaphysik, womit ich aber nicht sagen will, daß die abstrakten Wesenheiten in der Natur vorhanden sind. Sie scheinen vielmehr eine zweite Ebene der Realität zu bilden, die uns aber ebenso objektiv. u. von unserem Denken unabhängig gegenübersteht wie die Natur.' [27, pp.502,504]

§3. Gödel's turn to Husserl's transcendental idealism.

§3. Gödel's turn to Husserl's transcendental idealism. We want to substantiate the claim that what attracted Gödel so much in Husserl's philosophy is the doctrine of transcendental idealism, which Husserl developed after his *Logical investigations*.

3.1. Varieties of idealism. As a first characterization,[20] idealism holds that there exists a non-physical realm of 'the ideal' on which everything that does not belong to it in some sense depends.[21] Idealism, thus understood, is not incompatible with realism and in fact requires it with respect to the realm of the ideal (for example, Plato's idealism involves a realism about Ideas). The notion of the ideal can be construed in a number of ways. Usually, it is related to the mind and its contents; but there are exceptions to this, such as linguistic idealism. Likewise, there are various possibilities for the dependence relation: it may be ontological, epistemological, or conceptual. Thus one obtains a number of varieties of idealism. Our first characterization should be taken as a formal one and is not meant to suggest that these various idealisms are all developments of one basic truth. In order to get a clear view of Husserl's particular version, and on Gödel's approach to it as compared to other idealisms he knew, we provide the following simple taxonomy of idealism as background:

problematic or skeptical idealism: (Descartes) 'the ideal': the ideas in one's mind. They certainly exist, but we cannot be certain that anything external to them exists.

dogmatic idealism: (Berkeley) 'the ideal': the ideas in one's mind. Only they exist, and the existence of anything external to them is illusory.

subjective or formal idealism: (Kant, Fichte) 'the ideal': the forms of our experiences. The mind imposes these forms on the matter of our experiences, and therefore we cannot come to know things in an unmediated way, as things in themselves. Moreover, whatever does not lend itself to being given through those forms, may exist but is beyond our cognitive reach. Kant's specific version is known as 'transcendental idealism'.

objective or absolute idealism: (Schelling, Hegel) 'the ideal': the forms of our experiences. Unlike in subjective idealism, these forms are neither contributed by our minds, nor by the objects of our experiences, but rather are all-pervasive aspects of reality.

linguistic idealism: (Wittgenstein, Quine) 'the ideal': language (or 'grammar'), understood as inherently public. What exists, and what does not, is determined only relative to a language, and in that sense there is no reality independently from language.

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[20] In this section we are much indebted to [5], [98], and the various entries on idealism in [79].

[21] In the literature, there are two terminological traditions. One uses 'ideal' to qualify the objects in the independent realm; the other uses it to qualify the objects that are dependent on that realm. We will adhere to the first usage. Compare, for example, [5, p.6] and [98, p.104].

Husserl's transcendental idealism: 'the ideal': the realm of possible consciousness. Existence (of any particular object) is equivalent to accessibility to a possible subject. We will describe this type of idealism in detail in section 3.3. (Husserl also formulated a stronger version. As we will see in section 3.4, Gödel found that one objectionable.)

3.2. Gödel and German Idealism. A letter from Kreisel to Gödel is a good starting point for obtaining further clarification of the differences between subjective idealism and objective idealism (historically these two positions are known as 'German Idealism'), their position relative to realism, and why they were important to Gödel. On September 6, 1965, Kreisel sent Gödel the manuscript of his contribution to *Bertrand Russell, philosopher of the century* [64]. Concerning a passage in the manuscript on the distinction between realism and objective idealism, in the accompanying letter [GN folder 01/87, 011187.5] he recalls (presumably from their conversations) Gödel's view that the distinction between objective and subjective idealism is of greater philosophical consequence.[22] The passage that Kreisel is referring to is the following:

> There is a *broad* distinction between views which hold that all mathematics is purely 'conventional' or, more precisely, depends on human reactions incapable of *a priori* explanations and those which hold that there is something 'objective' about mathematics [...] It would seem that there are quite basic distinctions between different views of the second kind, for instance those that stress the objective aspects which are *external* to ourselves and those which do not. (Trivially, everything has an aspect not external to ourselves simply by virtue of being perceived and understood.) It might well be that the methods needed to extend known axioms depend on whether or not mathematical objects are (primarily) external to ourselves. [64, p.221]

Kreisel does not use the terms 'realism' and 'objective idealism' here, but he does employ them in his letter when describing the passage. As Frederick Beiser explains it,

> The basic difference between [subjective and objective idealism] is quite straightforward. While subjective idealism attaches the forms of experience to the transcendental subject, which is their source and precondition, objective idealism detaches them from that subject, making them hold for the realm of pure being as such. [5, p.11]

[22]Given the explanation of the contrast that follows, it is not likely that 'objective idealism' here specifically means that of Schelling and Hegel, it seems also to include Husserl's transcendental idealism.

In subjective idealism there is no guarantee that what is a property of our minds also characterizes anything in objective reality outside of it. Objective idealism, on the other hand, agrees with naïve realism to the extent that it locates the forms outside the subject and in that sense conceives of them as aspects of objective reality. This explains Kreisel's observation that for Gödel, the distinction between subjective and objective idealism was more important than that between objective idealism and realism. The two latter strands of thought both have room for the objectivity of mathematics in the strong sense that Gödel cared about. From his point of view, it would not suffice to say, as one should, that mathematical objects are invariants in our (mathematical) experience; for a subjective idealist could say the same. What Gödel wants to accomodate is the idea that these invariants are objective and in no way subjective.[23] From his letter to Günther (quoted in section 2.4), it is clear that, of the two choices mentioned, Gödel opts for a form of idealism, not for realism (in the sense in which it is opposed to idealism as described by Gödel).

According to the letter to Günther, what Gödel finds agreeable in idealism is that it takes the subject into account, but he refrains from embracing it when it denies truth or sense to the notion of objective existence (it is relevant that Gödel explicitly includes abstract objects here). Hegel once stated the problem very clearly:

> But also the objectivity of thought, in Kant's sense, is again itself subjective, in the following way. Thoughts, according to Kant, although universal and necessary determinations, are 'only our' thoughts—separated by an unbridgable gap from the thing as it exists 'in itself'. But the true objectivity of thinking consists in the thoughts being not merely ours, but at the same time being the 'in themselves' of the things and whatever is an object. [29, IV, 2, §41, Zusatz 2; trl. ours][24]

[23] William Howard tells the following story from 1972 or 1973 [84, pp.40–41]:
'Because Gödel had repeatedly asked me to describe my experiences during meditation, I finally suggested that maybe he would like to learn how to do T[ranscendental] M[editation]. He said no, and I asked why not. Gödel replied, "The goal of Maharashi's system of meditation is to erase thoughts, whereas the goal of German idealism is to construct an object."

In saying this, he became quite forceful, holding out his hand—palm and fingers upward—as if he were grasping an object. I think what Gödel meant was that the goal was to build a mental structure. I tried to explain that it was not the purpose of TM to erase thoughts; but his mind was made up.'

The explanation of Gödel's phrase 'constructing an object' here is a delicate matter, and Howard's explanation may not be sufficient; but Gödel's gesture is very telling.

[24] 'Ferner ist nun aber auch die kantische Objektivität des Denkens insofern selbst nun wieder subjektiv, als nach Kant die Gedanken, obschon allgemeine und notwendige Bestimmungen, doch 'nur unsere' Gedanken und von dem, was das Ding 'an sich' ist, durch eine unübersteigbare Kluft unterschieden sind. Dagegen ist die wahre Objektivität des Denkens

Hegel introduced the term ‘subjective idealism’ to describe Kant’s position. In a note on a discussion with Wang [GN folder 1/208, 013171], Gödel contrasted the ‘realism’ of ‘objectivity, Platonism’ with ‘Kantianism’, which is ‘only subj[ective] id[ealism]’.

Gödel considered this denial of objectivity (in this strong sense) the reductio ad absurdum of Kantian idealism, as he wrote in one of his papers on the theory of relativity in the late 1940’s :

> Unfortunately, whenever this fruitful viewpoint of a distinction between subjective and objective elements in our knowledge (which is so impressively suggested by Kant’s comparison with the Copernican system, see below, p.⟦29⟧)[25] appears in the history of science, there is at once a tendency to exaggerate it into a boundless subjectivism, whereby its effect is annulled. Kant’s thesis of the unknowability of the things in themselves is one example. [26, pp.257–258n.27]

There are in fact various interpretations of Kant’s notion of the ‘thing in itself’, according as it is thought of as an independent object or, for example, as a mere (negative) idea of a limit to our knowledge. We see here that Gödel was inclined to accept the first interpretation of Kant. What Kant’s transcendental idealism, thus understood, has in common with, say, Berkeley’s dogmatic idealism, is that according to both there are no things in themselves to be known, because they are out of our cognitive system’s reach, or, respectively, because they do not even exist. A decade later, upon his reading of Husserl, Gödel came to see an alternative. At the end of his paper from around 1961, ‘The modern development of the foundations of mathematics in the light of philosophy’,[26] he writes:

> On the other hand, however, just because of the lack of clarity and the literal incorrectness of many of Kant’s formulations, quite divergent directions have developed out of Kant’s thought—none of which, however, really did justice to the core of Kant’s thought. This requirement seems to me to be met for the first time by

diese, dass die Gedanken nicht bloss unsere Gedanken, sondern zugleich das Ansich der Dinge und des Gegenständlichen überhaupt sind.’

[25]The annotation between brackets is by the editors of [26] and refers to p.29 of Gödel’s manuscript, which is printed on p.258 of [26].

[26]As an aside, we suggest that the views Gödel expounds in this paper on the history of philosophy since the Renaissance and the division of world views according to their optimism or pessimism, where idealism and theology are on the optimistic side, may have been inspired by a paper by Heimsoeth that he knew, ‘Leibniz’ Weltanschauung als Ursprung seiner Gedankenwelt’, [30, esp. pp.370, 372 and 376], and by Heimsoeth’s book *Die sechs großen Themen der abendländischen Metaphysik* [31], on which Gödel made 29 pages of notes, perhaps in 1962 (see p.27), in which one finds ‘p.19–70 = Opt[imismus]-Pess[imismus]’. The notes and the reference to the paper on Leibniz are in ‘idealis[ische] Ph[ilosophie].’ [GN folder 5/23]

> phenomenology, which, entirely as intended by Kant, avoids both the death-defying leaps [salto mortale] of idealism into a new metaphysics as well as the positivistic rejection of all metaphysics. [26, p.387][27]

The 'death-defying leap'[28] is the jump into a boundless subjectivism with, correlatively, an overblown conception of the subject, a conception which has not been arrived at scientifically, that is, a conception that is not founded on intuition (in a technical sense of the word, as in Kantian philosophy or in phenomenology). On the other hand, the 'positivistic rejection of all metaphysics' is motivated by the, according to Gödel, mistaken idea that there is no scientific way to arrive at metaphysics in the first place. Gödel's qualm here is about arriving at metaphysics by a leap of faith, not about metaphysics (in the form of idealism) as such.

3.3. The turn to Husserl's transcendental idealism. The position that Gödel found himself in, then, as far as metaphysics is concerned, was the following. On the one hand, as the letter to Günther shows, Gödel believed that idealism may well be the correct way to metaphysics, and that Kant had the right intentions; on the other hand, he thought that Kant did not work out this intention correctly, and that the forms of idealism he had seen so far were beset by problems of being unscientific and boundlessly subjectivist. These problems are responsible for what we have called the stalemate of the 1950's. We suggest that after that difficult decade he became convinced that there was a cure for these problems, Husserl's phenomenology. Indeed, Gödel's reason for this conviction may well have been that his views on idealism and on the place of Kant were very much those that Husserl had arrived at some five decades before; Husserl had been facing the same problems with them, and seemed to have found a solution.

Husserl confessed in 1915, a decade after his transcendental turn, that 'Mir ist der ganze deutsche Idealismus immer zum K... gewesen'—'German Idealism has always made me want to throw up' [9, p.28]. But Husserl also

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[27]'Anderseits haben aber eben wegen der Unklarheit und im wörtlichen Sinn Unrichtigkeit vieler Kantscher Formulierungen sich ganz entgegengesetzte philosophische Richtungen aus [dem] Kantschen Denken entwickelt, von denen aber keine dem Kantschen Denken in seinem Kern wirklich gerecht wurde. Dieser Forderung scheint mir erst die Phänomenologie zu genügen, welche ganz im Sinne Kants sowohl dieselben Salto mortale des Idealismus in eine neue Metaphysik als auch die positivistische Ablehnung jeder Metaphysik vermeidet.' [26, p.387]

[28]Gödel's term in the German original, 'Salto mortale' will have been a reference to Friedrich Heinrich Jacobi (1743–1819), who argued that in the end all knowledge can only be grounded by making an un-reasonable 'salto mortale' or leap of faith, a leap which he valued positively and considered the proper response to scepticism. The term became famous because of the ensuing 'Pantheism controversy' in which, among others, Jacobi, Mendelssohn, Kant, Herder, Goethe and Hamann took part. See [4, ch.2] for further discussion.

found a way to appreciate it, and by 1919 he had developed the view that, although the idealists lacked the required attitude and methods to turn the fruits of their labour into something of scientific value, they were looking in the right direction:

> Although Kant and the other German Idealists hardly have anything satisfying and defensible to offer by way of a scientifically strict treatment of the motives of inquiry that move them so much, anyone who can really follow and understand these motives and immerse himself into their intuitive content, can be sure that in the idealist systems completely new dimensions of problems come to the fore that are the most radical in philosophy. Only by their clarification and by the development of the specific method required for them can philosophy open the way to its final and highest goals. [51, p.309, trl. ours][29]

The 'dimensions of problems that are the most radical in philosophy' refer to Kant's Copernican turn which characterizes German Idealism, and which according to Husserl ultimately leads to his notion of transcendental subjectivity; and by the 'specific method required for them' Husserl of course meant his own transcendental phenomenology. A formulation by Husserl that Gödel will have seen before 1961, because it is in *Ideas*, which we think is among the first of Husserl's works that he read,[30] is

> Accordingly, it is understandable that phenomenology is, so to speak, the secret nostalgia of all modern philosophy [...] And then the first to correctly see it was Kant, whose greatest intuitions become wholly understandable to us only when we have obtained by hard work a fully clear awareness of the peculiarity of the province belonging to phenomenology. It then becomes evident to us that Kant's mental regard was resting on that field, although he was still unable to appropriate it or recognize it as a field of work pertaining to a strict science proper. [49, p.142, trl. modified][31]

[29]'Mochten Kant und die weiteren deutschen Idealisten für eine wissenschaftlich strenge Verarbeitung der sie machtvoll bewegenden Problemmotive auch wenig Befriedigendes und Haltbares bieten: die diese Motive wirklich nachzuverstehen und sich in ihren intuitiven Gehalt einzuleben vermögen, sind dessen sicher, daß in den idealistischen Systemen völlig neue, und die allerradikalsten Problemdimensionen der Philosophie zutage drängen und daß erst mit ihrer Klärung und mit der Ausbildung der durch ihre Eigenart geforderten Methode der Philosophie ihre letzten und höchsten Ziele sich eröffnen.'

[30]From his notes, it is clear that Gödel read Husserl's texts mainly in the Husserliana series; by 1961, eight volumes had appeared, of which *Ideas I* was the third [37].

[31]'So begreift es sich, daß die Phänomenologie gleichsam die geheime Sehnsucht der ganzen neuzeitlichen Philosophie ist [...] Und erst recht erschaut sie Kant, dessen größte Intuitionen uns erst ganz verständlich werden, wenn wir uns das Eigentümliche des phänomenologischen Gebietes zur vollbewußten Klarheit erarbeitet haben. Es wird uns dann evident, daß Kants Geistesblick auf diesem Felde ruhte, obschon er es sich noch nicht zuzueignen und es als

And Gödel probably also saw p.287 of volume 1 of *Erste Philosophie* (*First philosophy*) [39], on which there are reading notes in GN folder 5/22, and which appeared in the Husserliana in 1956, where transcendental phenomenology is described as 'an attempt to realize the deepest meaning of Kant's philosophizing';[32] and p.181 of the second volume [41], which appeared in 1959, where Husserl, speaking of transcendental idealism, writes that 'phenomenology is nothing but the first strictly scientific form of this idealism'.[33] It was only after his transcendental turn that Husserl came to say that Kant and he share deep philosophical intentions;[34] so the fact that Gödel in his paper from around 1961 [26, pp.374–387], writing just two or three years after beginning his study of phenomenology, describes the relation between Kant and Husserl in a very similar way, namely by saying that the latter is the first to realize the true intentions of the former, shows his specific interest in Husserl's transcendental idealism.

What Husserl found particularly troublesome in the German Idealists' methodology is that they allowed themselves to build castles prior to checking the ground. Their philosophies are grand systems, yet not systematic in the required sense, as their beginnings and first principles, even if there is a grain of truth in them, come out of the blue. According to Husserl, all knowledge, however, should be rooted in intuition; it should not be somehow 'deduced' from principles that are not themselves given in intuition. Husserl here employs Kant's dictum 'thoughts without content are empty' [58, A51/B75][35] against Kant himself. Gödel agreed with Husserl here; when Wang, in one of the drafts for his book *From mathematics to philosophy*, wrote

> One aspect of structural factualism is to take the idea of reflection seriously. It seems to follow that we should pay sufficient attention to the data on which we are to reflect and not to philosophize over thin air. [GN box 20: '*From mathematics to philosophy*, II Fassung, 1–30 and Introduction', p.6]

Gödel added a footnote to 'over thin air' saying that Kant 'gets the categ[ories] out of thin air', and wrote next to Wang's last line, 'Husserl'.

It is now clear that Gödel's criticism of Kant, 'A thorough beginning is better than a sloppy architectonic' [97, p.171], is equally a recommendation

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Arbeitsfeld einer eigenen strengen Wesenswissenschaft nicht zu erkennen vermochte.' [37, p.148] = [47, p.133]

[32]'ein Versuch [...], den tiefsten Sinn Kant'schen Philosophierens wahrzumachen'.

[33]'die ganze Phänomenologie [ist] nichts anderes als die erste streng wissenschaftliche Gestalt dieses Idealismus'.

[34]For examples from correspondence and work, see [60, pp.28–33].

[35]'Gedanken ohne Inhalt sind leer' [57, A51/B75].

of Husserl. And Gödel probably thought the same about the other idealists.[36] Indeed, again in full agreement with Husserl, he said that 'Idealistic philosophers are not able to make good ideas precise and into a science.' [97, p.168]

Gödel reaffirms his belief in transcendental idealism in a draft letter to Gian-Carlo Rota from 1972:[37]

> I believe that his [i.e., Husserl's] transc[endental] phen[omenology], carried through, would be nothing more nor less than Kant's critique of pure reason transformed into an exact science, except for the fact that[V] the result (of the 'critique') would be far more favourable for human reason [GN folder 1/141, 012028.7]

adding in a footnote that

> [V]Kant's subjectivism & negativism for the most part would be eliminated

We already saw that, according to Gödel, this 'negativism'—the unknowability of things in themselves—and 'subjectivism'—resulting in a notion of objectivity as contingent upon the peculiarities of the human mind—do not lead to the correct metaphysics. Husserl's transcendental idealism, on the other hand, he thinks will lead to a 'perfectly consistent metaphysics', and in another footnote in this draft letter to Rota, Gödel says that 'There is no reason why this metaph[ysics] should not be objectively true'. Such a metaphysics is exactly the goal Husserl set in his lecture series from 1907

[36]It seems that Gödel made a much more intensive study of German Idealism than Husserl ever had; compare the amount of material in the relevant folders in the Gödel *Nachlaß* [GN folders 5/16,5/17,5/18, and 5/23] with the remark by Boehm [9, p.50n.1]. (Boehm is of course right when he goes on to point out that lack of direct acquaintance with a body of philosophical work does not imply a judgment on the quality of one's critique of it.) In passing, we note that Gödel closely studied the section '<Kant und die Philosophie des Deutschen Idealismus>' ('<Kant and the philosophy of German Idealism>') in Husserl's *First philosophy* [39, p.395ff]. Conversely, Husserl was well-read on British empiricism, of which in particular Hume was important to him: Hume's *Treatise on human nature* is the most heavily annotated book in Husserl's library, and Husserl, in his transcendental phase, has a very high opinion of Hume (e.g., [38, p.91], [39, pp.156–157]). Gödel, on the other hand, seems never to have studied the British empiricists that carefully. Robin Rollinger pointed out to us that this means that, via Husserl, Hume had a considerable *indirect* influence on Gödel. Indeed, Köhler [15, pp.359–360] has drawn attention to the similarity of two passages in Gödel and Hume.

[37]This draft is a reply to Rota's review of Husserl's *The crisis of the European sciences and transcendental phenomenology* [38], intended for Scientific American, sent to Gödel by Rota on July 11, 1972. It must have been written somewhere in the period July–September 1972, as Gödel sent the final version (omitting the passages we quote) on September 15, 1972 [GN folder 1/141, 012030]. Incidentally, that final version differs in letter but not in spirit from Rota's rendition of it in [80], a circumstance that Rota hints at by next presenting as a quotation what is really a gloss on the final paragraph of Gödel's paper from around 1961 [26, pp.374–387].

that introduced his transcendental idealism and was titled *The idea of phenomenology*:

> What is required is a science of what exists in the absolute sense. This science, which we call metaphysics, grows out of a 'critique' of positive knowledge in the particular sciences. It is based upon the insight acquired by a general critique of knowledge into the essence of knowledge and known objectivity according to its various basic types, that is, according to the various basic correlations between knowledge and known objectivity. [53, p.19][38]

Gödel was acquainted with the text and considered it, as one can see on one of his bibliographical *Zettel*, a 'momentous lecture' [GN folder 5/22, 050110]. This assessment is indicative of the relief Gödel must have felt at finding that, instead of seeing his philosophical game end in a stalemate, there was a move to be made after all.

What Husserl had come to see in those lectures of 1907 is that there is a necessary correlation between things in themselves and consciousness, in such a way that the latter is open to the former. We take the key formulation to be the one in *Ideas I* of 1913, which was a further development of the 1907 lectures:

> Of essential necessity (in the Apriori of the unconditioned eidetic universality) to every 'truly existing' object there corresponds the idea of a possible consciousness in which the object itself is seized upon originarily and therefore in a perfectly adequate way. Conversely, if this possibility is guaranteed, then eo ipso the object truly exists. [49, p.341][39]

This correspondence is at the heart of Husserl's version of idealism. The thinking that led him to assert this correlation may be summarized as follows.

Husserl held that it makes no sense to assert the existence of a certain object if one at the same time holds that this object is in no way accessible to any possible consciousness. Kant in fact agreed with this. The specific ingredient that gives Husserl's transcendental idealism its power in ontological matters (or, alternatively, its hubris) is that it holds that there is an essence of mind. Husserl's idea here is that minds in their full concreteness may be very

[38]'Es bedarf einer Wissenschaft vom Seienden in absolutem Sinn. Diese Wissenschaft, die wir Metaphysik nennen, erwächst aus einer "Kritik" der natürlichen Wissenschaften auf Grund der in allgemeinen Erkenntniskritik gewonnenen Einsicht in das Wesen der Erkenntnis und der Erkenntnisgegenständlichkeit nach ihren verschiedenen Grundgestaltungen, in den Sinn der verschiedenen fundamentalen Korrelationen zwischen Erkenntnis und Erkenntnisgegenständlichkeit.' [36, p.23]

[39]'Prinzipiell entspricht (im Apriori der unbedingten Wesensallgemeinheit) jedem "wahrhaft seienden" Gegenstand die Idee eines möglichen Bewusstseins, in welchem der Gegenstand selbst originär und dabei volkommen adequat erfaßbar ist. Umgekehrt, wenn diese Möglichkeit gewährleistet ist, ist eo ipso der Gegenstand wahrhaft seiend.' [37, 349] = [47, 329]

different from each other, but they are essentially the same or they wouldn't all be minds. This means that if, by reflecting on our human minds, we come to know certain essential properties of them, we can then make judgments that hold for any kind of mind, even God's. Running ahead of things, we mention here that Leibniz, in the preface to his *Theodicy*, says that 'the perfections of God are those of our souls, but he possesses them in boundless measure' [trl. [71, p.111]].[40] Here Kant disagreed, he thought that different minds need not be essentially the same; in particular, he postulated the existence of a mind called the intellectus archetypus—God's mind—which was able to see things as they are in themselves, which, according to Kant, we humans cannot. This move was unacceptable to Husserl, as it is not possible for us to have intuitions of such different minds, precisely because of the fundamental difference. Again, we see Husserl proving himself to be more Kantian than Kant. This must have been one of Gödel's reasons to conclude, in his paper from around 1961, that Husserl is the real Kant [26, p.387].

For Husserl, then, when I correctly take something to be objectively existing, I grasp the accessibility of that object to a possible mind, and, Kant notwithstanding, 'a possible mind' here must mean 'a variation on my mind such that the essential properties are the same'. In other words, a possible mind in the required sense is a modalization of my own concrete subjectivity. Thus understood, objectivity ultimately refers back to my own concrete subjectivity; while I do not create the object, I do create my awareness of it as something objective. Notice how Gödel already in the letter to Günther (quoted in section 2.4), so before studying Husserl, said of reflection on the subject that he considered it 'entirely possible that this is "the" way to the correct metaphysics'; and he expressed a conviction that, in choosing this way to metaphysics, one does not prejudge the issue of objective existence, even though some well-known varieties of idealism, such as Kant's, do: 'the denial of the objective meaning of thought that is connected with [idealistic philosophy] [...] is really entirely independent of it'. For in Husserl, Gödel found an idealistic philosophy that does not deny the objective meaning of thought. In his draft letter to Rota, Gödel strengthened his claim for the powers of reflection by asserting that 'by introspective analysis of the principles of our thinking one arrives by nec[essity] to [sic] a certain *perfectly consistent* metaphysics' (emphasis Gödel's).

Husserl seems to have found a way to do justice both to what is valid in idealism and to what is valid in realism; he denied the validity of each as a whole, but claimed that his transcendental idealism includes what is correct in them. From realism, he accepted that objects are not created by our consciousness, but rejected the idea that the objects are independent in the strong sense of being unknowable things in themselves. Instead of

[40]'Les perfections de Dieu sont celles de nos âmes, mais il les possède sans bornes' [68, p.469].

the principled disconnectedness implied by that notion, Husserl distances himself from Kant and offers his correlation thesis, which is the specifically idealistic element in Husserl's transcendental idealism. However, at the same time he rejects the idea that accessibility must mean accessibility to any particular subject at any particular time, because the thesis is formulated in terms of a *possible* consciousness; thus he avoids Berkeleyan idealism as well.

We are aware that Husserl in 1934 wrote to Abbé Baudin that 'No ordinary "realist" has ever been as realistic and concrete as I, the phenomenological "idealist" (a word which by the way I no longer use)' [trl. Føllesdal's, [26, p.369n.d]][41] We interpret this, following Kern [60, p.276], as follows. Husserl repeatedly saw himself confronted with assimilations of his type of idealism to one of the more traditional ones. To discourage that, in the 1930's he came to discontinue his use of that term; however, it would still be applicable.

Husserl's claim in his letter to Baudin is that, by seeing the correlation that defines his idealism, he has a fuller and in that sense more realistic picture of reality than ordinary realists have. This fuller picture embodied for Gödel a solution of scientific value to a problem of long-standing interest to him. As we suggested above, Gödel needed, in order to bridge the gap between his realist convictions and the rational arguments he was able to find in support of them, an account of subjectivity that integrates rationality and Platonism; put differently, he needed a rational account of how abstract objects are accessible to our consciousness. Transcendental phenomenology bridges this gap. Through its correlation thesis it connects consciousness and existence of the objects; at the same time, it connects consciousness and rationality, by conceiving of rationality (or reason) as a predicate earned by consciousness when it proceeds correctly, that is, motivated by evidence of the kind appropriate to the objects it is investigating, thereby obtaining further evidence. In §23 of the *Cartesian meditations*, Husserl says that 'Reason refers to possibilities of verification; and verification refers ultimately to making evident and having evident' [43, p.57].[42] As Marcus Brainard has put it, for Husserl, 'reason is nothing separate from consciousness; it is not a subject or a substance, but rather something that belongs intimately to consciousness. But then not as a faculty in the classical sense. Rather, as something predicated of consciousness. Hence it is more appropriate to speak of "rationality" (Vernünftigkeit) than of "reason" [Vernunft] inasmuch the former term emphasizes the predicative nature of reason in *Ideas I*' [11, p.203]. By thus relating, on the one hand, existence to consciousness and, on the other, consciousness to reason, transcendental phenomenology

[41]'Kein gewöhnlicher "Realist" ist je so realistisch und so concret gewesen als ich, der phänomenologische "Idealist" (ein Wort, das ich übrigens nicht mehr gebrauche)' [52, VII, p.16].

[42]'Vernunft verweist auf Möglichkeiten der Bewährung, und diese letztlich auf das Evident-Machen und Evident-Haben'. [35, p.92].

by transitivity establishes the connection between existence and reason which had been missing in Gödel's notion of rationality in the 1950's, a lack that had led him to what we have called, in section 2, the stalemate.

Husserl saw his philosophy as the 'method by which I want to establish, against mysticism and irrationalism, a kind of super-rationalism which transcends the old rationalism as inadequate and yet vindicates its inmost objectives' [87, p.78].[43] (Compare Gödel's use of the term 'superknowledge' as the goal of phenomenology [97, p.167], and of 'superscience' to describe knowledge that he thought Kant privately had [97, p.166].) What enables Husserl to transcend the old rationalism is his insight how transcendental subjectivity relates existence to reason, in the way that we just sketched:

> Phenomenology as eidetic is [...] rationalistic; it overcomes restrictive and dogmatic rationalism, however, through the most universal rationalism of inquiry into essences, which is related uniformly to transcendental subjectivity, to the I, consciousness, and anything objective of which I am conscious. [61, p.321, trl. modified][44]

We have argued that Gödel's aim in his study of Husserl was to find, by such 'inquiry into essences', a deeper notion of rationality. This thesis is corroborated in Gödel's draft letter of 1969 to I. Shenker of the New York Times. He there says that his 'primary interest' from 1959—the year he begun his study of Husserl—to 1969 has been 'the problem of reason & the philosophical preparations for it' [GN folder 2/50, 020971]. In particular, Gödel saw he could work on this problem from the point of view of transcendental idealism, as opposed to Husserl's earlier version of phenomenology. In fact, Husserl himself made his breakthrough to transcendental phenomenology after a period of severe depressions during which he confessed, in posthumously published personal notes, that

> Until I have sorted out, in outline, the sense, essence, methods, and main points of a critique of reason, until I have devised, designed, established and founded a general blueprint of it, I will not be able to live genuinely and truthfully. [40, p.297, trl. ours][45]

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[43] Gödel will have read this in the 1965 edition of [87], where it occurs on p.84. The passage is from a letter from Husserl to Lévy-Bruhl, March 11, 1935: 'die Methode [...] durch die ich gegen den schwächlichen Mystizismus und Irrationalismus eine Art Überrationalismus begründen will, der den alten Rationalismus als unzulänglich überschreitet und doch seine innerste Intentionen rechtfertigt.' [52, VII, p.164].

[44] 'Die Phänomenologie als Eidetik [...] ist rationalistisch; sie überwindet aber den beschränkten dogmatischen *Rationalismus* durch den universalsten der auf die transzendentale Subjektivität, auf Ich, Bewußtsein und bewußte Gegenständlichkeit einheitlich bezogenen Wesensforschung.' [42, p.301]

[45] 'Ohne in allgemeinen Zügen mir über Sinn, Wesen, Methoden, Hauptgesichtspunkte einer Kritik der Vernunft ins Klare zu kommen, ohne einen allgemeinen Entwurf für sie

These lines were written on September 25, 1906; the lecture series *The idea of phenomenology*, held between April 26 and May 2 of the next year, marked the beginning of transcendental phenomenology and, as part of that, of a critique of reason, which had been lacking in Husserl's earlier work, notably the *Logical investigations*.

In the Fall of 1909 Husserl discovered the 'absolute time-constituting flow' of consciousness and, correlatively, the 'absolute self'. With this he arrived at a thick notion of self, one that in the *Logical investigations* he had still claimed he could not find.[46] It allowed him to fill in some of the details of the notion of subjectivity implied by the transcendental turn as documented in *The idea of phenomenology*. To Sue Toledo, Gödel commented

> Husserl's philosophy is very different before 1909 from what it is after 1909. At this point he made a fundamental philosophical discovery, which changed his whole philosophical outlook and is even reflected in his style of writing. He describes this as a time of

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ausgedacht, entworfen, festgestellt und begründet zu haben, kann ich wahr und wahrhaftig nicht leben.'

[46]Concerning this, Gödel marked some of the relevant passages in his own copy of the *Logical investigations*. This was a 1968 reprint of the second (B1) edition; it had not appeared in the Husserliana series yet. Before 1968 he must have studied a copy of another edition. In his own copy, the footnote on p.354 to the last line of §4, is marked by a large exclamation mark on the left, and underlined as follows:

> Die sich in diesem Paragraphen schon aussprechende Opposition gegen die Lehre vom "reinen" Ich billigt der Verf., wie aus den oben zitierten *Ideen* ersichtlich ist, nicht mehr. (vgl. a.a.O., §57, S. 109; §80, S.159.) [The opposition to the doctrine of a "pure" ego, already expressed in this paragraph, is one that the author no longer approves of, as is plain from his *Ideas* cited above. [44, p.542n.1]]

Correspondingly, on the preceding page (353),

> Das phänomenologisch reduzierte Ich ist also nichts Eigenartiges, das über den mannigfaltigen Erlebnissen schwebte, sondern es ist einfach mit ihrer eigenen Verknüpfungseinheit identisch. [The phenomenologically reduced ego is therefore nothing peculiar, floating above many experiences: it is simply identical with their own interconnected unity. [44, p.542n.1]]

is marked by a large question mark in the margin. And a passage in *Ideas I* is underlined as follows:

> In den "Log. Unters." vertrat ich in der Frage des reinen Ich eine Skepsis, die ich im Fortschritte meiner Studien nicht festhalten konnte. Die Kritik, die ich gegen Natorps gedankenvolle "Einleitung in die Psychologie" richtete (II^1, S. 340f.), ist also in einem Hauptpunkte nicht triftig. [37, p.138] = [47, p.124] [In the *Logische Untersuchungen* [*Logical investigations*] I advocated a skepticism with respect to the question about the pure Ego, but which I could not adhere to as my studies progressed. The criticism which I directed against Natorp's thoughtful *Einleitung in die Psychologie* [*Introduction to psychology*] is, as I now see, not well-founded in one of its main contentions. [49, p.133]]

On p.4 of the first four inside pages of his copy of *Ideas I*, among the notes is one in which Gödel refers to this footnote.

> crisis in his life, both intellectual and personal. *Both* were resolved by his discovery. [92, 3/24/72, p.1; original emphasis]

In a similar comment to Wang, Gödel concludes that

> At some point in this period, everything suddenly became clear to Husserl, and he did arrive at some absolute knowledge.[47] [97, p.169]

In these comments to Toledo and Wang, Gödel must be reporting on his reading of Husserl's posthumously published notes.[48]

Husserl indeed came out of his deep depression and in 1911 (10 years after the publication of the *Logical investigations*) wrote, in a letter to the neo-Kantian Hans Vaihinger,

> I am working, for the tenth year already, with all my powers, on a systematic foundation of phenomenology, or rather, on the phenomenological theory and critique of all reason. I believe I have overcome the main difficulties. [52, V, p.206, trl. ours][49]

Consistent with Gödel's high opinion of *The idea of phenomenology* and his conviction that with the subsequent discovery of the absolute self, Husserl had arrived at some absolute knowledge, Husserl's key publications, according to Gödel, are from after Husserl's transcendental turn. Wang reports

> Gödel told me that the most important of Husserl's published works are *Ideas* and *Cartesian meditations* (the *Paris lectures*): 'The latter is closest to real phenomenology—investigating how we arrive at the idea of self' [97, p.164].[50]

Husserl found the absolute self when he took up his earlier analyses of time again, now from his recently won transcendental point of view. Accordingly, Gödel suggested to Toledo

> Perhaps the best would be to repeat [Husserl's] investigation of time. [92, 3/24/72, p.3][51]

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[47] On the other hand, at one point Gödel said to Wang that 'Husserl aimed at absolute knowledge, but so far this has not been attained.' [97, p.291]

[48] For an intellectual-psychological biography of Husserl, see [99].

[49] 'Ich arbeite, nun schon das zehnte Jahr, mit Aufwand aller Kräfte an einer systematischen Begründung der Phänomenologie, bzw. der phänomenologischen Theorie und Kritik der gesammten Vernunft. Ich glaube, die wesentlichen Schwierigkeiten überwunden zu haben.'

[50] Incidentally, the *Paris lectures* and the *Cartesian meditations* are not the same work; the latter is a much worked out version of the former. They are, however, published together in Husserliana, *Cartesianische Meditationen und Pariser Vorträge* (1950) [35], which Gödel owned. Perhaps Gödel mentioned this title to Wang and the 'und' got lost in the notetaking.

[51] Gödel continues:

> At one point there existed a five hundred page manuscript on this investigation (mentioned in letters to Ingarden, with whom he wished to publish the manuscript). This manuscript has apparently been lost, perhaps when Husserl's works were taken to Louvain in 1940. It is possible that this and other works were removed.

3.4. Gödel's criticisms of Husserl's idealism. Given the above, at first sight Wang's (early) suggestion that Gödel 'probably did not accept Husserl's emphasis on subjectivity' [96, p.122] seems implausible. However, there is a grain of truth in it. When Husserl reached the view that the objective for its existence is dependent on the subjective, he introduced an ontological asymmetry that Gödel did not approve of. Here are two examples of Gödel's objecting to it.

First, a remark recorded by Sue Toledo in 1972. It concerns Husserl's *Formal and transcendental logic* [46], which appeared in between the two works he recommended to Wang as Husserl's most important, *Ideas I* and the *Cartesian meditations*. Gödel said:

> [Husserl's] 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. [92, 3/24/72, p.6; original emphasis]

On the page mentioned (p.212 in the original publication, pp.246–247 in [46]), Husserl explains objectivity as 'what is there for everyone, legitimated as what it is in an intersubjective sharing of knowledge'.[52] It is possible to read this as suggesting that the notion of objectivity is exhausted by that of (maximal) intersubjective agreement. According to Gödel, however, there should also be something which is given, something which goes beyond the merely subjective. As he said to Wang,

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(see also Wang [97, p.320]) Gödel has made similar remarks about manuscripts disappearing, e.g., some of Leibniz', which have sometimes been dismissed as symptoms of a possible mental instability on Gödel's part. But in this case, Gödel was completely correct, and by way of proof he pointed Sue Toledo [92, p.9] to the following statement of Husserl's former student Roman Ingarden from 1962:

> Thus in 1927 Husserl proposes to me also that I should 'adjust' a great bundle of manuscripts (consisting probably of 600–700 sheets of paper) on the original constitution of time, which he had written in Bernau in 1917-1918. He gave me a completely free hand with the editing of the text, his only condition being that the work should be published under our two names. I could not, however, accept his proposition, first of all because I was convinced that Husserl would have done the work much better himself at the time. To tell the truth, I now regret my decision. Judging by what he told me on the context of his study, it was certainly his most profound and perhaps most important work [...] As it happened, the work has not been edited at all, and what is worse nobody seems to know where the manuscript is. [56, p.157n.4]

Apparently unbeknown to Ingarden, after his declining Husserl's proposition, the task was accepted by Husserl's assistant Eugen Fink. However, he hardly worked on it and in 1969 he gave the manuscript to the Husserl Archive in Leuven. It was published only in 2001 [54].

[52] ' "objektive", in jenem Sinn der für Jedermann daseienden, sich als wie sie ist in intersubjektiver Erkenntnisgemeinschaft ausweisenden.' [46, p.247]

> What is subjective, even with agreement, is different from what is objective, in the sense that there is an outside reality corresponding to it. One should distinguish questions of principle from questions of practice: for the former, agreement is of no importance. [97, p.171]

We note that on p.233 (p.270 in [46]) on the other hand, Husserl speaks of objectivity purely in terms of the correlation thesis; and from Gödel's reading notes [GN folder 5/22, 050099] it is clear that he knew that passage as well.

The second example concerns a passage in Husserl's *Ideas I* that is quoted by Weyl on p.292 of his paper 'Insight and reflection' [101].[53] Gödel marked and partly underlined it on the reprint that he owned [GN box 20, no separate folder]:

> All real entities are entities of the intellect. Intellectual entities presuppose the existence of a consciousness which assigns them their meaning and which, in turn, exists absolutely and not as the result of assigned meaning.

Gödel may have noted that this translation of the beginning of §55 of *Ideas I* is not particularly accurate. The German reads:

> Alle realen Einheiten sind 'Einheiten des Sinnes'. Sinneseinheiten setzen [...] sinngebendes Bewußtsein voraus, das seinerseits absolut und nicht selbst wieder durch Sinngebung ist. [37, p.134] = [47, p.120]

In the original German article, of which Gödel read an English translation, Weyl quotes this correctly. The more careful translation by F. Kersten reads

> All real unities are 'unities of sense'. Unities of sense presuppose [...] a sense-bestowing consciousness which, for its part, exists absolutely and not by virtue of another sense-bestowal. [49, pp.128–129]

Be that as it may, his remark to Toledo just quoted convinces us that, when Gödel annotated, in Gabelsberger, the quotation in Weyl's paper by 'falsch' ('wrong'), this was not on account of the translation. As remarked by Iso Kern [60, p.280], while Husserl's thesis of a correlation of being and consciousness does mean that all being is in principle accessible to consciousness, it does not imply that being is ontologically dependent on consciousness. To assent to that dependence is a further step that Husserl took. With this step, Alfred Schutz noted, 'the idea of constitution has changed from a clarification of sense structures, from an explanation of the sense of being, into the foundation of the structure of being; it has changed from explication to creation' [83, p.83]. In terms of our characterization of idealism in section 3.1, Kern and Schutz point out that Husserl changed his dependence relation. It

[53] For an account of the later Weyl's disagreements with Husserl, see [6].

is outside the scope of this paper to discuss Husserl's reasons for doing this, and we confine ourselves to noticing that Gödel was not prepared to follow Husserl in that direction. In this respect, Gödel will have preferred Husserl's conception in *The idea of phenomenology* over that in *Ideas I*.

§4. How is the turn related to Leibniz?

4.1. Phenomenology as a methodical monadology. Where Gödel's fascination with Leibniz originated is hard to gauge. The earliest evidence of Gödel's study of Leibniz that we have found is a library slip from 1929 [GN folder 5/54, 050173] requesting volumes of Gerhardt's edition of Leibniz [69]. Karl Menger mentions that Gödel had begun to concentrate his philosophical studies on Leibniz in the early 1930's [62, p.69]. On the other hand, in one version of his reply to the Grandjean questionaire, Gödel says that 'the greatest phil[osophical] infl[uence] on me came from Leibniz which I studied about 1943–1946' [96, p.19].[54] Perhaps, on Gödel's view, some of his encounters with Leibniz had more influence on him than others. The first (and only) published avowal of his Leibnizian views are the striking remarks at the end of the Russell paper from 1944. The fact that Gödel had come to accept, well before he took up the study of phenomenology, fundamental tenets of Leibniz' philosophy, will provide, when considered in combination with his view on the relation between Leibniz and Husserl, an important clue as to what Husserl had to offer him.

We begin by repeating this remark of Gödel's to Wang:

> Gödel told me that the most important of Husserl's published works are *Ideas* and *Cartesian meditations* (the *Paris lectures*): 'The latter is closest to real phenomenology—investigating how we arrive at the idea of self' [97, p.164].

The emphasis that Gödel put here on the idea of self points to his interest in Leibniz, in particular the latter's 'monadology', a term that Gödel borrowed to describe his own philosophy to Wang as late as 1976 [97, p.309].

It has been reported by Wang [97, p.166] that 'Gödel's own main aim in philosophy was to develop metaphysics—specifically, something like the monadology of Leibniz transformed into an exact theory—with the help of phenomenology'. Gödel considered such a reading of phenomenology to a large extent historically justified: 'Metaphysics in the form of something like the Leibnizian monadology came at one time closest to Husserl's ideal' (quoted in [97, p.170]). The quotation continues, 'Baumgarten [1714–1762] is better than Wolff [1679–1754]'. This probably refers to the fact that the Leibnizian philosopher Christian Wolff and his influential school

[54] In a letter to Gödel of July 26, 1954 [GN folder 1/141, 011919], Nicholas Rescher recalls that as a Princeton graduate student he had noticed that Gödel borrowed most of the books on Leibniz available at the Firestone Library at some point between 1946 and 1948.

downplayed the importance of the monadology in its original sense and revised it into oblivion, the exception being his student Alexander Gottlieb Baumgarten, who tried to restore and develop it [16]. Thus there arose two tendencies of unequal strength, one to take the monadology as an attempt at the true metaphysics, the other to take it as misguided or, at best, an attempt at poetry. Husserl and Gödel clearly showed the first tendency.[55]

Gödel's claim that something like the Leibnizian monadology came at one time closest to Husserl's ideal is easily supported. In a letter of January 5, 1917, to his former student, the Leibniz scholar Dietrich Mahnke,[56] Husserl confessed that 'I am, in fact, a monadologist myself'.[57] When Husserl made this remark, he had just begun to think of his own phenomenology as a monadology (1914 [12, p.143]), and he continued to do so for the rest of his life.[58] In his lectures from 1923, *First philosophy*, he said:

> Leibniz, in his brilliant insight of a theory of monads meant that everything that is can in the final analysis be reduced to monads [...] It may well be that in the end, a world view founded by a transcendental philosophy simply demands exactly such an interpretation. [trl. ours][59]

In passing, we mention that the 'world view' ('Weltbetrachtung') is echoed in Gödel's statement 'Husserl used Kant's terminology to reach, for now, the foundations and, afterwards, used Leibniz to get the world picture' (quoted in [97, p.166]). We also note that Gödel made detailed notes on these lectures [GN folder 9/22], of which the historical part was published in 1956. To return to Husserl, at the end of the same lectures, he said

> This way, phenomenology leads to the monadology that Leibniz in a stroke of genius anticipated. [trl. ours][60]

Although Husserl credits Leibniz for his insights, he faults him for not working them out systematically. To Mahnke, Husserl writes about Leibniz,

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[55]We are thankful to Arthur Collins for urging us to be explicit about these two contrary tendencies.

[56]Mahnke had studied mathematics with Hilbert and philosophy with Husserl in Göttingen from 1902 till 1906. He obtained his Doktorat in 1922 with Husserl in Freiburg, and his Habilitation in Greifswald in 1926. In 1927 he succeeded Heidegger in Marburg, when the latter came to Freiburg to succeed Husserl. In 1939, he died in a car accident. [20, pp.323–325], [52, III, pp.453,457]

[57]'Ich selbst bin eigentlich Monadologe.' [52, III, p.408]

[58]Of the literature on this connection, we would in particular like to mention [12], [21], [19] and [20].

[59]'Leibniz meinte in seinem genialen Aperçu einer Monadenlehre: nach seinem letzten wahren Sein reduziere sich alles Seiende auf Monaden [...] Es könnte am Ende sein, daß eine transzendental-philosophisch begründete Weltbetrachtung gerade eine solche oder ähnliche Interpretation als schlechtsinnige Notwendigkeit forderte.' [39, pp.71–72]

[60]'So führt die Phänomenologie auf die von Leibniz in genialem *aperçu* antizipierte Monadologie.' [41, p.190]; see also [39, pp.196–197], [45, p.7].

'He is truly a seer, but unfortunately, detailed theoretical analysis, without which what one has seen cannot become science, is missing everywhere.' [trl. ours][61] (Note that Husserl's criticism of Leibniz is of the same type as that of the German Idealists that we saw before.)

Husserl centered his systematic introduction to phenomenology of 1929, although titled *Cartesian meditations*, around a version of the Leibnizian notion of the monad. The importance of that notion is brought out in the fourth of these *Meditations*, where it is explained that all of phenomenology in the end is a study of the monadic ego:

> Since the monadically concrete ego includes also the whole of actual and potential conscious life, it is clear that the problem of explicating this monadic ego phenomenologically (the problem of his constitution for himself) must include all constitutional problems without exception. Consequently the phenomenology of this self-constitution coincides with phenomenology as a whole. [43, p.68][62]

This is the phenomenological interpretation of Leibniz' claim that each monad mirrors the whole universe (*Monadology*, section 60). In fact, Dietrich Mahnke managed to rewrite Leibniz' *Monadology*, some two hundred years after its conception, paragraph by paragraph, from a phenomenologically informed point of view, in an essay named 'Eine neue Monadologie' ('A new monadology') [74].[63]

Gödel read Mahnke's essay and commented, in a stenographical note on one of his bibliographical 'Zettel', 'vernünftig!'—'sensible!' [GN folder 5/25, 050120.1]. There have been other further developments of Leibniz' monadology than Husserl's and Mahnke's, and Gödel for example was aware [GN folder 5/62] of the *Nouvelle monadologie* (*New monadology*) of Renouvier and Prat [78]. But the absence of such non-phenomenological developments from Gödel's drafts and programmatic statements indicates that they did not lend themselves to his philosophical purposes as well as the phenomenological approach.[64]

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[61] 'Er selbst ist ja durchaus ein Schauer, nur daß leider überall die theoretische Einzelanalyse und Einzelausführung fehlt, ohne die Geschautes eben nicht zur Wissenschaft werden kann.' Husserl to Mahnke, January 5, 1917 [52, III, pp.407–408].

[62] 'Da das monadisch konkrete ego das gesamte wirkliche und potentielle Bewußtseinsleben mit befaßt, so ist es klar, daß das Problem der phänomenologischen Auslegung dieses monadischen ego (das Problem seiner Konstitution für sich selbst) alle konstitutiven Probleme überhaupt in sich befassen muß. In weiterer Folge ergibt sich die Deckung der Phänomenologie dieser Selbstkonstitution mit der Phänomenologie überhaupt.' [35, pp.102–103].

[63] There are differences between Husserl's interpretation of the monad and Mahnke's. Husserl's assistant Eugen Fink wrote a draft of a discussion of these, see [52, III, pp.519–520].

[64] Perhaps of relevance for the question whether Husserl ever imagined the possibility of incompleteness as proved, during his lifetime, by Gödel, a fact never known to Husserl, is the following passage in Mahnke's book from 1917, which Husserl marked in his copy:

4.2. Searching for the primitive terms. In a Leibnizian philosophy that takes its bearings from a mathematical conception of rationality—and we have been describing Gödel's philosophy that way—, one of the most important tasks is to find the right primitive terms or categories. How is this related to phenomenology? Gödel once said 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) and their interrelations, which, however, are to be arrived at phenomenologically. The task must be done in the right manner. [97, p.166]

Yet, on other occasions Gödel suggested that phenomenology and trying to find the primitive terms are one and the same project. For example, to Sue Toledo he said in 1972:

> Husserl never mentions that his goal for phenomenology is finally to come to an understanding of the primitive terms themselves. [92, 3/24/72, p.4]

And he also told her,

> Following Husserl's program with diligence could lead one finally to a grasping of the primitive terms (although there are other ways and perhaps quicker ways). [92, 3/24/72, p.6]

> That not all, even rather few, manifolds in the outside world have the property of being definite, is obvious. But also concerning formal mathematics it is still a great question whether its totality is a heap of infinitely many different and unrelated theories of manifolds, or rather can be organized into one big, definite system. The concept of mathematics seems to demand that the latter is the case; yet, a proof is still to be found. [trl. ours; 'Dass nicht alle, ja sogar nur herzlich wenige Mannigfaltigkeiten der wirklichen Welt diese Eigenschaft der Definitheit haben, liegt auf der Hand. Aber auch in der formalen Mathematik ist noch eine grosse Frage, ob ihre Gesamtheit ein beziehungsloses Nebeneinander von unendlich vielen verschiedenen Mannigfaltigkeitslehren ist oder vielmehr selbst in ein einziges, grosses definites System geordnet werden kann. Der Begriff der Mathematik scheint zu erfordern, dass das letztere der Fall ist. Doch steht der Nachweis dafür noch aus.' [74, p.32]]

There has been much discussion whether Gödel's incompleteness theorems are fatal to Husserl's philosophy of mathematics as expounded in *Formal and transcendental logic* [46]. Cavaillès [17, p.71ff.] may have been the first to raise that question. However, the surprising thing is that Husserl's former student Felix Kaufmann did not raise it in 1931. On January 15, 1931, Kaufmann participated in a meeting of the Wiener Kreis where Gödel presented his incompleteness theorems. Exchanges between Kaufmann and Gödel on that occasion have been recorded as well [88, pp.278–280]. At that very time, Kaufmann was corresponding with Husserl, reporting on his study of *Formal and transcendental logic*, and on his work on an article 'Logische Prinzipienfragen in der mathematischen Grundlagenforschung' ('Principal questions of logic in foundational research in mathematics') [52, IV, pp.179–181]. If Kaufmann had been aware of the potential problem for *Formal and transcendental logic*, he surely would have told Husserl. For a convincing reply to the charge that the incompleteness theorems are fatal to Husserl's philosophy of mathematics, see [72, ch.11].

Indeed, Leibniz himself saw a turn towards the subject as the correct way to arrive at the primitive terms of metaphysics. In a letter to Queen Sophie Charlotte of Prussia of 1702, he formulated the idea in the following way:

> The thought of *myself*, who perceives sensible objects, and the thought of the action of mine that results from it, adds something to the objects of the senses. To think of some color and to consider that one thinks of it are two very different thoughts, just as much as color itself differs from the 'I' who thinks of it. And since I conceive that other beings can also have the right to say 'I', or that it can be said for them, it is through this that I conceive what is *substance* in general. It is also the consideration of myself that provides me with the other notions of *metaphysics*, such as cause, effect, action, similarity, etc., and even those of *logic* and *ethics*. Thus it can be said that there is nothing in the understanding that did not come from the senses, except the understanding itself, or that which understands. [70, p.188, original emphases][65]

(One notices the similarity to Gödel's argument in the supplement to the Cantor paper [25, p.268].) And in section 30 of the *Monadology*, Leibniz writes:

> It is also through the knowledge of necessary truths and through their abstraction [from merely sensuous matters] that we are raised to *Reflexive Acts*, which enable us to think of what is called I and to consider that this or that lies within *ourselves*. And, it is thus that in thinking of ourselves we think of being, of substance, of the simple and compound, of the immaterial, and of God himself, by conceiving that what is limited in us is unlimited in him. And these reflexive acts furnish the principal objects of our [present metaphysical] reasonings. (See *Theodicy*, Preface) [71, pp.110-111, original emphasis; amendments by Rescher][66]

[65]'Cette pensée de moy, qui m'apperçois des objets sensibles, et de ma propre action qui en resulte, adjoute quelque chose aux objets des sens. Penser à quelque couleur et considerer qu'on y pense, ce sont deux pensées tres differentes, autant que la couleur même differe de moy qui y pense. Et comme je conçois que d'autres Estres peuvent aussi avoir le droit de dire moy, ou qu'on pourroit le dire pour eux, c'est par là que je conçois ce qu'on appelle la substance en general, et c'est aussi la consideration de moy même, qui me fournit d'autres notions de metaphysique, comme de cause, effect, action, similitude, etc., et même celles de la Logique et de la Morale. Ainsi on peut dire qu'il n'y a rien dans l'entendement, qui ne soit venu des sens, excepté l'entendement même, ou celuy qui entend.' [69, VI:502].

[66]'C'est aussi par la connaissance des vérités nécesaires et par leurs abstractions que nous sommes élevés aux *actes réflexifs*, qui nous font penser à ce qui s'appelle *moi*, et à considérer que ceci ou cela est en nous: et c'est ainsi qu'en pensant à nous, nous pensons à l'Être, à la Substance, au simple et au composé, à l'immatériel et à Dieu même; en concevant que qui est borné en nous, est en lui sans bornes. Et ces actes réflexifs fournissent les objets principaux de nos raisonnements (*Théod.*, Préf. *,4,a)' [67, pp.155–157; original emphasis]

We suggest that Gödel had passages such as these in mind when he wrote in the letter to Günther (quoted in section 2.4),

> The reflection on the subject treated in idealistic philosophy (that is, your second topic of thought), the distinction of levels of reflection, etc., seem to me very interesting and important. I even consider it entirely possible that this is 'the' way to the correct metaphysics.

And similarly, Leibniz' passages give a more specific meaning to Gödel's statement to Wang,

> If you know everything about yourself, you know everything of philosophical interest. [GN folder 1/209, 013184]

(The qualification 'of philosophical interest' was added by Gödel in Wang's typescript, but is not included in Wang's quotations [96, p.210], [97, p.298].)

In a draft letter from (June?) 1963 from Gödel to TIME Inc., regarding the upcoming publication *Mathematics* in the Life Science Library, he connects his phenomenological program to his famous 'disjunctive conclusion' that either the human mind infinitely surpasses the powers of any finite machine, or there exist absolutely unsolvable diophantine problems [26, p.310]. In that draft letter, he mentions the disjunction again, with the disjuncts in reverse order, and then comments:

> I believe, on ph[ilosophical] grounds, that the sec[ond] alternative is more probable & hope to make this evident by a syst[ematic] developm[ent] & verification of my phil[osophical] views. This dev[elopment] & ver[ification] constitutes the primary obj[ect] ~~matter~~ of my present work. [GN folder 2/30, 020514.7]

And another version of that passage reads

> I conj[ecture] that the sec[ond] altern[ative] is true & perhaps can be verified by a phenomenol[ogical] investigat[ion] of the processes of ~~thin[king]~~ reasoning.

We will leave a discussion of Gödel's efforts on the question of minds and machines for another time,[67] noting for now that these remarks show Gödel's optimism about phenomenology in the early 1960's. In the Life book, which was published in 1963, he even allowed the following to be reported on his intentions:

> 'Either mathematics is too big for the human mind,' he says, 'or the human mind is more than a machine.' He hopes to prove the latter. [8, p.53]

§**5. Comparison with earlier interpretations.** To say that Gödel's interest in transcendental phenomenology arose first of all from the need for a method

[67]van Atten, Horsten, and Rucker, 'Evolving a mind', in progress.

is not to suggest that he thought that Husserl's results, in contrast, were wide of the mark, but rather that he considered the methodology the original part. For the general picture Husserl arrived at, Gödel already knew from Leibniz: 'Husserl used Kant's terminology to reach, for now, the foundations and, afterwards, used Leibniz to get the world picture' (quoted in [97, p.166]).

It is often remarked that Gödel turned to phenomenology for its method of clarification of meanings and concepts, and that he considered such clarification necessary to justify the axioms of mathematics. Indeed, this is the motive Gödel himself gives in his 'The modern development of the foundations of mathematics in the light of philosophy' [26, p.383].

Analysis of meanings by itself, however, is not enough to justify one view on the foundations of mathematics over another. To do that, one would also have to analyse which meanings can be fulfilled. One not only wants to know what the terms mean, but also if they correspond to something in reality.

For example, Gödel used phenomenology to support classical mathematics, but Becker and Weyl have used it to support intuitionism and other varieties of constructivism. (Weyl in the preface to *Das Kontinuum* (*The continuum*) [100] refers to Husserl's *Ideas I* as his philosophical framework, the same book that Gödel saw as essential to his own conception of phenomenology.) To resolve this discrepancy phenomenologically, one would need not just an analysis of meaning but also a particular theory of constitution and evidence. This means that to explain Gödel's choice for phenomenology over another framework as a foundation of mathematics, it is not enough to point out that the other framework could not do justice to the meaning of concepts in classical mathematics (e.g., [90, p.200]). The very point of, say, the intuitionist's arguments in favour of revising classical mathematics is that he thinks there is something amiss with those classical meanings, and that these should be supplanted by meanings which are not thus defective. Put into phenomenological terms, the intuitionist claims that some of the meanings that play a role in classical mathematics will never lead to fulfilled intentions. This is illustrated by the two stages of Brouwer's criticism of Cantor's hierarchy beyond the first number class [14, p.80]: he first analyses what Cantor means, and then, while leaving open the possibility that Cantor's theory is consistent, argues that to such meanings can correspond no mathematical reality.

This is where the correlation thesis of Husserl's transcendental idealism becomes relevant: to say that something exists is to say that intentions directed at it can ideally be fulfilled, and vice versa. Being is always open to consciousness. Only if one goes beyond mere analysis of meaning, and analyses the possibility of fulfillability as well, can one come to distinguish the true from the merely consistent. This means that, from the transcendental phenomenological point of view, conflicts over mathematical ontology are conflicts not primarily over meaning but over what meanings correspond to intentions that can be fulfilled, in other words, over what mathematical objects can be constituted with full evidence.

A particular aspect of the correlation thesis that Husserl studied is the 'noetic-noematic correlation'. This is the correlation between the structure of acts ('noeses') and the structures of the objects intended in them ('noemata'), the functional relationship, or rather functional relationships, between the acts in which an object is intended and the way that object appears to us in those acts. Already in the lecture from 1907, Husserl had announced 'the various basic correlations between knowledge and known objectivity' (see section 3.3) as a central theme in his new metaphysics, and a significant portion of *Ideas I* (part 3, ch.4) is devoted to detailed analyses of them.

It is the noetic-noematic correlation that Gödel is thinking of when, in his paper from around 1961, he proposes to extend our knowledge of abstract concepts by directing our attention from the concepts to the acts in which we perceive them [26, p.383]; for without this specific correlation, there would be no reason to suppose that thus redirecting our attention could teach us anything about the concepts themselves.[68]

In his copy of *Ideas I*, Gödel marked the passages where Husserl criticized his own earlier *Logical investigations* for not yet having developed the noetic-noematic correlation (and, hence, for not having worked out the correlation thesis that defines his transcendental idealism). Here is an example of such a passage, with Gödel's underlinings:

> <u>Dies ist noch die Einstellung der "Log. Unters."</u> In wie erheblichem Maße auch die Natur der Sachen daselbst eine Ausführung noematischer Analysen erzwingt, so werden diese doch mehr als Indices für die parallelen noetischen Strukturen angesehen; der wesensmäßige <u>Parallelismus der beiden Strukturen ist dort noch nicht zur Klarheit gekommen</u>. [37, p.315n.1] = [47, p.296][69]

In translation:

> <u>That is still the focus of the *Logical investigations*.</u> However great the extent to which the nature of the matters themselves compels

[68] See also the paragraph on p.189 of [95], that ends 'It is my impression that Gödel proposes to answer it by phenomenological considerations', and Wang's draft for *From mathematics to philosophy*, 'II Fassung Further revisions of the chapter on set theory', p.3 [GN box 20], where Gödel rewrote a passage as follows: 'The observations in this and the last paragraph are meant to be the beginning of a descriptive analysis of our in part subconscious thinking process about sets and *thereby* of the objective ideas we have in mind when we use the term set' [emphasis ours]. For further discussion of the relation between Husserl's correlation thesis and the ontology of mathematics, see [1] and [2].

[69] Similarly, Gödel marked, by a stenographical note 'wichtig' ('important'), underlining, and vertical lines in the margin, the paragraph where Husserl reaffirms the noetic-noematic correlation and its universal importance beginning, in the edition that he owned [37], on p.330, line 31 and continuing on 331 until line 17 ([47, p.311 l.25–p.312 l.11], [49, p.323 l.26–p.324 l.10].)

> the carrying out of noematic analyses, the noemas are nevertheless regarded more as indices for the parallel noetic structures; the essential parallelism of the two structures has not yet attained clarity there. [49, p.308]

Just as it is not sufficient to point to the method of meaning analysis, one cannot fully explain the concrete form Gödel's interest in phenomenology took by pointing to phenomenology's realism about the abstract or conceptual, and to the possibility of categorial intuition or intuition of essences.[70] These certainly were essential determinants of Gödel's choice.[71] But an additional element is needed to explain why Gödel opted for the transcendental Husserl instead of the 'realist' or 'ontological' phenomenology of the *Logical investigations*, in which this realism and intuition figure as well. In fact, Wang [97, p.165] mentions, in addition, the belief shared by Husserl and Gödel, in 'the one-sidedness of what Husserl calls "the naïve or natural standpoint"'; this of course points to the other side, i.e., transcendental subjectivity. Wang concludes that

> For Gödel, the appeal of Husserlian phenomenology was, I think, that it developed the transcendental method in a way that accomodated his own beliefs in intellectual intuition and the reality of concepts. [97, p.165]

But the question is why Gödel was interested in the transcendental method in the first place. After all, the beliefs that Wang mentions were also shared by followers of Husserl who refused to take the transcendental turn. We are thinking here of phenomenologists in Munich and Göttingen such as Johannes Daubert, Adolf Reinach, Alexander Pfänder, and Hedwig (Conrad-) Martius, who chose rather to develop the framework of the *Logical investigations*. They said they were not able to understand Husserl's transcendental turn, and argued that a turn towards an alleged transcendental subjectivity was eo ipso a turn away from 'the things themselves' and thus, they continued, defeated the purpose of phenomenology.[72]

From his wide reading in phenomenology (as witnessed by the memoranda and reading notes in GN folders 5/22 and 5/41), Gödel will have been aware of these realist phenomenologists, but he disagreed with them. He held that Husserl's turn to transcendental subjectivity was a turn for the better. Once, when he said to Sue Toledo that 'There are also some detailed phenomenological analyses in the *Logical investigations*', he added, 'which were made,

[70]Føllesdal stresses these in his introduction to Gödel's paper from around 1961, although he certainly also touches on themes in transcendental phenomenology on p.369 and 372 [26].

[71]In recent years, Richard Tieszen has done much to make these Husserlian themes accessible to those interested in Gödel. See, e.g., [91].

[72]See, for example, the account by Conrad-Martius in [13], a book that Gödel knew, as there are reading notes in [GN folder 5/22, 050111] (although not to this paper in particular). See also [66].

however, before 1909' [92, 3/24/72, p.7, original emphasis]; as we saw, 1909 was for Gödel the year Husserl discovered the true notion of self and thereby completed his transcendental turn. And from Gödel's notes in his copy of Husserl's *Ideas I*, it is clear that he seconds Husserl's self-criticisms of the *Logical investigations* for their lack of what we above have called the correlation thesis and their lack of a rich notion of the self or subject.[73] Only these discoveries enabled Husserl to pick the fruits of Leibniz' suggestions. For Gödel, to adopt the alternative 'realist' or 'ontological' phenomenology of the *Logical investigations* would have required the sacrifice of the Leibnizian framework that he had made his own early on and would hold on to till the end of his life.

§6. Influence from Husserl on Gödel's writings.

6.1. On the schools in the foundations of mathematics. In 1965, Kreisel published the suggestion that 'what characterises the difference between e.g., the idealist and the realist view is what aspects of (crude) experience (in this case, mathematical experience) are regarded as significant and suitable for study' [63, p.190]. On this view, the different traditional schools in the foundations of mathematics each are an exaggeration of a particular aspect of mathematical experience at the cost of others.

Kreisel related this view to Robert Tragesser at Stanford in 1966 (see also Tragesser's reformulation [93, p.294]), and told him that he had learned this view from Gödel; this is our reason to count it among Gödel's published views, in a way similar to the passages that ended up in Wang's [95], uncredited, at Gödel's wish (see Charles Parsons' introduction to the Gödel-Wang correspondence [28, esp. p.395]). Kreisel acknowledged his debt to Gödel on this point in print in 1980 [65, p.209]:

> In his publications Gödel used traditional terminology, for example, about *conflicting* views of 'realist' or 'idealist' philosophies. In conversation, at least with me, he was ready to treat them more like different *branches* of the subject, the former concentrating on the things considered, the latter on the processes of acquiring knowledge about these objects or processes [...] Naturally, for a given question, a 'conflict' remains: Which branch studies the aspects relevant to solving that question? [original emphases][74]

[73]On p.237 of Gödel's copy of the *Krisis Crisis* [38], there are many underlinings in the passage where Husserl describes how already in the 5th and 6th *Logical investigations* the problematic of the noetic-noematic correlation comes close to the surface. Husserl therefore concludes: 'Thus, in that work lie the first, albeit very imperfect, beginnings of "phenomenology".' [trl. ours; 'So liegen in diesem Werke in der Tat die ersten, freilich sehr unvollkommenen Anfänge der "Phänomenologie".']

[74]The conversations Kreisel is here referring to will have been the same ones as those in the background of his letter to Gödel of September 6, 1965 that we mentioned in section 3.2.

Moreover, Tragesser informed us, Kreisel added that Gödel told him that he had formed this view while reading Husserl. What makes Kreisel's account very plausible is that there are two obvious places in Husserl's work that express the very idea in question,[75] both of which Gödel had surely read (as is evidenced by reading notes and excerpts), the one surely, the other most likely, before Kreisel's publication of 1965.

The first is sections 18–23 of *Ideas I*, the second section 16 of the 'Britannica article' (to which there are reading notes in GN folder 5/22). Of the latter, evidence that Gödel may have read it before 1962, when it was republished in the Husserliana series that Gödel used, consists in a library slip [GN folder 5/22, 050103] requesting the relevant volume (17) of the 14th edition of the *Britannica*.

In the 'Britannica article' in particular there is a passage that comes very close to what Kreisel writes. Husserl there speaks of

> oppositions such as between rationalism (Platonism) and empiricism, relativism and absolutism, subjectivism and objectivism, ontologism and transcendentalism, psychologism and anti-psychologism, positivism and metaphysics, teleological and causal interpretations of the world. [61, p.319, trl. modified] [76]

on which he then comments

> Throughout all of these, [one finds] justified motives, but throughout also half-truths or impermissible absolutizing of only relatively and abstractively legitimate one-sidedness. [61, p.319][77]

6.2. The given. Among Gödel's most famous philosophical passages is that occurring in the 1964 supplement to his Cantor paper:

> That something besides the sensations actually is immediately given follows (independently of mathematics) from the fact that

[75]Robert Tragesser suggested to us that Husserl in turn may well have taken Kant's discussion in the 'Amphiboly' section of the *Critique of pure reason* as a model, for example the comparison of Leibniz with Locke on B327.

[76]'Gegensätze wie die zwischen Rationalismus (Platonismus) und Empirismus, Relativismus und Absolutismus, Subjektivismus und Objektivismus, Ontologismus und Transzendentalismus, Psychologismus und Antipsychologismus, Positivismus und Metaphysik, teleologischer und kausalistischer Weltauffassung.' [42, p.300]

[77]'Überall berechtigte Motive, überall aber Halbheiten oder unzulässige Verabsolutierungen von nur relativ und abstraktiv berechtigten Einseitigkeiten.' [42, p.300]

Robert Sokolowski has remarked: 'Husserl acknowledges a debt to Leibniz in regard to *mathesis universalis* [and much more, as we have seen above], but Leibniz's hope of reconciling conflicting points of view, in science and politics, may also be at work in phenomenology, with similar deep-seated limitations'. In a footnote to this passage, he refers to Mahnke [75] and adds: 'Probably the greatest weakness is the conviction that agreement of minds pacifies human affairs.' [85, p.320] At the same time, we are reminded of Borges: 'The metaphysicians of Tlön [. . .] know that a system is naught but the subordination of all the aspects of the universe to one of those aspects—*any* one of them.' [10, p.74]

> even our ideas referring to physical objects contain constituents qualitatively different from sensations or mere combinations of sensations, e.g., the idea of object itself, whereas, on the other hand, by our thinking we cannot create any qualitatively new elements, but only reproduce and combine those that are given. Evidently the 'given' underlying mathematics is closely related to the abstract elements in our empirical ideas. It by no means follows, however, that the data of this second kind, because they cannot be associated with actions of certain things upon our sense organs, are something purely subjective, as Kant asserted.[78] [25, p.268]

This remark echoes the ones by Leibniz quoted above (see 4.2) and has, in a more systematic context, been connected to Husserl already in 1977, by Robert Tragesser in his book *Phenomenology and logic* [94] (and others have done so later). Yet Gödel in the Cantor paper does explicitly address the relation of his views to those of Kant, but not to those of Husserl. However, in a draft of the supplement there is an additional final paragraph that starts:

> 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. [GN folder 4/101, 040311, p.12]

Why did Gödel decide to leave this paragraph out? We suggest that Gödel felt safe enough to make, in print, the negative point about Kant, but not to make the positive point about Husserl. Wang [97, p.80] mentions that in the 1960's, Gödel advised logicians to read Husserl's 6th *Logical investigation* for its treatment of 'categorial intuition', and we add that the passage in the Cantor paper easily lends itself to interpretation according to the theory Husserl expounds there. Gödel's recommendation shows that he *was* willing to call attention to Husserl in private communication.[79]

Given Gödel's preference for transcendental phenomenology over the *Logical investigations*, it should be added that Husserl was convinced that in particular the 6th *Logical investigation* could be raised to the transcendental level; see his foreword to the second edition of that *Investigation* from 1921 [50, p.534]. One of the reasons why Husserl did not actually do this was his tendency to get lost in his present research rather than revisit and integrate earlier manuscripts. His incomplete drafts however show, for example, that in the new text he took the noetic-noematic correlation into account. For a discussion of the many issues involved, we refer to Ulrich Melle's introduction to [55].

[78][Concerning this last remark, see our discussion of Gödel's attitude toward Kant's idealism in section 3.2.]

[79]Warren Goldfarb [26, p.324] thinks that Gödel was overestimating the extent to which positivist dogmas remained orthodoxy in 1959, but even so it is not likely that a phenomenological view would have been welcomed by philosophers of mathematics at the time.

In the history of ideas, Husserl's theory of categorial intuition may be seen as an alternative to another anti-Kantian account of intellectual intuition, the one given in a defence of Leibniz' philosophy by Johann August Eberhard.[80] In a series of papers from 1789, Eberhard had claimed that everything of value in Kant's *Critique of pure reason* had already been said by Leibniz, and better (e.g., [59, Stück III, Nr.2, S.289]). Exceptionally, Kant chose to defend his system against this attack and in 1790 this resulted in a paper called 'On a discovery according to which all new critique of pure reason should be made superfluous by an older one'.[81] It is not quite clear who the winner of the Kant-Eberhard controversy is [22, ch.7], but surely Kant managed to raise many questions concerning this account of intellectual intuition. Gödel was aware of the Kant-Eberhard controversy: on a bibliographical note [GN folder 5/62, 050191; 1959-?] one can find the Princeton library call number 6174.667 of Eduard Ferber (1871–?), *Der philosophischen Streit zwischen I. Kant und Johann Aug. Eberhard*, Berlin: Itzkowski, 1894. Gödel did not pursue Eberhard's line, preferring Husserl's construal.[82]

6.3. Revisions in the main text of the Cantor paper. But not only the Supplement to the Cantor paper shows the influence of studying Husserl. Some of the revisions in the main text do, too. Compare the following paragraph from the 1947 text with its 1964 counterpart (we have emphasized the differences in the 1964 version that we want to comment on):

> The negative attitude towards Cantor's set theory, however, is by no means a necessary outcome of a closer examination of its foundations, but only the result of certain philosophical conceptions of the nature of mathematics, which admit mathematical objects only to the extent in which they are (or are believed to be) interpretable as acts and constructions of our own mind, or at least completely penetrable by our intuition. For someone who does not share these views, there exists a satisfactory foundation of Cantor's set theory in its whole original extent, namely, axiomatics of set theory, under which the logical system of Principia mathematica (in a suitable interpretation) may be subsumed. [25, pp.179–180]

[80] Eberhard defends 'nicht sinnliche Anschauung' ('non-sensuous intuition'). That he means 'intellektuelle Anschauung' ('intellectual intuition') is clear from his explanation [59, Stück III, Nr.2, S.281–282]. See also [22, pp.193–194].

[81] 'Über eine Entdeckung nach der alle neue Kritik der reinen Vernunft durch eine ältere entbehrlich gemacht werden soll.' [59]

[82] Husserl never discussed Eberhard in his manuscripts (including his published work), although he has read at least Kant's side of the polemic, as is witnessed by his pencil lines and marginal comments in one of his editions of Kant's writings. We are grateful to Robin Rollinger at the Husserl Archive in Leuven for investigating this for us.

> However, this negative attitude towards Cantor's set theory, and toward classical mathematics, of which it is a natural generalization, is by no means a necessary outcome of a closer examination of their foundations, but only the result of a certain philosophical conception of the nature of mathematics, which admits mathematical objects only to the extent in which they are interpretable as our own constructions of our own mind, or at least, *can be completely given in mathematical intuition. For someone who considers mathematical objects to exist independently of our constructions and of our having an intuition of them individually, and who requires only that the general mathematical concepts must be sufficiently clear for us to be able to recognize their soundness and the truth of the axioms concerning them*, there exists, I believe, a satisfactory foundation of Cantor's set theory in its whole original extent and meaning, namely axiomatics of set theory interpreted in the way sketched below. [25, p.258]

First, Gödel trades in the phrase 'penetrable by our intuition' for 'being given in mathematical intuition'. Charles Parsons has raised the question whether 'Gödel saw this as more than a stylistic change' [77, p.57n.25]; it can be answered that the latter phrase is highly idiomatical in Husserl's work, while the former is not.

Second, in the 1964 version, Gödel seems to insist on intuition (of the concepts), while at the same time denying the necessity of intuition of each individual mathematical object. Both the positive and the negative claim go with Husserl well. Husserl admitted the need for ideas in a Kantian sense. In particular, in sections 143 and 144 of *Ideas I* he points out that not even individual *physical* objects can be given completely (adequately) in intuition. We always only see a side ('Abschattung') of a physical object. 'But,' Husserl writes, 'perfect givenness is nevertheless predesignated as "Idea" (in the Kantian sense)' [49, p.342].[83] This Idea is a system that prescribes in what ways the object can appear to us, and depends on the type (or essence) of the object. This Idea as such, unlike the infinite series it determines, can be given in intuition. And Husserl explains in the next section,

> When the presentive intuition is one of something transcendent to it, then something objective cannot become adequately given; only the idea of that something objective can be given, or rather of its sense and its 'epistemic essence',[84] and consequently there can be given an a priori rule for law-conforming infinities of inadequate experiences. [49, p.343, modified][85]

[83]'Aber als "Idee" (im Kantischen Sinn) ist gleichwohl die volkommene Gegebenheit vorgezeichnet.' [37, p.351] = [47, p.331].

[84][The 'epistemic essence' is like the sense but includes aspects of evidence.]

[85]'Wo die gebende Anschauung eine transzendierende ist, da kann das Gegenständliche nicht zu adäquater Gegebenheit kommen; gegeben sein kann nur die Idee eines solchen

In mathematics, uncountability and, in a sense, even countability beyond certain bounds, imposes limits on intuitive accessibility in an entirely analogous way. Idealizations will be involved; they are conspicuous in the familiar explanations of the iterative concept of set. Disputes will then be about what idealizations make sense and are admissible (which brings us back to the above discussion of the schools in the foundations of mathematics).

Finally, in the new version Gödel specifies that the intuition he is discussing is 'mathematical' intuition. This is significant in the light of the phenomenological doctrine that to each realm of objects is associated a different kind of intuition; this doctrine is just a consequence of the noetic-noematic correlation. In his copy of *Ideas I*, Gödel underlined and marked with a vertical line in the margin the following passage:

> We have had to emphasize many times that each species of being has, owing to its essence, *its* modes of givenness and with that its own cognitive method. It is countersensical to treat their essential peculiarities as deficiencies, let alone to count them among the sort of adventitious, factual deficiencies pertaining to 'our human' cognition. [49, p.187, original emphasis][86]

Such an 'essential peculiarity' may for example be the need for certain idealisations involving Kantian ideas; moreover, such an idealisation may be stronger than a constructivist would allow for. In his recent discussion of Gödel's Platonism, Eckhart Köhler [62, p.104] claims that Husserl, like Brouwer, limited his notion of intuition to what is constructive. Although some followers of Husserl, such as Oskar Becker, indeed at some point did so, it is not at all clear that Husserl did, and in fact Dieter Lohmar has convincingly argued that he did not [72, 194–195n.15]. Husserl never aimed at revising classical mathematics.[87] Gödel recognized this; in a draft for a letter to Gian-Carlo Rota, dated September 7, 1972, he wrote:

> As far as Husserl's reform of logic is concerned I don't think he aimed at the rejection of anything in today's mathematical logic, but rather at supplementing it and laying its foundations deeper. [GN folder 1/141, 012029]

Gegenständlichen, bzw. seines Sinnes und seines "erkenntnismäßigen Wesens" und damit eine apriorische Regel für die eben gesetzmäßigen Unendlichkeiten inadäquater Erfahrungen.' [37, p.352] = [47, p.332]

[86]'Jede Seinsart, wir haben das schon mehrfach betonen müssen, hat wesensmäßig *ihre* Gegebenheitsweisen und damit ihre Weisen der Erkenntnismethode. Wesentliche Eigentümlichkeiten derselben als Mängel behandeln, sie gar in der Art zufälliger, faktischer Mängel "unserer menschlichen" Erkenntnis anrechnen, ist Widersinn.' [37, p.191] = [47, p.176]

[87]A different question is whether Husserl's intended non-revisionism is indeed forced by his philosophical premises; for an argument that it is not, see [2].

§7. Gödel's assessment of his philosophical project. We have argued that Gödel resorted to Husserl's transcendental phenomenology as a systematic means to combine the two strands of thought he had adopted earlier, his strong realist view of mathematics and the Leibnizian framework that put subjectivity in central position (monadology). On a very general level this attempt at integration may or may not have succeeded.[88] Yet, in spite of Gödel's optimism in the early 1960's, concrete results did not come quickly, if at all.[89] We are not aware of any specific contribution of Gödel to phenomenology, other than, arguably, his contributions to the chapter on sets in Wang's *From mathematics to philosophy* [95, ch.6] (see our footnote 68). Typical of Gödel's view of his philosophical project in the second half of the 1960's is a passage in his letter to Paul Cohen of April 27, 1967, in which Gödel explains why he declines Cohen's invitation to speak at a conference:

> For many years, my own thinking has moved along lines entirely different from those of the conference and even of a, perhaps envisaged, philosophical section of it. Namely, I have been trying first to settle the most general philosophical and epistemological questions and then to apply the results to science. On the other hand I have not yet advanced far enough to make such applications. For this reason I have not participated actively in the recent most interesting developments and am, at the present moment, not in a position to participate in their continuation. [GN folder 1/32, 010417.6]

At the same time, he did not think that the proof of the independence of CH posed a threat to his realist program by suggesting a certain relativism in set theory. To Church, who did interpret the independence proof along relativistic lines, he wrote on September 29, 1966:

> You know that I disagree about the philosophical consequences of Cohen's result. In particular I don't think realists need expect any permanent ramifications (see bottom of p.8)[90] as long as they are guided, in the choice of the axioms, by mathematical intuition and by other criteria of rationality. [GN folder 1/26, 010334.36]

Indeed, in the 1970's Gödel reaffirmed his belief in phenomenology. In a draft letter to Rota from 1972 that we already quoted from, Gödel says that 'his [i.e., Husserl's] transc[endental] phen[omenology], carried through, would be

[88] As far as the integration of phenomenology with monadology is concerned, one finds optimism about it in the essays by Mahnke [74], Cristin [19], and those by Cristin and Poser in [20]; Mertens, on the other hand, has argued that a phenomenological monadology is impossible in principle [76].

[89] Kreisel complains about this in his letter to Gödel of April 12, 1969 [GN folder 1/92, 011266].

[90] [Of Church's manuscript for his talk at the International Congress of Mathematicians, Moscow 1966, published in its proceedings in 1968 [18].]

nothing more nor less than Kant's critique of pure reason transformed into an exact science', which 'far from destroying trad[itional] metaph[ysics] [...] would rather prove a solid foundation for it' [GN folder 1/141, 012028.7].[91] Gödel recognized the difficulty of this task and was aware of his lack of results. But, he pointed out to Wang in 1972, there is no reason to abandon the project:

> 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; it can happen any time when the right idea appears. [GN folder 1/209, 013184]

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[91] Combined with Gödel's conviction, expressed in the draft letter to Rota quoted at the end of section 6.3, that Husserl was not a revisionist in mathematics, and moreover with Gödel's continued attempts at defending realism in his conversations with Wang, this is our reason not to believe that, rather than a phenomenologically grounded realism, the 1972 version of the Dialectica paper should be considered Gödel's final philosophical view, a possibility that Sol Feferman suggested to us. We think that in that paper, Gödel is showing his talent for penetrating a philosophical position that is not his own, as he had done before in his papers on Kant.

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