CRITICAL STUDY

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TRANSCENDENTAL ANALYTICS AS A CONSTRUCTIVE SEMANTICS

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1. PRELIMINARIES

Already in its second edition, Zeljko Loparić's *A Semântica Transcendental de Kant*[1] defends a bold and illuminating thesis, which is of great interest to all scholars interested in Kant's transcendental idealism. Loparić's thesis is that we should conceive the categories (the *a priori* concepts of the understanding) and, consequently, the pure principles of the understanding expounded in the "Transcendental Analytics" of the *Critique of Pure Reason*[2], as some of the rules of a constructivist semantics for all possible synthetic judgements, mathematical and empirical. Other

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[1] Loparić (2000). The first edition is from the same year. From now, *Semântica Transcendental*.

[2] Kant 1781 (1st edition) and Kant 1788 (2nd edition).

rules are provided by the intuitive operations of classifying sensations according to specific spatial and temporal orders. What is meant by semantics in Loparić's book is a theory of the reference and meaning of a whole set of mental representations (judgements and their constituent parts: concepts), and not what became known after Tarski[3] as a semantics for a language, artificial or natural. The fact that the supposed Kantian semantics applies to mental items like judgements rather than to more public things like utterances and sentences should not surprise anybody who is familiar with the post-Kantian linguistic turn; neither should it raise worries as to the objective credentials of such mental elements as concepts and judgements. After all, nowadays the recognition of a mental realm of propositional attitudes and their respective content besides a set of mental symbols having the required multiplicity for expressing the content in question is by no means incompatible with the attribution to them of an objective character. Hence, in order for the analogy with semantics for a language to work, Kantian judgements and concepts should be seen as mental symbols rather as their corresponding content.

The idea of constructing a general theory of meaning for natural language is quite new; it is certainly not more than forty years old.[4] And of course the effort to interpret Kant as proposing an important part of that theory of meaning is influenced by the theoreticians of natural language meaning as well as by the earlier theoreticians of a semantics for

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[3] See, for example, Tarski's characterization of a semantics for an artificial language (Tarski (1933)) and also Tarski's more informal exposition of the idea of a semantics of an artificial language (Tarski (1944)).

[4] Among the pioneers of the thesis that philosophers should look for an adequate theory of meaning for natural language are Davidson (for example, in Davidson (1967) and Davidson (1973)) and Dummett (see, for example, Dummett (1975) and Dummett (1976)).

a well-defined artificial language like Frege and Tarski. Loparić himself claims that the thesis that Kant's Transcendental Analytic consists of a sort of semantics has been around since at least the end of nineteenth century. It may be so. But its novelty as put forward by Loparić is that the thesis itself is not isolated but is part of a much more comprehensive hypothesis which asserts that Kant's first *Critique* describes his theory of the solubility of all problems of theoretical reason. Seen in this light, the thesis of the Analytic as a semantics looks a lot more plausible; if the solubility or insolubility of these problems is linked to the meaningfulness or meaninglessness of their associated questions, then an adequate semantics for the means of expressing the problems of theoretical reason must be a necessary condition for the possibility of finding solutions to them.

The Vienna Circle and the Wittgenstein of the *Tractatus* made it fashionable to tie questions about the solubility or insolubility of philosophical problems to the expressions of these problems making or not making sense. For example, Wittgenstein's famous rejection skepticism on account of its raising meaningless questions runs as follows:

> Skepticism is *not* irrefutable, but obviously nonsensical, when it tries to raise doubts where no questions can be asked.
> For doubt can exist only where a question exists, a question only where an answer exists, and an answer only where something *can be said*. (Wittgenstein 1922: 6.51)

In the same vein, Carnap dismisses as pseudo-problems questions about the existence of God, of the Cartesian ego, and so on for the simple reason that the inquirer has not given meaning to all the expressions of his questions.[5] The novelty of Loparić's thesis does not

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[5] See Carnap (1967).

just lie in his maintaining that Kant was the first to propose a close connection between the issues of the solubility of a certain range of problems, on the one hand, and of the meaning of their expressions, on the other; rather, Loparić's thesis is much more ambitious, it aims to show that the first *Critique* is a heuristic theory, that is, a theory that helps us in the solution of a broad range of philosophical problems. If we take seriously Reichenbach's distinction between the context of discovery and the context of justification of knowledge claims, then the contrast between the philosophy of the Vienna Circle and that of Kant boils down to this: while the Viennese logical empiricists were only concerned with the epistemic justification of our scientific beliefs, Kant was also immersed in a project of disclosing our methods of philosophical problem-solving.

But, does Kant really tell us a story about how we actually go about solving meta-scientific problems?[6] This is one of the questions that I would like to discuss in the following paragraphs. The question is crucial especially for those like Loparić who side with the critics of the Vienna Circle philosophy of science in rejecting the Viennese obsession with the context of justification in detriment of the heuristics of science. The above question is equally relevant for those like myself for whom the paradigm of the cognitive sciences have provided an interesting background with which to compare and evaluate any proposal for

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[6] I use the expression 'meta-scientific' because the philosophical problems that occupy Kant in the "Transcendental Analytic" and "Transcendental Dialectic" could be interpreted as meta-scientific in the sense that the search for a justification for the principle of causality and for the logical postulate of reason (given any empirical conditioned, look for the totality of its conditions [the unconditioned] B 364) are said to belong to the realm of the methodology that guides scientific practice.

treating the hard problems of human reasoning and human problem solving.

The other crucial question that will be on my agenda in this discussion is: could what Kant expounds in the "Analytic" really be substantially conceived as a semantics, that is a theory of the reference and meaning of all synthetic judgements? Again in the case of this question, we have a nice paradigm of what a semantic theory for a language should accomplish thanks to the work of logicians, linguists, psychologists and philosophers. It is certainly true that Kant's enterprise cannot be strictly evaluated as an attempt of providing a semantics for a restricted portion of our language. As remarked earlier, the thesis under scrutiny will be that the categories and the intuitions of space and time constitute and establish the content and reference of mathematical and empirical synthetic judgements taken as mental articulated symbolic types.

However, before discussing these two questions, I must summarize the main ideas of the book as well as its structure.

2. THE PLAN OF THE BOOK

Loparić's book contains a preface, an introduction and nine chapters. In the preface, the author tells the story of the genesis of the book as well as the general framework of the research presented there. Part of this framework is the now familiar idea of interpreting Kant's first *Critique* as a theory of the solubility of philosophical problems. A theory of this kind Loparić calls "heuristic", a topic we will discuss in the next section. The second element of *Semântica Transcendental*'s framework consists of the thesis that part of Kant's problem-solving theory, the part that corresponds to the *Critique*'s "Transcendental Logic", gives us a constructivist semantics for all synthetic judgements adequately restricted

to the domain of possible experience. This second element is further developed in chapters 4 to 6. The third element of the book's general framework concerns Loparić's *sui generis* interpretation of the first *Critique* in comparison with various possible criticisms from other influential commentators on Kant's book. One of the objections addressed at this early stage is that put forward by Coffa to the effect that Kant's work on semantics was confused, psychologistic and idealistic, mistakes that were later corrected by the philosophers who followed him in the semantic tradition (cf. Coffa (1982) and (1991)). In addition, Coffa accuses Kant of not having a good theory of the *a priori* since it rested on the constitutive powers of the human mind, another mistake that was corrected by his successors, notably Carnap and the early Wittgenstein. Needless to say that these objections are utterly unacceptable from Loparić's perspective.

The introduction discloses a crucial purpose of Loparić's book, namely: to put forward an alternative philosophy of science in order to face the crisis of logical positivism. The appeal to Kant is justified in terms of what the author of *Semântica Transcendental* believes went wrong with the Viennese philosophy of science, that is: its lack of interest (except in Carnap's early philosophy) in a theory of the solubility of problems. According to Loparić, an approach that incorporates such a theory deserves to be called heuristic. Hence, the suggestion by our author to face the downfall of logical positivism is the following: let us go back and re-examine Kant's heuristic philosophy of science.

2.1 Problem-solving

A point that is clarified in the introduction concerns the sorts of problems Kant is dealing with; his is a theory of the solubility of philosophical and empirical problems. Loparić's Kant advances the

following bold thesis: every philosophical, empirical or mathematical problem is either demonstrably insoluble or it is possible to give it a definite solution. Thus, he shows that, interpreted dogmatically, the problems of rational cosmology (for example, the problem of the size of the universe taken as a whole), rational psychology and rational theology cannot be solved. We are already familiar with the general question embracing all the problems Kant is interested in: how are synthetic judgements possible? If we take each synthetic judgement as a possible solution to an empirical, mathematical or philosophical problem,[7] and if 'the possibility of a synthetic judgement' is translated as 'the possession of reference and meaning by a synthetic judgement', as Loparić suggests, then there seems to be no other option available than to reduce the solubility question framed above to a semantical question. We seem forced to say this: a problem of the right sort[8] is soluble if only and if the synthetic judgements that may figure as possible solutions to it have reference and meaning or, as Kant would have put it, are objectively valid. But, is such a strong thesis plausible? I will come back to this question in the last section.

Chapter 1 elaborates on the issue of Kant's theory of the solubility of problems connecting it with his account of reason as a system of procedures and rules for bestowing content and reference to its representations of the world and also for solving problems. Such a conception of the mind is very close to what has been known in the cognitive science literature as the computational model of the mind.[9]

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[7] Another example of a philosophical problem is the question of whether or not each and every event in the world has a cause.

[8] That is to say: philosophical, empirical or mathematical.

[9] I should have said the symbolic computational model of the mind. About this computational theory of the mind, see, for example, Boden (1990), Minsky (1968), Pylyshyn (1984) and Turing (1950).

The objections to the computational account of the mind therefore apply to Kant's account of reason as portrayed by Loparić. But to pursue this issue would take us too far afield.

As far as the theory of the solubility of problems is concerned, Loparić proposes to interpret Kant as relating the solubility of problems with their decidability; all soluble problems are in principle decidable and vice versa. Nonetheless, we must be careful not to interpret 'decidability' here as having the same meaning it has in contemporary logic and computation theory, in which a decidable proposition is one for which there is an algorithm for establishing its truth-value in a finite number of steps. Undecidable propositions in this sense can of course be the solution of a well-formed problem; for example, Fermat's Last Theorem is both undecidable and the solution of a problem in number theory. However, if 'decidable' is to be read less technically – as meaning, say, that a problem of the form "how are synthetic judgements of this kind possible?" must either demonstrably have a positive answer or there is a proof that it cannot be solved – then it might be asked: what sort of demonstration or proof can be given that a certain set of problems is soluble or, as the case may be, insoluble? Suppose the answer is: the demonstration in the positive case consists of an explanation that shows that both each judgement of the class and its respective constituent concepts are meaningful and refer to a world of phenomenal objects, and the proof in the negative case comes down to an argument showing that the judgments in question lack content and reference. In this case we are back to our original suspicion that solubility is being reduced to a mere semantical question. As already suggested, this seems too strong but the promise was that we will discuss its strength later.

An interesting consequence of Kant's theory of the solubility of philosophical problems is that the principles of reason which emerge from his criticism of dogmatic metaphysics – the metaphysics that

generates the paralogisms and the antinomies – and *a priori* principles of the understanding – causality, permanence of substance and so on – will have their meaning explained differently from the meaning of mathematical and empirical judgements; the principles of reason will be understood as rules that should guide the discovery of further theories about the phenomena and the principles of the understanding will be conceived as rules for generating the content and reference of all mathematical and empirical judgements. But here I am anticipating something that will be discussed in much more detail in section 2.2.

The second chapter contains a useful examination of the philosophical method employed by Kant to solve the fundamental problem of the first *Critique*: that of explaining the objective validity of all synthetic judgements. Central to the examination is Loparić's claim (based on extensive textual evidence) that the combined method of analysis and synthesis used by ancient Greek geometers[10] was adapted by Kant for the solution of his fundamental problem. The method of analysis and synthesis was a method of discovery and proof. Its analytic phase comes first and consists of two parts. But the starting move of the whole method begins with the supposition that the problematic proposition has a determinate truth-value (is either true or false), which means that the object it is about exists. The first part of the analytic phase is called transformation; this is the abductive part of the method. In the transformation, we must look for premises from which the problematic proposition can be inferred and for geometrical constructions that will produce the conjectured object. The second part of the analytic phase is called resolution; in it, proofs must be found for

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[10] A Portuguese translation of Pappus's description of the method is quoted by Loparić from the English translation in Hintikka and Remes (Hintikka and Remes (1974)).

all the premises arrived at in the transformation and the constructions hypothesized in this earlier part must be legitimised. The synthetic phase of the method is also constituted of two parts. The first is called construction; there, the figure that instantiates the proposition supposed to be true in the beginning is constructed using the simple constructions legitimised in the resolution. Finally, the last part of the synthesis is called proof; there is where a proof of the mentioned problematic proposition is provided. According to Loparić, what struck Kant in the method of analysis and synthesis was its extraordinary heuristic power. Because, unlike mathematics for Kant, philosophy was not a kind of knowledge proceeding *via* the construction of concepts, he was forced to adapt the method in order to use it for solving philosophical problems.

An illustration of Kant's philosophical use of the method is given at the end of the chapter. The problem, as we know, is that of explaining the possibility (possession of reference and meaning) of synthetic judgements. Remember that among possible synthetic judgements some are mathematical, some others are empirical and yet others are the *a priori* principles of the understanding. If we are going to understand possibility in the sense of possession of reference and meaning of course this sense of possibility will not apply to the principles of the understanding. It is true that for Kant they are meaningful but it would be forced to say that they have referents in the domain of phenomena. Our illustration must then be restricted to an explanation of the fact that mathematical and empirical judgements are meaningful and objectively refer. This is not made clear by Loparić at this stage and it may mislead the reader into believing that the meaningfulness of the three classes of synthetic judgements will require the same sort of explanation.

Departing from the supposition that an arbitrary empirical judgement is meaningful and refers to objects – that is, has a determinate truth value – the problem is then to explain how it comes to have this

meaning and refer to precisely these things. This includes explaining also how it came to possess this logical form. Thus, in the resolution, which corresponds to the metaphysical and transcendental deductions of the categories and of the pure intuitions of space and time, it is demonstrated that logical form, meaning and reference require the joint operation of several intuitive and discursive rules on the data of sensations. It must be noticed that part of the adaptation of the method to this specific problem consists in leaving aside the quest for premises from which the problematic proposition can be deduced; our problem demands only finding a way of generating the content of the proposition in question and the objects and state-of-affairs that make it true or false. The transformation is the phase where the mentioned intuitive and discursive rules are discovered; these also include original apperception; by means of it each representation is related to the transcendental subject. In the resolution, these rules are legitimised, that is they are shown to constitute a complete, unique and necessary set of conditions for generating the desired content and reference.

With respect to these legitimising properties of the set of conditions of the meaning and reference of synthetic judgements, some important remarks are in order. The first has to do with the metaphysical deduction or exposition of the rules in question. Given that there would be a circularity if these rules were said to be acquired through experience, Kant is forced to say that they are *a priori* or innate, which could be made compatible with the claim that they are triggered by sensory stimulation. The legitimisation of the operations that produce content and objects must therefore appeal to the idea that the seat of these operations is our cognitive apparatus. But how can we operate according to these rules and at the same time not be aware most of the time that we are doing that? Answer: because most of these operations are performed

unconsciously, that is at the sub-personal level. Hence Loparić's interpretation of Kant renders him very close to computationalism.

The second remark concerning Kant's legitimisation of the categories, space and time relates to the supposed necessity of these conditions of all possible empirical synthetic judgement. Kant's transcendental deduction of the categories commits itself to the claim that in order to think of any object of experience (phenomenon) we need the categories. But one might ask: is it not possible to conceive of the content of an empirical or mathematical synthetic judgement which is not constituted by the categories? Let us take a simple example that must have been familiar to Kant. The orbit of Mercury moves around one of its foci. Does it say of the substance *the orbit of Mercury* that the accident of moving around a focus of its elliptical orbit belongs to it? We know, however, at least since Frege that many alternative analyses of the logical form of this judgement are available. We could, for instance, analyse it as a relation between two objects: the orbit and one focus. If the above is correct, then perhaps the rule of the permanence of substance is not indispensable for generating the content of the judgement in question.

The synthetic part of the method applied to the possibility of empirical and mathematical judgements requires the actual construction of the content and reference of the mentioned judgments using the categories and the *a priori* intuitions of space and time. This is what must correspond in the *Critique* to the schematisation of the categories and the proofs of the principles of the understanding. Content and object in Kant grow out of operations of the kind already mentioned upon sensations. So, even if we assume that such operations actually produce isomorphically content and its corresponding object, there remains the feeling that Kantian transcendental semantics is doing too much. A semantic theory should not be summoned to generate reality; it should suffice if it tells us about the content of a whole set of judgemental

representations. The difficulty here could not be removed by resorting to the distinction between realist and constructivist semantics. For the two differ only insofar as they spell out the meaning of sentences, or if you like, of judgements, in terms of truth-conditions and verification-conditions respectively. Hence, it is just how to characterize content that separates realist from constructivist semanticists; neither need worry about whether reality exists in itself or somehow depends on us.

But let us proceed to the third chapter. There, Loparić describes Kant's version of the arquitecture of the human problem solver. As we already know, crucial to this version of the human cognitive apparatus is the idea that the latter consists of a system of rules of various levels for manipulating and elaborating representations. The notion of rule being employed here is the one computalionalists about the mind have used all along: a rule is an operation having sets of representations as its input domain and yielding a representation as output; the difference between the types of content and form of the input and the output characterizes the content of the rule.

Thus, the rules of the lowest level are grouped in a faculty called sensibility; these rules plot external sensations, on the one hand, on a temporal and spatial scale and internal sensations, on the other, on a temporal scale.[11] Rules of a higher level manipulate temporal and spatial

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[11] There are various over-simplifications here. One of them is that I am leaving aside an operation of a very low level, the so-called original apperception: that operation by means of which every representation of the subject is linked with the representation *I think* and which unites all representations thus tagged in the same consciousness. Another simplification has to do with the fact that more than just one temporal and spatial classification of representational data is involved in cognition. One of the most basic must be that by means of which the sensations in our visual field, say, are organized.

sensations in order to produce more abstract and complex representations – concepts and judgements; these rules are put under the umbrella of a faculty called understanding. There are also rules of even higher level whose product are not representations; their function is to guide the production of our overall picture of the world. As some of the rules of the understanding are not deterministic,[12] and furthermore they must be reiterated many times if reasonably substantial successive representations of a portion of the world is to be generated and revised, then there must be rules guiding the processes of generation and revision of our empirical theories. These rules are conceived by Kant as belonging to the faculty of reason. The logical postulate of reason which demands that we look for every conditioned piece of knowledge obtained by the understanding the totality of its conditions[13] is a methodological rule of reason. It orders the researcher never to stop pursuing his empirical investigations; for example, in the field of splitting matter, he should proceed looking for ever smaller constituents of matter as if it were infinitely divisible.

It is worth while pointing out that in chapter 3 the concept of the correction of the employment of the cognitive rules of understanding, sensibility and reason makes its appearance in the book for the first time. The crucial analogy here is that between formal logic and transcendental logic. It is more or less uncontroversial that the laws of formal logic supply the criteria for correct reasoning; analogously, Loparić's Kant will maintain, the *a priori* principles of the understanding constitute the criteria for the correct manipulation of spatially and temporally ordered sensations in order to generate the objective content of our synthetic

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[12] In the sense that they do not guarantee a result for each arbitrary argument (a pair of representations as in the case, say, of the rule of causation) in a finitely many steps.

[13] This is in the *Crtique*: B 364, B 526.

judgements. Questions about the distinction between incorrect uses of categorical rules[14] of whose criteria of correct application one is aware, on the one hand, and cases where no evidence in conduct of consciousness of such criteria exist, on the other, are never raised in the book. This is for me strong evidence that the notion of correctness being used here is not robust enough to include it at the conscious or intentional dimension of the mind's operations. But this was to be expected.

2.2 Transcendental Semantics

We come then to the fourth chapter. Following Kant's division of objective representations in intuitions and concepts, Loparić focuses first on intuitions, that is those objective representations which are singular and thereby refer to an unique object. In order to generate intuitions, the intervention of rules of sensibility is necessary as well as of rules of the understanding upon the data provided by sensations (subjective representations). An example of a rule of sensibility is the spatial classification of external sensations (sensations produced by our sense organs that process information from the external world). With instances of rules of the understanding we are also familiar: the principles of causality and of permanence of substance. The essential distinction between these two kinds of rules consists in the types of representations which can be arguments for each of them. Rules of sensibility take sensations as arguments and yield spatial and temporal representations as values. Rules of the understanding cannot take external or internal sensations (that is, sensations of the operations of our own minds) as arguments; they must operate on spatial-temporal representations or at least on purely temporal representations. Other examples of rules of the

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[14] Rules associated with the categories.

understanding are the axioms of intuitions and the anticipations of perception; these *a priori* principles of the understanding render the application of mathematics to natural phenomena possible. The axioms of intuition make counting and measuring empirical things possible by authorizing the employment of the laws of the arithmetic of real numbers to the intuitions of these things. The anticipations of perception, in turn, authorize the application of the rules of calculus to temporal and spatial sensations. Chapter 4 ends with a short discussion of a few problems related to Kant's constructivism with respect to intuitions. One of these is the problem of the input basis for the construction of intuitions; another is the problem of the non-constructivity of the intuition or intuitions of something continuous (in the mathematical sense).

Chapter 5 focuses on Kant's theory of conceptual representations, and more specifically on his conception of the conditions for their possessing reference and meaning. As we know, according to Loparić Kant presents us in the "Transcendental Analytic" with a semantics for all concepts applicable to phenomenal objects. In this context, a semantics is an account of the conditions for conceptual representations to be instantiated by empirical or pure intuitions (that is, those corresponding to empirical or to mathematical objects); this is the notion of semantics that Kant inherits, Loparić tells us, from ancient Greek geometers. Following this interpretation of what a semantics achieves, concepts which cannot be instantiated by any intuitions do not refer and are therefore meaningless. There are, according to Loparić's exposition of Kant, four kinds of meaningful concepts: (a) perceptual concepts; (b) experiential concepts; (c) mathematical concepts; and (d) the pure concepts of the understanding.

The difference between perceptual and experiential concepts seems to be that between primitive empirical concepts and defined ones.

I clarify this because, in spite of what Loparić says about the content of experiential concepts – that their content is made explicit by a definition – the examples offered in the sections of the chapter where these two kinds of concepts are discussed do not make this completely clear. TREE is cited as a perceptual concept while GOLD supposedly instantiates an experiential concept. But, could TREE not be as precisely defined as GOLD? Perhaps what Kant and Loparić want is to distinguish between ordinary empirical concepts (like TREE) from scientific concepts (like GOLD), in which case I have no qualms about the distinction. Kantian semantics requires that these two kinds be instantiated by empirical intuitions; mathematical concepts, in turn, must be instantiated by *a priori* constructions. The case of the instantiation of the pure concepts of the understanding is the most complex; they are instantiated, if we may put it that way, by *a priori* analogical constructions, at least in the case of the dynamical categories. This means that their exemplars are acts of constructing complexes of sensations or perceptions according to rules (for example, the rule of searching for causes or the rule of searching for the substance of a series of accidents).

But what guarantees that all these concepts will be instantiated in intuition or in operations to manipulate intuitions or other empirical representations? Or to put it in a Kantian way: what makes it the case that all these concepts have the contents that we take them to have? This is the crucial question for the project of constructing a semantics for all synthetic judgements (the Kantian project of the "Transcendental Analytic", according to Loparić). I will focus on empirical (perceptual and experiental) and mathematical concepts; these are the ones for which in my opinion it makes sense to say a constructive semantics is being offered. In claiming this, I obviously do not imply that the categories do not possess a constructive content; the claim is rather that their being the rules of the proposed constructive semantics for empirical and

mathematical judgements and concepts is what confers content to the categories.

How then should the above question be answered? I take it that the short answer is: empirical and mathematical concepts get their content from the intuitions that instantiate them. These intuitions, in turn, connect to their respective concepts *via* the empirical schemas that, according to Kant, are constituted by *a priori* schemas of the categories (the schemas of quantity, reality, causality, substance and so on).[15] But what guarantees that an intuition of whatever contentful concept refers immediately to an object? I could not find a sufficiently precise answer to this question in the chapter under consideration; however, given all we have discussed till now, the answer must be something like this: intuition and object correspond to each other because the operations of our cognitive apparatus that generate the former (that is, the *a priori* schemas) also constitute the latter. The possibility of misreferring or misapplying a concept (applying the concept to an object which is not in its extension) must be accounted for in these terms: given that some of the mentioned rules do not allow us actually to construct the perceptions from sensations and the intuition from perceptions but merely to proceed analogically in search of a certain perception or an intuition – this happens with the rules corresponding to the dynamical categories of causality, substance and community – then the possibility of a mistake in this search is always open; furthermore, there is also the possibility of following deterministic rules incorrectly.

Chapter 6 contains Loparić's discussion of Kant's concept of truth. It is known that truth for Kant is some sort of correspondence between our meaningful judgements and their object.[16] And we already

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[15] This is in B 182-5.

[16] B 82.

know that the objects[17] of meaningful judgements are constructed[18] out of perceptions by means of the *a priori* schemas of the categories. Moreover, as Loparić reminds us,[19] Kant has a very particular understanding of the semantical content of a concept; for him, the fact that the possessing of content by a concept depends on the concept's possibly referring to something in reality – that is, meaningful concepts are those and only those that can refer to things and properties in the world – is rendered as the concept's possibly being instantiated by intuitions.

Meaningful empirical and mathematical judgements – that is, judgements that, according to Kant, are either true or false[20] – must satisfy two conditions: (a) they must have certain *a priori* interpreted logical forms; and (b) they must posses apart from logical concepts only meaningful concepts in the sense discussed above. Condition (a) implies that the twelve logical features of all judgements as interpreted by the

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[17] By objects here I mean something more than just particulars that could be given in experience; I mean empirical properties as well. Better perhaps would be to refer to them as objective features of reality.

[18] In a more lax sense than that familiar from Greek constructive geometry. As we know, Kant was very much impressed by the constructive methods of Euclidean geometry and also aware that empirical objects cannot be constructed in such a strong sense. A weaker sense of construction is required; for example, that allowed by analogical rules of construction such as causality, etc..

[19] For example, in Loparić 2000, p. 212.

[20] Thus interpreted, Kant is saying that the meaning of an empirical or mathematical judgement consists of its truth-conditions. Loparić reads Kant as putting forward a constructivist semantics, which means that the truth- and falsehood-conditions of any judgments must be ones that we always have access to; conceived in this way, truth- and falsehood-conditions are no different from justification- and refutation-conditions, which is what we should expect from a constructivist semanticist.

twelve categories must be present in all empirical judgements and at least some of them must be constitutive of all mathematical judgements. For example, the judgement "the illumination of the sun renders the stone hot"[21] exemplifies the interpreted logical forms of causality (for this is the relation between its antecedent and its consequent), substance (since both its antecedent as its consequent are substance-accidents less complex judgements), reality (*Realität*) – because it and all of its sub-judgements affirm something – , and many others. Another example is the familiar "7 + 5 = 12"; this instantiates the interpreted form of extensive quantity and also that of affirmation.

It is worth adding that each of the categories contributes to the possibility of empirical and mathematical judgements' truth or falsehood in its own way. Extensive quantity categories (unity, plurality and totality) shape the *a priori* content of a judgement's subject concept; intensive quantity categories (reality, negation and limitation) take care of the *a priori* content of each judgement's predicate concept; relation categories (causality, substance and community) provide an *a priori* content to the connection between the concepts of the subject and of the predicate; finally, modal categories (possibility, existence and necessity) deal with the connection between whatever content the categories of the other three groups (extensive quantity, intensive quantity and relation) assigned to a given judgement and the nature of the candidate truth-maker of the judgment in question. If such a truth-maker is connected to a truth-maker of some other verified judgement *via* some relational principle of the understanding (causality, substance, community), then the first truth-maker is said to be real (*wirklich*); if the truth-maker of a judgement is in accordance with the intuitive (spatial and temporal) and discursive (with respect to the categories) formal conditions of experience, then the truth-

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[21] An example from the *Prolegomena* (Kant 1783).

maker in question is said to be possible; finally, if our truth-maker would exist no matter what the course of experience were like, then such a truth-maker is said to be necessary. Since they possess this distinguished characteristic, modal categories do not contribute to generating the content of mathematical and empirical judgments;[22] they are not, strictly speaking, part of Kant's transcendental semantics.

Loparić discusses in great detail the contribution of each of the three groups of categories (extensive quantity, intensive quantity and relation) to the production of mathematical and empirical judgements' contents but I will leave the evaluation of the whole project of a constructive truth-conditions semantics to the last section. Rather, my last comment on the sixth chapter of *Semântica Transcendental* will concern the distinction in the domain of empirical judgements between perception judgements and judgements of experience.

The distinction is familiar from the *Prolegomena* (Kant (1783), §18) judgments of experience are objective while perception judgements are subjectively valid. What Kant is aiming at with this dichotomy is to highlight the fact that the final content that will characterize all empirical judgements is not yet in place in the case of perception judgements. If we are allowed to describe the situation in terms of a computing model, this is what we should: the human computational cognitive apparatus operates with representations at various levels. There is a level at which perceptions are compared to form a judgement but at which the operations corresponding to the categories have not been applied to the connection between the subject and the predicate concepts (say, in the case of subject-predicate judgements) in order to yield an objective judgement. For example, to say of a perceived bucket of water that it is warm is to make a perception judgement. On the contrary, to say that

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[22] See, Loparić 2000, p. 213.

the movement of a billiard ball provokes the movement of a second billiard ball is to form a judgement of experience; that is, to entertain this judgement is to apply the category of causality to the connection between the simpler judgements that the first ball hits the second and that the second ball moves. Before the judgement is formed, there was just a perception of the temporal succession of two events (the hitting of the first ball on the second and the motion of the second ball).

2.3 More Problem-solving

The discussion in chapter 7 returns to Kant's approach to problem-solving. According to Loparić, in Kant's theoretical philosophy there are two kinds of cognitive problems: those having as unknown objects and those having as variables theoretical systems. Problems of the first kind are the ones dealt with in the present chapter. Those concerning theories about the objects of experience are discussed in chapter 8. Problems concerning objects are of two sorts: mathematical and empirical problems. An empirical problem is, for example, that of finding out the cause of a certain type of phenomenon. This implies that the categories and their respective principles serve not only to confer content on empirical discourse; they also play a heuristic role in the search for hypotheses linking empirical phenomena. A heuristic principle of the understanding would be: look for physical laws of a causal form. Such is the role of the so-called analogies of experience, the principles of the understanding corresponding to the three categories of relation (causality, substance and community). The mathematical categories of extensive and intensive quantities play a less heuristic role. These categories and their corresponding principles (the axioms of intuition and the anticipations of perception) tell us how to apply intuitive mathematics (arithmetic and Euclidean geometry) to perceptions and

intuitions, that is to the empirical world.[23] As to the fourth group of categories and their principles (the postulates of empirical thought), they possess, as Loparić emphasizes, a methodological role in empirical research; they provide criteria for the epistemic justification of empirical hypotheses and also for evaluating their reliability.

As said above, chapter 8 discusses the human problem-solver with respect to a higher-level sort of problems: those concerning the search for new empirical theories. The task of establishing heuristic rules (and in this domain only heuristic rules can be proposed, according to Kant) for solving these problems belongs to the faculty of reason. Kantian insistence on including problems of this sort in his theoretical philosophy stems from his conception of the architecture of the human cognitive apparatus. Rules of the lowest-level, those having to do with the classification of sensations spatially and temporally, are grouped within the lowest-level computing faculty of sensibility; higher-level rules dealing with higher-level representations like perceptions, concepts and judgements and producing simpler and more complex (empirical hypotheses, say) belong to the faculty of understanding, and at the top of the hierarchy of cognitive rules are heuristic principles guiding the construction of empirical theories, which Kant classifies as making up the faculty of reason.

Thus, the concepts and principles of reason (the ideas of the totality of the universe, of the immortal soul and of God and the principles that, according to the supreme maxim of the human problem-solver,[24] they give rise to) are nothing more than guides to research in

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[23] They express, as we would say today, representation theorems, which means that they show that the apparatus of mathematics can be applied to measure the entities of the empirical world arithmetically and geometrically.

[24] As we know, this maxim commands us to find out for every conditioned knowledge produced by the understanding the totality of its conditions (the

the empirical domain. For instance, within the domain of empirical psychology the researcher must proceed as if our minds were simple substances conserving certain properties like personal identity, unity and so on. According to Kant, this is a heuristic guide for investigation in psychology.[25] Another example is the principle that commands the scientist to search for ever more basic theories of the structure of matter as if matter were infinitely divisible. The idea behind this principle is that the scientific finding out of ever more fundamental and smaller parts of matter will further causally explain the immediately less fundamental constituents of matter discovered before. This principle has proved more heuristically fruitful than the one about the simplicity of the human soul. This should not be read as a criticism of Kant's theory of reason, which in my opinion was a great advance with respect to his contemporaries. By his theory of reason, I mean Kant's spelling out of the luminous idea that the concepts of reason contribute to the epistemic enterprise not so much with new knowledge as with methodological guidelines for future scientific discovery.

Finally, chapter 9 contains an illustration of Kantian theory of reason (metaphysics) as a canon for evaluating alternative scientific and speculative systems of the world: the case of Kant's dynamical theory of matter. Here Loparić mentions for the first time Kant's acceptance of an

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unconditioned). This is in Loparić's interpretation what moves us to search for solutions to the systemic problems for our cognitive apparatus, that is, the problems of devising ever better empirical theories for explaining and predicting the behavior of phenomena.

[25] It should be mentioned in passing that Kant was actually wrong about this since the simplicity of the soul has ceased to be a fruitful guide in psychology, at least in general. Evidence for this is provided by investigations in psychoanalysis; another piece of evidence is offered by the downfall of the introspective model of the mind prompted by materialist theories of the psychological domain.

ideal (non-constructive) mathematics (the calculus with infinitesimals) for the purpose of solving the problem of the different degrees (intensities) of occupation of space by matter. The concepts of ideal mathematics do not possess the meaning and reference appropriate to constructive mathematical concepts. Nonetheless, like the concepts of reason (the ideas), they play a heuristic role in the scientific enterprise. In the specific case of the concepts of ideal mathematics, they help with an analogical interpretation of noumenal concepts which are very useful for scientific theories – the concepts of fundamental forces, absolute space, empty space, etc. The chapter ends with an example of the use of Kant's metaphysics of nature for the appraisal of a theory of matter which is incompatible with Kantian semantical principles: the atomic theory of matter. As Loparić correctly points out, Kant's arguments in favour of the dynamic theory and against the atomic theory are not demonstrations; what they do is to suggest that the concepts of the first theory are more fruitful for the continuation of empirical investigations than the concepts of the second. This was probably true at the time Kant wrote.

3 CRITICISM OF THE MAIN IDEAS

Loparić's text raised three major questions left unanswered in the preceding sections: (a) is Kant's theory about the human cognitive apparatus really a heuristics?; (b) is it plausible to conceive the "Transcendental Logic" as a semantics?; (c) is it correct to tie the solubility of a problem or class of problems to the meaningfulness of the expressions that describe it or them? The first two questions relate to Loparić's interpretation of Kant; the last concerns not only that but also a well-entrenched speculative hypothesis. Let me now try to sketch an answer to them.

The problem (c) of whether we should tie the solubility or insolubility of a problem with the meaningfulness or meaninglessness of the expressions constituting its respective question comes first. The linguistic tradition in philosophy has always characterized itself as believing in the above equivalence. The *Tractatus* quote from section 1 and the text from Carnap illustrate this strong tendency of this tradition. Nonetheless, in my opinion it is more plausible to claim that the solubility of a problem implies the meaningfulness of its respective question than the opposite implication. A famous case from the history of the foundations of mathematics will confirm my qualms. In various texts, Hilbert reaffirmed his belief that all well-formed mathematical problems are soluble. Among the well-formed problems that he himself formulated was that of proving the consistency of first-order arithmetic using finitistic tools.[26] As a well-formed mathematical problem, it was also mathematically meaningful and therefore, according to Hilbert, soluble. Gödel was the responsible for shattering Hilbert's cherished belief by showing that the problem is not soluble,[27] its meaningfulness notwithstanding. The lesson could not be clearer: the meaningfulness of a problem does not guarantee its solubility.

Nonetheless, I agree with Kant and Loparić in upholding the opposite implication, namely: that the solubility of a problem guarantees its meaningfulness. Thus, Kant is absolutely right in refusing the dogmatic solutions to metaphysical problems about the absolute size of

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[26] This means using that part of arithmetic which came to be known as primitive recursive arithmetic (See Skolem (1923)). This weaker arithmetic does not make use of unbounded quantifiers and therefore dispenses with set-theoretic notions.

[27] In Gödel (1931). A text where Hilbert reaffirms his belief in the solubility of all mathematical problems is, for instance, Hilbert (1926). For a pre-Gödelian dissonant voice, see Brouwer (1908).

the universe, about the compatibility between causal determinism and human freedom and about the simplicity of the human soul on the grounds that a framework for an answer to these questions has not been provided for. Or to put it another way: the dogmatic metaphysician has not offered, according to Kant, a criterion for giving an affirmative or negative answer to the above problems; hence, their respective questions are meaningless. Notice, however, that in requiring a decision criterion for the possibility of a solution we are not thereby demanding that the proposition expressing the problem be decidable in the sense of there existing an algorithm for establishing its truth-value in a finite number of steps. Section 2.1 has already made it clear that undecidable problems in this sense are perfectly soluble. Rather, what is being required here is something like the shapes of acceptable answers.

Now, how plausible is it to conceive of the "Transcendental Logic" as a semantics? If our standard of a semantic theory is that which Tarski developed then Kant's theory is of course way below the standard. And not because the latter is a mentalistic theory, that is a theory dealing with mental symbols (concepts and judgements) while Tarski's is a theory of the content of public linguistic symbols. Neither is it because Kantian "semantics" should be better conceived as a verificationist (or constructive) semantics rather than a full-fledged truth-conditional semantics. After all, there have been serious attempts like that of Michael Dummett at constructing an assertability-conditions semantics (cd. Dummett (1976)).

What I think Kant fails to articulate clearly is how the content of complex propositions relate to the content of their constituent simpler propositions and how the content of the simplest propositions relate to the content of their constituent non-propositional parts. As far as cases of the first kind are concerned, because Kant did not acknowledge other ways of linking two simpler propositions than by means of causal or

communitarian (the content of the formal relation between mutually disjunctive propositions) relations and because these are not logical ways of connecting simpler propositions into more complex ones, we are left without a clue as to how in general the verification-conditions of very complex propositions depend upon the verification-conditions of their propositional parts.

The same applies to cases of the second kind: since Kant recognizes only the substance-accidents relation as the content of the formal relation which binds concepts together in order to form the simplest of propositions, he is powerless to provide the verification-conditions of relation-relata atomic propositions (the proposition, say, that the sun is larger than the earth) in terms of the contribution of their constituent concepts to these conditions or even the verification-conditions of an atomic quantified proposition in terms of the contents of its constituent concepts. My complaint in summary about Kantian "semantics" is the following: it does not satisfy the fundamental requirement of a proper semantics, namely: that of explaining how we can produce infinitely many meaningful propositions out of manipulating just finitely many meaningful non-propositional parts. Kant may have contributed to the development of a semantics for a portion of our discourse by paying more attention than Hume to the articulation of concepts in a judgement and the articulation of simpler judgements in a more complex judgement. However, it is too much, in my opinion, to attribute to him the construction of a semantics for an interesting infinite portion of discourse (for instance, scientific discourse).

Let me finally address the first question, the problem of whether Kant's theory can be characterized as a doctrine about how to solve philosophical problems (those concerning scientific activity, for instance). I take it is undeniable that Kantian criticism of dogmatic metaphysics and his proposal of a new framework for solving theoretical

philosophical problems (Transcendental Idealism) was a major advance in the history of philosophy. In this sense, one could say that Kant's theory of our cognitive faculty is heuristic. But the history of philosophical development after Kant is itself a witness that various philosophical problems could not be solved within the Kantian framework. An example of such an insoluble problem is the famous mind-body problem; another one is that of explaining the emergence of intentional content out of stimuli possessing no initial content. I suspect that Kant's explanation is vitiated by a supposition that sensations (or whatever we call the most unelaborated representations our cognitive apparatus manipulates) already have a primitive content; if this is so, then Kant is victim of what has been called the myth of the given (Sellars (1956) and his explanation is circular. Again, I think it is too much to demand of Kant an awareness of the circularity and a framework to avoid it. Having said that, I still maintain that the onus of proof is on the side of those who claim that his is a heuristic theory in the sense of making explicit the mechanism by means of which we go about solving problems; what we have been told about Kant's heuristics with respect to philosophical problems is very incomplete. Something more robust is needed.

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