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Carnap's *Meaning & Necessity* and the Universalist Tradition

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RESUMEN

La idea de que la obra de Carnap en semántica contribuyó de forma decisiva a constituir la concepción del lenguaje como cálculo y al desarrollo de la aproximación a la teoría del significado característica de la teoría de modelos se halla muy extendida. Mientras que los estudios de Carnap sobre la sintaxis lógica del lenguaje cuadraban con una visión del lenguaje como medio universal, en su *Introduction to Semantics* y en *Meaning and Necessity* adoptó el paradigma del lenguaje como cálculo. En este ensayo se insiste en la línea renovadora del trabajo de Hintikka sobre Carnap argumentando que *Meaning and Necessity* contiene todavía diversos ingredientes universalistas. Se subraya en él que el principal rasgo de la semántica de Carnap en esta obra es la concepción de la teoría del significado como una teoría de la traducción.

PALABRAS CLAVE: *lenguaje como medio universal, lenguaje como cálculo, semántica teoría de modelos, sintaxis, Carnap, Tarski, Hintikka.*

ABSTRACT

It is generally thought that Carnap's work in semantics decisively contributed to conform the view of language as calculus and to develop the model-theoretical approach to the theory of meaning. Whereas his research on the logical syntax of language was consistent with an understanding of language as a universal medium, in *Introduction to Semantics* and *Meaning and Necessity* he moved into the paradigm of language as calculus. In this paper I reinforce Hintikka's renewing work on Carnap's semantics, arguing that *Meaning and Necessity* still contains a variety of universalist ingredients. It is emphasized that the main feature of Carnap's semantics in this book is that of conceiving a theory of meaning as a translation theory.

KEYWORDS: *Language as a Universal Medium, Language as Calculus, Semantics, Model-theory, Syntax, Carnap, Tarski, Hintikka.*

I. LANGUAGE AS THE UNIVERSAL MEDIUM *VS.* LANGUAGE AS CALCULUS

One of the most thought-provoking ideas in Jaakko Hintikka's work is the conception of contemporary philosophy, at least since Frege's times, as a sustained tacit confrontation between two conceptions of language, namely

language as a *universal medium* vs. language as *calculus*.¹ From the standpoint of a universal medium, it would be impossible to distance ourselves from the language in which we coin thoughts and express them. There is no getting outside of the language, no scanning it from without, as it were. This way of putting things is informal, but it can convey a deep insight once it is adequately shaped. Firstly, the fundamental semantical relations between language and the world – i.e., on the relations between the language’s nouns, predicates, and other basic descriptive constituents and the objects, properties or relations for which those expressions stand – turn out to be ineffable. Secondly, as a consequence of such ineffability, a large-scale reinterpretation of language – i.e. seeking to provide language an entirely different interpretation of its basic elements – becomes senseless. Only minute modifications here or there emerge as worthy of being recognized against a background of semantical invariance. Thirdly, the concept of truth loses the central place in semantical theory that it has been accorded since the times of Tarski and Carnap. On the contrary, the view that nothing is added to a sentence (proposition, judgment) by saying that it is true gains ground. Moreover, since the concept of truth is the key that allows us to introduce a wide range of metatheoretical notions, it is illusory to project and develop metalogical research. Fourthly, semantic analysis in model theory’s format is a baseless project from scratch. Philosophers and linguists who overlook this assessment risk becoming “[s]emanticists without semantics” [Hintikka (1997), p. 163]. Hintikka has shown that Frege, the young Russell, Wittgenstein, and authors such as Quine have developed many of their ideas with the help of the conception of language as the universal medium, providing outstanding examples of the *universalist* tradition.

On the other hand, if language is viewed as a rich and complex calculus – I will speak of the *model-theoretic* tradition hereafter, no claim listed above is admissible. Its main contention is the following:

If taken seriously, the model-theoretical tradition gives rise to the idea that the relation of a sentence to its models is the cornerstone of all semantics. According to this consistent model-theoretical conception, what a sentence S says, it says by specifying a class of models $M(S)$. To know that S is true in a model M_0 is to know that $M_0 \in M(S)$. To know that S is logically true is to know that it is true in every model, i.e., to know that $M(S) =$ the entire space of models. Thus in the last analysis everything comes down to the relation of a sentence S (or of a set of sentences) to its models [Hintikka (1997), p. 107].

Stated in a less technical way, model theory puts the semantical analysis of a language’s sentences in terms of the relations that these sentences hold to different models, i.e. possible worlds or scenarios. For a model-theoretical logician “all that really matters is the sentence-model relation” [Hintikka (1997),

p. 203]:² the meaning of a sentence S identifies with a class of models, namely those models in which S is true. Logical truth, logical consequence, and other semantical properties and relations are accounted for on the basis of the concept of being true in a model. Each model M represents a possible world and, by examining how a sentence S 's truth or falsity varies as a function of M 's constitution, the meaning of S can be displayed.³ Any doubt about whether semantics can be framed in model-theoretic terms is thereby dispelled. Hintikka claims that this is precisely what has happened, in the first place, to the foundations of logic and mathematics and, secondly, in semantics throughout the twentieth century. The gradual rise of model theory has meant, in his words, "a slow transition from the view of language as the universal medium to the view of language as calculus" [Hintikka (1997), p. 28]. Logicians such as Schröder, Löwenheim, Gödel, and Tarski, as well as mathematicians such as Hilbert, are among the creators of this brand of contemporary semantics.⁴

In this essay, I inquire into the place that Carnap's work occupies in semantics, and specifically the role played by *Meaning and Necessity* within the confrontation between the universalist and the model-theoretic tradition. Did Carnap hold the view of language as the universal medium or did he decisively contribute to make model-theory a paradigm for contemporary semantics? Hintikka's answer to this question has become more and more qualified over the years. In the essay 'Carnap's Heritage in Logical Semantics' [Hintikka (1975)] he underlined the significance of Carnap's work on model-theoretical semantics, with an eye put on the semantical principles of modal logic. Nevertheless, he has later argued that Carnap, besides making a substantial contribution to the language-as-calculus tradition, has likewise been a universalist semantician. In particular, whereas the author of the *Aufbau* and the logician who designed *Die Logische Syntax der Sprache*'s Language I is one of those "semanticists without semantics", the logician who designed Language II (in the very same latter work) moved into the model-theoretical territory, or was close to doing so [Hintikka (1997), pp. 193ff.]. This analysis bears an aspect that I fully endorse: the universalist and the model-theoretician Carnaps do not belong to watertight compartments [cf. Hintikka (1997), p. 208]. Starting from this analysis, I will argue, in opposition to a widely held viewpoint, that in *Meaning & Necessity* [= *M&N*, hereafter] Carnap did not unequivocally support Gödel's and Tarski's theses. Hintikka himself seems to imply this when writing that "Carnap, too, remained handicapped by important restrictive assumptions, relics of the universalist position" [Hintikka (1997), p. 198]. Of all such assumptions, only one is mentioned by Hintikka, namely the one-domain assumption –the requirement that in interpreting and reinterpreting one language, i.e. in providing it with arbitrarily different interpretations, we operate within one and the same universe of discourse. Expressed in a different way:

...we cannot vary the interpretation of one language...the totalities of the inhabitants of two possible worlds must ultimately be the same. [Hintikka (1997), pp. 198-199].

My goal is to argue that there are several other ingredients in the semantical theory which unfold in *M&N* and that do not support the conclusion that Carnap completely abandoned his former universalist convictions. What is, then, Carnap's task in *M&N*? What is his aim in that work?

II. CARNAP'S METHOD OF EXTENSION AND INTENSION

From the very beginning, Carnap candidly states that the chief task of his book is "to find a suitable method for the semantical analysis of meaning, that is, to find concepts suitable as tools for this analysis" [*M&N*, p. 2]. This claim, the first one made in *M&N*, is nothing short of amazing by today's standards, because we might ask: What nuance does 'semantical' add to 'analysis of meaning' that this very term would not include? Presumably, Carnap carefully chose every word of his statement and the adjective 'semantical', far from being redundant, plays a substantial role.⁵ It follows that Carnap had to hold that there are both semantical and non-semantical analyses of meaning. I hope that these ideas will display their credibility as the essay proceeds. For the time being, I will focus my attention on *M&N*'s architectonics, mainly on Carnap's design for Chapters I and IV. I propose that *M&N*'s spirit is best perceived in those structural features. In sections II-VI, I will focus on a few remarkable aspects on the Method of Extension and Intension that Carnap introduces in the first chapter. My reading of Chapter IV will be briefly presented in sections V-VI.

In Chapter I of *M&N*, Carnap sets the conceptual basis of a new method of semantical analysis, called the Method of Extension and Intension [= MEI, hereafter]. He does so by introducing a symbolic language T_1 and showing how MEI applies to it. In its essentials, T_1 is a first-order predicate language which includes, as its descriptive primitive expressions, individual names and n -ary predicates (for every natural number n). To apply MEI to the language T_1 , firstly, the concepts of extension and intension must be defined relative to each non-logical expression of T_1 ; and secondly, an extension and an intension must be assigned to it. Among the primitive expressions of T_1 individual names, individual variables, (simple) predicates, and complete sentences play a significant role. In summary, Carnap's task, i.e. the definitions he sought, reduces to the following. The extension of a sentence S (of T_1) is the truth-value of S ; the intension of S is the proposition which S expresses. The extension of a predicate P (of T_1) is the class of entities – class of individuals, class of pairs of individuals, etc., depending on P 's n -ary number; the intension of

P is the property (or relation) the members of P 's extension share (or hold). The extension of an individual name a (of T_1) is the individual for which it stands; the intension of a is the individual concept expressed by a . The extension of an individual variable x (of T_1) is the class of all the values that x can take, i.e. the universe or domain of discourse; the intension of x (or value intension) is the class of all individual concepts. To this framework, Carnap adds particular extensions and intensions to other expressions belonging to T_1 's grammatical categories, and manages to indicate how both the extensions and the intensions of T_1 's complex expressions are respectively determined by the extensions and the intensions of their basic constituents.

Although this is a significant achievement, it does not shed light on the intricacies of Carnap's design of MEI. The basis for the method lies elsewhere, i.e. in the definition of the concept of *truth*. Carnap needs to count on such a definition to assemble the intricate parts of his semantical machinery. Those parts are the concepts of L-truth, equivalence, and L-equivalence. Carnap uses these concepts in stating the principles of MEI that govern the extension and the intension of T_1 's constants and variables, predicates, and sentences. What is worth noting here is that the concepts of L-truth, equivalence, and L-equivalence are provided with a content only on the basis of a truth definition. Definition 3-5 (*M&N*, 14) captures the result of analyzing such a dependency. The two sentences S_1 and S_2 (of T_1) are equivalent if, and only if, the biconditional $S_1 \leftrightarrow S_2$ is true; S_1 and S_2 are L-equivalent if, and only if, the biconditional $S_1 \leftrightarrow S_2$ is T_1 -true. Two predicates (of T_1) P and Q are equivalent if, and only if, the sentence $\forall x(Px \leftrightarrow Qx)$ is true; two predicates (of T_1) P and Q are L-equivalent if, and only if, the sentence $\forall x(Px \leftrightarrow Qx)$ is L-true. Two individual names (of T_1) are equivalent if, and only if, the sentence $a = b$ is true; two individual names (of T_1) are L-equivalent if, and only if, the sentence $a = b$ is L-true. It can be seen that the concepts of equivalence and L-equivalence rest, respectively, on the concepts of truth and L-truth. If we add to this that L-truth is defined in terms of truth, we arrive at the conclusion that this very concept is the basis for MEI.

Does this conclusion imply that Carnap's Method of Extension and Intension agrees with the language-as-calculus view? Not necessarily. The method is arranged so that the meanings of the object-language's expressions are set out by assigning to them expressions of a certain metalanguage. The assignment adopts the form of translation theory from one language to the other and does not involve at all any relation between the object-language and the world. Carnap's design precludes the possibility of conceiving the semantic rules that the translation theory posits as ways into the object-language. There is no stepping outside language, but there is no stepping into it, either. That is, no principle included in the semantical theory states anything about the system of relations that connects language with reality. It is

important not to lose sight of this fact because it has been argued that we must accept the view of language as calculus if we resort to the idea of a metalanguage.⁶ The reason is that any metalinguistic assertion presupposes a position external to the object-language that the assertion refers to. This argument is not only far from obvious, but also far from making any sense. In itself the concept of a metalanguage is no closer to the conception of language as calculus than it is to the conception of language as a universal medium. Its leaning towards one of them depends on how that concept is understood. When the metalanguage is construed as a part of the one and only language that exists – a fragment of the language that is equipped to display a range of structural properties and relations possessed by expressions in a different suburb of the language – the universality of language is supported. With regard not to semantic theorizing but to language learning, Hintikka has written the following:

In other words, [when language is conceived as the universal medium] one cannot... vary the representative relations between our expressions on the one hand and the reality on the other. We are stuck, logically speaking, with our one and only home language. Even the enterprise of learning a new language, in the usual sense of the world, should strictly speaking be conceptualized as extending one's first (and only) language rather than as acquiring a radically new one. After all, the only way in which one could learn the 'new' language is by means of the old one, according to this view. In brief, the view of language as the universal medium implies a thesis of the *universality of language* reminiscent of the universality of logic to which Frege was committed [Hintikka (1997), p. 164].

I assume that the assignment of extensions and intensions to the expressions that constitute the so-called object-language likewise adopts the form of an enlargement of the only language there exists. This sort of translation of object-language's expressions into the metalanguage that the MEI invokes does not involve two different languages but an enlargement of the one and only language.

III. TRUTH-CONDITIONS, DESIGNATION, AND TRANSLATION

Carnap's first assault on the concept of truth takes place immediately after his having introduced the basic constituents of the language T_1 and stated the semantical rules that assign its expressions an interpretation. Two kinds of rules are introduced at this stage of MEI's presentation: rules of designation and rules of truth. Taken as a whole, those rules constitute

...a recursive *definition for 'true in T_1 '*, because they determine, in combination with the rules of designation, for every sentence in T_1 a sufficient and necessary condition of its truth. Thereby they give an *interpretation* for every sentence [M&N, p. 5].

The question to be addressed now is: How do the rules accomplish that task? To begin with, the example dealt with in 1-4 is a good indication of Carnap's strategy:

1-4. The sentence Bs is true if, and only if, Scott is a biped [*M&N*, p. 5].

This rule fixes the sufficient and necessary conditions for the sentence (of T_1) to be true by combining the outputs of the rules of designation for the individual name s and the predicate B . What deserves further examination is the way in which 1-4 succeeds. *Carnap conceives the rules of designation and the rules of truth and their mutual adjustment as a system of principles that jointly provide a translation of T_1 's sentences into a chosen metalanguage, M , the language in which MEI's principles are stated.* Carnap openly admits that he followed this strategy:

More specifically, we presuppose that a statement in M saying that a certain sentence in T_1 is true *means the same as the translation of this sentence*; for example, 'the sentence Hs is true in T_1 ' means the same as 'Walter Scott is human' [*M&N*, p. 6. Italics added].

What has happened here? In Carnap's plan, the rules of designation and the rules of truth work in tandem. The rules of truth recursively generate the part of truth-conditions of any sentence S that depend exclusively on S 's constituent, i.e. syntactical, structure. Thus, the rule of truth that governs the semantical interpretation of T_1 's atomic sentences made up of a monadic predicate P and one individual name a says that Pa is true if, and only if, the individual designated by the name a belongs to the class of individuals that is the extension of P (see Proposition 1-3). And the rule of truth for sentences of the form $S_1 \leftrightarrow S_2$ says that any such sentence is true if, and only if, S_1 and S_2 are both true or both false (see Proposition 1-6). The rules of truth provide, as it were, truth-condition schemas, and become full truth-conditions when filled with the outputs provided by rules of designation.

In this context, it is of interest to briefly consider the rules of designation for T_1 introduced by Carnap:

1-1. *Rules of designation for individual constants*

s is a symbolic translation of 'Walter Scott'

w — '(the book) *Waverly*'

1-2. *Rules of designation for predicates*

Hx — ' x is human (a human being)'

RAx — ' x is rational animal'

Fx — ' x is (naturally) featherless'

Bx — ' x is a biped'

Axy — ' x is an author of y ' [*M&N*, p. 4].

When combined with the rules of truth for T_1 , these rules of designation give rise to theorems such as the following two:

- (1) Hs is true (in T_1) if, and only if, Walter Scott is human
- (2) Asw is true (in T_1) if, and only if, Walter Scott is author of *Waverly*.

It can be seen, then, that the rules of designation belong to a system of rules that, together with the rules of truth, match any sentence S of an object-language T_1 a translation of S into a metalanguage M . (1) and (2) are *metalinguistic theorems of theory of translation* from T_1 to M . They should be understood in this precise way because the rules establish how to translate T_1 's individual names (constants) and predicates into M . Carnap makes this commitment explicit by proposing that the relation between those expressions and the designations linked to them by the rules is that of a "symbolic translation". As pointed out above, Carnap from the very beginning uses MEI as a method for translating an object-language into a metalanguage: "We presuppose that a statement in M saying that a certain sentence in T_1 is true means the same as the translation of this sentence" [*M&N*, p. 6]. In the end, an individual constant and a predicate's designation as well as a sentence's truth conditions, i.e. relations which hold between language and the world, are nothing but translations of those expressions into an appropriate metalanguage.

IV. STATE-DESCRIPTIONS, L-TRUTH AND THE HOLDING-IN RELATION

It was stated above that Carnap defines the concept of L-truth with the help of the concept of truth. In order to provide this definition, it is necessary to specify the truth-conditions of a class of sentences of the object-language called *state-descriptions*. T_1 's state-descriptions are conjunctions of sentences of T_1 such that each conjunct contains, for each atomic sentence of T_1 , At , either At or its negation $\neg At$. (An atomic sentence of T_1 has the form $Pa_1 \dots a_n$, being P an n -ary predicate and a_1, \dots and a_n are individual names or constants). A state-description is a description of a possible world made with the expressive resources of T_1 : "...it obviously gives a complete description of a possible world of the universe of individuals with respect to all properties and relations expressed by predicates of the system" [*M&N*, p. 9]. The class of all state-descriptions represents the whole of the possible worlds that can be symbolized by means of T_1 's descriptive and logical vocabularies. After having defined the concept of state-description, Carnap goes on to define the concept of L-truth: a sentence S (of T_1) is L-true if, and only if, S is true in all possible worlds, true no matter what the universe's state is. In other words, S is L-true, if S is necessarily true, i.e. S is not contingently true. The exact def-

inition (Definition 2-2) turns on the notion of state-description: "A sentence S is L-true (in T_1) =_{df.} S holds in every state-description (in T_1)" [*M&N*, p. 10]. At this point, we need to be aware that the notion which supports Definition 2-2 is that of *holding-in*: S is L-true if, and only if, S holds in all state-descriptions. What does it mean? Carnap's response elucidates the concept of a sentence S 's holding in a state-description by linking it to the concept of truth-condition. That S holds in E means that if a state-description E is true, then S is also true:

That a sentence holds in a state-description means, *in non-technical terms*, that it would be true if the state-description (that is, all sentences belonging to it) were true. *A few examples* will suffice to show the nature of these rules: (1) an atomic sentence holds in a given state-description if and only if it belongs to it; (2) $\neg p$ holds in a given state-description if and only if p does not hold in it; (3) $p \vee q$ holds in a state-description if and only if either p holds in it or q holds in it or both; (4) $p \leftrightarrow q$ holds in a state-description if and only if either both p and q or neither of them hold in it; (5) a universal sentence (e.g., $\forall xPx$) holds in a state-description if and only if all substitution instances of its scope (Pa, Pb, Pc , etc.) hold in it [*M&N*, p. 9. Italics added].

This passage makes at least three claims that, though briefly, need to be discussed. First, in *M&N* Carnap does *not* define the notion of holding-in, i.e. he does explain what relation this concept applies to. He introduces it "in non-technical terms". Therefore, his is a rough, conceptually unrefined, analysis of the relation of holding-in. Second, the insight that guides his analysis can be easily recognized. His strategy consists of analyzing the concept of holding-in in terms of a further concept, namely that of a true state-description. If E is a description of the universe – that is, if E is the true state-description – then if S holds in E , then S is also true. One difficulty this analysis has to overcome is that Carnap cannot claim that there is a true state-description unless he chooses one among the possible worlds and designates it as the real world. (He would be forced to do this if he needed to say that there are sentences in T_1 that are true, period.) The only notion of truth available to him is the notion of truth *with respect to* a state-description (' S holds in E if, and only if, ...'). In the third place, and most importantly, what Carnap offers in exchange is an alternative that might be justly qualified as *structural*: S holds in a state-description E if (and only if) either S or other sentence or sentences are (syntactical) *constituents of E* – that is, if they are among the atomic sentences or the negations of other atomic sentences of T_1 that constitute E . What sentences are these? It depends on how S is constituted. It is also important to note that the very definition of the concept of state-description is already a structural one, because it is framed in terms alien to those that MEI brings to bear. Nothing which belongs to the "semantical analysis of mean-

ing” is essential in order to understand what a state-description is. On the other hand, although the above quotation seems at first sight to provide a recursive definition of the notion of a sentence S 's holding in (a state-description) E , such an impression should be resisted. That is, in such a case the recursion base ought to make use of a term, ‘belongs to’, the credentials of which need to be validated. Nobody knows what lies under the claim that an atomic sentence belongs to (or does not belong) to a state-description E , except that if the term ‘belongs to’ is the familiar set-theoretical relation, then it adds no properly semantical content to the notion of holding-in. Possibly, this explains why Carnap does not put forward clauses (1)-(5) in the above quotation as (part of) a recursive definition of the key concept of holding-in, and represents them as cases in which the relation links sentences to state-descriptions. Holding-in is a relation that a sentence S holds with a state-description, and every state-description is a linguistic entity characterized in purely structural terms, i.e. foreign to the semantical analysis of meaning. The concept of truth that results from this chain of definitions is per force a structural one, too. If we read something else into it – that is, if we construe it as the basis on which a plainly semantical, i.e. model-theoretic, system of principles can be erected – we would be projecting onto Carnap’s design more than what it literally contains.

The conclusion that follows from these remarks is that the concept of L-truth is as *structural* as the concepts of state-description and holding-in. Carnap states that it is a precise counterpart – he chooses the term ‘explication’ – of the idea of necessary truth. However, this claim goes beyond what his analysis delivers. After considering the details of Carnap’s proposal, his analysis amounts to the following: S is a L-true sentence (of T_1) if, and only if, $trad_M(S)$ is a logical consequence of $\{trad_M(E_1), \dots, trad_M(E_n)\}$, being $trad_M(S)$, the translation into the metalanguage M of the sentence S (of T_1) and $trad_M(E_1), \dots, trad_M(E_n)$ the translations into M of the state-descriptions available in T_1 . The specific design of the metalanguage M will supply the resources needed to capture the particular instances of the logical consequence relation among the corresponding translations of sentences of T_1 . In the end, the conclusion arrived at above concerning the concept of truth (in T_1) follows here again concerning the concept of L-truth: Carnap’s guiding idea on “the semantical analysis of meaning” in *M&N* is that a semantical theory of a language T (such as T_1) is a system of principles that, firstly, shapes a language – a metalanguage M – in which the meaning of expressions of T can be represented and, secondly, that assigns the expressions of T a translation into M . The attempt to read into this design a network of links that systematically connect T 's expressions to individuals, properties, and truth-conditions runs the risk of exceeding by far what the theory really provides.

V. THE PROBLEM OF A REDUCTION OF ENTITIES

In sections II-IV, three aspects of *M&N*'s Method of Extension and Intension have been pointed out as differing from the usual method in contemporary model theory. Instead of laying the foundations for an analysis of the relation between a sentence S (or a set of sentences Σ) and a class of structures, Carnap delves into the relations between S (or Σ) and its possible translation into a metalanguage M , $trad_M(S)$ (or $trad_M(\Sigma)$). What for the present-day sensibility is *prima facie* a semantical relation, in Carnap's conception, is a purely structural sort of connection. The relations between individual constants, predicates, and sentences and their respective semantical values, i.e. extensions and intensions, are captured, as far as those relations can be reflected by the translation relations between expressions that belong, respectively, to the object-language T_1 and to its metalanguage M . This insight makes it possible to understand the unusual design of MEI. The logical order in which Carnap introduces his definitions shows the central role played by the concepts of equivalence and L-equivalence. Any principle of MEI that assigns either an extension or an intension to an expression of T_1 finally rests on one of these concepts. What has not been sufficiently repeated is that Carnap's definitions of the concepts of equivalence and L-equivalence finally depend on translation relations. However, that feature of Carnap's design makes it easy to understand why he repeatedly downplays the ontological significance of MEI's principles. The clearest example of such a philosophical attitude in *M&N* has to do with the choice of classes and properties as extensions and intensions, respectively. At an early stage of the book, Carnap claims that the choice of extensions and intensions is the choice of "forms of translation" [*M&N*, p. 17]. Hence, if the extension of a certain expression of T_1 is a specific entity and the intension of a certain expression of T_1 is another entity, the key to MEI's adequacy lies in the design of T_1 's metalanguage. This metalanguage, writes Carnap, "must contain certain translations of the sentences of the object languages to be dealt with in M " [*M&N*, p. 17]. Such an apparently mild claim has deep ontological and semantical implications, because no matching of expressions of the object-language and expressions of its metalanguage will result in materially adequate translations. The sentence (of T_1) 'Hs', Carnap says, can be translated into M in three different ways, according to the kind of ontological significance the metalanguage is to have, namely as Proposition 4-1, as the Proposition 4-2, and as the Proposition 4-3:

- 4-1. Scott is a human being
- 4-2. Scott has the property Human
- 4-3. Scott belongs to the class Human

To assign the object-language predicate ‘H’ the intension Human is to state a semantical rule that allows translating ‘Hs’ into M as the Proposition 4-2. And by assigning the class Human to the predicate ‘H’, ‘Hs’ can be translated into the M as the Proposition 4-3. What makes Carnap’s position interesting is that he denies any ontological significance attached to these translations by claiming that they are nothing but “forms of translation” or “modes of speech” [*M&N*, pp. 17-18]. Later, in the fourth chapter of his book, when pursuing the goal of showing that any commitment to either extensions or intensions can be canceled, Carnap reiterates that very point [see *M&N*, p. 145]. He even adds that the assignment of extensions and intensions to the expressions of T_1 finally amounts to “only a duplication of terminology” [*M&N*, p. 146] or to the acceptance of “the duplication of expressions” [*M&N*, p. 152]. Because the choice of either an extension or an intension for an expression (of T_1) as a semantical value that the expression might have is equivalent to choosing a way of translating it, Carnap is forced to show that MEI’s semantical rules should not be taken at face value. This is what Carnap calls the Problem of a Reduction of Entities.

Carnap’s urge to relieve MEI’s from any ontological burden is among the main guidelines of *M&N*.⁷ (In fact, it gives rise to a line of argument that intertwines Chapters I, II, and IV.) Thus, that Proposition 4-1 should be translated into M either as 4-2 or as 4-3 leads to the following reflection of Carnap’s. On the one hand, if the terms ‘property’ and ‘class’ are included in M ’s repertory, then by using M we become committed to an ontology that includes either properties or classes. On the other hand, these terms are simply modes of speech. It follows from this that resorting to ‘property’ and ‘class’ could be avoided, whereupon MEI need not use them. Although Carnap permits anyone to make use of these terms uncritically, as it were, he does so because it is always possible to dispense with them. By giving up the use of these terms, semantical theory avoids ontological hypostatization, i.e. the error of “mistaking as things entities that are not things” [*M&N*, p. 22]. As for properties, this mistake is made when claiming that they have an independent subsistence, that they reside in a super-heavenly place, or that they have been in God’s mind before having become manifested in things. “These formulations, if taken literally, are pseudo-statements, devoid of cognitive content, and therefore neither true nor false” [*M&N*, p. 22]. Starting with these ontological convictions, Carnap’s solution to the Problem of a Reduction of Entities lies in choosing an appropriate translation function from expressions of T_1 to expressions of a metalanguage M' , other than M , a maneuver that relies on a careful design of M' to identify the right value-range of the translation function. This is how the design of M' has to proceed:

Thus we have to look for a language form M' in which we use, instead of the two phrases ‘the class Human’ and ‘the property Human’, only one phrase; this

phrase, however, is not to be one of the two but rather another one which is neutral in containing neither the word 'class' nor the word 'property'. The simplest procedure is to take the word 'human' or 'Human' alone... We take M' as the *neutral metalanguage* which results from M by these changes, that is, by eliminating the terms 'class', 'property', etc., in favor of neutral formulations. Our task is now to find suitable forms for formulations in M' [$M\&N$, p. 153].

In the important Section § 37, Carnap shows how to extend MEI by the new expressive means that M' contains to work. The question he confronts is how to translate statements such as 37-1 and 37-2 into the new metalanguage M' . Here is his answer:

37-1. The extension of 'H' in T_1 is (the class) Human

37-2. The intension of 'H' in T_1 is (the property) Human

Carnap solves this problem by enriching the metalinguistic resources of MEI. In the present case, he endows M' with two new relation (metalinguistic) expressions that capture the needed link between M' 's neutral expressive resources and the kind of semantic values involved. The new relation expressions, 'designates' and 'L-designates', wholly alter the previous situation, the one affecting T_1 and M . The rules that state what a predicate designates and the rules that state what that same predicate L-designates may share some of their range-values, but they do not have to share all of them. Thus, when MEI is framed in the metalanguage M' , 37-1 and 37-2 are replaced by 37-3 and 37-9 [$M\&N$, pp. 162-163]:

37-3. 'H' designates Human

37-9. 'H' L-designates Human⁸

'Human' is a neutral predicate that favors neither a commitment to an ontology of classes nor a commitment to an ontology of properties. The predicate 'H' will be inexorably translated as Human (once MEI is couched in the metalanguage M'). However, this does not mean that 37-3 and 37-9 are the only rules that might matter. Other rules that Carnap alludes to in his discussion are these:

37-4. 'H' designates Featherless Biped

37-5. 'H' designates Rational Animal

37-9. 'H' L-designates Rational Animal

However, since the predicates ‘Human’ and ‘Featherless Biped’ are not equivalent in M' , it can be proved that ‘H’ does not L-designate ‘Featherless Biped’. That is:

37-10. ‘H’ does not L-designate Featherless Biped [*M&N*, p. 163].

It can be seen that 37-4, 37-5 and 37-9 work as instructions that govern the translation of the predicate ‘H’ into M' . Whereas each of the three rules 37-4, 37-5, and 37-9 state a possible translation of the predicate, 37-10 rules out one possible choice.

VI. CARNAP’S UNIVERSALISM: THE FINAL METALANGUAGE

There is one more feature in Carnap’s solution to the Problem of a Reduction of Entities that should be highlighted: his solution to this problem is informed by the universalist tradition of language. *The reason why Carnap is committed to the idea of language as a universal medium emerges when the question of what is the right metalanguage in which the semantical rules are to be stated is answered.* This is the language in which science conveys its contents. Even if the metalanguage adopted includes terms such as ‘property’, ‘class’, ‘truth’, ‘proposition’, ‘concept’, etc., Carnap insists that the ontological pressure that these terms exert on semantical theory can be counteracted:

Whatever is said in this book about properties may be wrong, but it has at least cognitive content. This follows from the fact that our statements belong to, or can be translated into, the general language of science. We use the term ‘property’ in that sense in which it is used by scientists in statements of the following form: ‘These two bodies have the same chemical properties, but there are certain physical properties in which they differ’; ‘Let us express the property..., which is exemplified by the one but not by the other of these two bodies, by ‘P’ [*M&N*, p. 22].

Therefore, the Problem of a Reduction of Entities can be seen as the problem of finding the best translation of an object-language into a metalanguage that reflects the way science conveys its contents. The ontological minimalism that presides Carnap’s design of MEI is continuous with his conviction that the language of science, adequately reconstructed, is the universal medium of thought and knowledge.

VII. CONCLUSION: SEMANTICS IN A SYNTACTICAL FORMAT

By the 1930’s, logicians and philosophers believed that the endeavor to place semantics on the safe path of science was, if not impossible, a dubious

one. The central concepts of semantical theory – reference, truth, definition, etc. – seemed to be a breeding ground for paradoxes and contradictions. Besides these obstacles, many other notions used in semantical research were involved in metaphysical controversies. The confrontation between realism and idealism concerning the nature of the external world and the impossibility of adjudicating it through rational argumentation had a profound impact on the evolution of Carnap's philosophy in the late 1920's. Both the *Aufbau* [Carnap (1928a/1969), Part V, ch. D] and *Pseudoproblems in Philosophy* [Carnap (1928b/1969)] clearly expound the metaphysical background of Carnap's approach to the problems of meaning analysis in those years.⁹ Despite such formidable impediments, Carnap found an indirect way to construct semantical theories. In the 1930's his strategy consisted in developing *syntactical* theories of meaning. This is the project he set to develop in *Die Logische Syntax der Sprache* [Carnap (1934/1937)]. Under the influence of Wittgenstein, who had written in the *Tractatus* that in logical syntax the meaning of an expression plays no role,¹⁰ this principle guided his metalogical research. The leading idea was clear: semantical properties and relations must be studied by means of a battery of concepts that represent structural, i.e. purely formal, features that the expressions of the language studied have. A syntactical approach to meaning identifies the structural features that serve as semantical properties and relations. What distinguishes the syntactical analysis of meaning from the sort of semantical theories put forward in [Carnap (1942)] as well as in *M&N*, i.e. the semantical analysis of meaning proper, is the use of techniques discovered by him and by Tarski. The main one is the creation of the Double-Language Method, which Tarski had applied in his metalogical research before using it to provide a definition of the concept of truth for some formalized languages and a theory of definability. Tarski's method demands dealing with the analysis of semantical concepts by distinguishing two languages: the language whose expressions a semantical theory studies and the language in which the theory is stated. Needless to say, the Double Language Method is built into MEI. This method allows the extension and the intension of an expression to be stated explicitly without involving any relation between language and the world. Carnap's semantical theory limits itself to the matching of expressions in the object-language to expressions in the metalanguage.¹¹ Any semantic value assigned to an object-language expression is taken for granted and goes unmentioned.

In this essay I have argued that Carnap found a way of performing semantic analysis without renouncing the demands of ontological parsimony. A semantical theory is a system of principles that give the meaning, i.e. the extensions and intensions, to the expressions of an object-language by translating them into expressions of the corresponding metalanguage. This claim backs Hintikka's diagnosis that not even in the semantical phase of his philosophical development did Carnap give up his commitment to the idea of language as the universal medium. Tarski's Double-Language Method is crucial for the

enterprise taken over by Carnap. Also, the method meets the demands of logical syntax, a requirement so central to Carnap's philosophy. Although a careful explanation of this claim would enrich the picture that frames the argument deployed in this essay to carry it out carefully is a task for the future.

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NOTES

¹ Hintikka's writings on this subject are collected in Hintikka (1997). As Hintikka admits, his ideas on this ultimate presupposition find inspiration in van Heijenoort (1967)'s work on the nature of logic. Kusch (1989) shows that these two conceptions of language equally play an active role in the philosophies of Husserl, Heidegger and Gadamer. For a detailed analysis of Husserl's and Heidegger's views on language, the work to consult is [Kusch (1988)].

² See also [Hintikka (1997, pp. 119, 199, 202)].

³ This is the sort of understanding of the relations between sentences and models subscribed by Representational Semantics. On this approach to model theory, sentences are endowed with a fixed meaning, while models can vary arbitrarily (within a certain range). For Interpretational Semantics, an alternative understanding of model theory, sentences have no meaning in themselves, each model being a particular way of interpreting sentences' basic symbolic constituents. In addition, the world is to remain fixed, so that the fact that a sentence S is true in M_i and false in M_j means that S is true when interpreted in M_i 's way but false when interpreted in M_j 's way. The difference between Representational and Interpretational Semantics is elucidated in [Etchemendy (1990)].

⁴ Besides Hintikka, this claim is also held by other authors. See, for example, [Woleński (1999); (2002)].

⁵ This point is not adequately grasped by Martin (1963), who criticizes Carnap's Method of Extension and Intention for confusing semantics and syntax.

⁶ According to Kusch, whereas from the language-as-a-universal-medium viewpoint "metalanguage is a misuse of language", from the language-as-calculus viewpoint "metalanguage is possible and legitimate" [Kusch (1987), p. 7].

⁷ The close relation between semantical and metaphysical matters that *M&N* reflects can be also perceived in Carnap (1963)'s intellectual autobiography [p. 65].

⁸ Concerning the metalinguistic expression 'Human' Carnap writes the following interesting remark: "'Human' is regarded neither as a name of a class nor as a name of a property; it is, so to speak, at once a class expression and a property expression" [*M&N*, pp. 153-154].

⁹ In [Acero (1994); (1995)] I studied this aspect of the evolution of Carnap's thought on semantics. There I emphasized the role of the *Aufbau*'s doctrines in Carnap's skepticism towards semantics in the 1929's and 1930's. Echoes of the logicians and philosophers' distrust about the possibility of constructing scientific theories of meaning, reference and other semantical concepts can be heard only at one stage of the well-known history of philosophical semantics narrated by Alberto Coffa [(1991), p. 305]. Fortunately, Oberdan (1992), Ricketts (1996) and Creath (1999) improve on Coffa's important pioneering work. However, nothing is said either in Coffa's book or in Creath's, Oberdan's and Ricketts's papers that explains why *M&N*, as well as Carnap (1942)'s *Introduction to Semantics*, means the abandonment by Carnap of such a skeptical attitude while still maintaining a sort of minimalism concerning metaphysical entities. Mormann (1999) and Mancosu (2008) usefully show Neurath's philosophical reluctance towards semantical notions such as reference and truth, and to what extent he was alarmed by the Carnap-Tarski association.

¹⁰ "In logical syntax the meaning of a sign should never play a role. It must be possible to establish logical syntax without mentioning the meaning of any sign: only the description of expressions may be presupposed" [Wittgenstein (1922/1961), § 3.33].

¹¹ In the essay 'On Some Fundamental Concepts of Metamathematics', published in 1928, Tarski had acknowledged the significance of this distinction. See [Tarski (1983), pp. 30ff.]. Tarski's investigations, as well as the work of other Polish logicians, go back to 1920, as he confirms at the beginning of 'Investigations into the Sentential Calculus' [cf. Tarski (1983), p. 38].

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