THE INFORMATIONAL CONTENT OF NECESSARY TRUTHS*

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Abstract

In the twentieth century, several accounts arose from the philosophy of language and the philosophy of logic, as to how to understand the content of a sentence and the effect of pragmatic factors on it. In this paper, we highlight the three views that we consider most relevant to the contemporary philosophy of information: (a) Kripkean defence of the existence of a posteriori necessary truths, (b) truth-conditional pragmatics that incorporate into the content of the utterance part of what, according to Grice, would have previously been understood as pragmatic implicatures, and (c) inferential expressivism, a position in the philosophy of logic that stems from Frege and Wittgenstein, presently held by Brandom, whose main point is that the semantic role of sentences that include logical constants is to display inferential relations among the propositions involved.

We conclude that there are different kinds of necessary truths, each one with its own particular characteristics. We do not offer a substantial position but simply introduce the alternatives stressing their relevance for a theory of semantic information.

1. *Introduction*

Necessary truths do not form a natural kind. The characterization of a content as necessarily true can be attributed to different reasons, and depending on these reasons the information codified may be of a different type. Following the traditional classification, we will distinguish between *a priori necessary truths* and *a posteriori necessary truths* and, among the former, we will distinguish between *propositional tautologies*, *analytic sentences* and *logical truths*. The latter two are, in our opinion, the types that offer a more
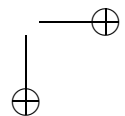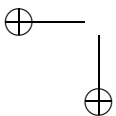
appealing contribution to the general theory of information. "Informational content", in turn, is not an univocal expression either. The informativeness of an utterance, its status of *being informative*, can be considered from an objective point of view, i.e. the third-person perspective, and from a subjective point of view, i.e. the first-person perspective. The former is referred to by expressions such as "semantic information", "content", "proposition", or "intension"[1], whereas the latter is usually associated with expressions such as "psychological information", "dynamic information" or "epistemic information"[2]. Broadly speaking, the semantic information of a sentence or an utterance is the proposition expressed by it, and the epistemic information of a sentence or utterance is defined as the difference between the content of a subject's state of belief before and after becoming acquainted with the semantic content of the sentence in question. In our understanding, semantic information does not need to be true.

Since our aim is to examine the informative contribution of necessary truths, the standpoint taken in this paper will be objective, i.e. we will analyse the content of this kind of truths from a third person perspective and will disregard subjective or epistemic considerations. This does not suggest any criticism of a treatment of the topic from the agent's perspective. On the contrary, we hold that a complete theory of information must consider both perspectives. Moreover, the semantic-pragmatic account of content here discussed integrates aspects that are purely semantic, as those derived from the meaning of the sentence, with aspects that have to do with the speaker's intentions in a particular communicative exchange. The sense of "information" that is excluded from our treatment is the epistemic sense, the sense that depends on the information an agent has before becoming acquainted with the particular piece of discourse whose content is under consideration. The epistemic sense of "information" is related to a speaker's state of belief, whereas we want our discussion to be mainly related to the content of a speech act without a special reference to what the speaker knows or ignores.

We contend that, even within the realm of semantic content, several kinds of information should still be distinguished. We have isolated three: *factual*, *linguistic* and *purely inferential*, but some others may be identified.

[1] In his paper in this volume, Floridi considers the semantic sense the most important one and defines it as propositional knowledge about the state of a system. We will relate semantic content with individual sentences in particular speech acts. It is easy to see the connections between our sense and Floridi's. Jago, in his paper, calls semantic content "declarative information".

[2] Jago's paper, in this volume, deals with an epistemic, dynamic, notion of information that he defines through the relation of being updated that can hold between an agent's state of knowledge and the declarative content of a sentence.

By "the factual content of a sentence S in a context C" we understand the state of affairs depicted by S in C. The factual content of a sentence is its truth conditions or, alternatively, its truth-maker. We consider these three characterizations as synonymous.

Some sentences give information about the meaning and use of terms and expressions in a language, or about similarities and differences between the meaning and use of terms and expressions in different languages. Analytic sentences and definitions are of this type and we say that they convey "linguistic information". Strictly speaking, linguistic information is not a new kind of information but only the factual information that has to do with a particular aspect of reality, to wit, language[3]. Nevertheless, distinguishing between linguistic and factual information is useful for our discussion here. Firstly, there is a historical reason; analytic truths are a kind of necessary truth distinguished by their own specificities, which have warranted a separated treatment in the specialized literature. Secondly, from an epistemological point of view, necessary truths of the linguistic kind have been systematically qualified as "a priori". The externalist claim that there are a posteriori necessary truths does not apply to sentences that convey linguistic information.

Additionally, some complex sentences that include logical constants may offer information about the inferential connections between the propositional contents represented by their atomic parts. We call this type of information "purely inferential information". It is *purely* inferential since, in a wide sense, all propositional contents offer some kind of inferential information. By grasping the content of a sentence, an agent may recognize what follows and what is excluded by the sentence's truth. We will conclude that different types of necessary truths may convey different types of information, and that it is very unlikely that any sentence actually used in a successful speech act can be informatively empty.

Since our point of view is non-epistemic, we join the broad semantic line initiated by Bar-Hillel and Carnap (1952) but not its details. An updated semantic view has to take into account the semantic-pragmatic notion of "what is said" as it is used by authors like Bach (1979, 1987), Recanati (2001, 2004), and Carston (1988, 2004).

Bar-Hillel and Carnap (1973: 231) offered a definition of the semantic content of a sentence in terms of the state-descriptions ruled out by the sentence, a definition that is easily re-worded in the terminology of possible world semantics. The flaws of this definition are well known. The two that

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[3] We are grateful to a referee for having pointed out this fact.

are most relevant for our purposes are the following: (a) that logically equivalent sentences have identical content and (b) that necessary truths are contentless (their amount of information is zero). Both, (a) and (b), are counter-intuitive theses and do not follow from the pragmatist perspective presented here and supported by the contemporary developments in the philosophy of language. (a) and (b) depend on a particular way of understanding semantic content, i.e. as state descriptions or as sets of possible worlds, that has now been surpassed by a more fine-grained apparatus that allows more subtle distinctions to be made. In relation to (a), two sentences can be logically equivalent in the sense that they are mutually deducible without having the same content. This is something that Carnap also assumed and he developed his notion of "intensional isomorphism" by way of explanation. Nowadays, the contextualist definition of proposition takes into account not only truth conditions but also the information that depends on the very wording of the sentence concerned[4]. In relation to (b), the externalist acknowledgement of the existence of a posteriori necessary truths, on the one hand, and the contextualist thesis of the pragmatic enrichment of semantic content, on the other, no longer justify the identification of the feature of necessity with that of informational emptiness[5].

In the contemporary debate about what is said by an utterance, that is to say, in the debate about the limits between semantics and pragmatics, there are subtle distinctions that do not need to be taken into account here. It suffices to recall Recanati's definition: "What is said in the maximalist sense corresponds to the intuitive truth-conditions of the utterance, that is, to the content of the statement as the participants in the conversation themselves would gloss it" (2001:80). Some relevant features of the notion of content as what is said is that it is context-sensitive, it respects the speaker's intentions and is atomistic, so to speak. This last feature means that, by an utterance, a speaker says something that has definite limits, and that does not include everything that follows from it. A further aspect of the notion of informative content in our sense is that, as it is what a speaker means by a particular speech act, it does not need to be true. One might take pragmatic considerations to be irrelevant to the theory of semantic information, but this does not need to be so. Grice relegates the effect of the context to the realm of what

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[4] See, for instance, Recanati's definition of proposition, in (Recanati 1993: 27): "The meaning of the utterance provides a 'route' to the truth-condition. In order to understand the utterance, what the hearer must grasp is not its truth-condition *simpliciter*, but the truth-condition as *it is presented by the utterance itself*. This — the truth-condition as it is presented by the utterance itself — is what I call the proposition expressed."

[5] Sequoiah-Grayson's paper in this volume offers the basis of a theory of psychological information capable to account for a view of content that rejects, as we do, thesis (a) and (b).

is implicatured by the utterer. If one rests within the Gricean picture, pragmatics can be argued to lie far from our present interests. Nevertheless, contemporary truth-conditional pragmatics defends the view that the semantic content of an utterance, i.e. its truth conditions, is obtained through primary pragmatic processes that are heavily context-dependent.

Let's consider briefly all these types of necessary truths, starting out with those less interesting for the topic of informational content.

A posteriori necessary truths are generally accepted since Kripke argued in their favour in his 1970 Princeton Lectures. Kripke qualified the content expressed by sentences such as "Water is H_2O" as a posteriori and necessary because he understood them as identity propositions between rigid designators. Natural kind terms rigidly refer, according to this picture, to some stuff on Earth. But, given that the source of their truth is neither meaning[6] nor logical relations, they convey the same kind of information as that transmitted by contingently true sentences. There is nothing special about them concerning their informational status. As a posteriori truths, they are discovered at some point, and thus they supply new information from an epistemological point of view.

A priori necessary truths of the analytic kind, such as "triangles have three sides", do not in principle expand the knowledge of a competent speaker. They seem to make semantic remarks whose content should be obvious to anyone proficient in the language used to formulate them. Nevertheless, taking a broader perspective that encompasses a complete speech act, analytic truths may convey information pragmatically, *via* implicatures or enrichment. If the information comes *via* implicatures, the thesis that analytic truths are contentless does not need to be modified, but if the favoured picture is that context actually enriches the semantic content of an utterance, then the traditional picture has to be re-assessed. Sentences such as "war is war" or "You are your father's son[7]", although empty from the point of view of what is literally and strictly said, may transmit an informative content, heavily context-dependent.

Tautologies and logical truths are of a different kind. According to the traditional viewpoint, they lack factual informational content in the sense that they cannot serve to discriminate between the actual world and other possible worlds. If the option one takes regarding logical truths is that they represent necessary aspects of every possible state of affairs, then the information they transmit would be extralinguistic although not empirical. From

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[6] Kripke (1980: 118 ff.) warns one against the temptation of understanding this kind of scientific identities as analytic truths. Their truth, if it is the case that they are in fact true, depends on the world and not on our use of words.

[7] We owe this example to an anonymous referee.

418   MARÍA J. FRÁPOLLI AND FRANCESC CAMÓS

a different take on logical truths, a view that we call "expressivism", the content conveyed by logical truths is related to the conceptual links established within the belief system of the agent that uses them, and not to the structure and nature of the world. It is characteristic of tautologies and logical truths that they include the occurrence of logical constants. According to expressivism, logical constants encode operations between concepts and propositional contents. The sentences that include them disclose conceptual links between propositions. Such a view on logical constants is more naturally placed in an inferentialist framework about content such as the one defended by Brandom (Brandom 1994). Nevertheless, it is also compatible with a more traditional, truth-conditional, account of content. These three kinds of necessary truths — a posteriori necessary truths, analytic sentences and logical truths — will be analysed in some detail in what follows.

2. *A Posteriori Necessary Truths*

A posteriori necessary truths enter into the philosophical arena thanks to externalism, a proposal in the philosophy of language that takes meanings out of the heads of speakers and places them either in the natural world or in the speaker's social community. Kripke (Kripke 1971, 1980) and Putnam (Putnam 1970, 1973, 1975) put the stress on the relations between words and the natural stuff from which they originally acquired meaning through an act of initial baptism. The latter Wittgenstein (Wittgenstein 1956/2001) and, currently, Tyler Burge (Burge 1979, 1988, 1989), highlight the role played by the social community to which the speaker belongs.
  Meaning externalism is ruled by the following principles:

[Ext. 1] Meanings are external to the individual (or at least meanings and concepts have aspects that are external to the individual);
[Ext. 2] Epistemology and metaphysics are independent approaches to contents;
[Ext. 3] Speakers must rely on experts to know the meaning of the terms they use. This is the Principle of Division of Linguistic Labour.
Externalism is now the main paradigm on meaning, so only a brief presentation will be given.

  Our words mean what our linguistic community takes them to mean, and thus the content of our utterances is not necessarily patent to us. When we utter a sentence, the proposition we express through it depends on the contents that are socially attached to the words used. Both natural externalism and social externalism imply that the speaker is not necessarily aware of the content of his speech acts. Neither meanings nor contents are in the head,

and thus no introspective act discloses contents to the user of the language. According to externalism, epistemology no longer runs parallel to semantics; the correct use of language no longer guarantees any special access to meanings. The independence of epistemology and semantics allows a whole range of combinations of semantic and epistemic categories. While within the traditional view, which considers meanings internal to the subject, all necessary truths are known a priori, for externalism necessary truths can be known either a priori, and then one talks of analytic truths, or a posteriori. Many true scientific or historical claims are necessary truths known a posteriori. "Gold is the element with atomic number 79" and "Queen Elizabeth II is the eldest daughter of King George and Queen Mary" are cases of necessary truths that are not a priori. Let's now explain in which sense they are necessary and in which sense they are a posteriori.

Proper names and natural kind terms are, according to Kripke, rigid designators. The notion of rigid designator was introduced by Kripke to explain how we understand counterfactual discourse, if the meanings of terms were sets of descriptions that correspond to the features of the named objects or to the referred stuff, counterfactual discourse in which some of these features are suspended would be unintelligible. If being Alexander's tutor is part of what the name "Aristotle" means, we could hardly make sense of a conditional like "If Aristotle had not been Alexander's tutor, Alexander would not have died young". For this reason, Kripke assumes, proper names do not have descriptive meaning. They mean their referents and the latter, the same in every occasion of use, in every "possible world", are also their semantic contents. A term of this kind is a rigid designator. Proper names are not the only terms with this property of referring to the same object in every possible world, most terms in language are also rigid: natural kind terms, common nouns, adjectives and verbs (Kripke 1980: 134). Definite descriptions that include necessary properties of their denotatum are another kind of rigid expression.

"Hesperus is Phosphorus" and "Water is H_2O" are identity statements between rigid designators, and express, if they are true, necessary truths. Identity sentences of this kind are not analytically true, for their truth does not depend on the meanings of the terms involved in the traditional sense, and their informational content is not linguistic but factual. They are a posteriori, and hence informative in the epistemological sense. The necessity of identities like "Water is H_2O" is neither conventional nor conceptual, it does not depend on the way we think of the world or on the meaning of the terms we use; their negations are thus conceivable, for although it might have been the case that water were not H_2O, once it is the case (assuming that our scientific theories are correct) and the terms have been introduced into our language with the referents they have, it is impossible for the two rigid designators to designate different objects or different stuffs.

From the point of view of the theory of information, an a posteriori necessary truth conveys information about the actual world; its necessity does not make its informational content to be of a special kind. These truths are necessary because (i) the way in which their terms have acquired meaning and (ii) the actual constitution of the surrounding reality. But neither (i) nor (ii) need to be known to the speaker, who can still master his language at the user's level. The distance between the speaker's correct usage of a language and the knowledge of the external conditions that provide meaning and content to terms and concepts of that language makes it possible for necessity and a posteriori access to be independent. If we follow the traditional viewpoint, and think of a posteriori propositions as extending our non-linguistic knowledge, and of a priori propositions as only giving linguistic and logical information, then a posteriori necessary truths and a posteriori contingent truths are both epistemologically informative about the world, and the feature of necessity does not add any special characteristic that allows to discriminate types of informational contents.

3. *Tautologies, Contradictions, and Analytic Truths*

Tautologies and contradictions are truth-functional combinations of atomic sentences and formulae that are necessarily true (or necessarily false) because of the meanings of the truth-functional connectives involved. "$\varphi \vee \neg \varphi$" and "$\varphi \rightarrow \varphi$" are schemas that produce true sentences when their propositional variables are substituted by declarative sentences, and "$\varphi \wedge \neg \varphi$" always produces falsities after the substitution process. Analytic truths are sentences that can be recognized as true by anyone who understands the language used to formulate them. Tautologies and analytic sentences are similar kinds of truths, their truth-value being dependent on meaning, on the meanings of connectives the former, and on the meanings of their non-logical terms the latter. From the point of view of factual information, they are empty. This is the traditional view that can be seen in Hobbes and Husserl, in Wittgenstein and Carnap. Hobbes, for instance, characterizes what we would now call "analytic falsities" as follows:

> "[M]en make a name of two Names, whose significations are contradictory and inconsistent; as this name, an *incorporeal body*, or (which is all one) an *incorporeal substance*, and a great number more. For whensover any affirmation is false, the two names of which it is composed, put together and made one, signify nothing at all. For example is it be a false affirmation to say *a quadrangle is*

round, the word *round quadrangle* signifies nothing; but is a mere sound" (Hobbes 1651/1952: 30).

Two centuries after Hobbes, Husserl (1900/1970) dealt with analytic falsities in his *Logical Investigations*, and he too considered them empty combinations of words. Hobbes and Husserl are more interested in necessary falsities than in necessary truths, for the object of their enquiries is the analysis of nonsensical expressions. Nevertheless what they say applies equally well to necessary truths, like "a body is corporeal" or "a quadrangle is square".

The classical Tractarian view of tautologies and contradictions characterizes them as degenerated propositions that, although saying nothing, still show the limits of language and thought. Wittgenstein considers that having a sense or, what amounts to the same thing, being *bipolar*, i. e., having the possibility of being either true or false, is a necessary condition for a proposition to be contentful[8]. Obviously, since tautologies are true because of the definitions of the logical constants involved, and contradictions false for the same reason, they essentially fail to be bipolar and thus, in the Wittgensteinian picture that has become paradigmatic in analytic philosophy, they are factually contentless, for they are either compatible with all possible states of affairs or, in the case of falsities, incompatible with all of them.

If we stopped here, and bought the traditional view as such, we should conclude that tautologies, contradictions and analytic truths do not posses informational content, apart from the linguistic information contained in them. Nevertheless, it is a fact that speakers sometimes use apparently empty sentences relevantly. We sometimes say things such as that war is war, that you are your father's son or that if one is committed to do something, one is committed to do it, and intend to make a point with these sentences. The traditional picture does not have an explanation for these apparently empty uses[9], an explanation of them requires broadening the focus of our research to include not only the sentences used but also the complex situations in which they are uttered. It requires moving to pragmatics.

The distinction between what is strictly and explicitly said by the utterance of a sentence, and what it is pragmatically conveyed stems from Frege (1892)[10], and was developed by Grice (1967). Presently, the distinction has

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[8] *Vid.*, for instance, *Prototractatus* 2.11.14 and *Tractatus* 4.46–4.4.62.

[9] Wittgenstein became soon perfectly aware of this fact though. See Wittgenstein (1960: 161). We owe this reference to an anonymous referee to whom we are very grateful.

[10] In (1892: 168) Frege says: "Almost always, it seems, we connect with the main thought expressed by us subsidiary thoughts which, although not expressed, are associated with our words, in accordance with psychological laws, by the hearer. And since the subsidiary

MARÍA J. FRÁPOLLI AND FRANCESC CAMÓS

become central to the debate between different schools in the philosophy of language, between literalism and contextualism for instance, and also in the debate about the relative borders that divide semantics and pragmatics. The Gricean view, inherited by literalists, considers that what is said by a speaker, when he uses a particular sentence, is closely related to the conventional meaning of the words uttered. Nevertheless, the information conveyed by the utterance does not stop at this point; by using a particular sentence in a particular situation, speakers may suggest further information, which is to be drawn from the contextual features of the communicative exchange. This new information is inferred from what is literally said by flouting some maxims that specify what Grice calls the "Cooperative Principle". These maxims are classified into four categories: *quantity*, *quality*, *relation* and *manner*.

Grice calls "conversational implicature" the propositional content pragmatically conveyed in a speech act by flouting a maxim. For example, when someone says (a),

(a) Paul is meeting a woman this evening,

a conventionalized conversational implicature arises when the use of "a woman" triggers a pragmatic process. The implicature generated is that this woman is not Paul's wife, nor his mother or sister, nor even a close friend of his. This is so because, according to the maxim of relevance, one would not call the person Paul is meeting "a woman" if she was a member of his family or a close friend.

Applied to the issue of the informational content of tautologies, contradictions and analytic truths, the notion of implicature is highly relevant. The above mentioned kinds of necessary truths are, in this theoretical framework, informationally empty from the point of view of what it strictly and literally said. If a speaker offers an empty sentence of this kind as a relevant contribution to a communicative exchange, it is easy to defend that he is flouting the maxim of quantity ("Make your contribution to the conversation as informative as necessary"). In this case, contextual factors will help the hearer to derive the pragmatic content of the speaker's act.

Philosophers like Searle (Searle 1969), Recanati (Recanati 1993) or Bach (Bach 1979, 1987), and linguists like Carston (Carston 1988, 2002) and the Relevance theorists (Sperber and Wilson 1986) have pushed the picture further and put forward the view that what is strictly and literally said by an utterance necessarily includes contextual factors not directly related to the linguistic components of the used sentences. In this context, the information, that in a classical Gricean account would be considered as belonging

thought appears to be connected with our words on its own account, almost like the main thought itself, we want it also to be expressed. The sense of the sentence is thereby enriched, and it may well happen that we have more simple thoughts than clauses".

to the realm of what is pragmatically implicated but not literally said, is instead understood as part of the proposition expressed. Following Recanati, we call this latter view "truth-conditional pragmatics". An already classical example, due to Carston (Carston 1988), is (1)

(1) she gave him her key and he opened the door.

In a suitable context, what is said by using this sentence is that she gave him her key and *then* he opened the door *with that key*[11]. In this case, contextual information has enriched the sentence *via* a pragmatic process that differs from the pragmatic processes that trigger implicatures. This pragmatic process of enrichment adds new content to the proposition expressed by the sentence instead of generating a new propositional content besides the one that has been said. This is a brief outline of the contextualist view.

Truth-conditional pragmatics rejects that sentences themselves express propositions. An isolated sentence, truth-conditional pragmatists maintain, fails to *say* anything. Saying something, expressing a proposition, always requires an actual speech act, i.e., a sentence used in a context with a purpose. In this view, tautologies, contradictions and analytic truths can be informative through the contextual components with which context enriches the sentential schema.

Thus, assuming the lessons of the various schools of contemporary pragmatics, the traditional view that tautologies, contradictions, and analytic truths are devoid of any informational content needs to be revised. They seem to be informationally deficient when the focus of analysis is too narrow, leaving out the contextual features that provide the informative contents that serve to complete them. The Gricean notion of implicature or, alternatively, the contextualist notion of pragmatically enriched proposition illustrate the way in which a speaker can be informationally relevant even through the utilization of sentences that are, at face value, non-informative. The contextualist notion of what is said — of pragmatically enriched proposition — can turn a truth conditional tautology, i.e. an informationally empty sentence, into a perfectly informative one. At this point, contextualism, truth-conditional pragmatics, directly challenges the traditional view on analytic

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[11] Depending on the context, the content conveyed can be different. If there were two women and two men involved, (1) might have different contents according to the appropriate anaphoric references of the pronouns in it.

MARÍA J. FRÁPOLLI AND FRANCESC CAMÓS

truths, something that the traditional Gricean picture, although it lies at the origin of contemporary pragmatism, leaves untouched[12].

4. *Logical Truths*

A logical truth is a complex sentence or formula that is true under every interpretation of its non-logical terms. Logical truths are complex formulae with parts that are either propositions or propositional functions, and also include quantifiers and truth-functional connectives. Unlike analytic truths, the truth of which depends on the meanings of their non-logical terms, the truth-value of logical truths depends on the stable meanings of logical words. We have distinguished them from tautologies and contradictions, which are logical truths of the propositional calculus, for quantifiers deserve a separate treatment. The difference for our purposes is however one of degree.

The meaning of logical terms is subject to discrepancies. As Warmbrod claims in a recent paper, "there is as yet no settled consensus as to what makes a term a logical constant or even as to which terms should be recognized as having this status" (Warmbrod 1999: 503). The lack of a shared paradigm regarding how these terms work makes the question of the informational content of logical truths a difficult one. We will explore here two possibilities that, to our mind, have attracted more support. One is broadly Fregean and the other mostly Wittgensteinian.

Frege has been generally interpreted[13] as defending the view that logical and mathematical truths represent very general features of the surrounding world. This view is patent in his polemic with Hilbert about axioms (Frege 1980). Let's call this view "Fregean realism". The alternative view is the one occurring in Wittgenstein's *Tractatus* (Wittgenstein 1922): logical words are not names of anything. Let's call this view "Wittgensteinian expressivism"[14]. According to Fregean realism — and to any kind of realism about abstract entities — there is no essential difference between the type of

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[12] Of course, a strict Gricean might accept that analytic truths are able to offer some kind of pragmatic information, and that therefore in a broader sense of "information" they not are always "informationally empty". But this would not make the traditional picture compatible with the contemporary contextualism, because in contextualism the pragmatically enriched aspects of content affect the truth conditions, and this is something that is rejected by the traditional view on content.

[13] Particularly from 1892 onwards. *Begriffsschrift* (1879), Frege's first published work, introduced an account of logical constants closer to Wittgenstein than to the mature Frege.

[14] "My fundamental idea", Wittgenstein said in 4.0312, "is that the 'logical constants' are not representatives." In Wittgenstein's view what there are are atomic facts and their components. Logical words are not components of facts. As Stenius says commenting on the

information conveyed by logical truths and that communicated by true empirical propositions. In both cases, there are facts external to language and to our use of it that are reflected in the sentences and that determine their content; the information transmitted is thus that things are such-and-such, and they are true if, and only if, things are as the sentences in question say they are. The truth of necessary truths is subsidiary on the existence of necessary facts, facts that belong to every possible world.

Wittgensteinian expressivism, on the contrary, draws a strict demarcation between logical words and run-of-the-mill concepts. The latter, but not the former, represent objects and properties of the world, while logical words indicate operations between propositions and concepts. Logical truths are expressed by sentences in which logical constants essentially occur. A logical constant is a function, and a sentence with logical constants shows which combinations of its atomic contents would make the sentence true. The features that determine what a logical truth is stand on the side of language, of concepts, of thoughts. Logical truths exhibit relations between concepts and propositional contents. Complex propositions, those made out of atomic ones by means of logical words, do not reflect complex facts, for there is no complex fact in the Tractarian universe. What, then, is the informational content of logical truths, according to Wittgensteinian expressivism? Is it the substantive information that things are so-and-so? The answer is in the negative. Logical truths transmit the holding of some connections between the semantic contents of the atomic propositions that are part of them, i. e. they transmit intrasystemic, intralinguistic, information.

With the exception of the few empiricist accounts of logic, logic has been characterized as a "formal" science. The trouble with this approach lies in understanding what "formal" means, and undoubtedly Frege and Wittgenstein did not understand the term "formal" applied to logic with the same meaning. Even today, there is no satisfactory explanation of the formality of logic. In *Begriffsschrift*, for instance, Frege maintained that logic dealt with judgeable contents; during the first half of the XX century logic was identified with formal calculi. On this latter view, that logic is formal means that it is interested in some syntactic relations between uninterpreted formulae of these calculi. Nevertheless, the formulae of artificial languages do not correspond to sentences of natural languages, but rather to their contents. Otherwise, since the syntax of different natural language is different, there should be a Spanish logic, a French logic, a German logic, etc. and everybody accepts that this would be absurd. Going back to the contrast we have stressed between Fregean realism and Wittgensteinian expressivism, there is no risk in saying that the sense in which Frege and Wittgenstein may accept

Tractatus, "logical compounds are *not* pictures", Stenius (1960: 144). It would be possible to completely describe the world, any world, without using logical constants.

that logic is a formal science would be distinct. A more risky task would be making these senses precise. Even so, a broad characterization can be given. For Fregean realism "formal", in the case of logic, means *general*[15]. The case of Wittgenstein is different, for him that logic is formal means that it is empty.

A further refinement of Wittgensteinian expressivism is inferential expressivism. Inferential expressivism understands the role played by logical words as that of making explicit inferential links between concepts, those inferential links that are implicit in our everyday inferential practices. The connections between concepts and conceptual contents stressed by Wittgensteinian expressivism are now characterized as inferential. Inferential expressivism has been put forward recently by Robert Brandom (Brandom 1994), who ascribes it back to Sellars, its proximal ancestor, and to Frege's *Begriffsschrift*, its distal referent.

Inferential expressivism about logical words should not be confused with inferentialism about concepts in general. There are currently two main paradigms in the philosophy of language offering rival accounts of the meaning of ordinary concepts. One is truth-conditional semantics[16], the other inferential semantics[17]. The difference between them is that whereas truth-conditional semantics makes truth the basic notion in defining meaning, inferential semantics considers inference a more basic notion, from which the very notion of truth can be derived. Both truth-conditional semantics and inferential semantics are proposals about how ordinary concepts gain their meanings. The key notion of truth-conditional semantics is *representation*. A sentence is contentful because it represents a particular state of affairs. The content of the sentence is its truth-conditions, and this amounts to saying that its content is the state of affairs depicted in it. If the state of affairs represented by the sentence belongs to the actual world, the sentence in question is true. On the other hand, the central notion of inferential semantics is *inference*. The content of an utterance is defined through the propositions from which it follows, that is to say, the propositions that, if asserted, would entitle the assertion of the utterance in question, and the propositions that follow from it, that is to say, the propositions the speaker becomes committed to by the utterance. The assertion of a propositional content places the speaker in the game of giving and asking for reasons, and it is nothing but the rules of this game that provide his acts of claiming with the content they have.

[15] Frege was a realist for most his life, but his first work on logic, *Begriffsschrift*, is an exception.

[16] Davidson (Davidson 1984) is the main figure in truth-conditional semantics.

[17] (Brandom 1994: chapter 2), for a defence of inferential semantics.

Brandom offers the following explanation of his position: "The basic idea is [...]", he says in (1994: 141), "that propositional contentfulness must be understood in terms of practices of giving and asking for *reasons*. A central contention is that such practices must be understood as social practices — indeed as linguistic practices. The fundamental sort of move in the game of giving and asking for reasons is making a claim — producing a performance that is propositionally contentful in that it can be the offering of a reason, and reasons can be demanded for it." This inferential picture also holds for concepts. The content of a concept is defined by the inferences allowed by its application, that is to say, the consequences of it, and the circumstances in which its use is appropriate.

The expressivist proposal about logical constants is *not* that they have inferential meaning, something that, according to inferential semantics, every concept has, but rather that the meaning of logical terms is exhibiting inferential links among propositions. Having inferential meaning is not a sufficient condition for a term to be a logical constant; it is necessary that its inferential meaning characterizes it as an inference marker. Gentzen-like accounts understand logical terms as possessing inferential meaning in the sense that their meanings can be completely conveyed by the rules that govern their introduction and elimination in a system. In this sense, a Gentzenian account does not offer a definition of logical words that distinguishes them from the rest of our everyday concepts. Being a logical constant is something else besides possessing inferential content: it is being a linguistic device that casts material inferences as *explicit* inferences. The inferential significance that makes some expressions logical words rests on their functional status, without which speakers could hardly use them to display inferences; a logical constant expresses a rule of inference in itself, and it is not sufficient that its meaning can be presented as a set of rules.

A concept like WOMAN is inferentially connected with other concepts, like FEMALE, HUMAN BEING, VERTEBRATE, and many others. For this reason one cannot assent to (1), and reject (2),

(1) Victoria is a woman

(2) Victoria is a human being.

A sentence like (3)

(3) A woman is a human being

is a necessary truth of the analytic kind. It is true because of the meanings of WOMAN and HUMAN BEING. If one is an inferentialist about content, one will maintain that these meanings support the correct material inferences in which these concepts are involved, an example of which is the transition from (1) to (2).

The rules that define conjunction, for instance, are much simpler than the rules that define womanhood. If only for this reason, inferentialism about

conjunction seems to be more plausible than inferentialism about woman-hood. But with the appropriate theory of meaning, the phenomenon is the same in both cases. The inferential rules for conjunction are (RC1), (RC2) and (RC3),

   (RC1) A & B $\Rightarrow$ A
   (RC2) A & B $\Rightarrow$ B
   (RC3) A, B $\Rightarrow$ A & B

If we wanted to indicate explicitly the inferential movements that conjunction allows, we would have to say something like this: if one assumes a proposition of the form A & B, one is also committed to A and to B. If one is committed to A and one is committed to B, then one is committed to A & B. Thus, although some inferences rest on the meaning of conjunction, conjunction is not used to display an ongoing inference. We use conditionals for this purpose, and so conditionals but not conjunctions are the logical constants at stake. With the concept WOMAN we have the same situation; there are some inferences that rest on its meaning, among others the inference from (1) to (2), as we have seen. If we wanted to display them explicitly, we would have to use an explicit conditional: "If (1), then (2)", for instance.

Inferential expressivism then goes a step further from ordinary inferentialism. If logical truths essentially include logical constants, understanding the informational content of logical truths requires comprehension of the contribution of logical constants to the content of the propositions in which they are involved. Language users bring logical words into play for some purpose, and the main purpose is, according to inferential expressivism, making inferential connections among concepts and propositional concepts explicit; this is the pragmatic role of logical constants. Logical constants bring into the open the structure of an inference, and they permit present inferential transitions as explicit inferences. What is special about logical words is that their inferential significance makes them inference-*markers*.

In this expressivist picture, the informational content of logical truths is inferential. Logical truths enable the speaker to assume some contents once that others have been assumed. In negative cases, i.e., when negation is involved, they display relations of incompatibility between propositional contents.

5. *Final remarks*

What, then, is the informational content of necessary truths? As we have shown, this question does not have a simple answer. Necessary truths come in different brands; we have distinguished here between a posteriori necessary truths, analytic truths, and logical truths. Similarly, there are also

different kinds of informational content: factual, linguistic and purely inferential content, amongst others. Equipped with these distinctions, and taking into account the current theories of meaning and content in the contemporary philosophy of language and logic, there is a complex, and probably still incomplete, answer to the question above.

A posteriori necessary truths are statements about the world and the essence of its constituents. They are factually informative and possess semantic content; being a posteriori, they extend our knowledge of the extralinguistic reality. They work in the same way as the rest of empirical truths. Analytic truths and falsities, in turn, give information about language, their truth-values are patent to everybody who masters the language in which they are expressed. Traditional truth-conditional semantics considers them factually empty. Strictly speaking, they do not convey any extralinguistic information. Nevertheless, if the bearer of informational content is not the sentence but the whole speech act, then it is possible to understand them as pragmatically conveying factual information under the species of conversational implicatures. In a context where a speaker A asks (c),

(c) Do you not have mercy?

to a hearer B, an analytic truth like "war is war" as a response can be as informational as the use of any other non analytic sentence, since it triggers a pragmatic process that generates an informational content equivalent to the content of an answer like (d),

(d) No, I do not have mercy.

A more radical position, represented by truth-conditional pragmatics, is able to offer a different answer: although analytic sentences seem to be informationally empty, contextual factors contribute to enrich their contents, i.e., what is literally and strictly said by them, to the point of making them factually informative. However, the Gricean explanation does not need to be incompatible with truth-conditional pragmatics. On the contrary, truth-conditional pragmatics is a radical derivation of it, and both may be seen as somewhat complementary for both accept the production of pragmatic implicatures *via* secondary pragmatic processes. When it is doubtful that a pragmatic process of implicature is involved, truth-conditional pragmatics is able to offer an explanation of why some analytic sentences convey informational content. It does so by showing that what seems to be an analytic truth is not so once one takes into account the enriched content prompted by the context of the utterance.

Finally, logical truths may express the most general aspects of the world, of every possible world, according to the view that we have labelled "Fregean realism". Fregean realism treats logical truths as similar to empirical truths, the difference being the degree of generality of the features of the world that they respectively represent. An alternative view on logical truths derives

430   MARÍA J. FRÁPOLLI AND FRANCESC CAMÓS

from the view on logical constants that we have called "expressivism", either Wittgensteinian or inferential. Expressivism marks an essential distinction between logical words and the rest of language. Logical words would be tools to display inferential links between concepts. According to this point of view, the informational content of logical truths is internal to the conceptual system one possesses. In the inferentialist variety, the information transmitted by logical truths is basically either entailment relations or incompatibility relations among propositions.

The feature of necessity does not make truths homogeneous for the purposes of the theory of information.

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432   MARÍA J. FRÁPOLLI AND FRANCESC CAMÓS

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