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LOGICAL THEORY AND HUMAN PRACTICES. SOME REMARKS ON THE METAPHYSICAL PRESUPPOSITIONS AND USE OF FORMAL LOGIC

Abstract: This paper's aim is to help winnow out some ideas about the role of formal logic in human doings at large. I start by discussing some metaphysical presuppositions of logical theory; specifically, I attempt to work towards a clearer understanding of the role of modalities, together with the notions of meaning and truth, in mainstream logical theory. I then appeal to a modal formal semantics (Brandom, 2007a) in order to outline the cognitive role of logical constants in general. From these discussions I conclude that any view of formal logic, and its core concepts, which does not involve a grasp of what we do with them will be found to be distorted.

Keywords: Inferentialism, Intensional Formal Semantics, Neo-pragmatism

TEORÍA LÓGICA Y PRÁCTICAS HUMANAS. ALGUNAS OBSERVACIONES SOBRE LAS PRESUPOSICIONES METAFÍSICAS Y LA FUNCIÓN DE LA LÓGICA FORMAL

Resumen: El objetivo de este trabajo es ayudar a discernir algunas ideas respecto del papel de la lógica formal en las prácticas humanas en general. Comienzo considerando algunas presuposiciones metafísicas de la teoría lógica; en particular, intento presentar una comprensión más clara del papel de las modalidades, así como de las nociones de significado y verdad, en la teoría lógica moderna. Recurro entonces a una semántica formal de tipo modal (Brandom, 2007a) para perfilar el papel cognoscitivo de las constantes lógicas en general. A partir de estas discusiones, concluyo que cualquier concepción de la teoría

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lógica y sus conceptos fundamentales que no involucre lo que hacemos con ellos será en definitiva distorsionada.

Palabras clave: inferencialismo, semántica formal intensional, neo-pragmatismo.

I

Historically, views advocating a necessary relationship between logic and man's cognitive endeavors have been the norm.[1] Similarly, the leading figures of modern logic have acknowledged, and cultivated, a close connection between logic and knowledge in general, and between logic and philosophy in particular; the work of Frege, Russell, Wittgenstein and Quine,[2] to name a few, witness to this. However, at times there appears to be an insurmountable crevasse between a technically complex formal science such as our contemporary logic and the rest of the philosophical realm. My starting-point is that the centrality granted to the concept of deductive consequence by the model-theoretic approach, to the detriment of the epistemically robust concept of inference, has rendered the connection between logic and the rest of our intellectual concerns somewhat blurred.[3] More accurately, howe-

1 Two illustrious examples, among many others, quickly come to mind. The stoics used to compare philosophy with an egg, so that ethics would be like the egg's yolk, physics would be the white, and logic would be the shell, that is, the structure without which knowledge would be impossible. (See Diogenes Laertius, 7.38-41). In a quite similar vein, Kant readily underscores from the start of his *Critique of Pure Reason* the role of logic as the propaedeutic of all knowledge. Kant, I., *Kritik der reinen Vernunft*, Reclam Verlag, 1986, (1787), B, IX. Two equally valuable, and equally thorough, works dealing with this issue are the classical Kneale, W., & Kneale, M., *The Development of Logic*, Oxford University Press, 1971, and Deaño, A., *Concepciones de la lógica,* Madrid, Taurus, 1980.

2 See, for example, Macbeth, D., *Frege's Logic*, Harvard University Press, 2005. Hylton, P., *Russell, Idealism, and the Emergence of Analytic Philosophy,* Oxford University Press, 1993, and Hylton, *Quine*, Routledge, 2007.

3 This point has been pressed e.g. by Sundhom. His contention is that at the basis of the concept of logical consequence lies a verification-transcendent concept of truth, whereby the formula α could be claimed to be a logical consequence of the set Γof formulae regardless of how one comes to know that every case in which the elements of Γ are true, α is true too. Such disdain of epistemic issues would stand at odds with the eminently cognitive nature of the concept, and the practice, of inference. A consequence-based view of logic, Sundolhm concludes, would obliterate its cognitive aim, namely to obtain new knowledge from knowledge one already has. Sundholm, G., «'Inference versus consequence' revisited: inference, consequence, conditional, implication», *Synthese* (2012),

ver, I see the partial estrangement between logic and philosophy as resulting from the extensional formal semantics by means of which the concept of logical consequence is explicated since Tarski. Aiming at the highest exactness and univocality, extensional semantics may have obscured the picture in another way nonetheless. My hypothesis is that a reasoned readmission into mainstream formal semantics of some intensional notions could help us to better appreciate the cognitive role of logic. In order to argue for such readmission, I will raise some doubts about the actual success of extensionally-minded logicians in explaining away intensional notions.

Let us begin with modalities. In this connection, it is striking that a full-blooded champion of extensional truth-conditional semantics such as the Tractarian Wittgenstein ends up acknowledging, unwittingly but unmistakably, its inextricably modal presuppositions; an instance among others of this admission is proposition 4.024: "To understand a proposition means to know what is the case if it is true. (One can understand it, therefore, without knowing whether it is true) (…)"[4] The conditionals employed here by Wittgenstein are clearly counterfactual, and hence modal ones. To understand the significance of, say, $p \rightarrow q$, this extensional approach tells us, consists in knowing its truth conditions. As simple and forceful as it is, a key feature involved in this semantic clause is sometimes subtly disregarded. According to the truth-functional account, one grasps what $p \rightarrow q$ signifies when one grasps not the *actual* truth values of p and q, but rather insofar as one grasps the *possible* valuations of p and q that *would* render the complex formula true, regardless of their actual valuations. The point I want to raise here is, I think, just as simple and forceful as the truth-functional account itself: understanding what the truth table of $p \rightarrow q$ tells us is no less than knowing that the combined eventual truth of p and falsity of q in a given valuation is *incompatible* with the complex formula $p \rightarrow q$ being true; in other words, what one is to grasp in order to count as having understood the truth table of $p \rightarrow q$ is that it *would* be *impossible* for $p \rightarrow q$ to be true in an interpretation I_i if p *were* true and q false in I_i. My point,

No. 187, pp. 943-956.

4 Wittgenstein, L., *Tractatus Logic-Philosophicus*, London, Routdlegde, 2002, (1922).

then, is that just as with ordinary language expressions,[5] mastering the truth-functional semantic clause for a logical constant is mastering a counterfactual conditional. It is not actually feasible for anybody to grasp –let alone apply– what an extensional truth-conditional account of meaning consists in without their having an antecedent mastery –an implicit one, if you will– of intensional concepts such as possibility, or those definable from it (such as incompatibility).

This suggestion is likely to be quickly dismissed by pointing to the ease with which possible worlds semantics can account for counterfactuals and modalities in purely extensional terms. Indeed, nobody is to deny the smoothness, elegance, and efficacy to many purposes with which this technical apparatus runs. Our doubts here are prompted not by a technical insufficiency, but rather by a conceptual one. Borrowing Frank Ramsey's wordsat the service of a different, albeit not wholly unrelated, discussion,[6] thinking that possible worlds semantics actually spares us from dealing at some point with irreducibly modal concepts appears to be like feigning anesthesia. The expectation of explaining away modal concepts by means of possible worlds semantics seems ultimately question-begging, for such an extensional account is in fact intelligible only on condition that one implicitly operates with the very explicandum.[7]

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5 In Sellars the counterfactual component underlying meaning at large is presented in a most convincing, although at times also abstruse, manner. Sellars, W., «Inference and Meaning», *Mind,* New Series, Vol. LXII, (Jul., 1953) No. 247, pp. 313-338.

6 It is the discussion on the physicalist reduction of statements about personal experiences. See for instance Ayer, A.J., *Logical Positivism,* New York, The Free Press, 1959, p. 20.

7 In this connection, Brandom notes that "as Quine emphasized, the modal vocabulary whose use is essential to this semantic approach evidently falls within the circle of terms and concepts to which empiricist suspicions and questions apply. Whether possible worlds are thought of as abstract objects, as concrete particulars spatio-temporally unconnected to our universe, or as *sui generis* possibilia, the epistemological question of how we are to understand the possibility of our *knowing* anything about such items (and their accessibility relations), and the question how, if the possibility of such *cognitive* contact is mysterious, the idea of our having the *semantic* contact necessary so much as to *talk* or *think* about them can be made intelligible, are wholly untouched by this formal apparatus [possible worlds semantics], and remain every bit as pressing as before". Brandom, R., «Modality and Normativity: From Hume and Quine to Kant and Sellars», 2007,

In the eyes of some, extensional truth-conditional semantics admittedly has killed two birds with one stone, for ridding us of modalities is only part of an enterprise that rids us of the equally awkward concept of meaning. To assess its efficacy in achieving this latter aim, let us add to the previous observation a parallel one, resulting this time from consideration of atomic formulae, that is, formulae of the form *Pa*. To grasp the meaning of the atomic formula *Pa* is to grasp its truth conditions, the account goes. The latter, in turn, are customarily taken to be captured by the following clause: *Pa* is true if, and only if, the object named *a* is part of the extension of the predicate *P*. Although for many purposes this schematic grasp of truth is quite thorough, the philosophically minded are liable to query how one actually comes to know that the object named *a* is part of the extension of *P*. The standard answer, i.e., "I know that *a* is part of the extension of *P* because *a* is an element of the set *P*" is unlikely to satisfy them. For, granted that this answer is both efficacious and efficient in dealing with formal structures, the point remains that knowing whether an individual has a given property is, above all, a *cognitive* activity, and as such is in effect far more complex than what the extensionally-minded theoretician deems appropriate to assume. In order to know if it is the case that the object *a* has the property *P* I must, to begin with, know what *P means*. One cannot expect the meaning of *P* to be *ultimately* settled by the extension of the set *P*, but rather the other way about: first one knows (to a greater or lesser degree) what *P* means, and only then is one able to give the extensional definition of the set *P*.[8] If there is substance in this, we might have grounds for questioning the view that takes truth as an ultimately extensional concept (or as successfully reducible to an

Available at http://www.pitt.edu/~brandom/locke/locke-w5.html [retrieved on Oct. 10, 2013]

8 As Hylton shows, this thought, or something quite akin to it, is advocated by Russell in *Principia Mathematica:* "It is an old dispute whether formal logic should concern itself mainly with intensions or with extensions (…) The facts seem to be that, while mathematical logic requires extensions, philosophical logic refuses to supply anything except intensions. Our theory of classes reconciles these two apparently opposite facts, by showing that an extension (…) is an incomplete symbol, whose use always requires its meaning through a reference to intension" Whitehead, A.N. and Russell, B., *Principia Mathematica*, Cambridge University Press, 1910.Cited by Hylton, *Russell, Idealism, and*…, cit., p. 290.

extensional concept). Meaning, and not reference alone, is inextricably bound up with truth, and thus with any theoretical enterprise resting on the latter concept.[9] This in turn would beg the question as to the actual extensional purity of extensional semantics at large.

An objection to these suggestions is readily available. Admittedly, predicates can be thought of as sets. Consistent adversaries of concepts and other abstract entities, such as Quine, have no reservations in admitting sets as entities, inasmuch as they can be accounted for in fully extensional terms. The objector, then, finds our position incomprehensible, since an utterly reference-based explanation is available; one that successfully explicates what a predicate is with all the exactness that could be desired. Nevertheless, I think this is just an instance of the subtle, although persuasive, distortions an insufficiently qualified empiricism is liable to. One can certainly construct as many sets as one pleases by, as it were, merely haphazardly adding elements to their extensions, and hence without appealing to an independently settled admission criterion for such elements. However, this is not the way we actually construct sets for most cognitively or communicatively significant purposes. At any rate, this is clearly not the manner in which we fix the extension of most of the predicates we use in theoretical and ordinary activities. Normally, what we do first is to identify the criterion by means of which we are to pick out its elements. When dealing with formal structures one may have plenty of occasions to usefully create sets randomly, i.e., without appealing to their intensions in order to fix their extensions. But we are to admit that, as legitimate as it is, this use of sets and predicates is eccentric as compared to our mainstream cognitive and communicative practice in theoretical and ordinary realms.

We have claimed that to assess the truth of the atomic formula *Pa* involves at bottom more than knowing whether *a* is part of the extension of the set *P*; it is essentially an activity in which one inquires into whether *a* falls under the intension of *P*. And arguably one cannot know the latter unless one can also recognize possibilities and conditional necessities. For instance, in order to determine the truth

[9] I take Carnap to have tried to develop this thought. Carnap, R., *Meaning and Necessity*, Chicago, The University of Chicago Press, 1948.

value of the sentence "the geometric figure ABC is a triangle", I may doubtlessly rely on an inspection of the extension of the predicate "x is a triangle", so that if ABC is actually an element of the set dubbed "triangles", I can conclude confidently that the sentence "ABC is a triangle" is true. However, if this were the only feature on the grounds of which I could tell whether or not ABC is a triangle, I could not seriously count as actually grasping the significance of the predicate "x is a triangle". At minimum, I should also know things such as "a triangle is necessarily a three-sided closed polygon" or "it is impossible for the sum of a triangle's internal angles to be greater than 180 degrees". Meaning and modalities are ultimately interconnected; vindicating one is also vindicating the other.[10]

Before moving on, I would like to point to one more modal presupposition underlying standard logical theory. Specifically, it concerns the inference rules associated with a logical calculus. Let us think quickly of the inference figure associated with any inference rule, say modus ponens:

$$A \rightarrow B$$
$$A$$
$$\text{---------}$$
$$B$$

Although an inference rule can be shown to be semantically equivalent to a corresponding statement expressing a logical law, and viceversa,[11] an inference rule has a pragmatic force of which the law lacks: the former is a prescription; it has normative force.[12] Now, what would be the most accurate wording to capture both the semantic content and the

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10 This point is made from several different, although ultimately concurring, perspectives, in Brandom, «Pragmatism, Inferentialism, and Modality in Sellars's Arguments against Empiricism», 2006, available at http://www.pitt.edu/~brandom/currentwork.html [retrieved on Oct. 10, 2013]. Grice, H.P. and Strawson, P.F., «In Defense of a Dogma», *Philosophical Review*, Vol. LXV (Apr., 1956), No. 2, pp. 141-158. Strawson, "Causation and Explanation" in Vermazen B. and Hintikka J. (ed), Oxford: Oxford University Press, 1985.

11 An inference rule can be recast as a logical law by means of the deduction theorem. A logical law can be shown to be equivalent to an inference rule by means of the completeness theorem.

12 See Lukasiewcz, "Outlines of the History of Propositional Logic", 1934, cited by Deaño, *Concepciones de la*…, cit.

pragmatic force of the above inference schema? It should be something like "if you asserted A → B and A, then of necessity you would have to assert B."[13] Again, we come across a counterfactual conditional lying at the foundation of formal logical theory. Granted that an extensional account of counterfactuals is available via possible worlds semantics, there is hardly any Elementary Symbolic Logic instructor who would rely on the antecedent mastery of this technical apparatus on the part of her average student. When it comes to the way theoreticians and students actually study and apply formal logic's inference rules, it is a strong command of modal notions what is indispensable. Later on I will say something else in connection with this.

II

If the previous suggestion about the inextricably modal nature of logical vocabulary is not fatally flawed, one could expect an overtly modal formal semantics to be more valuable than its non-modal extensional counterparts for certain specifically philosophical concerns, namely, for capturing the actual cognitive significance of logical vocabulary.[14] In order to explore this thought, I would like to discuss some features of a recent proposal along these lines, namely Robert Brandom's incompatibility formal semantics.[15]

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13 More accurately, the formulation should be "if you asserted A → B and A, of necessity either you would have to assert B, or admit the falsity of one of the premises".

14 I take the semantic primitiveness of logical incompatibility relations to have been unwittingly observed by the Tractarian Wittgenstein. Wittgenstein, *Tractatus Logic-Philosophicus*…, cit., prop. 6.3751. And explicitly acknowledged by the post-Tractarian Wittgenstein. Wittgenstein, «Some Remarks on Logical Form» in Copi, I. y Beard, R. (eds.), *Essays on Wittgenstein's Tractatus*, New York, Macmillan, 1966, (1929), pp. 31-37. I develop these thoughts at large in Moscaritolo, A., «Significado y razones. Posibilidades y desafíos para la semántica inferencialista de R. Brandom», Chapter I «Del atomismo al holismo semántico», Trabajo especial de grado para el título de Magister Scientiarum en Filosofía, Mención Lógica y Filosofía de la Ciencia. Comisión de Estudios de Postgrado, Facultad de Humanidades y Educación, UCV, 2011, pp. 10-31.

15 Brandom, *Between Saying and Doing. Towards an Analytic Pragmatism,* Oxford University Press, 2008. However, we shall work here with Brandom, «Incompatibility, Modal Semantics and Intrinsic Logic», 2007, Available at http://www.pitt.edu/~brandom/locke/locke-w5.html [retrieved on Oct. 10, 2013]

Brandom's starting-point is to take the modal concept of incompatibility, construed as 'non-compossibility', i.e., as the negation of conjunct possibility, rather than truth as the cornerstone of formal semantics. The traditional truth-based concept of logical consequence is replaced by the incompatibility-based concept of incompatibility consequence,[16] which yields the exact same results as the former, i.e. whenever α is a logical consequence (in the traditional sense) of the set Γ, α is an incompatibility consequence of Γ, and vice versa. By means of the core notion of incompatibility, Brandom purports to explain the significance of a logical operator by determining all the formulae incompatible with a formula whose main operator is the operator being defined. The basic motivation is straightforward: the significance of a linguistic expression in general consists, above all, in the differences it makes in the logical space, in the space of reasons.[17] To illustrate the general idea, let us glance at the incompatibility definition of logical negation. The critical insight here is that ¬*p* is entailed by all the formulae incompatible with *p*. Thus, instead of the usual semantic clause for the logical negator, i.e. ¬p is true if and only if p is false, one would say, to begin with, that *¬p is incompatible with any formula r that is incompatible with any formula q incompatible with p.*[18] Let p be 'Fido is a dog', let ¬p be 'Fido is not a dog', let r be 'Fido is a Golden Retriever', and let q be 'Fido is a cat'. 'Fido is *not* a dog' is incompatible with 'Fido is a Golden Retriever', which in turn is incompatible with 'Fido is a cat', which in turn is incompatible with 'Fido is a dog.'[19]

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16 Using $\models_I$ to indicate incompatibility consequence, $\Gamma \models_I a$ if, and only if, every set X of formulae incompatible with α is also incompatible with Γ. See Brandom, *Incompatibility, Modal Semantics*…, cit., pp. 11 and ss.

17 As Brandom himself is always quick to acknowledge, one important distal source of both the term "space of reasons" and this semantic insight is W. Sellars.

18 Brandom, *Incompatibility, Modal Semantics*…, cit., p.12.Two warnings are in order. First, it is worth noticing that the cumbersome wording in giving the incompatibility semantic clause for ¬p cannot be averted by using the easier, but only seemingly equivalent, clause "¬*p* is incompatible with any formula *q* incompatible with *p*". Indeed, ¬*p* is *entailed* by any formula *q* incompatible with *p*: "Fido is not a dog" is entailed by 'Fido is a cat', which is incompatible with 'Fido is a dog". Secondly, the incompatibility semantic clause for ¬p just given is not completely accurate, for incompatibility is in effect a relation among sets of sentences rather than among single sentences.

19 *Ibid.*, p. 19.

Of course, if this semantics is to be taken seriously as an alternative to possible worlds semantics, it is to account for all the logical locutions, including alethic modalities. Not only does it do this, but, interestingly enough, it shows all the non-modal operators thereby defined to behave classically; also, the operators of necessity and possibility can be shown to yield all the theorems of S5.[20] Moreover, incompatibility semantics can be developed extensionally, despite the intensional nature of its founding concept.[21]

The problem, however, is that the resulting explications depend on a locution belonging to the very same set that constitutes the explicandum, namely the modal concept of possibility (for, again, incompatibility amounts to non-compossibility). Brandom claims to have avoided this circularity by defining the modal alethic operators in terms of the normative pragmatic concepts which, he argues, underlie language use in general, namely those of assertional commitment and entitlement.[22] The general claim is that a speaker who is assertionally commitment with, say, 'necessarily p', is also to count as assertionally committed with p and precluded from entitlement to assert ¬p. Indeed, a basic tenet of Brandom's neo-pragmatism is that semantics is ultimately reducible to pragmatics.[23] I have argued elsewhere that this subordination is untenable.[24] Nonetheless, the merits of Brandom's

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20 All the theorems of classical logic are provable on the basis of incompatibility readings of the standard operators. *Ibid.*, p. 22, and pp.46 and ss.

21 Indeed, Brandom provides the semantic clauses for all the operators in set-theoretic terms.

22 Brandom, *Making It Explicit. Reasoning, Representing, and Discursive Commitment*, chapter 3 "Linguistic Practice and Discursive Commitment", Harvard University Press, 1998, pp. 141 and ss.

23 Brandom, *Articulating Reasons,* Harvard University Press, 2000, pp. 186 and ss.

24 Moscaritolo, *Significado y razones. Posibilidades…,* cit., especially chapter IV, «Límites de la pragmática social en la explicación del contenido conceptual». Confessedly, Brandom's aim is to "(…) explain what is asserted by appeal to features of assertings, what is claimed in terms of claimings (…)". Brandom, *Articulating Reasons*…, cit., p. 4. In turn, he expects to explain the force of those speech acts by means of his normative pragmatics, whose key concepts are those of asssertional commitment and entitlement. However, I argue that one cannot account for the ability of linguistic practitioners to distinguish these normative statuses unless their discernment is steered by an antecedent knowledge of semantic rules: it is because I have some knowledge of the meaning of the predicates involved in a claim that I can pick out the additional commitments and entitlements

intensional formal semantics are independent of this last step. To tackle semantic concerns with the help of the concept of incompatibility gives us a uniquely insightful picture into the actual cognitive and communicative significance of the corresponding language. Success in understanding what meaning is, and in applying this idea to particular languages, both natural and formal, requires holding on to a founding semantic idea, one that either presides over, or incessantly hovers on, the thought of virtually all those who have taken an interest in these matters. The point is pressed eloquently by the Tractarian Wittgenstein*:* " (…) A proposition, a picture, or a model is, in the negative sense, like a solid body that restricts the freedom of movement of others, and, in the positive sense, like a space bounded by solid substance in which there is room for a body."[25] A formula has actual semantic significance inasmuch as it makes some difference in the 'logical space', that is, inasmuch as its assertion both expands and restricts the possibilities of making other assertions about the same subject-matter. This is the key virtue of incompatibility semantics: while truth and assertibility are certainly important features of meaning, incompatibility is not only just as important, but also the *distinctive* feature of semantic content; it is the one feature that succeeds in giving a comprehensive account of the cognitive and communicative *role* of linguistic expressions, both formal and ordinary. Incompatibility semantics would prove most useful even if it were not found to be fully self-sufficient, for, borrowing Sellars's words, it does succeed in providing us with a *functional* account of logical terms. It tells us what a logical term is, or more accurately, what it *does*.

Proverbially metaphoric G. Ryle instructs us in these matters by comparing formal logical locutions with coins: just as the invention of coins greatly facilitated trade in virtue of their having explicitly defined exchange-values, thus allowing for an accurate standard with which to conduct and assess commercial transactions regardless of the goods being traded, the coining of logical constants, Ryle suggested, aims to facilitate the appraisal of inferential transactions. For just like coins, they are explicitly introduced with clear-cut meanings; and, just like

anybody undertakes by asserting it.

25 Wittgenstein, *Tractatus Logic-Philosophicus*…, cit., prop.4.463

coins, their presence allows us to appraise inferential transactions regardless of the subject-matter of those transactions.[26] This thought, together with the general spirit of Brandom's incompatibility semantics, give us the opening to put together some ideas about the role of logical constants. At the highest level of generality, logical constants –both ordinary and formal– are conceptual tools whose function is to bring out the roles that each formula, or propositional content, has in an inference.[27] Logical constants tell us what a formula is worth in inferential dealings, that is, what one can and hence cannot do with it for inferential purposes. For example, following the also Rylean thought that conditional statements are inference tickets,[28] discursively 'owning' a conditional such as "If it rains, then the streets will get wet" gives us enough purchase power to 'own' also the assertion that the streets will get wet insofar as the former is complemented in its purchase power with the assertion that it rains. While discursively owning the disjunction that either Hillary Clinton or Joe Biden will run for president in 2016 falls short of having enough purchase power to let us own any of the separate claims 'Hillary Clinton will run for president in 2016', 'Joe Biden will run for president in 2016', it does nonetheless have enough purchase power to let us own the claim that a former Obama administration official will run for president in 2016.

As to *formal* logical constants, they have been deliberately designed to bear their value on their face. But just like a five-euro bill, as unambiguous about its exchange-value as it is, can be used to buy certain things only within a limited geographical realm, we may find it natural to inquire about the cognitive and communicative realm within which the vocabularies of the diverse logical systems lend themselves to be used. While a thorough answer is beyond our ambitions here, we might make a start by appreciating how classical logic's

26 See Ryle, G., *Dilemmas*, Cambridge University Press, 1964, pp. 119-121.

27 A similiar point is made by Frapolli: "Logical constants are higher-order predicables that have 0-adic predicables as arguments. They don't name any kind of entity but rather are natural language devices for making inferential relations among concepts and propositional contents explicit". Frapolli, M. J., «Redefining Logical Constants as Inference Markers», *The Linguistic Review,* Vol. XIX (2012), No. 4, p.7

28 See Ryle, *The Concept of Mind*, London, Hutchinson's University Library, 1954, pp. 121 and ss.

vocabulary is suitable to express inferences from theories whose valuations are complete and consistent (i.e., in which both the law of excluded middle and the law of non-contradiction hold.)[29] Indeed, and in contrast to a common view, the material conditional does indicate inferential proprieties. It is worth stopping to see why.

Medieval logicians thought of our modern concepts of inference, logical consequence, and conditional statement as mere variants of a single concept: their term "consequence" denoted a hypothetical proposition which could be expressed equivalently by the words 'si' (if), 'sequitur' (follows), and 'igitur' (therefore).[30] However, in the eyes of some modern logicians, whoever expects a formal language operator to express a metalinguistic relation such as entailment is committing the most elementary of mistakes.[31] Be that as it may, there's an evident resemblance between $p \rightarrow q$ and $p \models q$, which indeed suggests that the former is an object-language simulator of the latter.[32] It is in fact an easy point to make. On the one hand, the metalinguistic statement '*p* entails *q*' is true if and only if there is no interpretation in which *p* is true and *q* false. On the other hand, the object-language statement $p \rightarrow q$ is true in an interpretation I_i if and only if it is not the case that *p* is true and *q* false in I_i; that is, the truth of $p \rightarrow q$ in a given interpretation tells us that there is at least one interpretation in which it is not the case that *p* is true and *q* false. What is required for *p* to entail *q* is for the truth values of *p* and *q* to behave in all interpretations just as in I_i. Put differently, the truth in a given interpretation of $p \rightarrow q$ constitutes a necessary condition for the truth of the statement $p \models q$. Via the soundness result, the truth of $p \rightarrow q$ becomes also a necessary condition for the truth of the statement $p \vdash q$, i.e., for the inference from *p* to *q* to be sound. The material implication is, then, inferentially significant.

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29 Both the point and the terminology are put forth by Beall, J.C., and Rest all, G., *Logical Pluralism,* Oxford University Press, 2006, and Beall, *Logic. The Basics,* Routledge, 2010.

30 See Sundholm, *Inference versus consequence*…, cit., pp. 946-947.

31 The mistake conspicuously pointed out by Quine, namely, to conflate use and mention. See Quine, W.V., *Word and Object*, The MIT Press, 1960.

32 This point has been raised by e.g. Palau, G., *Introducción filosófica a las lógicas no clásicas*, Barcelona, Gedisa, 2002, p. 35.

Evidently, the inferential significance of the material implication by far fails to capture all the inferentially relevant shades of meaning of its rich ordinary analogue. But another metaphor of Ryle's may be the beginning of wisdom here:

> The logician's 'and', 'not', 'all', 'some', and the rest are not our familiar civilian terms; they are conscript terms, in uniform and under military discipline, with memories, indeed, of their previous more free and easy civilian life, though they are not living those lives now.[33]

Frege opened the very first systematic account of what came to be classical logic with this warning: "this ideography (…) is a device intended for certain scientific purposes, and one must not condemn it because it is not suited to others."[34] The moral to be drawn from these observations is that one cannot impugn the significance accorded to the vocabulary of a logical system merely because it doesn't suit all of our inferential dealings. This is in fact a variation of a more general theme, namely, the issue of the rivalry that might exist between different logical systems. Here we embrace the thought that seeking to determine what logic is "the right logic" is as doomed to failure as are most, if not all, absolutistic pretensions in philosophy.[35] There is room for logical pluralism on the grounds of the different applications to which each system, and specifically the vocabulary of each system, lend themselves.[36]

III

While Brandom's detour into pragmatics may not yield the foundation for semantics he seeks, it nevertheless may be used to illuminate

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33 Ryle, *Dilemmas*…, cit., pp. 167-168.

34 Frege, G., «Begriffsschrift, A Formula Language Modeled upon that of Arithmetic, for Pure Thought » in *Conceptual Notation and Related Articles*, Oxford University Press, 1972, (1879), p. 4.

35 In contrast with views such as J. Peregrin's, who argues for the priority of intuitionist logic from an inferentialist perspective, my position is akin to Brandom's. Peregrin, J., "Brandom's Incompatibility Semantics", in *Philosophical Topics,* Vol. XXXVI (2008), No. 2, pp. 99-121. (read my review for ideas about the dependence of PWS on an intensional semantics). Brandom, «Reply to J. Peregrin», *Philosophical Topics,* Vol. XXXVI (2008), No. 2, pp. 148-152.

36 This thesis is developed at length by Beall and Restall, *Logical Pluralism*…, cit.

certain additional metaphysical presuppositions of logical theory that usually receive scant attention.

Arguably, a broadly pragmatist, i.e. epistemically involved, conception of logic is to be grounded not in the concept of deductive consequence, but rather in the concept of inference.[37] Regardless of whether or not one takes meaning-based inferences as more fundamental,[38] a notion integral to the idea of inference is that of a rule. Inferential rules, both formal and meaning-based ones, are an instance of conceptual normativity, a phenomenon with which Brandom's normative pragmatics deals in some detail.

His basic insight is that concept-deploying creatures exhibit by principle the following features: 1. They are held accountable for (at least some of) their expressive concept-involving activities; 2. They can meet (at least some of) those justificatory demands; 3. They acknowledge (at least some of) the consequences of their expressive concept-involving activities. In a nutshell, expressive conceptual practice requires its practitioners to be able to acknowledge two types of normative status: commitments and entitlements. For example, to count as understanding the meaning rule of the predicate "x is a square", you are to know, at the very least, that attributing it to a given particular commits you willy-nilly to attribute it also the predicate "x has four equal sides". To count as understanding the meaning rule of the predicate "x is a bird", you are to know, at the very least, that attributing it to a given particular prima facie entitles (but does not commit) you to attribute it also the predicate "x can fly".

As the previous examples hint, the very talk of rules of any kind presupposes the idea of *agents* whose actions are to be constrained by such rules. To say that modus ponens is a formal inference *rule* is to say, essentially and not just incidentally, that it governs the actions of inferential *agents*. Because of its own nature, normative pragmatics lends itself to illuminate the role formal logical rules play in actual human inferential activities, that is, the ways in which they guide what inferen-

37 See Sundholm, *Inference versus consequence*…, cit.

38 The priority of meaning-based inferences is advocated e.g. by Brandom, *Making It Explicit. Reasoning*…, cit. Brandom, *Articulating Reasons*…, cit. and Sundholm, *Inference versus consequence*…, cit.

tial agents do. Formal inferential rules can thus be found to set either the consequential obligations that an agent undertakes in accepting the truth of certain propositions, or the prima facie inferential rights he thereby acquires.

The above remarks are indeed there formulation of an old and quite familiar difference between two types of inference rules, i.e. between deductive inferential rules on the one hand, and inductive ones, on the other. Despite this parallelism, the pragmatic construal remains interesting, for it is the one perspective that brings out what *we do* with them, or rather what they do to us as regulators of our inferential activities.

IV

One last Rylean metaphor might prove useful. Logic is to philosophy, Ryle claimed, what parade ground military drills are to actual battle: while the artificiality of the former is at odds with actual battle conditions, the good soldier nevertheless is she who, having mastered those stereotyped, controlled drills, makes sensible use of the skills thereby learned to succeed in the haphazard battle ground.[39] Thinking of logical theory as, at least in part, a *regulatory ideal* steering our inferential practices might help bring out one of logic's specific roles in our lives, both as theoreticians and laymen: logic could be seen as modeling form all your multifarious inferential activities so as to produce ideal standards by which the correctness of those practices can be assessed. Precisely because of the complexity of those activities and the variety of contexts in which they are performed, a single model reasonably could not be expected to do the entire job. The coexistence of diverse logical systems would then appear quite natural to us.[40]

Thinking of logic as a formal science not only operationally but also as regards its ultimate object of inquiry can doubtlessly bear fruit in some areas. But this cannot be the end of the story. I have tried to argue that even those contented with a scrupulously formalistic view of logic undertake metaphysical commitments of which one cannot make sense except against an epistemically charged background. I will

39 See Ryle, *Dilemmas*…, cit., p. 112.

40 This form of pluralism is advocated by Beall and Restall, *Logical Pluralism*…, cit.

put forward one more observation in favor of this general claim, one which I take to be just as self-evident as it is forgotten. The alliance between philosophy and logic, renewed to this day by almost every philosopher since it was first subscribed by Aristotle, makes sense only insofar as logic constitutes a tool propitious to secure the philosopher's main aim, namely to disentangle *substantial* relations of entailment and incompatibility, i.e., relations between concepts that are anything but 'formal'. Formal logic, the philosopher trusts, aims to cast light on the inferential relations underlying our varied conceptual activities from the vantage-point accorded to it by its formality. Were logic found not to be in this business anymore, we would be well advised to find quickly a replacement for it.

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