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No Miracles[1]
What does it mean that science seeks the truth?

Abstract. The purpose of the following pages is to show that the rejection of Metaphysical Correspondentism doesn't force us to reject Default Correspondentism and that the rejection of Metaphysical Realism doesn't force us to reject Default Realism. As a consequence, we aim to disentangle the analysis of the (standard, robust, ordinary but also scientific) notion of truth from the debate between realism and anti-realism. The independence of the analysis of notions such as knowledge and assertion from the metaphysical debate follows too.

Keywords: scientific truth, metaphysical correspondentism, default correspondentism, realism, anti-realism

Nic dziwnego
Co znaczy, że nauka poszukuje prawdy?

Abstrakt. Celem artykułu jest pokazanie, że odrzucenie metafizycznego korespondentyzmu nie pociąga za sobą odrzucenia domyślnego korespondentyzmu i że odrzucenie realizmu metafizycznego nie pociąga za sobą odrzucenia domyślnego realizmu. W związku z tym, staramy się oddzielić analizę (standardowego, odpornego, potocznego, ale także naukowego) pojęcia prawdy od debaty między realizmem a anty-realizmem. Wynika z tego niezależność analizy pojęć, takich jak wiedza i asercja, od debat metafizycznych.

Słowa kluczowe: prawda naukowa, metafizyczny korespondentyzm, domyślny korespondentyzm, realizm, anty-realizm

1. Naturalism

As animals in natural surroundings, we engage in causal and intentional relations with a wide range of middle-sized physical objects. And we cannot do otherwise. Believing in the external world is not a conscious decision, but the default position. The external world constrains our beliefs, which thus have to be approximately true at least in their main lines. This kind of confidence in our ordinary methods of knowledge acquisition is a core assumption of pragmatist approaches, an example of which is Wittgenstein's view in *On Certainty*:

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109. "An empirical proposition can be *tested*" (we say). But how? And through what?

110. What *counts* as its test? – "But is this an adequate test? And, if so, must it not be recognizable as such in logic?" – As if giving grounds did not come to an end sometime. But the end is not an ungrounded presupposition: it is an ungrounded way of acting.

111. […] I want to say: my not having been on the moon is as sure a thing for me as any grounds I could give for it.

And in the same vein, Ryle (1949/2009, 47) declares:

It is obvious that where misunderstanding is possible, understanding is possible. It would be absurd to suggest that perhaps we always misconstrue the performances that we witness, for we could not even learn to misconstrue save in learning to construe, a learning process which involves learning not to misconstrue. Misinterpretations are in principle corrigible, which is part of the value of controversy.

There is also philosophical paranoia. Paranoid patients fight their delusions with the help, if they are lucky, of their closest social group. But a generalized paranoia covering the whole of mankind, i.e. the generalized state of mind of being unable to distinguish rational beliefs from unconstrained products of the imagination, is a hypothesis that hardly makes sense. If you think it does, then this paper is not for you.

Default realism is a non-inferential, spontaneous attitude that makes us believe, unless we have strong evidence to the contrary, that the display screen in front of me is not a fantasy, that if I don't turn the grill off the sausages will burn with the corresponding risk for my life and belongings, or that my car is in the garage even if I can't see it at this moment. Metaphysical realism is something else. It includes a number of highly sophisticated philosophical theories, which depend on sets of metaphysical assumptions for which their proponents give reasons or else directly postulate. In the debate between realists and anti-realists, the anti-realist side classically has assumed the worst part and for good reasons: it seems to run against common sense. Anti-realists have to face the following dilemma: (i) either buying the realist story, with all its cycles and epicycles, or else (ii) losing Paradise, i.e. withdrawing to an inane conceptual parcel, in which the standard, ordinary discourse about truth, objectivity, and knowledge is forbidden. David Hilbert declared in 1925 (1925/1964, 191) that "no one shall expel us from the Paradise that Cantor has created". My purpose in the following pages is to argue for our right to rest in the realist's paradise without being entangled in its dark aspects.

There are solid reasons to accept the realist story, and solid reasons to reject it. The theoretical difficulties that harass realists are well known, among them the status of abstract objects and the challenges of skepticism. In exchange, realists enjoy a comfortable, non-revisionist position about basic metaphysical, epistemic, and semantic concepts. Anti-realism, by contrast, is always a parasitic position.

The situation with realism is analogous to the situation with the correspondence theory of truth. In fact, correspondentism plays an essential role in the standard

rationale for realism. Aristotle's view, saying of what it is that it is not is false, and of what it is that it is is true, is hardly deniable; it is as undeniable as Tarski's Convention T. Much more debatable is the view that makes of truth a relation and that either (a) restricts the use of truth to empirical discourse, or (b) inflates the realm in which talking of states-of-affairs makes sense to accommodate numbers, values, and feelings. Let's call Aristotle's position "Default Correspondentism", and call its metaphysically implemented versions "Metaphysical Correspondentism" (for a discussion about the commitment of prosentientialism with correspondentism, see Gentile 2013).

The purpose of the following pages is to show that the rejection of Metaphysical Correspondentism doesn't force us to reject Default Correspondentism and that the rejection of Metaphysical Realism doesn't force us to reject Default Realism. As a consequence, we aim to disentangle the analysis of the (standard, robust, ordinary but also scientific) notion of truth from the debate between realism and anti-realism. The independence of the analysis of notions such as knowledge and assertion from the metaphysical debate follows too.

The "solid reasons" for and against realism are not solid reasons for *the same kind* of realism: there are solid reasons to defend Default Realism and solid reasons to reject Metaphysical Realism. The situation, in fact, is more extreme: whereas we cannot help being default realists, neither metaphysical realism nor metaphysical anti-realism makes any sense from a pragmatist perspective. Both fall on the Mystic Side (*Tractatus* 6.44), out of reach for natural creatures.

Truth is not the exclusive property of metaphysical realists; reasons against metaphysical realism are not reasons to withdraw from the discourse of truth, knowledge, and objectivity. The meaning of truth is a semantic issue. The epistemic issue of criteria for its application in turn varies depending on the kind of content and the type of act (Frápolli 2012). The debate between realism and anti-realism, if in the end we conclude that there is still something left in such a debate, affects neither meaning nor criteria.

In 1965, Paul Benacerraf told the story of Ernie and Johnny, the children of two well-intentioned logicians, who raised them in the set theoretical approaches to the foundations of arithmetic respectively closer to their hearts. Both children mastered the set theories in which they were instructed, and were able to apply them to the mathematical practices required in ordinary life. Nevertheless, the dialog between them was not always easy: "Delighted with what they have learned", Benacerraf explains, "[Ernie and Johnny] started proving theorems about numbers. Comparing notes, they soon became aware that something was wrong, for a dispute immediately ensued about whether or not 3 belonged to 17. Ernie said that it did, Johnny – that it did not. Attempts to settle this by asking ordinary folk (...) understandably brought only blank stares. In support for this view, Ernie pointed to his theorem that for any two numbers, x and y, x is less than y if and only if x belongs to y and x is

a proper subset of *y*. Johnny, on the other hand, countered that Ernie's "theorem" was mistaken, for given two numbers, *x* and *y*, *x* belongs to *y* if and only if *y* is the successor of *x*." (1965, p. 278).

One of the morals of Benacerraf's story is that, to use arithmetic for its intended purposes, Ernie and Johnny are equally well equipped. Their discrepancies about the definitions of "number", "ordered pair", or relations such as "less than", the validity of certain axioms, etc. fail to touch what really matters, i.e. arithmetical practices.

In the debate between realism and anti-realism the situation is analogous: the theoretical apparatus underlying these metaphysical positions fails to touch the work of theorists in other areas. In particular, it has no effect either on the theoretical proposals of the diverse scientific communities or in the professional practices of the members of these communities. Both the realists and the anti-realists, are at pains to explain what they mean by "truth" and "real", but neither the realists nor the anti-realists renounce the use of arithmetic in order to drive a car, or to retort to the latest claim of their favorite politician with a "you are lying", or to feel miserable if they are abandoned by their beloved one. They all act on the assumption of the existence of the external world and other minds, on the reality of feelings, on the belief that some of our propositions are true and some others are not, and on the assumption that the results of scientific research expand our knowledge of the world we live in and make our relations with it easier.

2. What is it like to be a scientific realist?

A. Musgrave defines scientific realism as follows: "Scientific realism is the view that science seeks the truth and sometimes finds it" (Musgrave 2007). If this is a fair characterization, as I think it is, then scientific realism is the default position, contested only from deeply non-standard epistemic backgrounds. *That the sciences seek the truth* is the nominalization of a propositional generalization, whose content hardly goes further than a standard definition of "science". The second clause, *that it sometimes finds it*, is a prudential report of our past epistemic success and our fallibility.

Thesis [1],

[1]   Science seeks the truth,

cannot be used to draw a divide between competing metaphysical positions. In particular, [1] cannot be used to discriminate between Metaphysical Realism and Metaphysical Anti-realism. The intuition that it does, i.e. the intuition that supports the transition from endorsing [1] to endorsing Metaphysical Realism, rests on two

further assumptions. The first one is the semantic position that analyzes [1] along the lines that most of us would follow to analyze [2],

[2]   Joan seeks the TV remote control.

Imagine the following situation: Joan is watching TV, turns the TV off to go to the kitchen for a snack and, back to the living room, doesn't find the device to turn the TV set on again. The relation "seeks" is, in this case, a first-order binary relation that holds between two objects, Joan and the remote. The semantic position that understands the informational content of [2] as derived from its status as an image, picture, or blueprint of a particular situation is called "Representationalism". There are good semantic reasons not to analyze [1] using the same pattern. "Seeking the truth" doesn't behave as "seeking the remote". In the first case, what is being sought is an object, in the second case it is not. "Truth" is an abstract name that doesn't work referentially. The following equivalent reformulation of [1], [3], is less misleading:

[3]   Sciences seek what is true.

In its semantic behavior [1] is closer to [4],

[4]   The European Community seeks peace in Middle East.

[1], [3], and [4] encode general thoughts, and their standard use consists in packing an indeterminate amount of complex information in a manageable way. None of them represents states-of-affairs, in the sense in which a representationalist would defend that [2] does.

The second assumption that seems to lend support to the inference from [1] to Metaphysical Realism is the implicit understanding of existence as spatiotemporal location: to exist is to be located. Existence, Frege taught us, is a higher-order concept which indicates instantiation, and instantiation is a circumstance that is seen in the inferential relations to which we get committed when we assert certain kinds of contents. In (1884/1980, 64), Frege declares: "The construction in 'four thoroughbred horses' fosters the illusion that 'four' modifies the concept 'thoroughbred horse' in just the same way as 'thoroughbred' modifies the concept 'horse'. Whereas in fact only 'thoroughbred' is a characteristic used in this way; the word 'four' is used to assert something of a concept". Four, like existence, is a property of concepts, not a characteristic of them. And he continues in the next paragraph: "the proposition that there exists no rectangular equilateral rectilinear triangle does state a property of the concept 'rectangular equilateral rectilinear triangle'; it assigns to it the number nought". No connection is made from the use of an existential claim to the assumption of causal relations or empirical discourse.

Consider now the following examples:

[5]   The analysis of the material picked up on Mars in the latest NASA mission detects unequivocal traits of H_2O of extra-terrestrial origin.

[6]   The cardinality of the set of real numbers is greater than the cardinality of the set of natural numbers.

[7]   To prepare Peking duck, you have to be an expert cook.

Whoever sincerely asserts [5], becomes thereby committed to [8],

[8]   There is (or has been) water on Mars.

If a speaker claimed [5] and at the same time rejected [8], we would be entitled to doubt the use of the words involved.
By the same argument, whoever who claimed [6] would have to accept [9],

[9]   There are transfinite numbers greater than $\aleph_0$.

Again, if somebody asserted [7] and in the same act rejected [10],

[10]   There are ways of preparing duck not apt for beginners,

we would be entitled to accuse the person of pragmatic inconsistency.
Do these inferences force us to assume water, transfinite numbers, and ways of preparing duck as primitive objects in our universe? The Fregean analysis of existence shows that they don't. This answer deserves some explanation, though. A quite standard reaction to the question that starts this paragraph is that the three inferences are of a very different nature, i.e. that asserting [5] commits us to accept the existence of water, but that this is not so in the other two cases. As we see it, this answer is misleading, and resorting to the idea of a canonic language in which ontological commitments are perspicuous and/or to the procedure of rephrasing —the standard Quinean answers— is begging the question. To give an appropriate explanation, two aspects should be distinguished: the first one has to do with the inferential connections between these three pairs of propositions, [5] to [8], [6] to [9], and [7] to [10]. The rule of existential generalization, the rule that supports the transitions from [5], [6], and [7] to [8], [9], and [10], respectively, is an essential feature of the semantic behavior of the concept of existence. Existence, as a higher-order notion, expresses some property of concepts, in this case that they are not empty. By [5], we say that the concept "Martian water" is not empty, by [6] we say the concept "transfinite number greater than $\aleph_0$" is not empty, by [7] we say that the concept "a novice cook able to prepare Peking duck" is empty. The further infer-

ence that, in order to assert existence, some kind of causal connection to "reality" should be established is tantamount to requiring that extensions of concepts always consist of physical objects.

The second aspect is related to the circumstances under which we are entitled to assert [5]–[10]. To be in a position to assert [8] we should have some kind of causal link, even if indirect, to samples of H_2O. The required connection is provided by [5]. But the requirement of the causal link is independent of the meaning of existence. It depends on the empirical status of this particular kind of discourse. Nevertheless, converting empirical discourse into the paradigm of existence is unwarranted, since conceptual instantiation takes place in any kind of discourse, regardless of its subject matter. Properties of physical objects are instantiated by physical objects, properties of abstract objects are instantiated by abstract objects. The inferential import of the existential higher-order concept forces us to accept [9] when we accept [6], and to accept [10] when we accept [7]. Otherwise our use of the notions involved would be *sui-generis*.

The differences between [5], [6], and [7] rest on the different assertion criteria fitting for the kind of discourse to which they belong. To assert [6] we should have some kind of proof. But once we have it, if the proof supports our assertion of [6], it necessarily has to support our assertion of [9]. The kind of criteria that entitles us to assert [6] are not the kind of criteria on which we rely in order to assert [7]. But, be that as it may, once we are entitled to assert [7], we have all we need to assert [10].

Now, let us go back to truth. The connection between truth and realism perspires in claims such as [11],

[11]   True theories represent how (a particular portion of) the world is.

The claim [11] is an instance of the theory of truth as correspondence applied to theories, and, as happens with the correspondence theory, it admits interpretations that seem to support realism and others that are neutral about the metaphysical debate (Frápolli 2012a).

In the last decades, an argument for realism has arisen above its competitors. It is the *No-Miracles Argument*, originally attributed to Putnam and then endorsed by realists of any kind (for a discussion of the argument and its effect in prosententialism, see Gentile 2013). Compared with the support enjoyed by the "argument", Putnam's assertion stands out for its modesty. In (1975, 73), he declares that "[realism] is the only philosophy that doesn't make the success of science a miracle". Even more modest is Haack, who claims (2003, 145):

Putnam argues that, unless theories in mature science were at least approximately true, their predictive successes would be miraculous. I argue only, more modestly, that true consequences of a claim or theory constitute evidence that is to some degree supportive, and hence to some degree warrants it.

Do we need to be metaphysical realists to agree with Putnam and Haack? The point here is that we don't. Putnam and Haack voice their support to the more than reasonable assumption that we, human beings, don't make up the world we live in. Their claims don't imply, however, the less reasonable thesis that for our theories to be true, their terms have to be causally connected with some external objects and their propositions have, in some sense, to mimic state-of-affairs. In short, Putnam and Haack declare their support to Default Realism, not to Metaphysical Realism. At least, in the above-mentioned texts.

As we see it, the No-Miracles Argument is a declaration of Naturalism, not a defense of Metaphysical Realism (Frápolli 2012b, 126ff). It is a way of showing general confidence in our basic empirical beliefs. To defend Metaphysical Realism, better arguments should be implemented. Naturalism, in the non-reductionist version that we favor, amounts to the claim that human beings belong to the natural world and are thus constrained by it. Naturalism in my sense requires the explanations we offer in the realm of our professional practices to be compatible with the best scientific theories available to us. Naturalism is an extension of what we have called above "Default Realism".

3. The meaning of truth

Truth ascriptions, sentences by means of which truth is put to work, can be either general or singular, depending on the kind of content they possess. Consider the following dialog:

[D1] Victoria: Mom is in Lisbon now.
         Joan: What Victoria says is true.

In [D1] Joan utters a truth ascription having singular content, i.e. it doesn't include quantifiers. In contrast, a truth ascription such as [6], is suitable to express general contents. Of course, out of context, [6] doesn't express anything, but in an appropriate communicative setting, [6] expresses a general rule by which the speaker endorses any particular assertion by the person referred to as "he". [1], [3], and [4] above are also general truth ascriptions.

The semantic analysis of general truth ascriptions has to combine an explanation of the features that characterize them as *ascriptions* of a specific kind and the features that derive from generality.

What semantic features do the following utterances [12]–[16] have in common?

[12] What he says is true.

[13] I agree.
[14] You are right.
[15] Things are as you say they are.
[16] Yes, it does.

The first striking aspect about them is that merely by looking at (or hearing) them we cannot infer the kind of state-of-affairs that they might be used to depict. These sentences don't give the minimal information even to begin research in order to determine their truth value. The reason should be obvious: they don't *say* anything, even though they are perfectly meaningful English sentences. A second aspect emerges when we place them in context as in the following dialogues, [D2]-[D6],

[D2] Joan: Marina is at home.
       Victoria: What he says is true.
[D3] Joan: This is a good film.
       Victoria: I agree.
[D4] Joan: We shouldn't eat so many sweets.
       Victoria: You are right.
[D5] Joan: The Spanish financial crisis shows the weaknesses of capitalism. Either the European Community changes its general policies concerning the Euro, or we are bound to have more unemployment and poverty.
       Victoria: Things are as you say they are.
[D6] Joan: Does the emission of greenhouse gases have any effect on the climatic change?
       Victoria: Yes, it does.

In each case, Victoria's utterance has the content of Joan's assertion. In [D2] Victoria is saying (in a relevant sense of "saying") that Marina is at home, in [D3] Victoria is saying that the film to which Joan refers by "this" is good, and so on. And nothing would change if the sentences uttered by Victoria in these dialogs were replaced by another in a different order. For instance, in [D5] Victoria might have said: "You are right", and the general import of the speech act would remain the same. The behavior of the sentences uttered by Victoria shows then that they act as some kind of propositional variable, i.e. they are sentences able to inherit any propositional content in context. In the same way in which we can use "he" to refer to any contextually salient male individual, "You are right" can be used to lend our support to any contextually salient content. In the same way as it makes no sense insist, out of context, in finding out who "he" really is or whether he is tall or short, it makes no sense to ask whether what she said is true in the absence of an independent propositional content to which the adscription refers.

Examples [12]–[16] illustrate an empirical thesis, [17]:

[17] In natural languages, some sentences work as propositional variables.

I call those expressions characterized by [17] "sentential pro-forms" or "pro-sentences" for short. Truth-terms are means to construct pro-sentences although, as examples [11]-[16] show, some pro-sentences are not truth-ascriptions.

Pro-forms, in general, play an essential role in our conceptual system, since without them we would not be able to express general thoughts: the expression of generality requires variables. There are other jobs that pro-forms perform, although for our purposes they are less relevant and will not be analyzed in this paper.

What could be the communicative intention of an agent who utters thesis [1]? A fair rewording of [1] is [18],

[18]   If *something* is true, sciences should seek to establish (discover, explain) *it*.[2]

Like [1], [18] expresses (in an appropriate speech situation) a general content with, in principle, infinite instances. Some of them could be the following [19]-[23]:

[19]   If there is a transfinite number greater than the cardinality of the set of natural numbers and less than the cardinality of the set of the real numbers, then sciences should establish that there is a transfinite number greater than the cardinality of the set of natural numbers and less than the cardinality of the set of the real numbers.
[20]   If there is water on Mars, science should establish that there is water on Mars.
[21]   If the Earth is warming up, sciences should establish that the Earth is warming up.
[22]   If every even integer greater than or equal to 4 can be expressed as the sum of two primes, science should establish that every even integer greater than or equal to 4 can be expressed as the sum of two primes.
[23]   If the skull fragment of the VM-0 from Venta Micena belonged to a primitive hominid, science should establish that the skull fragment of the VM-0 from Venta Micena belonged to a primitive hominid.

And, in general, [24],

[24]   If p, then sciences should establish that p (for all p).

Neither English, nor Polish, French or Spanish possess simple propositional variables that make it possible to give a word-by-word translation of [24]. To render [24] in English, Polish, French or Spanish, it is necessary to resort to the apparatus of propositional generalization available in these languages, i.e. the truth apparatus:

[25]   If something is true, sciences should establish it,

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[2] Note that [18] is only a reformulation of [1]. We might think that science is not interested in every kind of fact, particularly that science is not interested in trivial or insignificant facts, and that thus [18] should be qualified in some way. Nevertheless, we are not interested in the debate on the kind of facts science pursues, but rather in giving a fair explanation of the import of [1]. [1] is a general claim, and so is [18].

that has [1] as an equivalent formulation.

Truth terms are incomplete symbols, in Russell's sense. Their semantic contribution distributes over the proposition expressed by the sentences in which they occur and is represented by quantifiers and propositional variables.

4. Propositional quantification

The standard reaction to an analysis of truth ascriptions along the lines I am offering here focuses on the alleged difficulties of quantifying over propositions, and can be formulated as follows,

[Objection 1] Accepting [20] would commit us to the existence of propositions as individuals.

This objection rests on two assumptions that, despite their artificiality, have enjoyed extraordinary success. The two assumptions are:

[Assumption 1] All quantified variables are nominal.

[Assumption 2] A discourse's ontological commitment is reflected in its quantified variables.

Both assumptions are false, although they can be made true by appropriately restricting their scope. In fact, for the realms for which they hold, they are trivially true, and their generalization derives from the unwarranted interpretation of first-order logic as *the* language of science.

First-order logic is Frege's logic, the logic that Frege introduced in *Begriffsschrift*. Frege developed his system to represent inferences in arithmetic. Given that arithmetic deals with numbers, to derive (a substantial part of) it and to assess the validity of its inferences, we need no variables other than nominal. In strict terms, not even this non-committed claim is correct: the full import of Peano's ninth axiom, i.e. mathematical induction, cannot be expressed in a first-order language. But let us concede that it is right. As a grammatical issue, the substitution instances of nominal variables are singular terms, and singular terms are the only expressions that refer to something, even though not all uses of singular terms are referential. Thus, applied to first-order languages, the claim that quantified variables carry the ontological import, even if not completely correct, is harmless. Once it has been decided that only first-order languages are appropriate to represent scientific theories, the claim that all variables are nominal is trivial (since this is what "first-order" means).

The expressive power of natural languages is richer than the expressive power of first-order languages, something clearly understood by Frege, who illustrates the contrast using the metaphor of the eye and the microscope in the prologue to his

treatise (1879). Natural languages, in fact, have pro-forms in all grammatical categories (e.g. pro-nouns, pro-adverbs, pro-adjectives, pro-sentences, pro-attitudes, etc.). And if we were able to eliminate the scholasticism from some philosophies of logic, we would see that there is nothing wrong in identifying variables of several categories even in the language of the first-order predicate calculus.

Consider the following formula [26], belonging to a standard first-order language,

[26] $\forall$x (Px →Qx).

In it, not only is "x" a variable, but "P" and "Q" also are, even though they are not *explicitly* quantified over. The standard position is that the language of first-order logic includes neither higher-order quantifiers nor predicative variables, but it can be argued that [27],

[27] $\forall$x (x is a human being → x is mortal),

is as much an instance of [26] as [28] is,

[28] Pa →Qa.

We might meet the retort that even if [27] and [28] could be loosely interpreted as instances of [26], they are not instances *in the same sense*. Capital letters "P" and "Q" in a first-order language stand for particular predicates, whereas quantified variables range over any element of the universe. If this is so, [27] would be at most a specification of [26] and not an instance, in the proper sense. Let us concede the objection. The point I am stressing in this section is, nevertheless, that an argument in which predicative letters occur doesn't change its logical status if they are systematically and consistently replaced by alternative letters. Given a valid argument in which "P" and "Q" appear, it would remain valid if they are modified as "P_0" and "Q_0", respectively. The same would happen with any other replacement. If the language at issue contains the possibility of forming infinite predicative letters by adding indexes, any valid argument can be seen as a template to produce an infinite amount of valid arguments with the same structure. In this circumstance, to say that predicative letters represent particular predicables and cannot have a general use, even if literally correct in the standard knowledge of first-order calculus, becomes hard to maintain. In particular, it is difficult to explain in what sense predicative letters stand for *particular* predicates, given that their particular features do not play any role whatsoever.

But the interpretation of predicative letters as abbreviations of specific predicables is also debatable. Tarski, for instance, states that: "In order to differentiate between individuals and classes (and also between classes of different orders), we employ as variables letters of different shapes and belonging to different alpha-

bets." (Tarski 1941, p. 68). And he insists: "To facilitate our considerations, we introduce special variables 'R', 'S', ... which serve to denote relations." (1941, 88). Classes, in the logic of classes, are the items analogous to predicates in the predicate calculus. Tarski considers them variables, without further specification, and I think that this characterization exposes better their genuine status.

A further objection to interpreting [27] as an instance of [26] is stressing that [27] is not a formula of the language of first-order logic. The objection is used to stress the distinction between variables and "schemes", as Quine sometimes call them. This would be correct, even though irrelevant for my point, but this argument cannot be used in the following case [29]–[31]

[29] $\forall$xy (Pxy →Pyx),
[30] Pab →Pba,
[31] $\forall$xy (x = y →y = x),

in which the three formulae belong to the language. In [30] the instantiation results when nominal variables are replaced by individual constants, and in [31] when predicative letters are replaced by the sign of a constant relation. Let us consider what Quine says about variables and schemes: "The schematic predicate letters 'F', 'G', ... attach to variables to make dummy clauses 'Fxy', 'Gx', 'Gy', etc., as expository aids when we wish to talk about the outward form of a complex sentence without specifying its clauses. Any actual compound sentence intended would contain, instead of the dummy clauses 'Fxy', 'Gx', etc., some genuine component sentences formed with the help of the special vocabulary of the particular theory under consideration —such component sentences as 'x < y', x> 5', 'y < 5' if the theory is arithmetic". (Quine 1963, 9–10). To insist that the difference between explicitly quantified variables and implicitly quantified schemes is that the former but not the latter carry ontological commitment is begging the question, being a mere repetition of a previous assumption. Complete formulae can also be seen as variables. If in the propositional calculus, letters "p", "q", etc. represent natural language sentences, their counterparts in first-order languages also represent natural language sentences. The difference is that propositional letters are syntactically simple signs whereas first-order formulae are complex sentential variables. The fact of being a variable is a semantic issue, which is orthogonal to the syntactic distinction between simple and complex signs.

To place the ontological commitment of a discourse in its nominal quantified variables is, I have said, wrong but harmless. Extending the error to cover variables of all categories is equally wrong with the addition that in this case it has unwanted effects on our understanding of how languages (natural and artificial) work.

A second classical objection against the analysis of [1] in terms of [24] is the following:

[Objection 2] [24] is ill-formed,

given that p is a variable quantified over, it has the grammatical category of a singular term, and thus cannot stand on its own as the antecedent of the conditional. To restore well-formedness, [24] should be modified as [32],

[32]   For all p, If p is true, then sciences should establish that p,

which would be circular.

[Objection 2] also rests on [Assumption 1], an assumption that I have shown to be false. Ramsey foresaw [Objection 2] against his own proposal and his answer, which smoothly applies to our case, was: "We can then say that a belief is true if it is a belief that p, and p. This definition sounds odd because we do not at first realize that 'p' is a variable sentence and so should be regarded as containing a verb; 'and p' sounds like nonsense because it seems to have no verb and we are apt to supply a verb such as 'is true' which would of course make nonsense of our definition by apparently reintroducing what was to be defined." (Ramsey 1929/1991, 9–10)

5. Realism and representation

Truth-ascriptions, I am arguing, are natural language propositional variables. This is an empirical claim. Now, we might ask: what is the relationship between this semantic issue and metaphysical *Weltanschauungen* such as Metaphysical Realism and Metaphysical Anti-realism? The answer is unequivocal: none, although the steady understanding of truth and realism as two sides of the same coin deserves some explanation. The standard connection that philosophers have found between the semantic issue of the meaning of truth and the metaphysical debate about realism derives from the account of meaning to which most of them have stuck so far. The understanding of meaning as representation, the standard account, leads almost invariably to metaphysical realism: language pictures reality and a true picture is a picture which provides an accurate representation. The Picture Theory for elementary sentences given by Wittgenstein in the *Tractatus* is a naïve version of representationalism; Austin's explanation of meaning and truth in (1950) (see for instance, pp. 115-6) is a highly sophisticated variant. But all versions encounter the same difficulty: to make sense the world has to be stretched to keep up with the infinite expressive power of languages. Metaphysical Realism is then a follow-up: Representationalism is Realism's semantic side. Fortunately, exposing the limitations of representationalism is a simple task; we only have to ask with Strawson: "With what type of state-of-affairs (chunk of reality) is the sentence 'The cat is not on the mat' correlated by conventions of description? With a mat simpliciter? With a dog on a mat? With a cat up a tree?" (Strawson 1950, 154)

A contemporary critical metaphor against representationalism, analogous to Strawson's criticism, is Price's (2011, 3) following story:

> Imagine a child's puzzle book, arranged like this. The left-hand page contains a large sheet of peel-off stickers, and the right-hand page shows a line drawing of a complex scene. For each sticker – the koala, the boomerang, the Sydney Opera House, and so on – the reader needs to find the unique outline in the drawing with the corresponding shape. The aim of the game is to place all the stickers in their correct locations, in this sense.

And he goes on:

> Now think of the right-hand page as the world, and the stickers as the collection of all the statements we take to be true of the world. For each such statement, it seems natural to ask what makes it true; what fact in the world has precisely the corresponding "shape". Within the scope of this simple but intuitive analogy, matching true statements to the world seems a lot like matching stickers to the line drawing.

For the child, the game is trivial if the right-hand page includes the lines to place the stickers. For the philosopher, it becomes trivial if the "facts" are pre-determined, as happens in formal semantics. When the universe is explicitly given (as a set of numbers, for instance), predicates explicitly defined as sets of individuals, and every name has a unique bearer, playing the representationalist game offers no difficulty. The bad news is that this laboratory game hardly has any similarity with what we do when using language in ordinary exchanges. This is Price's point.

In a representationalist view of meaning, it is natural to define truth as follows:

> [33]   A true sentence is one that represents an existent state-of-affairs. (A sticker has its shape to be stuck on).

As Strawson's question suggests and Price's story illustrates, there are reasons to review our generalized commitment to representationalism, to the view according to which a sentences such as [30],

> [34]   The cat is on the mat,

depicts a state-of-affairs in which there is a cat and a mat and they have a relation of "being on" (the cat, the mat).

In the representationalist picture, the state-of-affairs is what the sentence is intended to express, and it represents the sentence's assertion conditions: an agent is entitled to assert that the cat is on the mat when having reasons to believe that there is a cat on a mat. There are other semantic approaches (inferentialist, conventionalist, etc.), which would offer alternative explanations. But my aim is not to challenge representationalism as a reasonable, even if local, approach to meaning, but rather

to show that for some specific cases in which higher-order notions (*truth*, *not*, *all*) occur, it loses all its force. Let us then assume that representationalism is correct for elementary sentences. The point I wish emphasize is that the more abstract the sentence, the less obvious is the representationalist picture applied to it. Let us compare the following examples, [35] and [36], with the standard account offered for the meaning of [30]. What is the state-of-affairs that sentences [35] and [36] depict?

[35]   Syria is not a democratic country.
[36]   Victoria is confident that she will pass her exams.

Even though we might still insist that [35] and [36] describe, to disclose the situations described above is not as straightforward as it seems to be for the case of [34]. But the task of identifying the state-of-affairs becomes impossible applied to propositional variables. What is the state-of-affairs pictured by a sentence such as [7]? As a truth ascription, [7] is apt to inherit the content of any assertion. Generality is reached to the prize of indetermination, and thus a propositional variable such as [7] cannot depict any particular state-of-affair. We must then conclude that the representationalist approach fails at least for this kind of sentence.

As examples [13-16] illustrates, a truth ascription such as [1], expresses (in a suitable context of use) a general content. Then, given that, from a semantic viewpoint, [1] cannot be explained as [2], there is no direct connection between asserting [1] and defending Metaphysical Realism. With respect to [20]-[23], we might be representationalists, inferentialists, or a followers of any other semantic alternative. We might be metaphysical realists, or an anti-realists regarding the core information given by these sentences, regarding their grounds to be true, or regarding the ultimate epistemic aims of science. But to be in a position to sincerely assert [1], assuming its complete semantic import, we don't need to adhere to any particular metaphysical position.

In the standard use of truth and existence, both their common use and their scientific use, whoever is in a position to assert a content *p* is thereby *entitled* to assert that the content is true and *committed* to the truth ascription by the rule of truth introduction [T1],

[TI]   From p, Tp follows (where *p* is a propositional content, and "T" the truth operator "it is true that"),

which governs the functioning of the operator.

The meaning of the concept of existence, on the other hand, entails the fact that whoever is in a position to assert a content, for the same reasons has to accept any content that follows from it, and in particular the consequences that follow by existential generalization:

[EG]   From $P(t_1, t_2, ...t_n)$ follows $\exists\ x_1, x_2, ...x_n\ P(x_1, x_2, ...x_n)$.

Rejecting rules [T1] and [EG] would amount to the rejection of the standard concepts of truth and existence, something their defenders had to explain.

Accepting with some anti-realists that some of our theories are true but that we remain agnostic about the existence of the objects involved in their axioms and theorems would imply that we reject the rule of existential generalization, and this would amount to changing the meaning of our concepts. To lend support to a theory or to a claim means that one is committed to its consequences on pain of irrationality. If I assert [36], I cannot reject [37],

[37]   Victoria is a human being.

If I assert [38],

[38]   I enjoy cooking,

I cannot reject [39],

[39]   There are some activities that I enjoy.

In the same vein, If somebody asserts [40],

[40]   Almost all galaxies contain black holes in their centers,

that person cannot at the same time reject [41],

[41]   There are black holes,

because [41] directly follows from [40].

The meaning of truth-ascriptions is a technical issue that involves our best semantic theories. Claims such as *truth is the aim of science* have the logico-semantic structure of generalizations over propositions. In 1925, Hilbert declared: "From time immemorial, the infinite has stirred men's *emotions* more than any other question. Hardly any other *idea* has stimulated the mind so fruitfully. Yet, no other *concept* needs *clarification* more than it does." (1925/1964, 185). Even if Hilbert was then right, there are reasons to claim that the place he reserved for the infinite in 1925 has been progressively occupied by truth (and its connection with realism). The passionate assumptions with which all of us face the world and our place in it are the non-testable background that maintains our *Weltanschauung* coherent and manageable. However, the effect of the metaphysical background in the particular development of the scientific proposals that actually make explanation and prediction possible is rather indirect. Truth is a higher-order notion; this is what follows from our best hypotheses in the philosophy of language, and Default Realism is

the general position that human beings develop as part of the natural world. The semantic hypotheses put forward by the philosophy of language and the default position with which we try to understand reality stand at different levels, and they don't touch each other. Default Realism is the natural approach for us as ordinary people; as scientists, we should assume the best-tested results brought out by the relevant scientific communities. And this means assuming that they are true and that the concept they use are instantiated. On the topic of truth the best explanation derives from the recognition of truth-ascriptions as propositional variables. Rejecting representationalism related to higher-order concepts does not force us to embrace non-standard general approaches that, as with anti-realism, go against well-entrenched common sense and our actual beliefs and actions.

References

Austin J., 1950, *Truth*, *Proceedings of the Aristotelian Society* 24: 111–129.

Benacerraf P., 1964, *What Numbers couldn't be*, (Benacerraf and Putnam 1964, 272–294).

Benacerraf P., Putnam H. (eds.), 1964, *Philosophy of Mathematics. Selected Readings*. Cambridge: Cambridge University Press.

Frápolli, M.J., 2012a, *The neutrality of truth in the debate Realism vs. Anti-Realism*, [in:] S. Rahman, G. Primiero, M. Marion (eds.), *The Realism-Antirealism Debate in the Age of Alternative Logics: Logic, Epistemology & Unity of Science*, Dordrecht: Springer, p. 85–99.

Frápolli M.J., 2012b, *The Meaning of Truth. An updated approach to the meaning of truth ascriptions*, Dordrecht: Springer.

Frápolli M. J., 2013, *How to Naturalize Truth*, [in:] M. Milkowski, K. Talmont-Kaminski (eds.), *Regarding Mind, Naturally: Naturalist Approaches to the Sciences of the Mental,* Cambridge Scholar Publishing, p. 262–281.

Frege G., 1879/1972, *Conceptual Notation and Related Articles*, trans. and ed. T. W. Bynum, Oxford: Clarendon Press.

Frege G., 1884/1980, *The Foundations of Arithmetic*. Oxford: Basil Blackwell.

Gentile N., 2013, *Sobre la neutralidad de la verdad en el debate realism-antirrealismo*, Contribution to the XVII Congreso Interamericano de Filosofía (SIF 2013) Salvador de Bahía (Brasil), October 7-12.

Haack S., 2003, *Defending Science within Reason*, Amherst: Prometheus Books.

Hilbert D., 1925/1964, *On the Infinite*, (Benacerraf and Putnam 1964, 183–201).

Musgrave A., 2007, *The Miracle Argument for Scientific Realism*, The Rutherford Journal 2, rutherfordjournal.org.

Price H., 2011, *Naturalism without mirrors*, Oxford: Oxford University Press.

Putnam H., 1975, *What is Mathematical truth?*, [in:] *Mathematics, Matter and Method: Philosophical Papers*, vol. 1, Cambridge: Cambridge University Press, p. 60–78.

Quine W.v.O., 1963, *Set Theory and its Logic*, Cambridge MA: The Belknap Press of Harvard University Press.

Ryle G., 1949/2009, *The Concept of Mind*, London: Routledge.

Strawson P., 1950, *Truth*, *Proceedings of the Aristotelian Society* 24: 129-156.

Tarski A., 1941, *Introduction to Logic and to the Methodology of Deductive Sciences,* New York: A Galaxy Book.

Wittgenstein L., 1969, *On Certainty*, ed. by D. Paul, G.E.M Anscombe, Oxford: Basil Blackwell.

Wittgenstein L., 1922/1961, *Tractatus Logico-Philosophicus*, Oxford: Routledge and Kegan Paul.