COMMENTS ON MACIA'S PAPER

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Macia's paper contains some important observations concerning the significance of (interpreted) formal languages for logical investigations and their inability to substitute for natural languages. Clearly no-one should confuse formal with natural languages -but all too often many of us talk as if they would differ from each other only standards of "grammatical" rigor. Macia then is completely right to remind us of their differences.

Perhaps it should be emphasized more often that formal languages are not designed as a means of communication but as instruments for the purposes of logical analysis. Even here we have to be aware of restrictions and limitations; thus, e.g., the usual first-order languages will not suffice for the analysis of non-extensional relationships between given propositions. Using Macia's term, formal languages are "models" and like every model they are not made to share every property with the original but only those relevant for the purposes at hand. Since I agree with Macia's main conclusions, I will restrict my comments to a few minor points that seem to need clarification.

1. In order to treat the question what a sentence of a formal language might possibly mean, Macia first distinguishes two main ways of providing an "interpretation" for a given system of forms. In both cases the non-logical constants are assigned denotations via a given model $M = (D, F)$. The difference lies in the way this interpretation is then extended to the class of complex well-formed expressions. Giving a variation of arguments, Macia shows that no matter how this is done the interpreted formula *Pa* will not mean the same as *Armstrong philosophizes* (if the set of all philosophizing human beings is assigned to *'P'* and David Armstrong to *'a'*).[1] One of the arguments is directed against a "holistic defence": The defender might concede that the fact that a certain biconditional follows from the interpreting truth theory does not make a formula mean something -to achieve that one has to take into account the entire interpretation for the whole language. One then sees "when" the formula is true and concludes what it means. Against this Macia proposes a slight change of one of

the base clauses in the given interpretation. While this change does not touch the old (truth) values it results in a different biconditional for the formula in question, thereby suggesting a change of meaning. But this is unacceptable in our picture, since values of primitive symbols and truth values of sentential formulae were not changed at all.

At this point I felt vaguely reminded of the project for a referential theory of meaning for natural languages (such as Montague's or Davidson's theories) and wondered whether and how Macia's arguments would affect those approaches to a theory of meaning. Is that project bound to fail? It seems natural to point out that a truth theory Θ provides more than just the referential values assigned to the (complex) expressions: The biconditional "T-sentences" that are implied by Θ can be obtained through derivations from the axioms of Θ. Now, one might be able to define a class of canonical derivations of T-sentences and claim that the truth-conditions giving the meaning of a sentence should be seen in the context of such derivations: knowledge that a T-sentence *S* follows from Θ is not sufficient for understanding *S*, in addition one has to know how *S* is canonically derived from Θ. This seems to make room for arguing that Macia's proposed change *did* cause a change of meaning afterall.[2]

2. How then can a system of forms be endowed with appropriate meanings? Macia's favourite way is "to provide a translation from the formal language into a natural language". ('formal language' is used here for 'system of forms'.) Of course, since a system of forms by itself is not a language, it is a bit misleading to speak of a "translation" in this context: there can be no requirement of meaning preservation for the mapping which assigns, e.g., English phrases to uninterpreted expressions. (There are restrictions for the choice of such mappings, but these concern the right syntactic resp. semantic categories of input and output.) Keeping this in mind, such translations can be seen as assignments τ of phrases of a given natural language (or rather one to which things like variables are added) to the basic vocabulary of a system of forms, which are then extended "homomorphically" to τ^* applicable to complex well-formed formulae. Thus, e.g., the assigment τ('*P*')='philosophizes' and τ('*a*')='Armstrong' yields 'Armstrong philosophizes' for τ^*('*Pa*'). Clearly, the formulae of a system of forms equipped with something like τ^* are meaningful (relative to τ^*, where τ functions roughly like a dictionary). The resulting system is what Macia appropriately calls a "regimented language". The interpolation of regimented languages between formal and natural languages is quite useful, as Macia makes clear in the second part of his paper.

In fact, starting from the other end, let us suppose we want to formalize a given argument (formulated in English) for the purposes of logical analysis. Then, I would usually recommend starting with an intermediary step in which one paraphrases the argument in order to unify varied idioms, solve cross-references of pronouns, dissolve ambiguities etc. The result is similar to an expression of the argument in a regimented language and the final step of schematizing this is an easy and mechanical matter. Consequently regimented languages enhance logical analyses.

One of the differences between regimented and natural languages Macia discusses concerns the "fixed domains for all uses of quantifiers". But what about many-sorted languages? Perhaps they cannot capture every kind of quantifier domain change in a natural language either, but they certainly improve the flexibility of the model considerably. In our context they are thus superior to one-sorted languages.

The second difference between regimented and natural languages that Macia mentions is not quite clear. *'Ra'* is claimed not to follow logically from *'Qa'*, although 'Armstrong runs' does follow logically from 'Armstrong runs quickly' and these are the translations of the former expressions. How can such divergence occur when we are told that the formal expressions and the corresponding natural language expressions have the same meaning (relative to the given translation)? Now, Macia admits that this could not happen if items of the regimented language were seen as abbreviations of items in English. This reminds us that introducing the regimented language is not the same as accomplishing an enterprise of implementing a system of abbreviations (as is the case, for instance, for many contextual definitions). But what exactly are the differences?

3. As Macia says, it is clearly a benefit for studying the relationship between formal and natural languages to divide this task into two subtasks: studying the relationship between regimented and natural languages on the one hand and that of regimented and formal languages on the other hand. The latter relationship he sees as a kind of modelling; like when an engineer uses a scale model of a wing to study its aerodynamics. This is an illuminating comparison.

The model (i.e. formal language) is supposed to help us understand how the truth of a sentence of a regimented language depends on the meanings of its significant sub-expressions and "the way the world is". And it ought to be useful for showing the adequacy of the now standard definitions of logical truth or of logical consequence.

To do that, Macia starts by describing the pre-theoretical intuitions connected with the concept of logical truth, viz., that we call a sentence logically true if it is true just in virtue of the *logical expressions* contained in it and the "form" of the sentence. This is indeed a quite natural description one might find in many logic books, e.g., in Quine's "Methods of Logic".

As an explication of these intuitions Macia proposes that "a sentence is a logical truth if it is true whatever way the world might be and whatever the meanings of the non-logical expressions might be, provided that they have a meaning that keeps them in the same semantic category". This seems to agree with other intuitions one has too: a sentence that is logically true should be true "whatever way the world might be". But how do we come to see this as a more precise version of the first description, which didn't mention "worlds" at all?

Am I only missing a step in the connection of these two descriptions or is there more "behind" it? Notice that a logician as eminent as Bolzano, for instance, defines his concept of logical consequence without resorting to possible worlds or other modal notions. Perhaps his conceptual analysis is not correct, but one would certainly wish to see a more extended argument to that effect.

Granted that the explanation of logical truth requires consideration of both meanings and "worlds", we still have to see whether the class of all formal languages (or all appropriate set theoretic structures) is sufficient to model the combined influence of meaning and world. But besides the question of whether the class of structures is rich enough for this purpose, one would like to understand how it is possible to replace the two parameters "world" and "meaning" by one set-theoretic structure. Maybe the class of all structures should be thought of as partitioned in such a way that structures in the same cell represent "world changes" whereas structures in different cells represent "meaning changes". This would exlain why quantification over all structures takes care of the combined effect of arbitrarily varying "meanings" and "worlds".

Notes

1 Macia rightly insists that assigning the value "True" to an expression α doesn't make α true. Notice that we need a more complex phrase for 'α is true' since α is just an uninterpreted formula and thus neither true nor false. What phrase should that be?

2 Notice that Macia operates with an intuitive notion of "meaning" that has not been explicated. Perhaps one might take some of his arguments to show the inadequacy of this pretheoretic notion -which would be more in line with Davidson who wants to get rid of those fine grained entities called "meanings" anyway.