Logics Probe: A Methodological Bridge between Logics and Metaphysics

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Many incredulous stares at metaphysics have attacked its methodology. They ask how we do know what is going on in the metaphysical reality, which is independent of our mental activities. Several philosophers have shifted the main battlefield of metaphysics into more accessible realm: semantics and its corresponding logic. Dummett, for instance, claims that to adopt a metaphysical theory is to adopt a semantics and its corresponding logical principles. Theodore Sider argues that reality has its logical structure; so logic is a strong candidate for the language which "carves at joint". However, their approaches presuppose logical monism, according to which there is one correct logic. This attitude first requires to settle down (seemingly) endless disputes on what is the right logic before approaching to metaphysical discussions.

This paper/talk suggests an alternative method to overcome this difficulty in our era of logical pluralism (cf. Beall and Restall). I suggest the following methodology, which employs logics for the sake of metaphysics. Logics, instead of the single logic, probe (not prove) the metaphysical reality. Each logic itself does not say so much about the reality hidden behind our epistemic and semantic veil. Rather, the collection of working logics tell more about the reality by examining what they agree and disagree with each other and by stipulating what semantic ground makes possible i.e. embraces these (dis)agreements. As much as time permits, I will demonstrate how this method works in a particular topic of metaphysics and logic: modality. In particular, I will overview the well-developed system of different modal propositional logics and several semantics suggested so far. Then I will argue requirements for better semantics and the metaphysical consequences of selecting semantics.
Keywords: logic, methodology, logical pluralism, metaphysics, abduction, Williamson, Sider, Dummett

1 Introduction

Let's talk about metaphysics! Let us talk about metaphysics realistically. But many would ask: how? The most common variant of "incredulous stare" at the realism enterprise of metaphysics would further ask: how do you know what is going on in such a thing called metaphysical reality, which should be independent of our epistemic and linguistic reach, according to your own (standard) understanding? We realists should tackle this kind of arguments before even launching the metaphysical project. Otherwise, our project of realism would become an esoteric business, which only insiders care about , understand, evaluate and execute.

Logic may tell some. Logic would be a candidate tool to bypass this issue. Some may expect logic as a guiding rope– as if logic leads us to the true conclusion of realm of metaphysical reality. Logic has historically been, and even is, often characterized by its universal (i.e. context-free) nature. Following this picture of logic, logic should work in any discpline or area of study. Then, why not metaphysics? Philosophers have traditionally expected logic as an *organon* because logic is believed to guide any

Submitted to:
5th Nagoya Meta-Philosophy Workshop

intecultural endevour of us and lead us to the valid, correct and justified conclusions. Believing this universal (i.e. topic-free) nature of logic, it seems natural to rely on this tool to search the reality.

Logical monism may do. The logic –the single, guine, true, and only logic– may do such a job, if any such a thing. Since Aristotle, logic has been counted as the tool or instrument Organon for any intellectual activity. In fact, "college-prep" in those days contains logic as a part of their core program in addition to other libral arts programs such as mathematics and rethoric. An article on IEP [1] says: "Ancient commentators regarded logic as a widely-applicable instrument or method for careful thinking. "

Logical pluralism pops up. However, throughout the twentieth century, it has become highly questionable to beleive in such a previleged and ultimate logic. We have, as a matter of fact, many different logics. First of all, our vocabulary for what are counted as logical ones vary. We can expand one logic (say, propositional logic) into another one (modal logic for instance) by adding extra operators (box and diamond). Adding extra operators, we can easily gain further other tribes – modal logic, temporal logic, epistemic logic, dynamic epistemic logic, to name a few. [2] Even when we fix our vocaburaly, say propositional ones, we have not only classical logic but also many other variants of logics with different consequences – intuitionistic logic, relevant logic, paraconsistent logic, substructural logic–they have different logical rules (principles).

We are living in the era of *logical pluralism*, according to which there are more than one correct logics. I do not claim that its opposite, *logical monism*, which claims that there is the single ultimate logic, is impossible and hopeless. As a matter of fact, many philosophers including Quine [8] believed that classical logic is the only genuine logic and some non-classical logicians claim their favorite logic is the logic. For more direct arguments for and against logical pluralism, see several references [12] [4] [1] .

Strategic argument for logical pluralism. However, at this moment and for our purpose, we would like to shortcut the discussion supporting for logical pluralism by observing the following strategic or pragmatic grounds. First, there seem to be many people who want to keep many different logical systems. This says more than just that there are many different people with different favorite logics. Rather, there is a large group of logicians who want to study relations among different many logics, keeping a good many of them and without eliminating. This matters for mostly strategic reason. Forcing to abandon what people already have enjoyed is no good move to convince other parties. In particular, especially for modal realists' (like me), the very fact that non-metaphysicians employ the framework of possible worlds is one of the strong defense of their thesis. So do not dare throw that cool thing away please, monist.

Second, pluralism is better than monism with respect to explanatory power. It is straightforward to explain monism in terms of pluralism; it is not that much in the other way around. In other words, what pluralists allow themselves accomodates monists within pluralists' picture. In pluralist's perspective, monists may well be characterized as someone takes logic in a narrower sense and prefers her own position for some (maybe reasonable) reason. In this sense, pluralists easily capture or embrace monists in a straightforward manner. However, this move seems difficult for monists. How can monists even picture and postulate pluralists' positions? How can monists understands the opponent's statement properly as a meaningful one? Monist's attitude against pluralists would, in its nature, undermine pluralists. To restrict

[1] https://www.iep.utm.edu/aris-log/

oneself not to even stipulate logics different from her celebrated one puts them a dangerous location in discussion. Monists have difficulty to put their foot in the other (pluralist)'s shoes.

Endo's methodology. Here is my thesis for methodology. This is how I bridge logical studies to metaphysical studies. Considering logical pluralism, it is useless to fight for the single, unified and undisputed champion of logic among candidate logics. Although any single logic cannot work as a guiding rope as the old school expected, a collective of them i.e. a bunch of logics can contribute to metaphysics as *probes* to search the reality hidden behind our epistemic and semantic veils.

Construction of this chapter. The construction of the rest is as follows. First, let us review several modern previous figures who have employed logics as a toolkit for metaphysics. To name, we will overview Michael Dummett, Ted Sider, and Timothy Williamson in turn. We will observe their merits while some problems and limitations. These pre-logical metaphysicians / metaphysical logicians are currently facing a dilemma: she is too dogmatic or too relativisitic. Then, my own standpoint will be given. As already said, we should rather see logic, better, a bunch of logics, as a toolbox to probe the reality than as to prove. Finally, apply this methodology just established to a particular subfield of metaphysics: modal metaphysics. Modal metaphysicians are curious of metaphysical status of worlds and their inter-multiversal structure.

2 Previous logico-metaphysica and their glorious failures

2.1 Dummett

Dummett's aim and project. An Oxford philosopher Michael Dummett famously rewrote the project of metaphysics. Dummett claims that two major positions of metaphysics (and many other philosophical debates), realism vs. idealism, should be understood in terms of of semantics and (its corresponding) logic. I can say that Dummett is one of the most influential figures who back up my direction of bypassing metaphysics via logic(s). At latest in 1970s, Dummett clearly proposed that to adopt a semantics is to adopt its back-end metaphysics and vice versa. In other words, according to Dummett, disputes in metpahysics should be executed by selecting semantic theory, each of which has its corresponding metaphysical theory. Moser summarizes: "Dummett proposes that answers to metaphysical questions depend on issues about the correct theory of meaning for our language." [7] [p. 607] Dummett organizes positions in philosophical disputes, roughly, into two positions: *realism* and *anti-realism*. Any dispute in history of philosophy can be paraphrased in these terms. For instance, ethics has discussed whether ethical value exists independently of our construction of social or any other kind (realism) or it only exits upon these (anti-realism). Dummett links any argument of this line to the matter of logic. The realism, which believes that the sun and flogs exist independently of our cognitive or linguistic activities, is to believe and accept the law of excluded middle. Its opponent, anti-realism, rejects the law. [13]

Dummett opens up the gate. What can we, logico-metaphysicians in the 20th century, learn from Dummett? The merit I would like to borrow is to plug more accessible and testable things called logic into metaphysical inquiry. We already know some logic. Recall that Dummett is a huge fan of the idea of "meaning as use"; we are the master of semantical facts. Moreover, we already use some logic. We can employ this use, experiene or knowledge of logic as data for stipulating back-ends metaphysical reality.

This innovative methodology responds to one of the most common criticisms towards realism enterprise. Let us call this line of objection epistemic one because it asks how we do know what is going on such world(s) isolated from our epistemic reach. Dummett's approach tells us that we should think things up side down. The epistemic criticism often starts and even ends with the fact that we do not have data or evidence of our targeted domain to settle our argument (structure of reality in our case). However, under Dummett's scheme, the criticism does not work. We are researching metaphysical structure which reflects what we have already known and been familiar with.

What is wrong with Dummett? Although Dummett is great as someone who opens up the path from semantics to metaphysics, I cannot fully adopt Dummettian approach. Why? Because Dummett is too monistic. Dummett has been famous for his doctrine for intuitistic logic and verification-based semantics and anti-realism as their metaphysical back-end. As Moser already pointed out in his 1992 review, his argument is disputable. In fact, he seems to smuggle some semantically loaded concepts such as truth in his own explanation of Wittgenstenian verification-based semantics, violating his own requirement on vicous circularity.

Moreover, Dummett's methodology faces another methodological problem, which is more problematic. According to Dummett, in order to answer the metaphysical question, we need to fix semantics (for a certain domain in question) first. Equivalently, we need to settle down the war among logics first – which seems quite difficult in the era of logical pluralism – then, only after that, go to metaphysics. I am pessimistic to this precondition because it is hard to achieve. This precondition to metaphysical questions is much harder than defending monism in general. To complete this task, we should devote ourselves to defend not only (i) a version of logical monism itself but also (ii) a certain logic is the logic which deserves the champion ring.

2.2 Sider

Sider's metaphysical project. In between the two Oxford logico-metaphysicians, let me summon Theodore Sider. In his book Writing the Book of the World, Sider settles the goal and aim of metaphyscs as searching the *fundamental structure* of reality, which carves at joints of reality. His metaphysical (realisitc) stance says that the strucutre exists independently of our mental activities. Sider also claims, as the title of the book already tells, the language which talks about the structure does exist.

Towards his metaphysical claim, Sider settles down an *abductive* methodology under the name of *mainstream metaphysics*:

> Competing positions are treated as tentative hypotheses about the world, and are assessed by a loose battery of criteria for theory choice. Match with ordinary usage and belief sometimes plays a role in this assessment, but typically not a dominant one. Theoretical insight, considerations of simplicity, integration with other domains (for instance science, logic, and philosophy of language), and so on, play important roles (2009, 385).

Sider takes logic a candidate for a language which carves at joint [9]. The world has its logical structure, which more or less corresponds to logic we have employed in practices searching the structure of the world.

What can we learn from Sider? First, Sider connects logic to metaphysics. Logic reflects the fundamental structure. So to talk about logic is immediately to talk about metaphysics. It is funny that Sider, whose stance is opposite to Dummett, came up with the same methodological standpoint.

Second, he clearly settles an abductive methodology to metaphysics. His abductive approach makes metaphysicians to initiate their project with what we already have and have been familiar with.

Third, Sider made a strategic retreat from epistemic justification. Sider admits that metaphysicians cannot have their epistemic evidence to support their claim and switch their battleground to pragmatic field. Think about atoms in physics. While we cannot have direct epistemic access to atoms, most believe (and naturalists advice us to do so) that atoms exist because of pragmatic factors such as consistency with the successful scientific discpline. Sider encourages cooperation between pramatists and metaphysicians.

What is wrong with Sider? However, unfortunately, following Sider is not a way out. What matters then? I question Sider's argument for stating the world is amodal (non-modal) so there is no space for modal logics to say anything about metaphysics [9, ch. 12]. More particularly, I do not buy his argument given as follows. Sider's first observation is that successful discplines in natural science such as physics and mathematical studies reflect the structure in reality because they have been successful so far. His second observation is that contemporary physics and mathematics employ classical logic. They do not need modal logic in their practice. So, Sider concludes (better: suggests as a reasonable and strong hypothesis) that it is classical logic which carves at joints of reality.

Let me swallow the first observation. Any successful metaphysical theory, in my view, does not nor should not irritate any established descipline. Given metaphysics offers a new and better prediction, it always comes with empirical back-up anyway.

However, the second assumption is highly questionable because it ignores the need of nonclassical logics in many successful fields including physics and mathematics and others. For instance, look at quantum mechanics and its calling quantum logic, which violates the law of excluded middle? Does also Sider exclude constructive mathematicians from mathematics as a successful enterprise, whose logic is weaker than classic? This irritates many practiciers. This kind "logicians-do-that-so-logicians-know-that" argument may not convince many metaphysicians for they often take their studies are purely nonempirical. But it was Sider himself who brought these empirical data for his abductive method.

Furthermore, physicians and mathematicians do use some modal reasoning in a non-trivial manner. [2] The most obvious cases appear in their use of proofs. It is tempting to state that mathematical science is the most apparent case of a priori knowledge available to us. But it does not seem to be the case. Even pure mathematics which no particular application found (yet), however, stipulates and postulates a lot in their actual process. Mathematicians often make predictions (modality alert!) and they call them conjectures (like $N \neq NP$ and Goldbach's). Proofs and disproofs play crucial roles in mathematical studies because proofs add some more modal features of conjective claims. Once proved, the statment is true for sure; once disproved, the statement is false for sure.

2.3 Williamson

To come. See [16] [10] [3] [11] [5].

Williamson's argument. His claim on modal metaphysics is *necessitism*, which insists that anything which would exist exists necessarily. This conclusion *per se* is interesting and even shocking to some (or many, according to [3, p. 717]). Wittgenstein's unborn daughter exists necessarily – hence in this actual world as well! At the same time, more importantly for us, Williamson also suggests a methodology of metaphyscs. Following his general attitude towards philosophy , according to which philosophy is not so

[2] See [6, sec. 5.3], [**?**] and Ismael's paper in [**?**]

different from science [14], Williamson suggests and demonstrates how to do metaphysics *a la* science: do many try-and-error attempts to find a modal logic (in his case, the system of S5 with predicates) which gives the most benefit.

For more detailed descriptions for Williamson's methodology, see [15, p. 92-118] [3]. Here is a little more detailed explanation of how Williamson bridges modal logic to metaphysics. First, observe the universal generalization in modal logic: you can substitute any non-logical terms into syntactically well-formed variables and universal quantifiers over them. This operation makes modal logic into a higher-order theory. Second, read that the universal generalization is metaphysically universal only if it is true under its intended interpretation.

Good point? What I should adopt from Williamson's argument is his method to connect formal modal logics to metaphysical opinions. The benefit of interpretating the second order version (by universal generalization) instead of the first-order one (i.e. theorems of a modal logic) is that we can allocate a modal logic for contingest and another to neccessiest.

Moreover, Williamson adopts my favored criterion for theory-choice: does it speak of its rivals?

> Both contingentists and necessitists hope to simulate the other sides useful distinctions in their own terms. This is not a matter of translating one language into another, because they speak a common language and disagree without equivocation. However, each side hopes to find cash-values of the others utterances, sentences neutral in the metaphysical dispute that the other takes as equivalent to the originals. This can be done in both direc- tions for all sentences of first-order modal logic, if each side accepts a modest fleshing-out of its position. Even in higher-order logic, necessitists can simulate contingentists distinctions, because contingentists treat quanti- fiers as equivalent to ones restricted to a realm both sides recognize. However, contingentists cannot simulate all the distinctions necessitists draw with higher-order quantifiers. The best attempt to do so is by Fine; it uses infinite strings of quantifiers and modal operators which can be made sense of on necessitist but not on contingentist terms. [16, p. 715]

Bad point? Williamson might be a hidden monist. As Bricker [3, p. 719] points out, Williamson presupposes that the intended model is unique. This presupposition may be justified for the sake of simiplicity and other kinds of theoretical virue. But it surely violates another important theoretical virtue, namely, non-question-begging. Williamson needs to be clear about being fair to his rival (i.e. contingenist) for importing this assumption.

3 Endo

Endo's claim. My view is, in a nutshell, as follows: any single logic tells little about the reality. None of the list is the conclusive and previleged one which dominantly tells what the reality is. Each logic only reflects a small fragment of the reality. However, it still says something about the fundamental structure of the reality. Rather, the collection of different logics and distinction among these reasonable logics tell much more about the reality.

More particularly, the good semantics should have a well-organized set of conditions to get these accepted logics in their natural order. The metaphysical theory which works behind the good semantics – i.e. the most natural intended interpretation – is the chosen one.

Why can I, rather, we say that? I have two arguments for that. I agree with Sider for his trust towards contemporary successful natural sciences. I also agree with him claiming that it is less motivated to believe logic does not carve at joints. His abductive method implicitly trusts practicers, philosophical or nor, in the past. I do believe such and such because my trustworthy colleages has believed such and such. One argument to support my standpoint is to expand this kind of trust into the group of previous thinkers who has been disagreeing each other for some decades. Realism vs. anti-realism has been discussed for a long time. This fact that philosopers have been discussing 2,000 year old questions is often causes critisim towards philosophy for it seem to achieve no progress so far. But we can think this situation is happening because of its nature. Our cognitive resources may be insufficient for solving these metaphysical/logical issues (at this moment). However, we already achieve some partial insight of the fundamental structure. For example, we do not have to care about silly logics such as nihil and ad-hoc. They are of no use, no user, and hence we have no point for believing that reality is found by such stupid persons who are looking for completely hopeless places.

Compare to Dummett's mountain. Mine is more pluralistic and effective than Dummettian approach. His "basecamp" may allow these several different logics to stay there but the only chosen one can achieve the metaphysical summit. Following the metaphor of mountainiring, I would take that the genuine metaphysical structure lies not in the summit but hidden with snow (of our cognitive and semantic barrier). Then, logicians are like climbers looking for the treasure hidden under snow with instruments called probes. A probe is, roughly, a long pole with which people can seek party members lost in snow.

To pessimists. Notice that we already have a relatively nice guess. Are not there too many logics? Some pessimists would worry about that. No, we have a bunch of them but we know (more or less) what are unreasonable/useless and what are reasonable/useful. We exclude most of these useless ones from our consideration. Formally speaking, a logic can be seen as a set of sentences. In this sense, there are infinitely many logics. The most apparent cases are nihil logic, which proves nothing at all and trivial logic, which proves anything. We all share a good sense to eliminate ad hoc one (like a logic with all theorems of intuitionistic propositional logic and a random theorem, say, $p \wedge q \vee r$). This may confirm us that we are approaching at the genuine structure of reality and are to arrive at the genuine structure eventually and in principle.

4 Demonstration: modal metaphysics via modal logics

To come. See poster. Also see my "In Search of Lost Spaces".

Modal realism revived. The conclusion is something like this: as logical pluralism embraces logical monism but not vice versa, modal realism embrace anti-realism but not vice versa. Consequently, as did we to logical pluralism, we should adopt realist's picture.

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