

Jun's Comments on Thessaloniki Fan Calculus Slides

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On Oct 19, Jun sent the following questions/comments about the slides I used for the talk at the Philosophy and Theory of AI (PT-AI) Conference held in Thessaloniki on Oct 3. These questions followed on from our discussion of the slides at the Group of N meeting in Toronto on Oct 13. In this blog post I've taken the liberty of reproducing Jun's questions, and making some initial replies. But these remarks are preliminary. The questions are great—and raise issues that we need to talk about in much more depth.

1) Slide 10 — Classical ontology

Jun: Where you say under the classical pictures objects are with “intrinsic identity conditions”. I wonder whether “with intrinsic identity”—dropping “conditions”—would be more accurate. For one, classical ontology probably does not care much about identity condition; for another, I suppose it's identity that's taken to be intrinsic, rather than identity conditions.

Brian: Yep, you're right. Much better. ✓

2) Slide 14 — Example

Slide: “Yuck! This file is corrupted! It was OK a few moments ago. Fortunately, I backed it up last night. But I've changed it a lot since then. But maybe I'll remember enough, so that if I retrieve it, I'll be able to fix it up in a couple of hours.”

Jun: This last sentence of the example seems slightly contrived to me. In particular the “it” of “re-trieve it” refers to the backup copy, rather than either the corrupted copy or the document.

Brian: I agree that the framing is contrived. But I'm not sure I agree that the referent of the ‘it’ that you've highlighted (the object of ‘retrieve’) is the backup copy. One doesn't really retrieve *the backup copy* per se, it seems to me. Rather, isn't it true that by copying back, to the laptop, the backup copy, one has ended up retrieving *the document* (at a higher level of abstraction)? Imagine that the retrieval process completes, leaving the (or ‘a’) file on the laptop again. In such a case, it seems to me that one might reasonably say, “OK, I got it.” It seems to me that the ‘it’ in this “I've got it” sentence refers to *what one has retrieved*. But that is surely not the backup copy, is it? My sense is that the (new) ‘it’ on the laptop isn't the backup copy *any longer*. (Maybe someone would say it *is* the backup copy—for a short period of time, anyway, until one makes the first edit to it? But if one wants to be pedantic, at best I should have thought that it is a *copy of the backup copy*.)

Maybe the deeper point is that there isn't really a fact of the matter as to what this ‘it’—or maybe any of the ‘it's, for that matter—refer to (see question #7, below). Maybe that is the thing to say: that *what one is referring to*—or more radically, in a way that Steve would like, maybe *what one is doing*—is made clear enough by the activities and practices indicated with the verbs, surrounding contextual assumptions, etc. On such a view, “reference” (i.e., “object resolution”) is needed *only enough to anchor or ground ensuing action*. (Wittgensteinians and Heideggerians might like this.)

Relevant to all of this is the point I tried to make at the end of our meeting two weeks ago: a pointer can't actually *causally indicate* what it points to, the abstracted or idealized document, but only causally lead to something like a *current causally-efficacious manifestation of that to which it points*. But maybe that's OK. In order to act, one needs engage with things (interfere in the causal nexus or plenum) only “here and now”. I.e., as long as the particularity where one intervenes is adequately related to “that to which one refers”, one may not need to specify how much

“idealized” or “abstracted” the referent is—so long as that referent, as it were, “emerges up of” this particular point of contact or engagement.

Does that suggest that the “idealized” or “abstracted” object (I am debating which word to use) doesn't matter? No, I don't think so. Not at all. Rather, what I would say is that it is the idealized or abstracted object, not the current nexus of causal particularity, that plays a role in the normative conditions that apply to the operations. I.e., whether the action is the right thing to do—even: what action *to* do—depends on the idealized/abstracted object, not merely on the currently available causal nexus of particularity.

I am sure this is obscure to the max—but my intuition is that the point behind it is hugely important! So this will be something to learn how to say. *Tai!*

3) Slide 30 — Codifying up everything is hopeless

Jun: That's of course right. but we may want to avoid the impression that we want to completely avoid codifying, because in practice we do codify a lot of things to some extent and that's extremely useful.

And I think the point could actually be made stronger: it is because we do not need to always codify and do not attempt to codify everything up that we could codify some things up. (Wittgenstein and Lewis Carroll come to mind.) and the fan calculus is going to help us negotiating what, when and where to codify.

Brian: Yep, good point. Correct and strong. ✓

4) Slide 34 — Identity works in this contextual and perspectival way

Jun: Yes, allowing us to express how identity “works”, that's the important and exciting thing about the fan calculus. this is the positive/constructive thing. this is where we could claim post-poststructuralism etc. This is where we are to reanimate Plato's problematic, which got buried by Aristotelean essentialism.

Brian: Yep ✓

5) Slide 42 — Gang of six all subscribe to classical ontology

Jun: I'm not too sure in the cases about lambda calculus, algebra, and differential calculus, whether that's true, because I'm not sure I know what it means for them to build in classical ontology. If the point is about their “own ingredients”, i.e. identity of their symbols and syntax being classical, that I can see. but at another level, is it really that important to say—to argue and defend the view—that everybody got it wrong? Likewise with RDF, OWL, XML, common logic, data bases, where it's more likely that you'll be taken to task for not having done your homework of understanding every nook and cranny of these ways of doing things. Personally, I feel it's safe to assume that nobody else has got it and just go ahead positively demonstrate how identity work and how powerful the fan calculus (Δ calculus) and the metaphysical perspective behind it are.

Brian: The general advice seems right: not to diss other things, especially gratuitously. To be positive, and just “do the work,” rather than putting other things down.

I will say two things, though.

First, as to the λ calculus, algebra, and differential calculus: these are genuinely interpreted calculi (both formally and in intuitive use): they do have semantic accounts attached to them. Think about algebra, for example. A formulae of the form ' $x=y$ ' is true just in case x “equals” y , which means that the (instances of the) symbol (type) ' x ', in the locally bound context, *denote the same entity as* (instances of the) symbol (type) ' x '. And there is a black-and-white fact of the matter. Similarly, ' $\lambda x.(\lambda y.y(x))$ ' denotes a functional (a function that takes a function as its ar-

gument) with a specific, perfectly definite behaviour, and so on. So I think they do build in “formal ontology” (which is not to say that they decide as between realism, idealism, etc.—that is a separate issue).

Second, in the very few cases where I have talked about the Δ calculus (Thessaloniki is the first even vaguely formal one), I have encountered reactions like “Isn't this just like α ?” where α is a formal system of some sort (based on formal ontology), or “That's what _____ logic does,” for some _____ variant of logic, etc. In Thessaloniki, for example, in one of the very first questions, someone basically said: (i) if the Δ calculus is to be taken seriously, it will need to have a mathematical model-theoretic semantics developed for it; and (ii) that such a thing will probably look just like traditional model theory. The implication, if I got his drift, was that what I was proposing was what at MIT we used to call “syntactic sugar” on top of standard logic: i.e., a different *notation*, effectively, but nothing that could not be expressed in logic (since *anything* can be expressed in logic, it is thought). There was no sense that this questioner got any sense that there was anything in the Δ calculus that could actually challenge logical foundations.

The answer to this (besides its being disappointing) is complex. It's not just that, *no*, even if you tried to construct a mathematical theory of its semantic interpretation, the result wouldn't [be able to] look anything like traditional model theory. More seriously, constructing anything resembling a traditional model-theoretic account of the Δ calculus would foreground the fact that model theory, which is taken to be a mathematical model of the *semantics* of formal logic, is more usually, in my view, a mathematical model of the particular logic's *syntactic and inferential aspects*. (There is an irony, here; in model theory one talks about a “model of a sentence,” or a “model of a formulae”—a phraseology that I think is more true and revealing than is often realized.)

The real problem, I guess, is that, in my experience, many proponents of classical systems, including strong adherents of the gang of six, have strong predilections that any formal proposal can be *incorporated into their preferred systems*. I don't think the Δ calculus will be incorporable in this way. And I believe the reasons go deep—reasons that have to do with the “Nonconceptual World” paper, for example, and that are strongly related to Dreyfus' “ontological critique” in *What Computers Can't Do* (which I've just been re-reading).

Note: by “incorporated,” in the above, I mean translated or something *in a semantics-preserving way*, in the sense that if α is a “formula” in the Δ calculus, and β is its “translation” or “incorporation” into a gang-of-six system (say, formal logic), then the semantics of β , according to the standard semantic interpretation of that system, *are the semantics that α has in the Δ calculus*. That, I take it, is what people dealing with the semantic web are trying to do, with XML and logic and such. And that is what I believe will not be able to be done.

More practically, I also have hunch is that the fact that Δ calculus structures won't be readily “encodable” or “implementable” in RDF, OWL, XML, etc., either. This is different. To say that α is *implemented* by β in, say, logic (rather than incorporated into it), then the semantics of β , in the standard interpretation of logic, would be the *syntax and proof-theoretic use* of α in the Δ calculus. That is: the “implementation” would in a sense be an effective (in the technical sense) theory of the Δ calculus as a mechanical system—and wouldn't deal with its semantics at all.

I say “more practically” because it is exactly this, in effect, that would be required in order to “code up” Δ calculus descriptions, say, in RDF or XML or such.

Note: I use the word ‘readily’ for a reason. Though I believe that incorporating the Δ calculus into a gang-of-six formalism will be genuinely impossible, even in principle, it would be silly to suppose that formulating a theory of the Δ calculus as a mechanical system in a gang-of-six formalism is impossible (especially if we intend to implement it!). Rather, what I expect is something like this: that if one were to implement the Δ calculus in XML, the complexity of the implementation would be vastly greater than the complexity of the calculus itself (a little in the

way that an effective implementation of 3Lisp in 2Lisp or in Ruby is much more complex than 3Lisp itself—except much more drastic, in this case).

Anyway, exactly what those practical issues come to in fact is something that will hopefully [to misuse that word] emerge more clearly as we get the Δ calculus developed. Onward!

6) Slide 44 — Syncategorematic

Jun: Is this the right word? are you using it to mean that identity piggy-backs on or gets absorbed in the identity of symbols established by the syntactic structure? Wikipedia says this word means terms that in and of themselves do not refer or correspond to real categories.

Brian: Interesting. From your comment, and then looking it up, it seems as if I've had the wrong understanding of 'syncategorematic' for many years. As to how my (erroneous) meaning and what is apparently the correct meaning relate—that is not a simple thing. Roughly, based I guess on some completely fanciful back-formation, I have taken syncategorematic to mean something like this: semantically indicated by syntactic *categories*, rather than by items that are instances of those categories—i.e., inscribed into the domain of interpretation in virtue of the *type structure* of the syntax or formal system itself, rather than the token-structure.

I can envisage an argument that these two interpretations are pretty close. I am not going to delve into the issue any more here—but maybe I'll write a Δ calculus blog entry on it sometime. Also: if, as seems to be the case, 'syncategorematic' doesn't mean what I thought it meant, I may need a different (new?) word to express the meaning I had in mind.

7) Slide 46 — “No fact of the matter”

Jun: As we were saying last Thursday, this is a hugely important point. But after giving it more thought, I'm not sure “no fact of the matter” is the most happy way to express the point, especially in communication with people of a more realist bend. I think the point is rather that the detailed categorial identity, whether we already have ways to codify it or not, does not matter. in the example of the corrupted file and in the example of EZY386 (flight name) in Henry Thompson's slides, it is arguably the case that we do know what sort of things each instance of “it” or “EZY386” refers to. In other words, if we have to, we could do translation or explication or refinement that would more or less make sense, except that would be pedantic or nitpicking and risk being irrelevant. So, I think the point is not that there is no fact of the matter tout court, but rather that perspectively, or from the perspective in question, there's no fact of the matter.

There might be a special case here, where it is arguably the case that there was no fact of the matter prior to something like a historical shift regarding the categories/types in question. So before sync was invented, it probably doesn't make sense to say that that link on slide 18 is a “local” (as versus “remote”) link. Similarly, before complex numbers were invented, it wouldn't make sense to ask what is the imaginary part of the number 2. There was no fact of the matter about 2's imaginary part back then.

Brian: This is provocative; worthy of many hours discussion. I think I *do* believe that “there is no fact of the matter”, but even taking this strong view has two apparent interpretations: (i) there isn't an *ontological* fact of the matter as to what objects exist or are being (more or less) referred to, in the sense that the ontological realm is not divided up in such a way as to warrant the existence of one or other; and (ii) there isn't an *epistemic* fact of the matter as to which, of the perhaps many perfectly-well individuated existent ontic things out there, is the one that one is in fact referring to.

This is another topic for another blog post. But here is a meta-question, maybe of some importance. Will (or should) the Δ calculus, on the one hand, enforce/require a particular meta-physical view (e.g., as to the difference between the two above interpretations of there being no

fact of the matter)? Or will the Δ calculus, on the other hand, as I believe most calculi to date have done, allow people with different metaphysical predilections to employ it, interpreting it differently, each in their preferred way?

I have always thought that, *in virtue of its being reflective, and reflectively describing its own semantic interpretation*, that it pretty much *would* enforce/require a particular view. Of course that that is so is not quite a theorem—at least not yet. For example, suppose that φ is a (mathematical) function mapping elements of the calculus onto what they mean or denote (to adopt, for the moment, an extremely classical, non-perspectival, non-use view), and suppose that α is the Δ calculus representation of its own semantics. All that is required, it would seem, of any candidate interpretation function φ_i , to allow it to be a legitimate interpretation of the Δ calculus, would be for that φ_i to map α onto itself (onto φ_i , not onto α). As long as $\varphi_i(\alpha)=\varphi_i$, that is, it would seem that φ_i should be a possible way of interpreting things, at least in the sense of honouring the system's reflective description of its own interpretation.

But two issues. First, I don't expect the real version of α merely to be a *name* of its interpretation, but rather a full semantical theory. So devising a φ_i that honours $\varphi_i(\alpha)=\varphi_i$ may not be that easy. Second, none of this discussion includes *actions*, and genuine level crossing operators ("semantic transducers", as it were—like counting), and such. So it may be that the interpretation is, as I've always suspected, much more fixed than initial considerations might suggest. (That the Δ calculus involves actions, level-crossing operators, etc., is part of the reason why it isn't egregious to say that it may include a "full" semantical theory, as stated above.)

More things to be thought about.

8) Deixis

Jun: Finally, a quick comment on the issue of **deixis** that came out more clearly during the discussion than in the slides. We said that fans (in their use) need to be situated deictically; I think that's exactly right. I also wonder whether the following makes sense: it is precisely because of deixis (or because we are situated) that we could get away with carving up the world at intermediate levels: neither rise all the way up to the Parmenidean one, nor get hopelessly trapped in the inexorable particularity. It is because we are deictically linked to that to which our categories apply that we could deploy our category to make a cut while (for many practical purposes) safely pretending there's no (more) fact of the matter.

Brian: I *think* that this relates to what I said above about how concrete causal linking and engagement are into the particular, in a way that doesn't settle (and, as you say, doesn't need to settle) the facts about the identity of the idealized/abstracted object. And sure enough, as you say, that concrete embedded linkage is deictic. As is the plenum...

Overall, these are fabulous questions. ✓ They do inspire me to get going on a real Δ -calculus blog. More on that very soon.