

# Comments on Matteo Grasso’s “Integrated information theory and the metaphysics of consciousness”

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In his paper, Matteo discusses the metaphysical commitments of Giulio Tononi’s Integrated Information Theory (IIT), according to which consciousness “has to do with the capacity to integrate information.” (2004, p. 2) Matteo explores IIT’s metaphysical consequences and contrasts them against a spectrum of possible views suggested by David Chalmers (2003). Matteo quickly rejects, correctly, dualism as a possible candidate and then he considers at length type-B materialism and type-F monism concluding that IIT is compatible with either of them.

Both views accept causal closure (*i.e.* physical events have physical causes and there aren’t non-physical causes of physical events) and both accept that there is an epistemological gap between physical truths and phenomenal truths (*i.e.* truths about consciousness are not entailed by truths about physics). However, Type-B materialists think that there is no ontological gap between the physical and the phenomenal, while Type-F monists think that there is one. The question, then, is whether IIT is committed to an ontological gap or not, that is, whether the physical necessitates the phenomenal or not.

As Matteo points out, Type-B materialism comes in flavors. The main tenet is that physical states necessitate phenomenal states. This can be

achieved when the latter supervenes on the former: there cannot be a change in phenomenal states without a change in physical states. But a stronger claim can be made: mental and physical states are the same, they are identical. For both types of materialism an epistemological gap remains because neither the identity or the supervenience relation can be known a priori.

Type-F monism, on the other hand, requires an ontological gap. The way of obtaining it, while keeping causal closure, is by making consciousness a fundamental property of nature. As Chalmers puts it, “type-F monism is the view that consciousness is constituted by the intrinsic properties of fundamental physical entities, that is, by the categorical bases of fundamental physical dispositions.” (2003, p.129) Consciousness, then, would be a fundamental property just as mass or charge are fundamental.

Surprisingly, for having so different ontological commitments, Matteo considers that Tononi’s IIT can be compatible with either type-B materialism or with type-F monism. As originally conceived by Chalmers, type-F monism is a non-dualist alternative to materialism and, naturally, it cannot be true at the same time as type-B materialism, which makes Matteo’s suggestion intriguing. Although I think Matteo did a great job exploring IIT’s commitments, I wonder if we can push him to tell us more about this apparent tension.

In the paper, Matteo suggests that Tononi’s official view is that consciousness is a fundamental property, which immediately makes him a type-F monist. But he also argues that a type-B materialist could also take consciousness to be “fundamental” in some way and reject the existence of an ontological gap. Tononi makes the explicit claim that consciousness is fundamental but he also makes other claims that directly support type-B materialism. So, unlike what Matteo seems to suggest, type-B materialism is more than a mere conceptual possibility for IIT.

Part of this problematic ambivalence regarding these two metaphysical positions is that Tononi’s presentation of IIT is itself ambiguous. Unlike

most neuroscientists, Tononi has devoted serious efforts for making explicit the metaphysical implications of his view. For instance, he says, favoring type-B identitarian materialism, that “according to the IIT, consciousness is one and the same thing as integrated information.” (2008, p. 232) Immediately after, Tononi says that “according to the IIT, (consciousness) exists as a fundamental quantity—as fundamental as mass, charge, or energy,” (2008, p. 233) favoring the type-F interpretation. However, in the same paragraph, he says that “if consciousness is integrated information, then integrated information exists. (...) As long as there is a functional mechanism in a certain state, it must exist *ipso facto* as integrated information,” (*ibid.*) favoring now type-B supervenience materialism.

The ambivalence is not limited to Tononi’s explicit claims. It extends to the properties IIT attributes to consciousness. Some of them can indeed make us think that the scale should lean in favor of type-F monism. Take, for instance, the fact that consciousness is a gradual phenomenon. Just as there can be more or less mass, more or less charge, there can be more or less  $\Phi$ , and thereby consciousness, within a system.

But let’s not rush. Consciousness as integrated information is not independent from physical states and the relations among them: it depends on the connectivity between the members of the main complex and their activation. Tononi thinks “consciousness is characterized here as a disposition or potentiality - in this case as the potential differentiation of a system’s responses to all possible perturbations, yet it is undeniably actual.” (2004, p. 19) Furthermore, “the theory predicts that a brain where no neurons were activated, but were kept ready to respond in a differentiated manner to different perturbations, would be conscious (perhaps that nothing was going on). Also, because consciousness is a property of a system, not of a state, the state the system is in only determines which particular experience becomes actual at any given time, and not whether the experience is present.” (2004, p. 19-20) This means that there is a clear distinction between there being

consciousness and the contents of consciousness. While the latter depends on the structure and capacities of the system, the former depends on current activations during a particular temporal window. In both cases the implication is that the informational state and the activations within the system necessitate consciousness and its contents. This moves the balance now towards type-B materialism.

I don't want to spend too much time commenting on the arguments for considering that Tononi agrees that there is an epistemological gap, but it is worth noting that it seems that he is guilty of similar ambiguities. While he thinks that "according to the IIT, a full description of the set of informational relationships generated by a complex at a given time should say all there is to say about the experience it is having at that time: nothing else needs to be added," (2008, p. 234) he also rejects the force of Jackson's Mary thought experiment by claiming that consciousness is a way of being rather than a way of knowing" (ibid).

I think Matteo did a great job putting Integrated Information Theory under metaphysical scrutiny, but certainly type-B materialism is more than a mere possibility for it. While Tononi takes consciousness to be fundamental, it also takes it to be identical to informational states, which are just peculiar physical arrangements of a physical system. We cannot adjudicate between the two options at IITs current state of development (it is after all, to quote Christof Koch, "in its infancy and lacks the graces of a fully developed theory"). But Matteo's effort to make its metaphysical commitments explicit and brining to the surface obvious tensions that underlie them is already a step forward. I'm sure that further comments on these and other issues by Matteo and other participants will give rise to a fruitful discussion.

## References

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