

On Describing Intention With Mathematics: A Descriptive Requirement

Introduction

This article presents a three-part analysis on revealing possible descriptive requirements for a math of intention. Part one, titled Philosophical Reduction, presents reductive reasoning for arriving at three possible problems that ultimately one of which a mathematics of intentionality must satisfy. Part two, titled Scientific Modelling, considers the potential resolution of these problems in light of current scientific theory, allowing the selection of a most probable problem from part one. Part three, titled Computational, Mathematical and Physical Description, considers what descriptions, and the nature of their relations, are required to satisfy the most probable problem. It is proposed in Part 3 that a threefold equivalence of description at a specific level is a necessary requirement to illustrate the formation of intention. In exposing the requirement there emerge two significant consequences for the nature of our current descriptions: a) David Chalmers' 'Hard Problem of Consciousness' specifically results from the absence of the requirement, and similarly b) Kurt Godel's 'Incompleteness Proofs' exist as true only in an operational conception of mathematics that exists post non-inclusion of the requirement. Finally, there is reason to suggest that even if the requirement is revealed and a math of intention realised, a math of consciousness likely cannot follow from its premise.

Part 1: Philosophical Reduction

1. What is the physical (reduced mathematical assuming the claim of Max Tegmark(1)) difference between life and non-life? We have no formulaic, deterministic understanding of the origin of life opposed to non-life (molecular assembly to cellular life), but it is clearly life - distinguished from non-life, even in its most simple form - that has the property of intention. The generative origin of the simplest life coming to be as such is the answer for which the mathematics of intention must encompass. (Note though that we cannot rule out the possibility that there may be a multitude of ways in which life is generated from non-life (e.g. alien life born in acid on another planet may have a different mathematical structure)).

2. We can reductively appreciate that consciousness as we humans experience it, as an organism with a long evolutionary history of immense complexity, would be far too difficult to explain in terms of initial intention generation, e.g. old key for a new lock (though this isn't proof a new key can't be created from an old key). If so, our only option for explaining consciousness is a 'downstream' description that accounts for it as it is now. (Which may only be true for a specific moment in time, for a specific individual's consciousness). Perhaps as a state of matter e.g. "perceptronium"(2) . So whilst it can be conceived that if we understand life in its most basic origin, then an explanation of consciousness would be possible as an advanced arrangement of some kind, I will demonstrate reasoning suggesting this is improbable, a new key cannot follow from an old key, though of course in the actual evolutionary arrangement consciousness surely followed from the evolution of initial intention. It is essential we can distinguish our thinking on description from our thinking on what actually occurs – they do not possess the same truth applicability.

3. What do we know about life and non-life that might allow us to appreciate the formation of intention? Clearly, each has many varying properties and capacities so perhaps it is best to begin with first ontological principles (in terms of first similarity and divergence). Life and non-life as entities both have parts and sizes (descriptively referred to as 'levels'). So, what is the difference between life and non-life, at the appropriate 'level' of parts? (This is a physical/mathematical difference sought, so we need not consider the argument that ideas, culture, qualia etc. are real and without parts, as this could only be accounted for when we can account for consciousness).

4. We have three physical/mathematical possibilities:

- a. Is it a unique part or property that differs life from non-life? (If so we have a discovery problem).
- b. Is it just a specific arrangement/recipe of the physical? (If so we have a recipe problem).
- c. Life is emergent from b. (If so we have a recipe problem, and an emergence problem).

Part 2: Scientific Modelling

5. Is a current scientific theory useful in revealing 4.a-c?

a. Quantum Phenomena

Can we explain behavioural movement of life in quantum terms?(3) (And so intention appearing).

- 1. We cannot measure the required initial conditions without disrupting and possibly destroying the entity, and if we did, quantum uncertainty would leave us with inadequate data to make a deterministic prediction.
- 2. The entity's electrons have non-linear interactions that preclude closed form solutions to the Schrodinger equation. Therefore, we would have to use a computer solution, and currently these are impracticable for as few as 8 electrons, let alone the 10^{23} or so in a small entity (e.g. a spider), and this does not even involve the limits imposed by chaos theory.
- 3. The basic equations of neural response are non-linear. So, chaos theory precludes deterministic predictions via neural net modelling.
- 4. In addition to all of these known difficulties we have no reason to exclude the emergence of new properties due to possible multi-body forces.

We can conclude quantum explanations currently have complexity limitations preventing a 4.a-c mathematical account.

b. Evolution

- 1. There is no deterministic formulation at the organism level to be applied at the microscopic level.
- 2. We know from population genetics the reach/ability of evolutionary processes, but this is not an answer for 4.a-c.
- 3. Ecorithms are nature's (evolution's) algorithms. This is the idea of computational theorist Leslie Valiant (4), but none have been discovered yet. If they are then they would be a possible answer to 4.b-c.(5)

4. Genes/DNA are too far evolved to offer reductive fruit.
5. Abiogenesis recipe (e.g. Protocell, RNA, fuel cells etc.). Currently there is no single, generally accepted model for the origin of life, but unless life came from another planet it is probably a matter of time before we determine/replicate in experiment the conditions for life/intention to arise from the physical/mathematical.

6. Improbable Scientific Sources

4.a is insurmountable because there is no-where from which the unique property comes from, and if it came from another planet (e.g. the panspermia hypothesis) well only on that planet could we possibly deduce its origin.

Entropy and Temporal (not explored here) and Quantum 5.a accounts have complexity limitations that are currently insurmountable.

4.c will be addressed in Part 3.

7. Possible Scientific Sources (to meet 4.b)

Ecorithms (5.b.3) may present a mathematical/computational way to describe the recipe formulation (4.b), but external modelling proof (and this could come from 5.b.5) would be required. If this alignment is correct it is then a matter of determining what form the appropriate description could take.

Part 3: Computational, Mathematical and Physical Description

8. Internal and External Descriptions

Arguably, if 7 is successful as a proposal for problem 4.b, what is required to satisfy a mathematical account of intention is an internalist account that aligns with external mathematic and scientific descriptions. Of course, no known mathematics is internal, which is where the missing piece of the formation of intention might hide. Perhaps the only conceptual option for the internal is computational interactions (at least we can conceive as such, e.g. a robot governed by internal programming giving it intention). Therefore, an Ecorithm 5.b.3 is the only conceivable internal mechanism for aligning with the recipe/arrangement 4.b facilitating the science of abiogenesis, 5.b.5. (Note: I am assuming that Leslie Valiant's original conception of Ecorithms within life must begin from non-life).

Now for this to occur in nature, there must be a level (a specific size) in which the internal and 2x external (the external mathematics of its occurrence, and the external physical baggage of its occurrence) are equal in description. This descriptive demand comes from the moment in nature in which intention arises, here there must be a match between description and reality, which is obvious but it is what happens post this or in light of this in which we need to be descriptively very careful. Standard equivalence diagrams (for example in Max Tegmark's book *Our Mathematical Universe* he uses (on four occasions) three boxes displaying different forms of the same underlying mathematical information but with difference degrees of baggage/labels) do not specify or demand a real level at which the external action is indistinguishable from internal action.

The ramifications of non-equality at a level is precisely that there is no level, so no mathematical way, at which intention could occur in the next moment in time.

Therefore where intention must be, and dually where life occurs, is at such a thrice-equivalent level. There is only one level in time with three equal descriptions of the non-life to life event, following which the level is no longer and then the subsequent descriptions cannot be equal, unpacked further in 9. and 10. (I haven't mentioned 4.c emergence until now because we only now can understand that 4.b. has to occur from this equal level first – then 4.c would follow so its mute/secondary. My view regardless is that 4.c is most likely just an inadequate, or false due to preconception, description of reality (like top-down causation)).

9. Boxing the Level of Thrice-Equality

As a thought experiment we picture each explanation discussed in horizontal Boxes, which make up a set in time at a specific level (real size) in which intention is generated:

Box (1). A generating program (Ecorithm) driving non-life to life. (Internal Recipe)

Box (2). A baggage/label free mathematical account of 4.b. (External Recipe)

Box (3). Any kind of visual cue mapping that accurately repetitively portrays the event and meets the criteria of the scientific method. (External Baggage Recipe)

10. Consequences

An explanation of consciousness must take a post intention form of Box 1, (e.g. Program of life interacting with non-life and other life (organism evolution)). All future Box sets through time, which lack this original Box 1 containing the program of intention, and instead have as example the consciousness Box 1, can never be equal. This is because the recipe source in original Box 1 is what is equal to original Box 2 and Box 3 only in time, at the specific level (in reality). Thrice-equality is no longer possible post this passage of time in which it occurred. So whilst we may assume descriptive alignment between Consciousness Box 1, Box 2 and Box 3 (as there is in reality) they can't be equal, nor thus proved. This in turn must create the 'Hard Problem of Consciousness', which is then a temporal recipe problem for description, lacking the level of initial thrice equivalence. And we can also see that it necessarily creates Kurt Godel's Incompleteness Proof's,(6) for first order description must be inconsistent of itself without its origin.

Conclusion

I think Max Tegmark overlooks this necessary level of thrice-equality in the creation of life/intention from the physical/mathematical and what it means for description (primarily because he looks past simple biology on a reductive merit to an explanation in physics, e.g. in quantum phenomena, a "conscious pattern", and multiverses etc.). Leslie Valiant gets closer to this mark with his Ecorithms but doesn't consider them in terms of 1-4. The significance of this requirement of thrice-equality in our descriptions post it, so in its absence, necessarily creates a descriptively castrated operation for mathematics, and indeed conscious explanations of reality that cannot fathom the influence of what it is. We are descriptively stranded, and so whilst we may reveal a math of intention I doubt that it will provide a math of consciousness.

End Notes

- (1) Tegmark, Max, "Our Mathematical Universe: My Quest for the Ultimate Nature of Reality", Vintage Books, Random House, 2014.
- (2) Tegmark, Max, "Consciousness as a State of Matter", Cornell University Library, <https://arxiv.org/abs/1401.1219>
- (3) Arguments 5.a.1-4 are taken from a dialogue with Dr. Dennis Polis, whom formulated them, and applied here in this context of my own volition.
- (4) Valiant L, "Probably Approximately Correct: Nature's Algorithms for Learning and Prospering in a Complex World", Basic Books, New York 2013.
- (5) For an introductory review of Ecorithms see: James, Jack, "Ecorithms within Evolution?" Philosopher.io, 2016, <http://philosopher.io/Ecorithms-within-Evolution>
- (6) Hintikka Jaakko, On Gödel, Wadsworth. 2000.

References

- Hintikka, J, "On Gödel", Wadsworth, 2000.
- James, J, "Ecorithms within Evolution?", Philosopher.io, 2016
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