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Universe creation on a computer

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Abstract

The purpose of this paper is to provide an account of the epistemology and metaphysics of universe creation on a computer. The paper begins with F.J. Tipler's argument that our experience is indistinguishable from the experience of someone embedded in a perfect computer simulation of our own universe, hence we cannot know whether or not we are part of such a computer program ourselves. Tipler's argument is treated as a special case of epistemological scepticism, in a similar vein to 'brain-in-a-vat' arguments. It is argued that Tipler's hypothesis that our universe is a program running on a digital computer in another universe, generates empirical predictions, and is therefore a falsifiable hypothesis. The computer program hypothesis is also treated as a hypothesis about what exists beyond the physical world, and is compared with Kant's metaphysics of noumena. It is argued that if our universe is a program running on a *digital* computer, then our universe must have compact spatial topology, and the possibilities of observationally testing this prediction are considered. The possibility of testing the computer program hypothesis with the value of the density parameter Ω_0 is also analysed. The informational requirements for a computer to represent a universe exactly and completely are considered. Consequent doubt is thrown upon Tipler's claim that if a hierarchy of computer universes exists, we would not be able to know which 'level of implementation' our universe exists at. It is then argued that a digital computer simulation of a universe, or any other physical system, does not provide a realisation of that universe or system. It is argued that a digital computer simulation of a physical system is not objectively related to that physical system, and therefore cannot exist as anything else other than a physical process occurring upon the components of the computer. It is concluded that Tipler's sceptical hypothesis, and a related hypothesis from Bostrom, cannot be true: it is

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impossible that our own experience is indistinguishable from the experience of somebody embedded in a digital computer simulation because it is impossible for anybody to be embedded in a digital computer simulation.

Keywords: Computer; Cosmology; Creation; Scepticism; Information; Entropy

1. The epistemology of universe creation on a computer

Tipler has suggested that our universe could be a computer program running on a computer in another universe (see, for example, Tipler (1989, pp. 240–244) and Tipler (1995, pp. 206–209)). Tipler imagines a perfect computer simulation of our universe, which precisely matches the evolution in time of our own universe, and precisely represents every property of every entity in our universe. Such a simulation would simulate all the people who exist in our own universe. Such simulated people, suggests Tipler, would reflect upon the fact that they think, would interact with their apparent environment, and would conclude that they exist. Their experience would be indistinguishable from our own experience, and Tipler infers from this that we ourselves cannot know that we are not part of such a computer program. *Ex hypothesi*, there is nothing in our experience which could be evidence that we are not part of such a program, hence, it might be argued, we cannot know that we are not part of a computer program.

This argument is a type of epistemological scepticism, similar to Descartes' dreaming argument. Descartes raised the possibility that one could experience a dream which is indistinguishable from the experience of a conscious, waking individual. The sceptical argument from this is that, *ex hypothesi*, there is nothing in one's experience which could be evidence that one is not dreaming, hence one cannot know that one is not dreaming.

A modern version of this is the 'brain in a vat' hypothesis. Jonathan Dancy characterises this sceptical hypothesis as follows: "You do not know that you are not a brain in a vat full of liquid in a laboratory, and wired to a computer which is feeding you your current experiences under the control of some ingenious technician/scientist...For if you were such a brain, then, provided that the scientist is successful, nothing in your experience could possibly reveal that you were; for your experience is *ex hypothesi* identical with that of something which is not a brain in a vat. Since you have only your own experience to appeal to, and that experience is the same in either situation, nothing can reveal to you which situation is the actual one" (Dancy, 1985, p. 10).

One can identify two distinct premises in this argument:

(a) It is possible for a brain in a vat to be fed experience of an illusional world.
(b) It is possible for that experience to be indistinguishable from our own experience.