

## Colonising the Galaxies

There has been a recent upsurge of interest in ‘physical eschatology’ and, in particular, in the idea that, in the far–distant future, intelligent life will spread from earth to the rest of the universe. Although some of the early seeds were sown by Freeman Dyson<sup>1</sup>, the main proponent of this idea has been Frank Tipler<sup>2</sup>. Tipler (1995)—a book devoted solely to the elaboration of Tipler’s ‘Omega Point Theory’—was released with an enormous fanfare, and it spent many weeks near the top of the bestseller charts. In this paper, I cast a critical eye over some aspects of the theory which Tipler develops.<sup>3</sup>

Some people have wondered whether Tipler’s promulgation of the theory is an elaborate joke.<sup>4</sup> Others have suggested that it is merely a cynical attempt to cash in on the current craze for pop physics treatments of ‘the big questions’<sup>5</sup>. Yet others have speculated that it

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<sup>1</sup> See Dyson, F. (1979) “Time Without End: Physics and Biology in an Open Universe” Reviews of Modern Physics **51**, pp.447–60; and Dyson, F. (1988) Infinite in all Directions New York: Harper & Row. Both of these pieces are charming and interesting; little in what follows applies to them.

<sup>2</sup> See Barrow, J. and Tipler, F. (1986) The Anthropic Cosmological Principle Oxford: OUP; Tipler, F. (1988) “The Omega Point Theory: A Model for an Evolving God” in R. Russell, W. Stoeger, and G. Coyne (eds.) Physics, Philosophy, and Theology: A Common Quest for Understanding Notre Dame: UND Press; and Tipler, F. (1995) The Physics of Immortality London: Macmillan.

<sup>3</sup> I am not the first philosopher to take an interest in Tipler’s work. For instance Mary Midgley’s Gifford Lectures—Science as Salvation: A Modern Myth and its Meaning London: Routledge, 1992—provide an interesting critique of Tipler, Dyson, and others. However, my interests here are rather different from Midgley’s.

<sup>4</sup> In the first paragraph of the Preface to Tipler (1995), Tipler writes: “One naturally wonders if I am serious” (ix). He immediately goes on to add: “I am quite serious”.

<sup>5</sup> See, for example, G. Ellis (1994) “Piety in the Sky” Nature **371**,8, p.115. Ellis’ review of Tipler (1995) is extremely savage: it calls Tipler’s book ‘a masterpiece of pseudoscience ... the product of a fertile and creative imagination unhampered by the normal constraints of scientific and philosophical discipline’ and asserts that ‘what one would have assumed was just an undergraduate joke is here presented as if it were a serious theory’. I wonder whether Ellis has a religious barrow to push. He writes: “.. the book will make things much more difficult than before for those engaged in the debate about the relationship between

may be an ill-conceived attempt to secure funding for expensive, large-scale physics research<sup>6</sup>. In this paper, I shall ignore these kinds of speculations, and proceed under the assumption that Tipler is serious and in good faith. It would be very disturbing were this assumption mistaken. Some on the religious right have made, and will make, capital from the mere fact that a physicist has been dabbling in ‘physical eschatology’, even if the strict letter of his doctrines provides no comfort to them. We do not need more physicists *apparently* telling the world that the most recent discoveries in cosmology and particle physics confirm traditional religious teachings. What would it profit Frank Tipler ...?

It is hard to give brief expression to the fantastic speculations which make up the body of Tipler’s Omega Point Theory. Perhaps a good place to begin is with the introductory paragraph of Tipler (1995):

This book is a description of the Omega Point Theory, which is a testable physical theory for an omnipresent, omniscient, omnipotent God who will one day in the far future resurrect every single one of us to live forever in an abode which is in all essentials the Judeo-Christian Heaven. .... I shall make no appeal, anywhere, to revelation. I shall appeal instead to the solid results of modern physical science. ... I shall describe the physical mechanism of the universal resurrection. I shall show exactly how physics will permit the resurrection to eternal life of everyone who has lived, is living, and will live. I shall show exactly why this power to resurrect which modern physics allows will actually exist in the far future, and why it will in fact be used. If any reader has lost a loved one, or is afraid of death, modern physics says: ‘Be comforted, you and they shall live again.’ (p.1)

From this introductory paragraph, the reader will naturally form the impression that Tipler believes the doctrines of the Omega Point Theory. While he mentions that it is a

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science and theology, a debate that is gaining momentum.” I would have thought that Tipler’s book—and, indeed, pretty much any book—would be easy to ignore for those who wish to do so.

testable physical *theory*, the rest of the paragraph plainly suggests that he takes it to be a well–confirmed theory (and that the real point he wants to make is that the theory is both *physical* and *testable*). Much of the rest of the book confirms this initial impression. However, when we get to Chapter 12 (“The Omega Point Theory and Christianity”), Tipler starts off with the following:

To emphasise the scientific nature of the Omega Point Theory, let me state here that I am at present forced to consider myself an atheist, in the literal sense that I am not a theist. ... I do not even believe in the Omega Point. The Omega Point Theory is a viable scientific theory of the future of the physical universe, but the only evidence in its favour at the moment is theoretical beauty, for there is as yet no confirming experimental evidence for it. Thus scientifically one is not compelled to accept it at the time of my writing these words. ... If the Omega Point Theory and all possible variations of it are disconfirmed, then I think atheism .. is the only rational alternative. But of course I also think the Omega Point Theory has a very good chance of being right, otherwise I would never have troubled to write this book. If the Omega Point Theory is confirmed, I shall then consider myself a theist. (p.305)

In the light of this paragraph, it is quite unclear what attitude Tipler actually takes towards his theory. On the one hand, he seems to say that there is nothing but ‘theoretical beauty’ which tells in its favour<sup>7</sup>; yet, on the other hand, he also say that there is ‘a very good chance’ that it is true. Perhaps the truth is that Tipler would very much like his theory to be true; until there is evidence or argument which tells against it, there is no reason why one cannot continue to hope that it is.<sup>8</sup> However, his initial talk about

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<sup>6</sup> This is my own speculation. It is at least as plausible as the first two which I have mentioned, but I have no reason to think that it is correct.

<sup>7</sup> Tipler’s conception of ‘theoretical beauty’ here seems to be rather idiosyncratic: certainly, it is not clear to me that the Omega Point Theory is beautiful in the sense in which Special Relativity is beautiful. Indeed, the main ‘beauty’ of the Omega Point Theory seems to be that it promises to fulfill common human desires. Why else is a theory in which life lasts forever more ‘beautiful’ than one in which life dies out?

<sup>8</sup> At p.16, Tipler writes: “Let me emphasise again that the Omega Point Theory, including the resurrection theory, is pure physics. There is nothing supernatural in the theory, and hence there is no appeal, anywhere, to faith.” But there is not much difference between hope and faith, at least in the present context.

‘appeals to the solid results of modern physical science’ now seems utterly out of place—even against the background of modern physical science, the Omega Point Theory is at best a piece of fantastic speculation; and, at least on occasion, Tipler seems to demonstrate that he is perfectly well aware that this is the case.<sup>9</sup>

Perhaps the best way to think about the Omega Point Theory is this. Suppose that one wanted to give a rational reconstruction of traditional theological doctrines in which the *letter* of those doctrines is preserved, but in which recourse is made only to the concepts of modern physical science. Suppose, further, that one is particularly interested in questions about personal immortality and the resurrection of the dead—questions which have been central to most religions. Then, very likely, the Omega Point Theory (or some ‘possible variation’ thereof) is the kind of view at which you will arrive. Of course, it is not clear what interest should attach to this kind of inquiry—in particular, since there is unlikely to be any attempt to preserve the *spirit* of traditional theological doctrines, it is unlikely that theologians ought to be very interested in the Omega Point Theory. (Some theologians—e.g. Wolfhart Pannenberg<sup>10</sup>—have been very enthusiastic about the Omega Point Theory; it seems to me that this can only be due to confusion on their part.) If it were the case that the theory is likely to be true, then everyone would have reason to be interested; but—as I have already indicated (and as I shall argue further below)—there is

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<sup>9</sup> It also seems clear that there is considerable justice in the allegations of ‘false advertising’ which Ellis, *op. cit.*, makes against Tipler. Given that Tipler does not believe the theory which he is expounding, he ought not to write in ways which suggest that he does believe it. It is not uncommon for readers to only get part way through a book ....

<sup>10</sup> See, for example, his “Theological Appropriation of Scientific Understandings: Response to Hefner, Wicken, Eaves and Tipler” *Zygon* 24, 1989, pp.255–71

not the slightest reason to think that the theory is true and, worse, there are various grounds for thinking that it is not so much as coherent.

## I

The basic ingredients of the Omega Point Theory are perhaps the following. *First*, we make an assumption about the large-scale structure of the universe, viz. that it ends in an Omega Point. (More exactly, we suppose that the future c-boundary of the universe is a single point. A consequence of this assumption is that the universe is closed, i.e., that it has a finite spatio-temporal volume). *Second*, we suppose that it will come to be the case that life exists everywhere in the universe at some time shortly after the point of maximum expansion. *Third*, we suppose that life is able to ‘manage’ the collapse of the universe in such a way that life continues to exist everywhere in the universe ‘right up to’ the Omega Point. *Fourth*, we suppose that life in the far future will consist of super-intelligent machines which will build enormously powerful computers. *Fifth*, we suppose that people (and indeed entire universes) can be perfectly ‘emulated’ on computers, and that all (sufficiently good?) people who have ever lived will be ‘emulated’ on computers in the far-distant future (and that these ‘emulations’ will continue to exist ‘right up to’ the Omega Point). *Sixth*, we suppose that the universe is globally hyperbolic—possesses a Cauchy surface—and that every timelike and lightlike curve extends to the Omega Point.

(Less exactly, we suppose that all of the information from all earlier stages of the universe is ‘available for analysis’ at the Omega Point.)

Given these assumptions—whose credibility we shall return to discuss—we next proceed to the problem of ‘placing’ the terms of traditional theology in this framework. If we take enough liberties, we can find ways to attribute most of the divine predicates to the Omega Point. Since the Omega Point is actually an ideal point—not part of the space–time manifold—it is ‘transcendent’. Since total information about all points of spacetime is ‘included’ in the Omega Point, the world is ‘immanent’ in it; and, for the same reason, the Omega Point is ‘omniscient’ and ‘omnipresent’. These last two ‘conclusions’ are further strengthened by the observation that we can think of our cosmological theory as one which is governed by the ‘boundary condition’ that the universe is such that the biosphere expands to fill the entire universe until the end of time. If we are prepared to ‘personalise’ this boundary condition, we get a sense in which the Omega Point ‘acts’ at all earlier times: the entire history of the universe is ‘governed’ by the final boundary condition. Stretching things even further, we can also use the claim that the final boundary condition ‘governs’ the evolution of the universe to support the claim that the Omega Point ‘loves’ living creatures. And so on.<sup>11</sup>

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<sup>11</sup> Lest it be thought that I am being unfair to Tipler, let me give some of this in his own words: “[I]n order for the information processing operations to be carried out arbitrarily near the Omega Point, life must have extended its operations so as to engulf the entire physical cosmos. We can say, quite obviously, that life near the Omega Point is omnipresent. As the Omega Point is approached, survival dictates that life collectively gain control of all matter and energy sources available near the Final State, with this control becoming total at the Omega Point. We can say that life becomes omnipotent at the instant the Omega Point is reached. Since by hypothesis the information stored becomes infinite at the Omega Point, it is reasonable to say that the Omega Point is omniscient; it knows what it is possible to know about the physical universe (and hence about Itself).” (pp.153–4) Since the Omega Point is an ideal point—a mathematical abstraction, no part of the space–time manifold—we should not want to follow Tipler in claiming that properties which tend to limits as the Omega Point is ‘approached’ from within the manifold

In similar fashion, if we are prepared to make certain assumptions about physical existence and personal identity, then we can claim that computer ‘emulation’ in the far distant future is ‘resurrection’; and that computer ‘emulation’ right up until the Omega Point is ‘eternal life’. Moreover—with the aid of further assumptions—we can claim that this kind of resurrection is indeed ‘bodily’ resurrection, and that it ‘coheres nicely’ with the claims of all of the major world religions (at least before their doctrines were corrupted by pernicious Greek nonsense about immaterial souls, purely spiritual resurrection, and the like).

Perhaps it is sufficient to put all this down in summary form to make clear how implausible some of it is. While the idea that one might ‘place’ the terms of traditional theology in the framework of a modern physical theory is not initially plausible, I suppose that one ought to be prepared to judge the results with something like an open mind. However, any attempts to ‘place’ the terms of one theory within another theory need to be subject to constraints. It is not enough to find single aspects of similarity, vague analogies, and the like: since what is going on is essentially intertheoretic reduction, one needs to show that the terms in the reducing theory are ‘good enough deservers’ of the ‘names’ of the old theory. And, in the case in which there is no good

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are instantiated at the Omega Point. So, even if we thought that ‘information storage’ does approach infinity as the Omega Point is approached—and even if we thought that ‘omniscience’ is a good label for ‘infinite information storage’—we should still not want to say that the Omega Point is infinite. However, it is also plain that we should not think that ‘omniscience’ is just ‘infinite information storage’ in Tipler’s sense. (This is so even if we allow that all physically possible worlds ‘collapse into’ the Omega Point, as Tipler’s version of the Many Worlds/Histories interpretation of quantum mechanics allows.) An omniscient being should know all about about physically impossible but logically possible worlds—yet there is no reason at all to suppose that this information will be ‘stored’ at the Omega Point.

enough deserver of the ‘names’ of the old theory, we should simply conclude that the entities of the old theory do not exist.

So we need to ask: what would it take for an entity to be a good enough deserver of the name ‘God’? What would it take for properties to be a good enough deservers of the labels ‘omniscience’, ‘omnipotence’, ‘omnipresence’, ‘immanence’, ‘transcendence’, and so on? What kinds of entities can properly be said to ‘act’, to ‘love’, to ‘govern’ and so forth? Once we ask these questions, I think that it is pretty clear that—as some previous reviewers have noted<sup>12</sup>—Tipler’s attempts to ‘place’ theological vocabulary in his physical theory are nothing more than word play and abuse of language. For instance, nothing should count as deserving the name ‘God’—by the lights of traditional Judeo-Christian theology—unless it is a personal creator and sustainer of the universe (where ‘personal’, ‘creator’ and ‘sustainer’ are understood in ordinary and literal ways). Since a single space–time point cannot be a person—this is a matter of at least metaphysical necessity—there is no way that the Omega Point can be a good candidate for the name ‘God’.<sup>13</sup> Since a single space–time point cannot be an (intelligent) agent—again this a matter of at least metaphysical necessity—there is no way that the Omega Point can be

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<sup>12</sup> Ellis, op. cit.; also J. Polkinghorne (1995) “I am the Alpha and the Omega Point” New Scientist, 4 Feb 1995, pp.40–1: “Throughout there are references to theologians. These often seem to trade upon verbal parallels which require much more careful evaluation.” (Polkinghorne goes on to say that there ‘is an interesting degree of parallelism’, suggesting that his enthusiasm for my line of criticism of Tipler would not be unequivocal.)

<sup>13</sup> Perhaps it isn’t quite right to call the Omega Point ‘a single space–time point’. As I have already noted, the c–boundary is not attached to the space–time manifold. Tipler writes: “[M]athematically speaking, the c–boundary is a completion of space–time: it is not actually in space–time but rather just ‘outside’ it. [Moreover], a c–boundary consisting of a single point is equivalent to the entire collection of space–time points (regarded as a unity) and a certain infinite collection of subsets of space–time points (all past light cones)” (p.154). The real significance of this observation is that the Omega Point is an *ideal* point which is used to characterise the boundary of space–time, but which is not itself part of the space–time manifold.

properly called a ‘creator’ or ‘sustainer’ of the universe. I assume that there is no need to labour this point: a little bit of reflection shows that there is really no justification for the ‘placing’ of traditional theological terms which Tipler provides.<sup>14</sup> Tipler is an old-fashioned physicalist (and none the worse for that!)<sup>15</sup>; consequently, he is an atheist, and will remain one even if he comes to believe the six assumptions listed above.

Perhaps Tipler might reply that ‘... [this] strike[s] me as mere quibbles over the meaning of words, and remind[s] me of Appendix IV .. of Hume’s *An Enquiry Concerning the Principles of Morals*: “Nothing is more usual than for philosophers to encroach the province of grammarians; and to engage in disputes of words, while they imagine, that they are handling controversies of the deepest importance and concern.”’ (p.238).<sup>16</sup>

However, this reply involves a misunderstanding: the point of insisting on the meanings of words is precisely to ensure that one does not make silly mistakes in handling issues of the deepest importance and concern. It is only by word play and abuse of language that

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This observation does not serve to justify Tipler’s further remarks about the ‘immanence’ and ‘transcendence’ of the Omega Point.

<sup>14</sup> At p.xiv, Tipler writes: “... the old theological words retain a rough coherence in the popular language, and I propose to reintroduce them as technical terms which, as the reader will see ... have roughly their popular meaning.” I think that it is obvious that Tipler ought to have taken the advice of his fellow physicists who advised him to avoid using these words—though not for the reason which they give. The problem is not that “these words [‘God’, ‘Heaven’, ‘free will’] have been debased by philosophers .. into synonyms for ‘nonsense’”; rather, the point is that these words have perfectly good uses in (popular) language which are dramatically at variance with the uses to which Tipler wishes to put them (and nothing but confusion can result, especially given his insistence that there is ‘rough’ equivalence of meaning). Of course, there could hardly be a competent speaker of English who thinks that ‘God’, ‘Heaven’, ‘free will’ and ‘nonsense’ are all synonyms (though no doubt there are some who think that no sense can be attached to the first three of these words).

<sup>15</sup> A qualification is needed here: *most* of the time, Tipler reads like a good old-fashioned physicalist. However, in Ch. VIII (“The Omega Point and the Physical Universe Exist Necessarily”) he appears to defend a kind of Berkeleyan idealism. It would be nice to be able to write off these lapses from grace as mere aberrations ...

<sup>16</sup> Tipler’s other avenue of reply is to say something like this: “I have shown at length in this book that the Omega Point Theory is consistent, *broadly speaking*, with the core beliefs of all the great world religions”

one could come to think that the properties of a point in a general relativistic spacetime are just the (essential) properties which traditional monotheistic religions attribute to God (and hence that the Omega Point Theory concerns matters of the deepest religious importance). There is no reason at all to think that there is anything in traditional theology which approaches, or indeed remotely resembles, the Omega Point Theory.<sup>17</sup> If theology is to seek comfort from modern physics, it should look elsewhere.<sup>18</sup>

## 2

Even if Tipler were to concede these points about God, he might still insist that his theory does address some matters of the deepest importance and concern—for his claims about resurrection of the dead and personal immortality may not be quite so obviously vulnerable to the same kind of objection. Isn't it possible that people might be 'resurrected' in the far distant future by being 'emulated' in super-computers? And if that is possible, won't investigation of the question whether it is likely to happen be an investigation of matters of the deepest importance and concern?

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(p.337) (my italics). Of course, since anything is like anything else in ever so many ways, sufficiently broad speech can make the Omega Point Theory consistent with just about anything.

<sup>17</sup> There are many places in the book where Tipler says that one theory is 'the same as' or is 'amazingly similar to' another theory from which it differs greatly. For example: "There is actually an astonishing similarity between the mind-as-computer-program idea and the medieval Christian idea of the 'soul'." (p.127) "Israel ben Eliezer ... emphasises the earthly nature of the afterlife. ... This is essentially the same as the afterlife in the Omega Point Theory." (p.290) "The doctrine that God is continually destroying and recreating the universe from moment to moment ... is quite similar to the view of the human body in modern quantum field theory, which pictures it as being annihilated and re-formed many times per second." (p.300) There are many similar passages in Tipler's book.

<sup>18</sup> My talk—in this section—about 'placing' the terms of one theory in another theory alludes to Frank Jackson's terminology in his discussion of what he calls 'the placement problem' in metaphysics. (See his

Clearly, these questions can't be fully answered without an excursus into metaphysics. We need to know what are the essential properties of persons, what makes for identity between persons, what are the conditions for the existence of bodies, and so on. Tipler provides discussion of all of these questions, and makes some references to the recent philosophical literature.<sup>19</sup> However—perhaps unsurprisingly, given the incredible claims which he makes—I do not think that his arguments will stand much examination.

Amongst the metaphysical claims which Tipler makes—and in some cases defends by argument—there are the following:

- (1) A human being is nothing but a finite-state information processing device. (p.xi)
- (2) A human soul is nothing but a program being run on a computer, viz. the human brain. (p.xi)

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From Metaphysics to Ethics Oxford: Clarendon, 1998.) The general ideas about intertheoretic reduction are due to David Lewis.

<sup>19</sup> There is quite a bit of philosophical material in Tipler's book. Perhaps the most important sections—from this perspective—are the following:

- Ch.2 #2: Can a machine be intelligent (esp.pp.38–43 on Searle's Chinese Room)
- Ch.3 #2: The eternal return in philosophy, religion and politics
- Ch.4 Physics Near The Final State: The Classical Omega Point Theory
  - #1: Computer definitions of 'life', 'person', 'soul'
  - #2: What does it mean for life to exist forever?
- Ch.7 How Free Will Can Arise From Quantum Cosmological Mechanisms
  - #1: The distinction between determinism and indeterminism
  - #2: Avoiding the conflict between divine omniscience and human free will
- Ch.8 The Omega Point And The Physical Universe Necessarily Exist
  - #2: Simulations and emulations
  - #3: The algorithm for deciding which concepts exist physically
- Ch.9 The Physics Of Resurrection Of The Dead To Eternal Life
  - #6: The pattern (form) theory versus the continuity theory of identity
  - #7: The ship of Theseus
  - #8: Continuity theory: a later emulation is identical to the original person
- Ch.11 #2.3 The definition of 'reductionism'

- (3) A person is nothing more than a computer program which can pass the Turing Test.  
(p.124) (The essential idea of the Turing Test is that what counts for personhood is behaviour: if it behaves in all respects like a person, then it is a person. (p.21))
- (4) A living being is just an entity which codes information, with the information coded being preserved by natural selection. (p.124) Life is information preserved by natural selection. (p.126)
- (5) If all objects can be truly described by quantum mechanics, then the Many Worlds Interpretation of quantum mechanics is correct. (p.169) Hence, quantum cosmology requires the Many Worlds Interpretation of quantum mechanics. (p.169)
- (6) If the Many Worlds Interpretation of quantum mechanics is false, then it is logically impossible for us to have free will. (pp.173, )
- (7) A world is indeterministic exactly if there is no proper part of it which contains total information about the whole. (p.187)
- (8) An agent acts freely just in case: (i) the agent feels that she is making the decision freely; and (ii) the agent's decision is undetermined at the most basic physical level. (p.202)
- (9) An entity is identical to all of its emulations (i.e. precise simulations). (p.207)
- (10) To exist physically is to be part of an entity whose emulations are sufficiently complex to contain observers as subsimulations. (p.210) The physical universe is a concept. (p.209)
- (11) Existence is a predicate, a relationship between concepts, a property of very complex simulations. (p.210)
- (12) To be is to be perceived. (p.211)

- (13) If a universe contains observers all the way into the Omega Point, then that universe exists necessarily. (p.211)
- (14) A person is identical to any person who has the same 'essential personality'. (p.226)
- (15) Continuity over time is not necessary for personal identity. (p.227)
- (16) Systems in the same quantum state are identical. (p.230)
- (17) It is not possible to derive an imperative sentence from a declarative sentence. (p.330)

Amongst these claims, (1)–(4), (9)–(12) and (14–16) are important for Tipler's assertions about the resurrection of the dead and personal immortality. If I am truly to be resurrected in the future in a computer emulation, then that computer emulation has to *be me*, and I have to enjoy physical existence in virtue of that computer emulation. But it seems perfectly obvious that nothing can enjoy physical existence in virtue of being emulated in a computer, and that, in particular, I could not enjoy physical existence in virtue of being emulated in a computer. The crucial point is that there should be no conflation of things with representations of those things. A computer emulation of a thing is a (perfect) representation of that thing: but that's all. If the thing is flesh and blood, then the computer emulation represents it as being of flesh and blood—but this does not mean that the emulation is itself a thing of flesh and blood. (Since we are talking about computers, the emulation might as well be thought of as an electronic encoding of a binary pattern. No flesh and blood there.)

That Tipler does confuse the properties of things with the properties of emulations of those things is clear. Here is the crucial passage:

[L]et us imagine that, when the program is run on some gigantic computer, the temporal evolution of the simulated persons and their city precisely mimics for all time the real temporal evolution of the real people and the real city. ... The key question is this: do the emulated people exist? As far as the simulated people can tell, they do. By assumption, any action which the real people can and do carry out to determine whether they exist—reflecting on the fact that they think, interacting with the environment—the emulated people also can do, and in fact do do. There is simply no way for the emulated people to tell that they are ‘really’ inside the computer. that they are merely simulated and not real. ... How do we know we ourselves are not merely a simulation inside a gigantic computer? Obviously, we can’t know. (p.207)

*As far as the emulated people can tell, they do!* But, in the relevant sense, there are no emulated people. There are representations—indeed, perfect representations—of people in the computer, but there are no people (and, in particular, no ‘emulated people’) in there.<sup>20</sup> There are representations of the states of consciousness of people in the computer—representations which can be interpreted by real people who have access to the representations in the computer—but there is nothing which has consciousness in the computer. The ‘emulated people’—the representations in the computer—don’t ‘tell’ anything, though they may represent people as telling things. And, since we are supposing that these simulations are indeed emulations, they will represent most people as ‘telling’ that they are not emulations. For, unless one is very sorely confused, one could not suppose that one is an emulation.<sup>21</sup>

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<sup>20</sup> Perhaps this talk about there being ‘representations in the computer’ also needs to be handled with care. I take it that this talk could be shown to be perfectly respectable, but it is something which probably requires some argument.

<sup>21</sup> Tipler’s ‘key question’ is reminiscent of familiar sceptical worries: am I deceived by a deceitful demon? am I a brain in a vat? have I been plugged into an experience machine? is it all just a dream? However, in all of these scenarios, the key question is not whether *I* am real—that question is never in doubt—but

I suspect that if Tipler could be convinced on this point, he would give up all of the Berkeleyan speculations involved in (9)-(12).<sup>22</sup> Moreover, were he to do so, he would not need immediately to give up all his claims about a future resurrection. After all, if there will be the technology available to create computers which can emulate people and universes, then surely there will be the technology available to create functional replicas of people. While I can't be resurrected as a computer emulation, I might be resurrected as a robot—and, since Tipler is supposing that the machines of the far future can exist right up to the Omega Point, why shouldn't it be the case that, once I am resurrected, I exist right up to the Omega Point? Tipler worries that any finite state machine which exists right up to the Omega Point will be subject to Eternal Return; however, there are reasons for thinking that this worry is misplaced. (I shall return to this topic later.)

Could I be resurrected as a robot? Would a functional duplicate of me be me? Should I feel pleased by thought that I might survive in the far distant future as a robot (even if, strictly speaking, there is no way in which I can be identical to that future robot)? These are familiar kinds of questions in the recent literature on personal identity, and they admit of a range of well-known answers.<sup>23</sup> Since there is unlikely to be any causal or informational connection between me and future robots, and since there is no reason why

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rather whether my experience is veridical. To suppose that *I* might just be a representation is to enter a quite different—and utterly incoherent—realm of speculation

<sup>22</sup> Of course, there are plenty of independent arguments which could be levelled against (9)–(12). I would certainly wish to object to all of them (except perhaps to the claim that existence is a predicate, at least when this is properly understood). However, it would take us too far afield to properly explore these issues here.

<sup>23</sup> Two classics of this literature are: J. Perry (ed.) (1975) Personal Identity Berkeley, CA: University of California Press and D. Parfit (1984) Reasons and Persons Oxford: Clarendon

there couldn't be many such robots (one for each minute of my life, perhaps), there are reasons for saying that no future robot will be me, and that what matters for survival will not be present in this case. If all possible 'human' robots were constructed, there would be many that were closely related to me, but it is unclear that I should take any particular comfort from, or interest in, their existence. In particular, given the conditions that will then obtain in the universe, it is hard to see that conditions for the fulfillment of my plans, projects and concerns will be resurrected with me. (Tipler considers the possibility that the global structure of the universe might make all of the information available at the Omega Point. Given an appropriate causal linkage, resurrection would be possible. But, as he admits, there are problems about opacity and loss of coherence which suggest that the information cannot be available. Moreover, there is independent reason to think that the universe does contain event horizons. And, in any case, the information is only available 'at' the Omega Point, so that there is no guarantee that 'your' robot will ever be built.)<sup>24</sup>

The upshot of this discussion is plain (and no doubt was so from the beginning): even if the Omega Point Theory were true, and there were to be computer 'emulations' of all of us in the far distant future, none of us would be resurrected, and none of us would have eternal life. Moreover, even if there were robotic duplicates of all of us in the far distant future, none of us would be resurrected, and none of us would survive. Many of Tipler's metaphysical assumptions are false or confused; and that is enough to undermine this part

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<sup>24</sup> For the purposes of this discussion, I ignore the issues raised by the debate between internalism and externalism about content. See the next section, thesis 5, for further discussion.

of his work.<sup>25</sup> (There isn't room here to discuss all of the metaphysical claims which Tipler makes. For example, I would *certainly* want to dissent from his account of free actions—(8)—and his claims about the Many Worlds Interpretation of quantum mechanics—(5), (6). Moreover, I am sceptical that any precise sense can be attached to his notion of 'essential personality'—(14).<sup>26</sup> I suspect that there would be *very* few people who would accept all of (1)–(17).)

### 3

This brings us back to the six assumptions which I suggested earlier form the core of the Omega Point Theory. Is there any reason to think that these assumptions are correct? I suspect that, in every case, the answer is 'No!'—and that, in one or two cases, these is reason for saying that these assumptions are not so much as coherent.

1. The universe ends in an Omega Point: This is really just a question for physics. I am quite prepared to believe that it is consistent with the evidence which we now have, and

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<sup>25</sup> Tipler is well-known as the co-author, with John Barrow, of The Anthropic Cosmological Principle (Oxford: OUP, 1986). Anthropic principles do not make very many appearances in the present work. However, at p.152, Tipler provides what looks like an anthropic solution to 'the Isotropy Problem': the reason why the cosmic background radiation is isotropic is that 'otherwise the universe in the far future would be inhospitable to life'. Perhaps it isn't quite right to claim that this solution is *anthropic*: for according to Tipler's theory, the evolution of the universe is governed by the "**Omega Point Boundary Condition** for the universal wave function: the wave function of the universe is that wave function for which all phase paths terminate in a future Omega Point, with life continuing into the future forever along every phase path in which it evolves all the way into the Omega Point" (p.181). However, there is surely some justice in the claim that this an *anthropic* boundary condition: the universe is said to have this boundary condition precisely because it must have this boundary condition if life is to continue forever. The usual disputes about anthropic principles should now arise.

<sup>26</sup> Tipler claims, for example, that someone who has Down's Syndrome might be resurrected 'by' the Omega Point in an 'improved' form in which they no longer have Down's Syndrome, and yet in which

the theories which we now suppose to be at least roughly correct, that the universe will end in an Omega Point. However, I would not be surprised to learn that, in the set of universes consistent with current theory and evidence, the set of universes which end in an Omega Point is of measure zero.<sup>27</sup> In any case, a more salient consideration is that the evidence seems to favour the claim that the universe is not closed, i.e. the universe will simply go on expanding forever. To date, a couple of decades spent searching for the ‘missing matter’ which would close the universe has not produced any definite results. That is not to say that it won’t—perhaps there is enough ‘dark matter’ out there waiting to be discovered—but that is not the direction in which the evidence currently points. Moreover, even if we were to discover that the universe is closed, it is quite unclear that the evidence would support the claim that the universe ends in an Omega Point. Since Tipler himself claims not to believe that the universe will end in an Omega Point, there is clearly considerable room for scepticism.<sup>28</sup>

2. Life comes to exist everywhere in the universe: I am not sure exactly what this claim means. If ‘life’ were a continuous quantity, then I would know what is required for it to be distributed throughout the universe. But life is not a continuous quantity. Moreover,

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they have the same ‘essential personality’. Of course, this claim raises other serious worries; but I shall not attempt to raise them here.

<sup>27</sup> Note that I would not conclude from the claim, that the set of universes which end in an Omega Point is of measure zero, either that our universe does not end in an Omega Point, or that it is certain that our universe does not end in an Omega Point. Contrast Tipler: “It is intuitively clear that if the number of trials is infinite, the probability that we eventually return to 1 is 1; which is to say, it is essentially certain. ... Hence we have eternal recurrence.” (p.96) That an event has probability measure zero does not mean that it does not happen, nor that it is certain that it does not happen. So Tipler’s inference here is invalid, even though he could reasonably conclude that it is *quite likely* that we eventually return to 1.

<sup>28</sup> Perhaps this paragraph could be worded a little more strongly. The current consensus—as of early 1999—is that the universe is open. If the consensus view is correct, then Tipler’s theory is ruled out on straightforwardly empirical grounds. However, it is also worth noting that expert opinion on these kinds of matters has been known to change.

there is reason for thinking that there are large regions of the universe which could not sustain life. Certainly, life as we know it—with its reliance on the chemistry of carbon, water, and so on—can only flourish in quite special conditions which no-one thinks are conditions which will eventually become typical of the universe at large. Of course, it would be unduly chauvanistic to insist that life can only be life as we know it. On the other hand, it does not seem unreasonable to insist that life does require a certain degree of complexity of organisation and structure, and that this requirement does place limits on the locations in which life can appear in the universe. Under conditions of sufficiently low density, there will be no life. So, most of the volume of the universe will be devoid of life (even if packets of life are uniformly distributed throughout). Under conditions of sufficiently high density, there will be no life. In particular, sufficiently close to the Omega Point, when even protons and neutrons have been torn apart, it seems incredible to suppose that there could be life. Perhaps the suggestion is just that every galaxy—or, less modestly, every star system—(which *now* exists?) will eventually be colonised. Even that seems most unlikely (to say the least). We are all too familiar with the vicissitudes of life to be confident that the resources are bound to be available to reach every galaxy (even under the assumptions which Tipler makes about progress in space-craft design, and so on); and, even if the resources are available, there are ever so many other imaginable problems which could get in the way. Co-operative exploration and colonisation has hardly characterised our history: what reason is there to think that our future should be any different?<sup>29</sup>

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<sup>29</sup> At p.154, Tipler writes: “When life has completely engulfed the entire universe, it will incorporate more and more material into itself, and the distinction between living and nonliving matter will lose its meaning”. This suggests that he thinks that life could exist everywhere even if there were lots of non-living material; but it doesn’t clear up what he means by ‘life exists everywhere’. (The last claim in the

3. Life exists everywhere in the universe right up to the Omega Point: The main difficulty here is one which I have already mentioned: it is very hard to believe that there is any form of life which could survive in the inhospitable conditions which would obtain in the universe as the Omega Point was approached. True enough, some people have been prepared to fantasise about intelligent beings which dwell in the depths of interstellar space (intelligent clouds of thinly dispersed interstellar dust) or at the cores of stars—but these suggestions surely are just fantasies. Moreover, in conditions under which quite fundamental particles—protons, neutrons, and even quarks—are torn apart, it is hard to see how one could even imagine that life might continue to survive.<sup>30</sup>

4. Life will consist of super-intelligent machines which build powerful computers: This seems to me to be perfectly physically possible. Perhaps Tipler's estimates about when we shall have machines which can pass the Turing Test, and so on, are a little over-optimistic—but I see no 'in principle' objection to this prediction. Of course, it is a different question whether it is likely to be the case that we are succeeded by—or become—super-intelligent machines. For myself, I think it unlikely—but I concede that reasonable people might well take an opposing view.

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quote requires correction. A distinction does not cease to be *meaningful* just because one of its terms happens, contingently, to cease to be instantiated.)

<sup>30</sup> This point is noted by Ellis, op. cit.: "This ignores the fact that the indefinitely rising temperature in such a Universe would dissociate not only molecules and atoms but even nuclei into their fundamental constituents. ... Both the reliable storage of complex biological information and its systematic and highly controlled hierarchical processing would be completely impossible in these circumstances."

5. People can be perfectly emulated on computers; and all of us will be perfectly emulated on computers in the far-distant future: I am happy to grant that people could be perfectly emulated on computers—i.e. I don't propose to argue that this is so much as physically impossible (it seems plainly logically possible). However, as I have already indicated, I do not see any virtue in conflating representations of persons with persons—i.e. I do not think that a computer emulation of me could be me, be a resurrected version of me, be my survivor, and so on. Moreover, I see no reason at all to think that we will be perfectly (or even approximately) emulated on computers in the far distant future. It is far from certain that there shall ever be computers powerful enough to emulate people. (Indeed, it is far from certain that human beings shall survive into the twenty-third century.) Even if there are such computers, it is hard to see what reason there could be for those who own the computers to try to produce computer emulations of people who have actually lived. Furthermore, even if those who own the computers do wish to produce computer emulations of people who lived long ago, it is quite unclear that they could succeed. Since there will be insufficient information available via reliable causal channels, the emulations will not be emulations *of* people who have actually lived. Tipler tries to circumvent this problem by arguing that all possible people will be emulated. However, although that might get around the 'causal connection' requirement, it seems unlikely that it is possible. Tipler claims that, since we are finite state machines, there are only finitely many possible people, and finitely many possible states which they can be in. However, this claim depends upon the assumption that states can be individuated without taking any account of environment and prior history. If the individuation of states is partly sensitive to 'external' considerations, then—given that the universe is not a

finite state machine with only finitely many possible states—it is not at all obvious that there are not infinitely many possible states that people can be in.<sup>31</sup> It may well be that one would need to emulate every physically possible universe in order to be sure to emulate all people who actually exist—and it is far from clear that this is even logically possible.<sup>32</sup>

6. The universe is globally hyperbolic, and every timelike and lightlike curve extends to the Omega Point: The condition that the universe is globally hyperbolic is a very strong causal condition which may well not be satisfied in the actual universe. At the very least, there seems to be some reason to think that there are event horizons in the actual universe, e.g. around black holes formed under gravitational collapse. If life were to ‘engulf the universe’, then presumably there will be living beings which fall into these black holes along timelike curves which are not extendible to the Omega Point. And, in any case, the point remains that it seems very unlikely to be true that every timelike and lightlike curve extends to the Omega Point.

In sum, then: even if we neglect the implausible ‘placement’ of theological terms in Tipler’s theory, and even if we further ignore the metaphysical problems which bedevil

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<sup>31</sup> Tipler considers something like this problem when he considers the suggestion that one could only ‘emulate’ a person if one emulated their entire universe, owing to the ‘quantum entanglement’ of the person with the universe. He claims that emulation need not require perfect simulation at the quantum level, but it is far from clear that this is correct. And, in any case, the problem raised by ‘externalism’ is quite independent of the problems allegedly raised by ‘quantum entanglement’.

<sup>32</sup> The logical problem is that, if the universe contains all these emulations, then the emulations must contain emulations of these emulations, which in turn ... . Even if this is possible, it seems to raise in a new guise the spectre of the Eternal Return which Tipler is so keen to avoid. (Perhaps we can get something even more like the Eternal Return if we think about the real run times for the emulations. Isn’t it the case that an event in an emulation of an emulation will be closer to the Omega Point than the same event in the emulation? Or is there some deep confusion in this thought?)

his account of ‘resurrection’, the remaining theory (or bunch of predictions about the future of the universe) is still rather implausible. Tipler makes quite a fuss about the predictions which his theory makes—e.g. estimates of the mass of the top quark and the Higgs boson, the density parameter of the universe, Hubble’s constant, and the amplitude of the density contrast. However, even if all of these predictions turned out to be confirmed, it is quite unclear how much support they lend to his theory. I take it that all of the predictions which I just mentioned are quite consistent with the absence of an Omega Point—and, indeed, that none of them makes an Omega Point particularly likely. Moreover, these predictions are equally consonant with the failings of the other major planks of Tipler’s theory. (One point here is that the prior probability of Tipler’s theory is extremely low. And another point is that there are no doubt many other cosmological theories which make the same predictions about the mass of the top quark, and so on, but which have higher prior probabilities.)<sup>33</sup>

#### IV

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<sup>33</sup> It is probably worth pointing out that I have not discussed *all* of the assumptions which Tipler makes in setting out his full theory. Among the other assumptions which he *explicitly* makes, there are the following: (i) the second law of thermodynamics applies in all circumstances whatsoever (p.72); (ii) the ‘Standard Model’ and General Relativity are objectively true (p.89); the phase space of the universe must be infinite (p.101); (iv) the wave function of the universe is that wave function for which all phase paths terminate in a future Omega Point, with life continuing into the future forever along every phase path in which it evolves all the way into the Omega Point (p.181—see also p.3)) There are also various *implicit* assumptions, e.g. about the nature of quantum cosmology, and the consistency of General Relativity and quantum mechanics. It would take us too far afield to try to discuss all of this. (Perhaps it is also worth noting the assumptions of the No-Return Theorem, upon which Tipler’s theory relies—see pp.102-3.)

There is much more which could be said in criticism of Tipler's views, and, in particular, of the development of those views in Tipler (1995). Moreover—as Midgley (1992) demonstrates—there are interesting speculations to make about the psychological motivation which one might have for attempting to develop views of this kind. However, the purpose of the present paper is quite modest: my aim has just been to show that there are good physical and philosophical reasons for thinking that Tipler's theory is, at best, utterly implausible and, at worst, perhaps not even so much as intelligible. Whether there are other versions of 'physical eschatology' which deserve more serious attention is a question which must be postponed to another occasion.