

## *Queer Mysticism: does Modern Physics Validate an Eastern Mystical World View?*

“Mystical profound insights are confirmed by modern scientific theories ...

Indeed Modern physics has been anticipated by ancient mysticism.”<sup>1</sup>

A paradigm shift in physics unfolding at the inception of 20<sup>th</sup> century shook up concepts fundamental to the classical picture of the universe, including our notions of space, time, causation and determinism; while adding to our models paradox, uncertainty and relativism. These developments, many now allege, point towards a view of the world that is consistent with the views of a variety of mystical traditions. The above remarkable claims made by Fritjof Capra in 1975 sparked off a controversy yet to subside, concerning whether there exist substantive parallels between the physicists and mystics insights into the nature of reality. ‘Parallelism’ consequently emerged as an important current at the interface of science, religion and mysticism. Despite the influence of parallelist doctrines there has been scant work evaluating either the parallelist’s characterisation of physics, mysticism, or the legitimacy of the purported parallels between the two fields. This paper evaluates the parallels presented by Capra in the *Tao of Physics*, arguably the seminal parallelist text.<sup>2</sup>

This paper necessarily covers a very wide range of topics, since it must examine Capra’s overall thesis, the extent to which eastern mysticism is a coherent body of thought with a unified metaphysics and Capra’s examples from relativity theory and quantum mechanics requiring technical treatments of aspects of these areas of physics. The subject of this paper is Capra’s strong version of physics-mysticism parallelism, outlined in my epigraph, emphasising not only that (a) modern physics is *consistent* with eastern mysticism,<sup>3</sup> but

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<sup>1</sup> Capra (1975, p. 145)

<sup>2</sup> While similar parallelist theses have been raised in the *Tao of Science* (Siu, 1957), *The Dancing Wu Li Masters* (Zukav, 1979), *The Eye of Shiva* (de Riencourt, 1980) for example, Capra’s *Tao of Physics* has received the greatest acclaim.

<sup>3</sup> Capra (1975, p. 32)

further that (b) mysticism has *anticipated* modern physical theories,<sup>4</sup> and (c) mysticism is *confirmed* by physics.<sup>5</sup> The claims that physics is *consistent with*, indeed *confirms* and has been *anticipated by* eastern mysticism shall be the focus of this paper. I shall evaluate Capra's claims as follows. Section I, examines the parallelist methodology generally and determines in what sense scientific and mystical beliefs can be compared. Section II and III evaluate the purported parallels between mysticism and Quantum Mechanics and Relativity Theory, respectively. Finally, Section IV outlines some important directions for future research.

My overall conclusion is that further work needs to be done in order to establish any of Capra's substantial parallels between mysticism and physics, given his mischaracterisation of the epistemological and metaphysical issues involved in both eastern mysticism and physics. *Contra* Capra, instead of a single 'world view' of mysticism we find a great diversity of views. Instead of a 'world view' of modern physics we find there is endless interpretational controversy. Where parallels are potentially defensible they are generally uninformative and suffer from severe translatability issues. None of Capra's central parallelist conclusions are satisfactorily supported by the arguments put forth in the *Tao of Physics*. I do not conclude, however, that substantive linkages between physics and mysticism must be ultimately rejected once and for all. There is no harm in drawing analogies with any field of endeavour provided that the nature of the analogy is understood. Capra's parallelist thesis however implies not mere analogy but meaningful identity between the findings of physics and mysticism, and in this overreaching I fear he has done more harm than good.<sup>6</sup>

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<sup>4</sup>Capra (1975, p. 126)

<sup>5</sup>(Capra, 1975, p. 114)

<sup>6</sup>This paper is also intended to provide a structure for my own inquiries into potential parallels between quantum entanglement (and the subsequent demise of local realism) and the notion of holism non-separateness. This shall not be discussed in what follows, but will be the focus of work to come (Tempone, 2015).

## *§I Parallelism*

Until recently, parallelist claims had been broadly dismissed as endeavouring to unify seemingly irreconcilable concepts. However, parallelist claims are increasingly being debated academically and amongst the wider public. Parallelism's new found popularity due, in considerable part, to Capra's *Tao of Physics* and subsequent texts.<sup>7</sup> Before examining the possibility of specific parallels, in this section I will evaluate on the parallelist methodology generally. By (i) identifying methodological issues with translatability, (ii) examining pitfalls of linguistic similarities, (iii) identifying issues with Capra's characterisation of eastern mysticism, and (iv) highlighting the potential transience of any apparent parallels. These considerations lead to a general scepticism of the parallelist enterprise and reveal important pitfalls facing Capra's parallelism.

### *(i) Issues with Translatability:*

It is necessary to consider the accuracy and scope of translatability between physics and mysticism generally. A fundamental tension faces Capra. He holds that physicists understand reality mediated purely by symbolic and conceptual abstractions: "physical theory contain solely representations which must not be confused with reality."<sup>8</sup> Yet in contrast he asserts mystics apprehend reality 'directly'; undergoing the "direct experience of reality transcending intellectual thinking".<sup>9</sup> This belief is similarly expressed in Glen Kezwer's assertion that: "the physicist is looking at nothing but a set of highly abstracted differential equations, not at reality itself, but mathematical symbols of reality... the mystic on the other hand claims to perceive reality directly." In discussing translatability it is important to contrast this realism in Capra's writing about the results of mystical investigations with Capra's anti-realism about physics. For Capra to claim physics and

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<sup>7</sup> S. P. Restivo (1978).

<sup>8</sup> Capra (1975, p. 35).

<sup>9</sup> (Capra, 1975, p. 28).

mysticism could even possibly converge or communicate it would appear he must admit mysticism *also* to be ‘merely’ a system of symbolic abstraction, as physical knowledge is uncontroversially viewed.<sup>10</sup> Thus it seems Capra must either (a) accept the apparent untranslatability between an exact science of symbolic abstraction and spiritual disciplines whose insights cannot be articulated, or (b) accept that the truths of mysticism, like physics, are ‘merely’ symbolic abstractions.

While this is no easily resolvable question, for the purposes of this paper I will proceed on the assumption (b) that both fields deal in abstractions. This is as, whilst (b) injects a degree of contingency into mystical beliefs - contingency which Capra would find objectionable<sup>11</sup> - at least (b) allows for translatability, with prospects for commonalities and thus ‘parallels’ across levels reflected in language. Additionally, *pace* Capra, this does not preclude the mystic having ‘genuine’ insight or perceiving reality ‘directly’,<sup>12</sup> it only recognises the difficulty in conveying those insights in language. Indeed, mystics have long held that truths expressed in words or symbols are necessarily limited and approximate. This is illustrated by ‘Koan’ paradoxes, frequently utilized by Taoists and Zen Buddhists to expose the inconsistencies arising from verbal communications and to show their limitations.<sup>13</sup>

Arguably, then, the parallelist endeavour is legitimized by the fact that the most one can do is compare the world-view of modern physics, imperfectly expressed, with the world-view of mystical experience, also imperfectly expressed. So, continuing on the assumption that there is at least *potential* for informative parallels to exist, I will examine further impediments to Capra’s parallelism.

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<sup>10</sup> See Capra (2003, p. 25), a point also raised by Wilber (1982).

<sup>11</sup> Capra (1975, p. 24)

<sup>12</sup> Capra (1975, p. 120)

<sup>13</sup> (Capra, 1975, p. 124)

*(ii) Pitfalls of Language:*

The basic data Capra draws upon to establish his parallels are, naturally, statements about the nature and implications of mysticism and physics. I'll argue Capra tacitly assumes that if the *linguistic* content of the statements of physics and mysticism is similar, then the *conceptual* content must be also. However in doing so Capra fails to account for the existence of 'accidental similarities' of language, which fail to reflect conceptual equivalencies. These accidental similarities arise due to the existence of *linguistic contamination* between the two fields as well as importantly the *functional differences* and *distinct origins* of terms which appear similar.

The linguistic problem of 'contamination', holds that the explanation for the apparent convergence of terminology and imagery is that as physics has developed, physicists have been forced to abandon the imagery and concepts of ordinary language, adopting what other terminology exists at their disposal. Consequently, if attempts to describe physical reality sound mystical, this may be a result of certain general linguistic patterns that prevail when people attempt to describe foreign concepts. This occurs as many modern influential mystics have come into contact with modern physics and similarly many physicists have come into contact with mysticism.<sup>14</sup> Humans readily demonstrate a propensity for drawing analogies across disparate systems of thought and for trying to understand the unknown in terms of the known. There is certainly evidence of physicists utilizing mystical terminology for simplicity's sake, without the existence of any deeper connection between the two subject matters. A telling example is the case of Gell Mann's<sup>15</sup> use of the Buddhist notion of the 'eightfold path' to describe a symmetry property in particle physics, though the analogy intended was purely linguistic. This is

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<sup>14</sup> (S. Restivo, 1982)

<sup>15</sup>Gell Mann (1998)

further complicated however due to the distinct *origins* of concepts and *functional* differences concepts serve.

Following Gould we can reasonably assume that terms are meaningfully defined specific to the theories of their original domain.<sup>16</sup> In which case, given their drastically different origins, it becomes even clearer that any nontrivial similarity between the linguistically similar notions drawn on in physics and eastern mysticism, would need to be established beyond mere lexical commonalities. Recognising the functional differences between scientific and religious language also affects the scope of particular parallels: those whose kinship is merely superficial and linguistic, compared to those reflecting meaningful identity between physics and mysticism. A useful example of functional difference is the use of paradox. Capra likens the paradoxical difficulties physicists have in visualising and interpreting wave-particle duality with the mystic's use of Zen Koans, paradoxical riddles used to transmit teachings.<sup>17</sup> However do paradoxes serve importantly similar functions in the two fields? Paradoxes in mysticism are valued as tools of teaching, which reveal the limits of verbal communication. Whereas, on the contrary, the majority of physicists aim to resolve paradoxes in order to create consistent theories.<sup>18</sup> Capra overlooks this functional difference. For example, while emphasising the mystery of wave-particle duality,<sup>19</sup> he obscures the various resolutions of this alleged paradox. Paradoxes in physics are generally not intended to reveal the limits of verbal communication, but considered inconsistent obstacles to be overcome in the creation of a consistent theory.

Given the threat of linguistic contamination and difference in conceptual origin and function, the burden is consequently placed on Capra and the parallelist in general, to prove linguistic similarities have conceptual significance, beyond mere *accidental*

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<sup>16</sup>For a detailed evaluation of relevance of origins and functionality to analogies value, see Gould (1988).

<sup>17</sup>(Capra, 1975, p. 43)

<sup>18</sup> See (Petruccioli, 2006), granted there are exceptions to this rule, Capra for one.

<sup>19</sup>(Capra, 1975, p. 151)

appearance of similarity. I'll now consider difficulties arising for Capra concerning his characterisation of eastern mysticism.

### *(iii) Capra's Characterisation of 'Eastern Mysticism'*

It should go without saying that the parallelist must achieve genuine representativeness, when *selecting* and translating *materials* for comparative analysis, in order to accurately portray the mystic's views. Achieving genuine representativeness can however be highly problematic. This is as the term 'mysticism' is used in a variety of senses and even within mystical traditions there exist controversies and in-house disputes. While the scant previous philosophical critique of parallelist accounts have focused exclusively on interpreting the physics,<sup>20</sup> I will briefly evaluate Capra's characterisation of 'eastern mysticism'. This is as I hold that either the conflation or mischaracterisation of the philosophical outlooks of various mystical schools will have significant ramifications for the legitimacy of Capra's purported parallels. Indeed I argue Capra mischaracterises mysticism; generalising and treating the variety of eastern mystical perspectives of "all ages and traditions" as adherents of a single "holistic mystical world view".<sup>21</sup>

The first step in this mischaracterisation is his assertion that all mystical experience is of either a 'nature' or 'depth' type. He defines nature mysticism as 'transfiguring' objects during meditation, resulting in experience of the world as 'undivided' or 'holistic', Depth mystics, by contrast, experience an 'imageless state' in which sensory experiences of the external world vanishes.<sup>22</sup> Capra however fails to provide justification for his assertion that *nature* versus *depth* is the primary distinction between mystical experiences. Indeed scholars theorise that there exist a variety of distinctions made by differing mystical traditions concerning the different types of *nature* mystical experience and those who

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<sup>20</sup>The only cursory examination of Capra's Tao of physics takes Capra's interpretation of mysticism at face value: see Clifton and Regehr (1990, p. 56).

<sup>21</sup>Capra (1975, p. 19)

<sup>22</sup> (Capra, 1975, p.41)

even deny the 'nature' 'depth' distinction outright. T Stace, for example, divides mystical experience into extrovertive and introvertive varieties, while in contrast R. C. Zaehner divides mystical experience into three kinds; nature mysticism, monistic mysticism and theistic mysticism. While Stephen Katz argues for the contextual nature of mystical experience, that mystical experience cannot meaningfully be separated from the cultural and philosophical context which serves to determine how that experience is produced and interpreted.<sup>23</sup> It is consequently difficult to reconcile Capra's characterisation of the world-view of Eastern mysticism with many varieties of Eastern mysticism.

The second step in Capra's mischaracterisation is the assertion that nature and depth mystical experiences have a common core of beliefs, drawing solely on personal experiences to argue "The basic features of the world views [of all mysticisms] are fundamentally the same."<sup>24</sup> Yet this assertion rings dissonant in the face of the doctrinal differences and exclusive claims of the various forms of mysticism. Renowned mysticism scholar Jones states "any reality experienced *nature*-mystically is not the *mystical* of the *depth-mystical* experience."<sup>25</sup> Indeed, scholars of Eastern philosophy have on the whole characterised mysticism as a disparate, multifaceted and oft contradictory group.<sup>26</sup>

The incredible diversity of mystical experience and beliefs defies Capra's efforts to produce a simple scheme of classification. Indeed in his efforts to produce a simple classification in which mystical experiences and beliefs are largely uniform, Capra has overlooked the variety in mystical experience and provided a truncated and simplistic account of mysticism. In conclusion it seems incredibly doubtful that mystical traditions can truly be regarded as having the degree of uniformity Capra demands.

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<sup>23</sup> These differences are outlined in greater detail in Woods (1996) and more recently (Wilber, 2011).

<sup>24</sup>(Capra, 1975, p. 19)

<sup>25</sup>(Jones, 1986) italics mine

<sup>26</sup> The variety of perspectives on the various versions of mysticism is pursued particularly in (Jones, 1986) and (Wilber, 1982)



*(iv) Transitory Parallels:*

One major criticism of Capra's parallelism, which I will return to in section II and III, is that any apparent parallel may simply reflect a temporary condition in modern physics. For example, Capra draws on the s-matrix theory, or the 'bootstrap' model, of elementary particles: conceiving of nature as a self-consistent whole, in that all its components are consistent with themselves and one another.<sup>27</sup> He asserts the s-matrix theory claims that "every particle consists of all other particles"<sup>28</sup> and that this view converges upon the Mahayana Buddhist notion of 'interpenetration' that all things are interrelated, part of a unity, that "in every particle of dust, there are present Buddha's without number".<sup>29</sup> However, the Bootstrap model of strong-force interactions is now generally rejected as unnecessary, given the discovery of a conglomeration of 'gauge' quantum field theories.<sup>30</sup> This illustrates the fact that although certain parallels may appear discernible, these may *also* simply reflect a temporary condition in modern physical theory where theoretical development is imminent. In contrast, mystical beliefs are generally held to concern unchanging 'truths', expected to remain relatively stable.<sup>31</sup> Though this argument does not undermine parallelism, it forces us to recognise the apparent transitoriness of even apparently convincing parallels.

*Section I Conclusion:*

As outlined in considering the nature of the parallelist methodology, strong grounds exist for scepticism towards the parallelist enterprise and Capra's account in particular. Given the translatability issues identified in (i) to defend parallelism Capra must admit

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<sup>27</sup>(Capra, 1975, p. 42)

<sup>28</sup>(Capra, 1975, p. 295)

<sup>29</sup> most clearly expressed in the avatamsaka sutra: see (Capra, 1975, p. 296).

<sup>30</sup> a whole category of theories, see (Kuhlmann, 2014).

<sup>31</sup> A claim defended in (Wilber, 2011)

mysticism to be a system of symbolic abstraction, as physics certainly is. Given the potential for accidental linguistic similarity as well as origin based and functional differences identified in (ii), the onus is on Capra to prove *actual* conceptual significance not superficial linguistic similarity. Given Capra's truncated characterisation of eastern mysticism in (iii), there is immediate doubt cast on the efficacy of any purported parallels. Finally any apparent parallels may be merely transitory, based upon temporary conditions in modern physics, as seen in (iv). Though I have set the groundwork by outlining potential pitfalls within the parallelist methodology, a genuine evaluation of Capra's claims requires engaging with his specific parallels, as such the following two sections engaging with Capra's interpretation of the metaphysical implications of both Quantum Mechanics and Relativity Theory.

## §II Quantum Mechanics

Undeniably Quantum Mechanics (hereafter, QM) has forced us to reconsider entrenched beliefs; beliefs in the existence of an observer-independent world, belief in the possibility of our gaining objective knowledge about that world, and belief that certain properties are objectively possessed by physical systems. Capra argues that QM confirms essential teachings of mysticism such as the role of consciousness in ‘creating reality’ and the status of reality as thoroughly indeterministic.<sup>32</sup> I evaluate these claims by addressing his characterisation of firstly, *the status of consciousness* and secondly, *the status of determinism* under QM. I find that in light of Capra’s failure to address the multiplicity of different interpretations of QM, we have no reason to accept his characterisation of QM as indeterministic or as essentially requiring consciousness. Consequently Capra is not entitled to claim that QM is either consistent with, anticipated by, or confirms mystical beliefs.

### (i) *The Status of Determinism in QM*

Determinism is often defined as the thesis that every event is necessitated by antecedent events and conditions together with the laws of nature (Hofer, 2010). To illustrate, take (BB) to be a statement about the initial conditions of the universe, (L) to be a statement about the laws of nature (whatever they are), and (E) to be a true statement about some event selected arbitrarily – in this instance the event of my drinking tea right now. We can say that determinism is true IFF for any true statement E the conjunction of BB and L entail E.

Capra states Quantum Mechanics has “fatally undermined the existence of strictly deterministic laws of nature”<sup>33</sup> entailing the indeterministic nature of the universe. This,

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<sup>32</sup> (Capra, 1975, p. 298).

<sup>33</sup>(Capra, 1975, p. 68).

Capra claims, parallels the mystic's view of reality as "completely indeterminate."<sup>34</sup> As I will argue however, physics however by no means requires us to jettison determinism. Indeed, on many interpretations QM is one of the best prospects for a genuinely deterministic theory. In what follows I will argue Capra massively overstates the prospects for indeterminism, which are highly contingent upon which interpretation of QM one adopts.

Under QM the wave-function of any given physical system evolves according to the Schrödinger equation in a linear *superposition* of different states. That is to say, it exists partially in all its particular theoretically possible states simultaneously. This is a very strange state to be in; indeed nothing in our familiar experience exists simultaneously in a variety of different possible states. Perhaps the most notable classical behaviour of macroscopic systems is that they exist in a single definite state.<sup>35</sup>

However the superposition of many states is not the strangest part of the story: the strangest fact is that somehow, upon measurement, this wave-function seems to 'collapse' to one state. That is, upon measurement we are given a result corresponding to only one configuration, measurement somehow always find the physical system in a *definite* state. The currently unresolved 'measurement problem' thus arises, of if this apparent wave-function collapse *actually* occurs, and if so how? And why?

'Objective Collapse' theorists attempt to resolve this dilemma by claiming the collapse of the wave function *genuinely* occurs. That is to say, something interrupts Schrödinger evolution and thus accounts for the appearance of physical systems in definite states – the classical behaviour of macroscopic systems. Capra uses this 'objective collapse' hypothesis to justify his claim that indeterminism or 'quantum indeterminacy' – the existence of 'objective chance' in natural processes – is a consequence of QM.

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<sup>34</sup>(Capra, 1975, p. 33).

<sup>35</sup>(Ghirardi, 2011).

Some assert this occurs due to the physical systems indeterministic behaviour upon wave-function collapse: the state of a system upon measurement cannot be predicted precisely, QM yields only the probabilities of which definite state will occur, given by the Born rule, are predictable. This is drawn on by some such as Capra, as evidence that the most basic constituents of matter at times behave indeterministically.<sup>36</sup>

However we've good reason to doubt this assumption of indeterminism, as the notion of 'collapse' has been subject to serious criticism. Many physicists assert that as the collapse process is not physically well defined it seems too ad hoc to be fundamental to nature's laws. The fact that these theories seek to extend QM's formalism, holding that the equation of the standard Schrodinger theory should be modified by the addition of a new equation to account for collapse, is also considered a violation of the principle of *parsimony* or simplicity. Further the fact that the collapse process is non-local and superluminal, occurring faster than the speed of light, means its existence would violate the speed limit imposed by Relativity Theory.<sup>37</sup> Until such issues have been resolved we should remain agnostic regarding collapse and also agnostic regarding the attendant indeterminism.

However the most essential point is that many deterministic QM interpretations denying the occurrence of wave-function collapse exist, what is more not all collapse theories are indeterministic, there even exist deterministic collapse theories.<sup>38</sup> These indicate the continued contestation of QM's purportedly indeterministic status.

### **The relation of probability to Indeterminism:**

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<sup>36</sup> Further on collapse theories (Ghirardi, 2011).

<sup>37</sup>For a more detailed analysis of the above issues see (Ghirardi, 2011)

<sup>38</sup>Those agnostics including the relational interpretation, consistent histories, ensemble interpretation and quantum logic, and those out rightly deterministic include, de broglie bohm, time symmetric interpretations and the many world's interpretation (both Everett's 1957, and Dieter Zeh's 1970).

Any assumption of indeterminism ignores the possibility that QM's probabilistic predictions only tell us that we have imperfect knowledge of a deterministic system. Indeterminism and unpredictability are not synonymous: A distinction must be recognised between genuine indeterminism (the existence of objective chance in natural processes) and our imperfect knowledge (our inability to measure the underlying variables).

This is as there exists an important distinction between the *epistemic* and *ontological* ramifications of Quantum mechanics, which bears on the status of determinism. The ontological ramifications concern what 'things' exist in the world, while the epistemic factors concern the scope of our knowledge of the world. Capra, however, conflates the two by equating determinism with predictability,<sup>39</sup> attempting to portray QM as 'necessarily' indeterministic, in revealing 'inherently' unpredictable knowledge of the world.<sup>40</sup>

The fact that *Quantum measurement can make only conditional probabilistic predictions of the definite states physical systems will be found in* – rather than explained as an ontological, indeterministic reality encoded in the universe, *could just as well* be attributed to epistemic limitations, resulting merely from human observational capacities.

However the truth of indeterminism depends on the universe's structure, independent of what we can know of it; Bricmont observes "nobody who has ever defended universal determinism ever meant it to be true of universal predictability."<sup>41</sup>

This is similarly illustrated in the mathematical field of Chaos theory: the study of the behaviour of dynamical systems that are highly sensitive to initial conditions. Small differences in initial conditions yield widely diverging outcomes for such dynamical systems, rendering long-term prediction practically impossible with current

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<sup>39</sup> As stated in (Smith, 2013).

<sup>40</sup>(Capra, 1975, p. 28).

<sup>41</sup> See Bricmont (2002).

knowledge.<sup>42</sup> This happens even though these systems are deterministic: their future behaviour is fully determined by their initial conditions, with no random elements involved.<sup>43</sup> In other words, the deterministic nature of these systems does not make them predictable. Determinism only requires that every event be necessitated by antecedent events and conditions together with the laws of nature, irrespective of our capacity to predict the occurrence of those events.

Indeed, in contrast to indeterministic collapse hypotheses, the many-worlds interpretation of quantum mechanics asserts physical systems obey a deterministic universal wave-function at all times; in particular there is no indeterministic wave-function collapse associated with measurement. Similarly de Broglie–Bohm propose a deterministic theory, on which particles always have positions and are always guided by the wave-function which evolves according to the Schrödinger wave equation, and this wave-function never collapses. In any case, as outlined in section I, even were we to accept that QM implies indeterminism we still have reason to suspect that purported parallels with mysticism may merely reflect temporary conditions in physical theory. Indeed, as our best current theories of particle physics and relativity theory are too inconsistent with each other to constitute a final theory, apparent theoretical indeterminacy should not be considered indicative of indeterministic laws governing our world.<sup>44</sup>

### **Is Mysticism really indeterministic?**

A further unaddressed question is whether mysticism itself is ‘indeterministic.’ Capra never makes particularly clear why he thinks it is, despite stating indeterminism is

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<sup>42</sup> (Kellert, 1992, p. 32).

<sup>43</sup> (Kellert, 1992, p. 56)

<sup>44</sup> see Earman (1986)

*exemplary* of the parallelist enterprise.<sup>45</sup> The primary motivation I could find is Capra's belief that indeterminism allows for human agency in a way determinism fails to, and a way which is also adhered to by mystics. Capra believes indeterminism is more in line than determinism with mystical recognition of human agency, which he expresses by writing QM has "heralded a return to an anthropocentric world-view".<sup>46</sup> However, the view that we have more free will in an indeterministic universe than a deterministic one is *exceptionally* contentious.<sup>47</sup> Lacking a compelling connection between indeterminism and free will, we have no reason to accept Capra's claim that mysticism is indeterministic.

### *(ii) The status of Consciousness in QM*

Capra again draws upon the measurement problem, to argue that human consciousness is essential to the collapse of the wave function. He asserts QM fundamentally and unequivocally requires consciousness and the human observer, stating: "Modern physics *always* includes the observer in an essential way."<sup>48</sup> On some interpretations, certainly, QM posits a special role for consciousness in the process of quantum measurement. These Consciousness interpretations, based on the central role of the observer, assert consciousness terminates the chain of indeterminate properties by deciding which outcome will materialise. Capra draws particularly on Wigner's claim that the 'non physical' conscious mind is the only measurement apparatus which can bring about collapse of the quantum wave function,<sup>49</sup> drawing the parallel that similarly "mysticism always includes the human observer and his consciousness."<sup>50</sup>

As already argued, the occurrence of wave-function collapse itself is a highly controversial topic; Capra however further fails to recognise that even amongst collapse

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<sup>45</sup> (Capra, 1975, p.65)

<sup>46</sup> (Leane, 2007: 105, 83)

<sup>47</sup> That an indeterministic universe provides no more space for free will than a deterministic one, is argued for compellingly in Berofsky (1966).

<sup>48</sup> Capra (1975, p. 81)

<sup>49</sup> (Schreiber, 1995)

<sup>50</sup> Capra (1975, p. 152)



theorists consciousness interpretations remain highly speculative and contentious, the formalism of QM in no way entails a unique interpretation. This is foremost because of the unresolved ambiguities regarding the notion of consciousness. It is often unclear whether quantum observers are taken to include foetuses, chimps or indeed amoebae, or whether it is only human consciousness which collapses the wave-function. Indeed currently we have no reason to believe a sharp distinction exists, or can be drawn, between conscious persons and non-conscious animals or organisms. Indeed, even the Copenhagen interpretation, drawn upon in Capra's defence, does not adequately specify what constitutes the 'observer' or 'observation'.<sup>51</sup> As a result, consciousness interpretations fail to explain which things have sufficient consciousness to collapse the wave function and why they do.

Consciousness is no longer even viewed as necessary for wave-function collapse during measurement – experimental results suggest that collapse-causing observations within inertial frames can be made by videotape recorder measuring devices just as well as conscious beings.<sup>52</sup> Further, delayed choice quantum eraser experiments have been argued to effectively preclude 'consciousness interpretations'.<sup>53</sup> The formalism of QM allows for collapse to be placed at any position in the causal chain from 'measurement' device to 'subjective perception' by human observers.<sup>54</sup> Clearly the view that consciousness plays a vital causal role in bringing about collapse is both highly problematic and contested. More condemnably, Capra ignores the fact that a consciousness interpretation of quantum measurement is merely one of a variety of positions on the measurement problem.<sup>55</sup>

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<sup>51</sup> See again (Neumann, 1996)

<sup>52</sup>(Ghirardi, 2011)

<sup>53</sup>(Yu & Nikolić, 2011)

<sup>54</sup> Illustrated by Von Neuman's chain, in Neumann (1996)

<sup>55</sup> A list of the variety of positions in full, and an outline of which prescribe a role for consciousness can be found in (Ismael, 2014)

### *Conclusion*

With statements such as “quantum mechanics tells us”<sup>56</sup> and “modern physics forces us to believe”<sup>57</sup> Capra has implied repeatedly that the technical apparatus of QM settles fundamental metaphysical questions. However whether QM requires observer-consciousness for wave-function collapse, and whether QM reveals indeterministic processes as fundamental to nature’s workings remain open questions. Capra fails to show either that QM implies indeterminism, or indeed that a mystical ‘holistic’ conception of reality even *embraces* indeterminism. There is no uncontentious interpretation of QM’s metaphysical ramifications, and ample reason to doubt those favoured by Capra. As such Capra is not entitled to claim QM is either consistent with, anticipated by, or confirms mystical beliefs. In what follows I will consider parallels drawn by Capra between the metaphysics implied by Relativity Theory and mysticism.

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<sup>56</sup>(Capra, 1975, p. 138)

<sup>57</sup>(Capra, 1975, p. 138)

### §III *Relativity theory*

Capra asserts that Relativity Theory (hereafter, Relativity) converges upon the metaphysics of eastern mysticism, and his portrayal of mysticism as what he calls a 'spacetime' philosophy.<sup>58</sup> His central claims are:

- (i) That Spacetime is unreal (the 'relationist' view), and that this 'unreality' is experienced by the mystic.
- (ii) That Time is 'static', and the apparent 'lapse of time' also unreal, supporting the claim that mystics can experience the full span of spacetime.
- (iii) That Causality is unreal, which supports the mystical experience of the transcendence of causality.

Though the many interpretational issues related to the philosophical status of Relativity are far from settled, Capra once more draws his parallelist conclusions from highly contested interpretations of Relativity. I find that once again, we're given no reason to accept Capra's characterisation of Relativity's implications for space, time, or causality. Consequently Capra is not entitled to claim that Relativity is consistent with, anticipated by, or confirms mystical beliefs.

#### *(i) Is Spacetime Real?*

The advent of Relativity shifted attention from the corporeality of *space* to the question of the corporeality of *spacetime*. The 'Substantialist' position holds that spacetime is a substance, existing independently of the processes occurring within it. The 'relations' position holds that spacetime is instead only a systematic way of describing the spatial and temporal relations existing between different bits of matter. Capra assumes Relativity provides conclusive evidence for Relationism, and that consequently spacetime is a "*mere*

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<sup>58</sup>(Capra, 1975, p. 190)

*element* of the language a particular observer uses for his description of phenomenon.”<sup>59</sup>

Further, he asserts this unreality of spacetime is “experienced by the mystic”.<sup>60</sup>

There remains however, ongoing disagreement over the ontological status of spacetime. The emergence of the general theory of relativity (hereafter, GTR) and inflationary cosmology have provided compelling reason to doubt the Relational view, and indeed support Substantivalism. GTR, for instance, predicts that “empty space” can have its own energy. As this energy is a property of space itself, it is consequently not diluted as space expands, rather, as more space comes into existence so does more of this energy-of-space.<sup>61</sup> That empty spacetime itself has both mass and energy, independently of events occurring within it, is difficult to reconcile with Relationist claims that spacetime exists only as a relationship among bits of matter.

Another compelling point, which I have not found anywhere in the philosophical literature on the nature of spacetime<sup>62</sup> is that it appears that in order to keep GTR consistent with inflationary cosmology, we must recognise spacetime as *real*. This is as the orthodox view of the origins of the universe, Inflationary cosmology, holds that just after the big bang the universe underwent a period of rapid exponential expansion occurring much faster than the speed of light. This is not the only time at which matter throughout the universe has expanded faster than the speed of light; indeed recent observations of distant type Ia supernovae provide compelling evidence that since the universe was about 7 billion years old, its expansion rate has not been decelerating as predicted, but actually *accelerating*.<sup>63</sup> The universe is expanding not only faster than the speed of light, but at an ever increasing rate of acceleration. However the speed of light

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<sup>59</sup>(Capra, 1975, p. 63)

<sup>60</sup>(Capra, 1975, p. 150)

<sup>61</sup> There is also a suggestion that dark energy may be intrinsic to empty space, see (Carroll, 2001)

<sup>62</sup> Even the most thorough going encyclopaedia on the debate has no mention of the relevance of inflationary cosmology as evidence for substantivalism see Nick Huggett, (2006).

<sup>63</sup>(Riess et al., 1999)

is thought to be the speed limit for familiar matter imposed by Relativity Theory.<sup>64</sup> It therefore seems that given early cosmic inflation, and indeed current rates of expansion, the galaxies are moving away from each other at a speed which violates the known speed limit for familiar matter.

The proposed solution to this apparent violation of Relativity's speed limit is to say that while *matter* cannot move faster than the speed of light, *spacetime* can. This is justified by arguing that the rule that relative velocities cannot increase past the speed of light according to GTR does not apply to relative velocities in co-moving coordinates, which are often described in terms of the "expansion of space" between galaxies. It seems to make little sense to use the expansion of space to solve a problem that the movement of matter can't solve, unless space is substantial.

In light of the fact that empty space is *not* empty of properties, and given Inflationary Cosmology's consistency with GTR requires viewing spacetime as a thing with capacities, it seems at present that, *pace* Capra, relativity tentatively supports substantivalism. Although future developments may tell convincingly one way or the other, for now there seems telling evidence that relationism seems to have kicked Newton's bucket and, *contra* Capra, substantivalism should be our working hypothesis.

### *(ii) Is Time an Illusion?*

Should we follow Douglas Adams in thinking time is an illusion, and lunchtime doubly so? Capra certainly seems to think so, alleging relativity theory, and the relativisation of simultaneity support a 'static' view of time, on which matter is displaced statistically in time, in opposition to our perception of change and 'becoming'. Capra claims this 'static' view supports the mystical belief that the universe is fundamentally timeless, and that the

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<sup>64</sup> (Riess et al., 1999)

mystic can experience this timelessness; can indeed experience the *full span of spacetime*.<sup>65</sup> “the ordinary awareness of time is transcended, instead of a linear succession of instances [mystics] experience a timeless yet dynamic present.”<sup>66</sup> Here I will evaluate (a) Capra’s assertion that the Relativity of Simultaneity provides compelling evidence against the *becoming* view, which holds times ‘lapse’ is not merely subjective but retains its physical objectivity, and for the *static* view, on which the future is as real as the present and the apparent passage of time is illusory. I will also consider (b) whether a physicist’s notion of time as ‘static’ is genuinely analogous to the mystical view of illusory time.

**(a) The Relativity of Simultaneity’s bearing on the nature of time:**

The Relativity of Simultaneity (hereafter, RoS) a consequence of Relativity, holds that whether two spatially separated events occur at the same time is not an absolute matter, but depends rather on the observer's reference frame. Accordingly it is impossible to say absolutely that two distinct events occur at the same time if those events are separated in space. So, a car crash in Canberra and another in Paris, which appear to happen simultaneously to an earth bound observer (according to a stationary earth reference frame) will appear to have occurred at slightly different times to an observer in a different reference frame (a different state of motion relative to the events). Indeed according to some reference frames the Canberran crash would occur first, while according to others the Parisian crash would occur first. This happens because there exist an infinite number of planes of simultaneity passing through any given space-time point, for which there is no physical test to distinguish one as genuinely real or present in comparison to the others. We have no way to distinguish *the* present from the multitude of *different presents*. This implies that for two people in relative motion, an event in A’s

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<sup>65</sup>(Capra, 1975, p. 186)

<sup>66</sup>(Capra, 1975, p. 179)

present could be in B's future and the reverse, which would seemingly give us multiple different 'nows'.

The relativity of simultaneity then drawn on by defenders of the static view of time, such as Capra, who assert that as there is no such thing as *absolute* simultaneity but only *relative* simultaneity, this renders the passage of time not an objective feature of the world. In this case proponents of the 'becoming' view would seemingly have to select one reference frame as the genuine 'present', a selection static theorists claim to be arbitrary and unjustifiable objectively.

There exist however several potential responses available to defenders of the becoming view. They may either (a) deny that general relativity provides an accurate account of spatio-temporal relations among events - obviously not a popular move as we haven't really got anything better than GTR just yet - or (b) deny general relativity entails there can be no absolute simultaneity. Unlike option (a) I think option (b) more plausible. This is as while Relativity entails that it is perhaps not possible to observe whether two events are absolutely simultaneous, the theory has no bearing on whether there is such a phenomena as 'absolute simultaneity' *absolutely* as it were - this is a similar argument to that raised concerning indeterminism's status: as with indeterminism, the *appearance* of multiple present 'nows', none with any privilege, may merely reflect an epistemic limitations. In which case all RoS has shown to be likely is that we can never physically discover which is the 'real' now. This 'becoming' response is by no means a conclusive defence; however it gives us reason to question Capra's assumption that the static interpretation is conclusively supported by Relativity.

### **Are the mystical and physical notions of 'timelessness' genuinely analogous?**

Even were the static view uncontroversially supported by Relativity, There exist strong reason to believe there are significant differences between the genuine meaning of the

‘static’ physical notion of illusory time, and the mystic’s notion of timelessness. As recognised in section I there should be no supposition of ‘translational equivalency’ between mystical and physical notions, particularly in light of functional differences. And there are blatant functional differences. It is generally held that the mystical ‘sense of illusory time’ results from the suspension of ordinary ways of ‘attending to the world’. In contrast the physicist’s static view is the result of a specific conceptual evolution. This suggesting that the mystic’s experience of timelessness has nothing to do with relativistic notions in physics but rather is the result of a particular kind of ‘absorptive attention’.<sup>67</sup> It is not at all clear, *prima facie* that their experience is conceptually equivalent.

*Tension and Contradiction in Capra’s characterisation of the eastern mystical  
notion of ‘illusory time’*

Indeed, we even have good reason to think Capra’s characterisation of the mystical notion of ‘illusory’ time is itself *incoherent*, and consequently fails to accurately parallel the metaphysical ‘static’ interpretation of time. This internal incoherence arises from apparent contradictory mystical claims made by Capra. At one time he asserts the mystical view supports the static view of “time as unreal, given the ‘now’ each person experiences is simply a reflection of his ‘ego’.”<sup>68</sup> However, he also appears to support the ‘becoming view’ stating that the ‘now’ gains special significance in Eastern Mysticism: “there is only a single moment of the present where life quivers... A present moment of illumination... It ceaselessly moves on.”<sup>69</sup> Ceaseless movement tends to imply flow. As such it seems he defends both the becoming view and the static view. This inconsistency

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<sup>67</sup> Jones (1986, p. 202)

<sup>68</sup>(Capra, 1975, p. 23)

<sup>69</sup>(Capra, 1975, p. 179)



exemplifies the way Capra oscillates between different often conflicting interpretations of both physics and mysticism to the detriment of the parallels he attempts to establish.

Indeed I would argue that Capra would be more true to the mystical notion of timelessness if perceiving 'timelessness' as in line with *presentism*, essentially the view that only things in the present exist, the past and future do not exist. This is given statements such as: "There are no divisions such as the past, present and future, *only a single moment of the present where life quivers.*"<sup>70</sup> However to do so would undercut the very parallel Capra is trying to make, as presentism is clearly distinct from *both* the becoming and static view.

While this hasn't been an exhaustive or conclusive debate over the relative merits of the static and becoming view of time, I've shown firstly we've reason to doubt relativity supports the static view which Capra unquestionably adopts, secondly that there are significant differences between the mystics and physicists notion of static time and finally that Capra's characterisation of eastern mysticism appears internally inconsistent and contradictory. I'll consider finally the nature of causality according to mystics and relativity theory.

### *(iii) Is Causality Unreal?*

Capra also draws on the relativity of simultaneity to argue that as time is illusory there is therefore no true 'before or 'after', and consequently no true causation. He thus claims Relativity supports the non-existence of causality, allegedly experienced by mystics: "eastern mystics assert that in transcending time they also transcend the world of cause and effect."<sup>71</sup>

In evaluating this claim, I must point out firstly that Capra sidesteps a host of problems with viewing event order in time as necessary to causality. Further, while by no means

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<sup>70</sup>In Capra (1975, p. 179) quoting D. T. Suzuki

<sup>71</sup>(Capra, 1975, p. 186)

universally accepted, the notion of backward causation holds temporal order of cause and effect as merely a contingent feature of causation: in which case there may be causes where the effect temporally, precedes its cause. The possibility of backwards causation emerged initially, as concerning theoretical 'tachyon' particles which could theoretically travel with a speed greater than light. According to relativity, the faster one travels through space the slower they travel through time, consequently at light speed there is no movement through time at all, in which case if 'tachyon' particles could travel at speeds faster than light they could potentially travel backwards in time.<sup>72</sup> While as yet there exists no evidence of backwards causation, its very possibility into doubt Capra's assertion that if time is illusory causation cannot exist.

However most crucially Capra overlooks the fact that relativity is entirely compatible with the assumption of causality; indeed it provides a principle of causality! Under relativity causality can be preserved by saying the cause must precede its effect according to all *inertial* observers. This means that a time-like interval must separate the two events and that a signal could be sent between them at less than the speed of light. Consequently causality remains an important and valid concept in relativity theory.

### **Conclusion**

In light of the above, it appears Capra's assertion that "in the Absolute there is neither time, space, nor causation"<sup>73</sup> is substantially devoid of support. We've compelling reason to the contrary to think relativity theory does not undermine the existence of spacetime, the passage of time or genuine existence of causal relations.

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<sup>72</sup> Llewellyn (2008).

<sup>73</sup> (Capra, 1975, p.187)

#### *§IV Directions for future research*

In what follows I identify four areas for future research which should be pursued in following on from Capra's assertions.

##### **Confirmation bias?**

More should be done on evaluating the danger of ideological confirmation bias. By attempting to establish consistency between mysticism and physics, Capra attempts to both improve the image of science amongst the mystically inclined, whilst simultaneously justifying mystical belief systems amongst broader society.<sup>74</sup> Capra is not alone, parallelists have commonly exploited prestigious modes of knowing, such as physics, to add to the reputation of their own modes.<sup>75</sup> This however can readily be a recipe for extreme forms of confirmation bias. To address the risk of potential bias, one important direction for future research is evaluation of the social origins and functions served by physics-mystic parallelism.

##### **Incommensurability?**

In attempting to validate mystical insights by appeal to science Capra implies that mysticism is in need of confirmation by physics, and as discussed earlier, potentially reduces mysticism to a system of 'symbolic abstraction.' Consequently in his attempt to aid mysticism, Capra may indeed be damaging it by linking its validity to that of transient physical theory. As stated by mystic scholar, Wilber, "does Buddha lose his enlightenment when the Bootstrap model is eclipsed?"<sup>76</sup>

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<sup>74</sup>Capra (1975, p. 25)

<sup>75</sup>This is a recurring strategy in intellectual conflict: see S. P. Restivo (1978)

<sup>76</sup>Wilber 27

Why not instead argue for incommensurability between the disciplines, providing an alternative to pitting their views against one another, which may save the dignity of both? Such arguments have been suggested at the religion-science interface, viewing the two as ‘non-overlapping magisteria’ which address fundamentally separate forms of knowledge and aspects of life. This would require recognition that both mysticism and physics contribute to a fuller understanding of reality, paired with a recognition of difference.

As Jones states “premature integration must be shunned; requiring that mystics give science proper recognition; while recognising that the objective of mystical experience is not to make empirical claims about the material world but to experience another dimension of human existence in the world.”<sup>77</sup>

### **Complementarity?**

Alternatively given the apparent failure of parallelism towards ‘confirmatory’ ends, perhaps a more fruitful avenue may be a thorough exploration of the ways in which science and mysticism could ‘complement’ one another. Already findings in neuroscience have put the long purported health and intellectual benefits of meditative practices on a more secure footing and increased their spread to a new western audience.<sup>78</sup> Indeed one area I intend to study further is the manner in which meditative practices, and notions such as ‘mindfulness’ have been adopted by the psychological sciences generally, and used to exceptional benefit.<sup>79</sup> I am however concerned about the danger that superficial understandings of notions such as mindfulness, taken out of context and placed in

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<sup>77</sup> See Jones (1986).

<sup>78</sup>(Brown, 1978).

<sup>79</sup> (Redhead, 1980).

western clinical settings, could have. However this too is an area which I for definitely intend to pursue!

#### *§V Conclusion:*

The arguments I've outlined should serve to undermine Capra's alleged parallels connecting physics with mysticism. There is generally oversimplification and insensitivity to the true contentiousness and depth of the interpretive, epistemic and metaphysical issues involved. I've argued the purported parallelist methodology is spurious for reasons ranging from semantics to ideology.

I've argued, where analogies to religious concepts are possible to uncover on certain interpretations of some physical theory; they suffering from serious translatability issues, and could too easily be entirely coincidental or superficial. The problem of differing areas of subject matter and differing functions for terminology must be addressed before any attempt to use one as a confirmation of the other is undertaken.

In examining the nature of mysticism and the metaphysical implications of modern physics, what is immediately striking is the confusion which surrounds Capra's reading of these issues. Contra Capra; instead of a single 'world view' of mysticism we find a great diversity of views. Instead of a 'world view' of modern physics we find endless interpretational controversy. Given so much uncertainty and disagreement it is difficult to see how Capra could even begin to argue for a simple identity of viewpoints, convergence and consistency, between the two systems of thought.

This does not mean, however, that substantive linkages between physics and mysticism must be ultimately rejected. There is no harm in drawing analogies with any field of endeavour provided that the nature of the analogy is understood. Capra's parallelist

thesis however implies not mere analogy but meaningful identity between the findings of physics and mysticism, and in this overreaching I fear he has done more harm than good.

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