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Time and Creativity in an Indeterministic World: Insights from Indian Philosophies

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Modern Science Approaches from Physics

It is fascinating to consider how the concepts of 'space' and 'time' have evolved over the ages in modern science. During Aristotle's era, and for a long period thereafter, especially in the Western world, space was thought of as a relationship between objects. However, Sir Isaac Newton revolutionised this idea by introducing space and time as passive coordinates or dimensions—a grand, absolute, and rigid backdrop where the theatre of the universe or life unfolds. In Newton's world, there is a universal "now," meaning that if any two observers' clocks are perfectly synchronised, they would always agree, regardless of how fast they move with respect to each other or how far they travel in that universe. In this sense, space and time are abstract and subtle; they do not interact directly with the events in the world, but events can only be perceived within this backdrop. For more technically minded readers, time in this framework is just a parameter in the dynamic equations we write. This ontology of the world is completed with a deterministic framework, where, in principle, it is possible to know with infinite precision the 'initial conditions' of a system (like a billiard ball rolling on a table, or even the vastly complex and chaotic weather). By using differential equations that describe the system's dynamics, we can perfectly 'see' where the system will be in the next moment or where it was in the previous one—a wonderful, eternal, clockwork world. Even in the theory of relativity (both special and general), time is on near same footing to space as a dimension, forming a four-dimensional continuum. Hence, time is not so unique; in extreme space-time regions like the interior of black holes, travelling through space is equivalent to travelling through time.

Determinism in modern science, while not outright challenged, was problematized to a certain extent with the advent of Boltzmann's statistical views of thermodynamics. Have you ever seen a scrambled egg unscramble itself? The answer, in 'probabilistic' terms, is that it has near zero probability, since the thermodynamic quantity known as 'entropy' always rises for an isolated system (still a statistical law). If the entire universe is considered an isolated system, then entropy almost always rises, with extremely low probabilities of fluctuations downwards. However, the concept of probability used here is 'ignorance probability,' meaning there is still a definite deterministic process occurring underneath. It is just that, due to our inability to know with infinite precision, and to account for all possible factors influencing the system, we rely on probability distributions. The second law of thermodynamics also suggests that there is a preferred direction of time. We distinguish between past and future, and time seems to move toward the future, where entropy almost always increases across the universe—where scrambled eggs almost never unscramble. This "arrow of time," as it is called, remains a central concept of temporality in modern science.

A significant departure from deterministic views came from the rise of quantum mechanics. Despite underlying differences in views among its founders, certain principles became generally accepted: ontological indeterminacy (as opposed to the ignorance probabilities mentioned earlier), context-dependent reality, and non-locality. These principles brought a foundational shock to modern scientific views of the 'physical' universe. Can quantum mechanics inspire a new perspective on time itself? This remains a profound issue upon which great minds have debated and worked. Is time merely a parameter, as in other scientific frameworks, or could it be an observable in its own right? Which means perhaps there can be some type of asymmetry in the concepts of space and time. Can time be 'quantized'? In other words, is there a smallest possible unit of time? Quantum mechanics suggests that many observables have discrete values, so perhaps space and time themselves might consist of discrete units, potentially becoming non-continuous at Planck's scale. For those interested, more technical discussions on this topic are available.

Concept of Creative Time in Modern Science

All the debates mentioned above still consider time as a given entity, but could time itself emerge? Recently, scientists have begun to explore foundational questions in this direction. The main shift is from the clockwork, deterministic universe established by Newton, towards a fundamentally indeterministic universe, as suggested by quantum mechanics (though there may be even more

foundational theories beyond quantum mechanics). If the initial state of a physical universe (where consciousness and mind are seen as emergent properties) is ontologically indeterminate or uncertain, then it can exist in potential states initially. For example, in quantum mechanics, until a system's state is measured, the formalism describes it as being in a 'superposition' of potential states or values. Once measured, these states become actualised into definite values, generating completely new information that was not present from the start—unlike in a fully deterministic universe. This emergence of new information represents creativity, and to fully grasp this, a concept of creative time is needed rather than a predefined, coordinate time. The reasoning here follows a chain: fundamental uncertainty leads to the emergence of new information, implying creativity and, consequently, a dynamic concept of time.

The above argument can be simplified by looking at two perspectives from the philosophy of time, often referred to as Theory A and Theory B (dull names indeed). Theory A is based on a deterministic view of the universe; for example, in this universe, the French Revolution is, and will always be, earlier than the next Cricket World Cup. Every event is necessary and predetermined based on the initial physical conditions. Theory B, on the other hand, sees things differently. Before the French Revolution occurred, it was just a potential event. Therefore, its relation to the next Cricket World Cup, which is also a potential, was undefined. Once the French Revolution happened, it would indeed always be earlier than the next World Cup, but the relation remains incomplete since the next World Cup is still just a potential event. This leads to a creative view of time or a creative worldview that embraces an open future, with multiple possible outcomes. Scientists suggest that such an open universe can exist in both 'classical' and 'quantum' domains, placing uncertainty at the core of a creative universe as a whole.

Complex Adaptive Social-Ecology

The above-mentioned view of a creative universe based on fundamental uncertainty, is perhaps best captured in the emerging science of complex adaptive systems. Complex adaptive systems' view of social-ecology is fundamentally process-based, where the world (with no sharp separation between nature and us, which was the case in standard deterministic objective view, which meant we are separate from nature and thus an utilitarian view emerged which made it legitimate to plunder and exploit nature as much we can, for our selfish utility maximization) is always in a state of becoming, creative, and future is always open-ended. Radical uncertainty is the term used in economics now a days to refer to

the fundamental in-determinism as referred to above, though a concrete framework is still wanting. Recurring crises of different forms is a testimony to the significance of that fundamental uncertainty. Here the point is also to adopt to that uncertainty to make living more creative, rather than getting deterred by the same.

Complexity science is based on deep insights from chaos theory, which is now well extended in social systems thinking, like in economics. A tightly networked view of society is on the rise (even metaphorically using the term 'entanglement' from quantum science). It immediately follows that there are foundational implications for policy making as well.

Indian Wisdom Thinking Contributions

A deterministic clockwork universe is rejected in many Indian wisdom thinking schools. Rather cyclical or non-linear time is well conceptualised in many cosmologies, with analogies to modern science thinking (for example: Roger Penrose's conformal cyclic cosmology). Uncertainty, has been viewed as creative life force in Indic traditions, and there are modern logicians working in such directions too.

Here we would refer to one particular philosophy, namely, *Syadvada* and *Anekanatavada*, in Jainism. We (Partha Ghose and Sudip Patra) have recently been working on a concrete logic framework inspired by the same, which has potential to significantly contribute to the creative universe argument. Literally (though much can be lost in translating from original Sanskrit), *Syad* would mean 'contextual' or 'conditional', and *Anekanata* would mean 'multiplicity', hence this philosophy of world embraces multitude or plurality in understanding a context dependent reality. In a logic set up, this means, there can be three valid state/judgements about propositions (about reality): True, False, and Avyaktam/indeterminate/un-manifest. Indeterminate is an equally ontological state of world as true-false, hence the logic is not tied to any true-false binary view of the world. Such logics are called 'para consistent logic', which are not contradictory in itself, but yet provide a much diverse view of reality. These three basic conditions (true, false, avyaktam) can then be combined into seven compound propositions, known as 'saptavanganaya'. In the recent works, we have shown how such a multivalued logic framework based on fundamental indeterminacy concept can help resolve age old paradoxes in foundations of modern science. Next would be applications of such a diverse reality view to complex adaptive systems theory, which still needs a concrete framework for a non-binary creative world.

Author Biography

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