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Schrödinger's notebook: Shifting real

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ABSTRACT

The science fiction prototype featured in this article is the second chapter of a novel in progress that contains an omnibus of interventions into physics, queer science, feminism, and intellectual history. The title of the article references the notebooks of Erwin Schrödinger, a Nobel-Prize winning physicist who discovered wave theory that superseded Heisenberg's more complex form of mathematical formalism, therefore changing the way in which interpretation is done. Despite being part of a series, the prototype is written so it could be read as a standalone. The story, combined with a critical explication of its background and intent, produces the contestations illustrating the relationships between physics, the cultures in science and technology, as well as politics extending over the internal and external values of the scientific enterprise. Specifically, the differences between these values are rendered impossible through the epistemic continuity stemming from a shared ontology. At the same time, the prototype also forecasts the possibility of future technologies based on current and possible developments in physics while contesting the notion of a 'good life' these technologies supposedly offer. As a politically inclined epistemic move, the prototype will demonstrate points of amplification in the interactions taking place at the microscopic level for manifestation in our macroscopic space. Therefore, the amplified microscopic interactions are in competition with the observables in our 'meatspace' dominated by the conventions of classical physics. The prototype also acts as a speculative device for modeling probable outcomes stemming from different constraint sets, thereby acting as an 'algorithmic' blueprint for the narration of scenarios produced as an outcome of macro- and micro-entanglement.

1. Introduction

The prototype conceived in this article is part of a second chapter of the novel in progress, but was written to cater to readers who have not read the first chapter [1]. The core plot is centered on an object that is purportedly Schrödinger's lost notebook of 1925, speculated as containing more than his earliest interpretations of quantum mechanics and the earliest indication of his fictive involvement in the production of a 'machine' spanning parallel worlds and multiple timelines. However, the main drivers of the story are two queer characters, Linda and Nora; the former an experimental particle physicist doing her postdoctoral training at a university in Kuala Lumpur, Malaysia and the latter a historian of physics investigating the mystery surrounding the semi-fictionalized scientific notebooks of the fictional/real Erwin Schrödinger [2]. There are multiple strands to the stories paralleling different timelines, and at times, different spatial dimensions. The prototype depicts convergence between the microscopic and macroscopic spaces for demonstrating the flows in the different narrative segments of the story.

The first chapter preceding the events in the prototype begins with Linda waking from a dream. After a morning work meeting was cancelled, she had checked on the message Nora left her about an article by Schrödinger, *The Present Situation in Quantum Mechanics*, where the infamous cat is used as an interpretative visual of quantum theory and its causal indeterminacy. The story of the cat, the unknowableness of its state of

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dead-ness or alive-ness, represents the problem of full ontological access, and therefore, the constraints of observation.

I picked the abovementioned essay by Schrödinger because it encapsulates the philosophical and conceptual questions that have come about from work done on quantum mechanics from its earliest days, beginning with the work of Bohr on the atomic spectra. The other reason is because the article contains a rigorous explication of the popularly imagined *gedankenexperiment* that invokes what would become a dominant feature in the interpretation of quantum mechanics: the problem of measuring local and non-local interactions. Simultaneously, the paper represents the beginnings of the kind of work attempting to reconcile theoretical formalism with experimental reality. Additionally, our most fundamental understanding of the universe is shaped by the explanation quantum mechanics provides in terms of the properties of the most foundational building blocks, as well as the material ontology that operates above and beyond the delimitations of quantum theory (i.e. the complexity systems). However, a spanner is thrown into the works, so to speak, when the copy of the Schrödinger paper held by Nora is found to conceal an emblem, in the form of a watermark, which holds the secret to what Schrödinger was working on beyond ordinary quantum mechanics. Around the same time, at the pantry of her workspace, Linda ran into a mysterious new colleague from the condensed matter physics (the study of laws of physics on matter phases such as solids, liquids, and superconductors) group, Raina, who played a role in the strange twist of events that are integral to the novel. Not long after the encounter, Linda made initial contact with a mysterious organization when an anonymous introduction email was sent her.

The prototype contains philosophical references to physics and the politics of knowledge through actionable physics set to interact with the rest of the human characters in the story. Through the prototype, I intend to foreground, more emphatically, the relationship between Nora and Linda, and how their interpersonal relationship is a pointer, or index, to intrapersonal events as well as inter/intra-relationships with the other characters, both human/non-human, in the story.

The more conceptual and theoretical elements of quantum theory are then set in relation to the pragmatic aspects of technological innovations. While not all of the connections are directly correlated, there is an underlying theme to the story that implies the primacy of relationships between the different experiences must also be part of the experienced relations [3]. Therefore, the story is all about experiencing the abstract and conceptual as real conditions while making the experiences self-reflexive by dramatizing them with tangible human (and non-human) actors. Certain theories are embodied by the characters, or their alter egos, thereby proving the inescapability of politics from the interrogated knowledge.

The use of tenses and their shifts between temporality are also intentional to the story, in that they are meant to set the moods, timelines, and contexts of the plotlines and activities in the prototype.

1.1. Explanation of work

The prototype is set in a parallel future in Malaysia, a future replete with the kind of scientific advancement that is not imaginable to the existing politics of the country. Furthermore, the advances appear to have improved the lives of the denizens on the surface, but in reality, have left a cascade of inexplicable events and strange phenomena in its wake.

The prototype is constructed from a multiplicity of fields in physics that are then connected together through the following criteria: observation, measurement, interpretation, and application. The story attempts to demonstrate how the most formalistic and abstract inquiries can affect the way experiments are performed, whether in physical space or by way of virtual simulation. The story of the infamous Schrödinger cat is an analogous way for visualizing the problem of entanglement in relation to how information is disseminated. The parable also describes the empirical materiality of the local/non-local interactions of these two separate states 'acting at a distant;' the cat paradox is merely one of the many versions describing an aspect of the structure and character of quantum mechanics.

The Schrödinger cat paradox parallels the problem of wave-particle duality already demonstrated by the interference produced in a double-slit experiment, where an electron is beamed through two narrow slits between the source and a screen, thus producing characteristic patterns of point-like luminosity on the screen. At the same time, these patterns are in the form of ordered intensity variations that could only be the outcome of the wave-like property of interference. In classical physics, it would appear contradictory for an electron to exhibit particle and wave qualities simultaneously. In the case of a single particle, should it be operating strictly from the framework of classical physics, it would only be in a single state in three-dimensional space with a determinate and linear timeline. However, the wave-particle duality effect demonstrated by the single electron proves that to be otherwise.

However, once we begin to think about two particles (and perhaps more) interacting at the same time, the complications increase, thereby bringing me to the derivation of Bell's theorem of inequality. The theorem states that one cannot presume the epistemological foundations of quantum mechanics to be complete unless we choose to ignore certain statistical predictions that may lead to contradictions with some observable effects in quantum theory, particularly when the same effects are not well understood. The problem stems from an incommensurability between classical and quantum physics as a result of our imperfect understanding of the epistemology constituting quantum physics [4]. The prototype also references a 'brane.' The brane represents geometrically, form of entities populating dimensions in space-time beyond a person's conscious access. In one sense, it is another mathematically driven prediction looking for a physical counterpart. In another sense, it opens up possibility for thinking through how the unknowable could be incorporated into the physics. By opening up to this possibility, the increase in candidate theories and models make more available an extension beyond the Standard Model [5].

The structure of modular story telling in the prototype is intentional. Moreover, the intention includes the instigation of a conformance between parallel worlds interplayed against each other, and these worlds are channeled through the characters of Linda and Nora in different ways. In fact, the choice of the couples as a physicist and historian of physics respectively is meant to foreground the knowledge fields that are key to this novel, as the channeling from the past and the future are important to the novel's intellectual and creative enterprise.

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