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Quantum Parallels in Culture:
Observation, Uncertainty, and Reality

Chandralekha Deshmukh

Provocation

In 1927, Heisenberg told us that as we try to pin down the position of a particle, the momentum gets reduced, is mathematically expressed as, $\Delta x.\ \Delta p \geq h/4\pi$ reveals the fundamental limitations of simultaneously measuring position and momentum, demonstrating that *observation fundamentally shapes reality*. Likewise, this piece also tries to showcase that cultural systems operate under a similar dynamic. The uncertainty in cultural interpretation can be represented as $\Delta C.\ \Delta I \geq k$ where ΔC denotes uncertainty in cultural context, Δ I represents uncertainty in interpretation, and k is a constant analogous to $h/4\pi$. Interdisciplinary methodology, including theoretical analysis and case studies, is the backbone of this proposal. The piece explores how observation and interpretation (in cultural contexts) collapse multiple possibilities into singular narratives. The proposal tries to build a similar notion of the observer effect in quantum mechanics that observation shapes reality. This framework, termed "Cultural Quantum Mechanics," symbolizes that observation is not passive but an act of creation, offering a novel lens to analyse the interplay of uncertainty and perception across disciplines.

Keywords: Heisenberg's Uncertainty Principle, Cultural Quantum Mechanics, Observer Effect, Cultural Identity, Social Construction, Multidisciplinary Approach, Quantum Metaphors, Observation and Reality, Uncertainty in Culture.

Manifesto

Stimulating perspective given by the convergence of quantum mechanics and cultural studies examine how observation shapes reality. 1927, the year which is generally attributed to Heisenberg's Uncertainty Principle, which postulates that the act of measurement inherently disturbs a quantum system ($\Delta x \cdot \Delta p \geq h/4\pi$). "Cultural Quantum Mechanics," the term given by Alexander Wendt also reflects its image in (cultural contexts): the

interpretation of cultural symbols (ΔC) and their contextual and ambiguous meaning (ΔI) posits the same resistance in the form of $\Delta C \cdot \Delta I \geq k$. This work offers "Cultural Quantum Mechanics" (CQM) as a framework to internalize this dynamic, arguing that cultural narratives—like quantum states—"collapse" into singular forms under the weight of observation (Berger & Luckmann, 1966; Barad, 2007).

Although quantum metaphors have pervaded the social sciences (Wendt, 2015; Kirby, 2011), structured, precisive work lacks a systematic and foundational treatment of uncertainty in cultural interpretation. By spanning quantum theory's mathematical strictness with cultural studies' focus on constructed realities. While the proposal tries to show the overlapping characteristics of Quantum Mechanics and Social Science but it is significant to acknowledge the critique of this analogy. David Bloor and Alan Sokal, have warned against the overextension of scientific or scientific metaphors to Social Science. Sokal tried to show the misleading way of connecting the links between physics to cultural context. However, this work tries to demonstrate (in a cautious way) heuristics to illuminate the complexity and instability about cultural interpretations.

Hypothesis

$\Delta C \cdot \Delta I \geq k$, this cultural quantum mechanics equation which tries to hypothesize that cultural systems operate under a similar principle parallel to quantum uncertainty, where the precision of interpreting a cultural symbol (ΔI) is inversely proportional to the certainty of its contextual framework (ΔC). Likewise, k represents similar footprints that is a cultural constant akin to Planck's constant (h), denoting the interpretative ambiguity inherent to any observational act.

Here, one must understand that 'observation' stands differently both in Quantum mechanics and social science. In cultural context, observation is not passive but an active perception such as rituals, texts, historicity, media representation, symbolic acts etc. Observation is a physical act that disturbs whole system; whereas the same thing in cultural context refers to framing, meaning-making, and positionality of observer. And that's why, it posits that cultural observation is not passive but generative (Barad, 2007) where the act of engaging with cultural artifacts (texts, rituals, media) collapses a spectrum of potential meanings into a singular narrative (cf. Von Neumann's measurement collapse, 1932; Foucault's discourse analysis, 1972).

Structuralism, discourse theory or symbolic anthropology widens our perspective on layered meaning in cultural context while Cultural Quantum Mechanics (CQM) explains this

ambiguity dynamically by stating that the meanings are inherent in nature until they are observed. Unlike other existing models, CQM stands on the principle: uncertainty and inconsistency are central, and not peripheral. Further, it integrates observer as co-creator. It argues observation shapes meaning itself rather the meaning is self-productive. It ignores the fixed cultural meanings and interpretations by outsiders. It draws an inspiration from Barad's performativity and Wendt's non-classical ontology, yet it moves from beyond metaphor and tries to connect both Quantum science and social science.

Research Question

This study addresses the following absurd questions:

1. How can Heisenberg's Uncertainty Principle be rigorously adapted to model uncertainty in cultural interpretation ($\Delta C \cdot \Delta I \geq k$)?
2. In what ways does cultural observation actively "collapse" multiple narrative possibilities (e.g., historical events, identity markers) into dominant frameworks?
3. What empirical case studies (e.g., media bias, contested heritage) validate or challenge the CQM framework?

Methodology

Methodological structure for this piece is to explore an interdisciplinary approach. The foundational aim is bridging the conceptual analysis and cultural case studies. Here, unlike physics or quantum tools, cultural quantum mechanics model ($\Delta C \cdot \Delta I \geq k$) is working as a **heuristic tool** to delve deeply into interpretational multiples.

For a basic establishment, we preferred key literatures and articles written by Barad, Wendt, Berger & Luckmann, Geertz, and Matthew. J. Donald. These are analysed to frame the basic principle that observation as an active, generative force. To prove the hypothesis in greater detail, some interesting selected cases—such as the Ayodhya dispute, Jallikattu protests, and Lavani's shifting image (Indian context) and confederate monuments (Global Context)—are interpreted through the CQM equation. These cases illustrate how meaning collapses under observation, revealing the dynamic trade-off between cultural context (ΔC) and interpretive clarity (ΔI).

Genealogy of Uncertainty

As our grandparents tell us stories that change with respect to time, space and location. Karen Barad, an American Physicist and feminist, in her Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning (2007), demonstrates the same storyline about the entanglement of measurement and meanings; which is referred as *agential realism*. Further, two of its chapters are examined and the following genealogy is presented. For our very basic understanding of Quantum mechanics, Barad enlightens us on the division of matter. According to her, matters of "facts" have been changed to matter of "signification." Matter further divides into three: Language, Discourse, and Culture. Barad, going ahead talks about the down going relevance of matter. Culture/ language which demonstrates agency or historicity has been placed above the matter, which is a 'matter' of concern for her.

Barad being a physicist, tries to converge both Science and Social science in a very subtle way. She is consistently a critique of representationalism belief in the power of words. Afterwards, the conflictual positions of performativity versus representationalism, where performativity involves thinking, observing, and theorizing practices, and representationalism is situated above or outside the actual world, are highlighted, and she tries to emphasize the importance of performativity over representationalism. Being a physicist, she can't escape from Neil Bohr and his atomic model which has the first and foremost place ever in Quantum mechanics. Neil Bohr, a Daniel theoretical physicist was also a greatest critique of representationalism and Newtonian physics. He rejected deterministic 'observer-neutral' models, foreshadowing Barad's agential realism.

Karen Barad, an American feminist could not resist from the humanist and post-humanist performative approach. Drawing an inspiration from works of Micael Foucault and Judith Butler, she offers her own footnotes on post humanist performative approach. Why she opposes: because humanism's focus on 'individual agency' clashes with her post humanist view of distributed agency. Post humanism here refers to the division between nature and culture. She is of the opinion that while studying the matter and on its parallel side of cultural mechanism, there should be "diffraction" of matter and likewise diffraction of interpretation rather than "reflection." As we deep dive into her literature, we find an interesting term called *"agential realism."* Further, this concept elaborates more on performativity.

"Relations do not follow relata, but the way around." (Barad, 2007) By this statement, we can infer that things (humans, objects, identities) do not exist first. Relationships exist

initially and then entities got established. That means they are not self-contained units that then they enter into relationships. Let's take an example, "there is a woman and man" _ and they related to each other as gendered beings; this is a traditional view. Now, Barad's view tells: Gendered identities does not pre-exist; they emerge through specific discursive material relations.

Further, Karen talks about the special characteristics of matter. Matter is produced and productive, generated and generative. "Changing patterns of difference are neither pure cause nor pure effect indeed, they are those effects or rather enacts a causal structure differentiating cause and effect." (Barad, 2007) The statement above demonstrates her critical view about the separation and patterns or narratives are being around its patterns. Therefore, she criticizes the notion of representationalism as being a fact of separation. Being a physicist, she lights on few terms like phenomena, ontology, apparatuses, agency etc. As per her knowledge, primary ontological unit is not independent boundaries and properties but rather phenomena and primary semantic units are material discursive practices not words. As she said in her book, *"Phenomena are the ontologically inseparability of intracting agencies."* (Barad, 2007)

Convergence of Science and Social Science further tells a story of another concept called apparatuses which are not merely passive observing instruments; they are the productive of phenomena. These are boundary-making practices. Tools for example, language, biases, media, history) shape what's seen. Example: Colonizers diary vs. indigenous oral history. In the second chapter called Entanglement, Karen focuses on the intra-action, meanings and interpretation. She posits that meaning is not a property of individual words or group of words but an ongoing performance of differential equations of intelligibility and unintelligibility. Everything (observer, tools, culture) is tangled at a quantum level- you can't measure/ interpret anything without changing it. Intra-action is above the interaction. That describes: meaning emerges during observation, not before. E.g., A ritual's true meaning doesn't exist until someone documents it. ($Here, \Delta C.\Delta I \geq K$ (Precision in one blur the other.) Unlike Physics hypotheses, you're part of what you study. Cultural observation is not neutral.

Before moving forward, we have seen the entanglement of meaning and matter described by Barad in a very gentle way. This exact thing finds resonance with Wendt's conception called linking of quantum metaphor to the social mind referred as superposition.

Alexander Wendt, an American political Scientist, a significant figure in the foundation of social constructivism and Quantum Science. In his Quantum mind and Social Science, 2015 described about two important concepts called entanglement and non-locality. We have already talked about entanglement above in Barad. But here Wendt describes it in a better way. It goes like, relation between two/ more microscopic practices in which the quantum state of one is entangled with the quantum state of the other.

$$A1 \rightarrow A2\ like$$

$$observation1 \rightarrow observation2$$

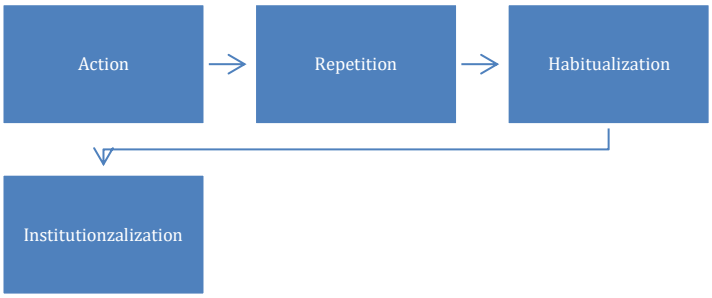
'We are walking wave functions,' the very contested line ever in Quantum mechanics. We are not going to talk about it in details. According to Quantum theory, there are two kinds of quantum states viz. wave function (Pure state) and mixed state. As Barad emphasises that social facts are quantum phenomena; they exist as multiple possibilities until observation fixes them. The same way is being followed by Wendt. He talks about social facts similar or equal to quantum superpositions like human subjectivity and social ontology. He's focus is on collective observation. Here, we all know about Schrödinger's cat___ alive or dead until we observe. Exact the same path is being followed by Wendt. According to him, norms, beliefs, potential decisions, and thoughts are shaped through observation and not fix in advance. Therefore, he narrates that Social Science should avoid *monologic truths*.

While proceeding further, Alexander emphasises that human minds are not classical computers. They hold conflicting beliefs until forced to choose. Core belief of Wendt narrates that we'll only ever able to get away from treating each other as objects if Physics can justify the reality of human consciousness. Collective observation is not fix like classical space-time, but rather as walking wave function___ entangled, indeterminate, and always becoming. Examples to narrate: Money, borders, identities don't exist until collectively observed. Cultural symbols like flags, rituals are in "superposition" until interpreted.

Observation at the level of Social Ontology is described by Wendt has a convergence with the Berger's and Luckman's conception of Habitualization and solidification of meanings into institutionalization. This section is explained below.

Both Peter Berger and Luckmann were Austrian born, American Sociologist. The Social Construction of Reality marked a special place in not only Sociology but also Political theory. They shed a light upon institutionalization of social facts and societal reality. Although this reading is not directly connected to Quantum mechanics study but the concepts like institutionalization and Habitualization gets different identity.

A very basic mechanism described by both of them is that reality is built through social habits and then it gets hardened into (monolithic) truths. And then eventually it internalized as natural. Reality is built through social habits gets hardened into truths and then finally internalized as natural. Societies justify reified norms through myths, laws, and education. It's the observer effect for culture. It measures certain meanings ever others. In this section, reader should link Sociology to Quantum mechanism. Significant concept described by them is Habitualization. It refers to the process through which actions get repeated frequently, and gradually becomes patterns, and eventually becomes institutionalized with losing its conscious meaning. For example: Marriage, motherhood. Each Habitualization is a mini collapse of cultural possibilities.



Why Habitualization matters in Sociology; to explain this Berger and Luckmann explains further that: It saves mental effort, creates predictability, and then finally it leads to institutionalization. Abstract ideas for ex. Justice turn into thing like facts that feel immutable ex. Laws. Like quantum system freezing into one state upon measurement, culture freezes into reified symbols. Ex. Flags, currencies.

Till now, we have seen that how meaning becomes fixed. In next section we'll see how Geertz examines the way in which these meanings get solidify into symbolic systems.

Clifford Geertz, an American Anthropologist, significantly contributed to symbolic and interpretive Anthropology. The Interpretation of Culture mainly talks about selected essays across many regions and their cultural aura and environment. He mentioned that culture is a dark web of meanings we spin and get involved into it viciously and its interpretations are the peelings back the layers. Superficial or surface actions hide layered meanings. Therefore, each “guess” is a measurement attempt that collapses into reduced ambiguous meaning but amplifies cultural contexts. Geertz narrates that the (outsider), the observer’s apparatus shapes rituals, art, and customs which textual meanings collapse. Here, pre-collapse has infinite meanings but post-collapse will change everything and it gets fixed meanings which are “official” by erasing others.

Case Clashes:

Cases	Pre-Collapse	Post-Collapse
Confederate Monuments	Heritage vs. White Supremacy	Removal/retention debates collapse into political binaries
Indian Folk Tradition	Dance as folk tradition (e.g., Lavani) vs. sexualized commodification	Media/moral policing reduces it to "vulgar" or "empowered" binary
Ayodhya- Babri Masjid Dispute	Multiple narratives (Hindu temple vs. Islamic Mosque vs. secular archaeological site)	Political/media discourse "fixes" a singular narrative (e.g., "birthplace of Ram")
Jallikattu Protest	Ritual (cultural identity) vs. cruelty (animal rights)	Media frames it as tradition vs. modernity

Uncertainty Manifesto

The confusing yet bold and mature step towards the beautiful convergence of Quantum mechanics and social science mark a significant footnote for an interdisciplinary approach. This piece has ventured out the uncharted territories while proposing Cultural Quantum Mechanics. Inspiring from a very basic yet significant and fundamental idea of Heisenberg's uncertainty principle and Schrödinger's observer effect, Barad's agential realism, Wendt's quantum social science, and Berger-Luckman's social constructivism__ we are at the concluding remarks: $\Delta C \cdot \Delta I \geq k$ where cultural context and interpretational ambiguity are existed in a dynamic trade-off. The subject has a power beyond metaphor, power of observation, and has a strength of a call for humility. It opens doors to empirical testimonies for future research. Finally, the question is "Whose observation will decide?" Everyone should think of it.

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