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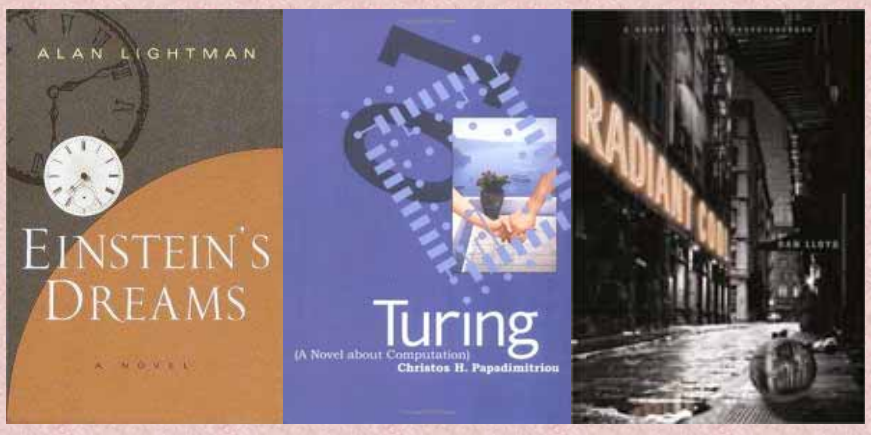
Schrödinger's Notebook

Thought Experiments, Quantum Epistemology and Fictive Worlds

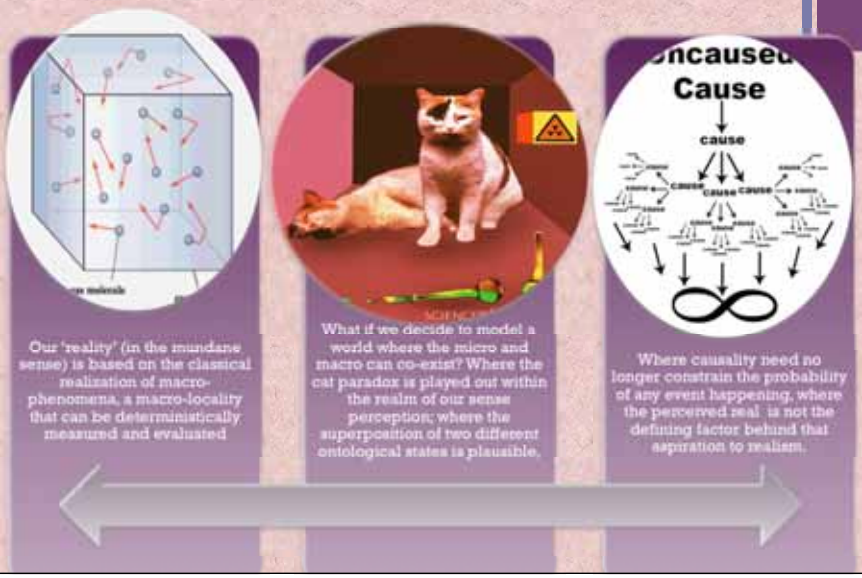
+ Fictions in Science-Fictive Modeling



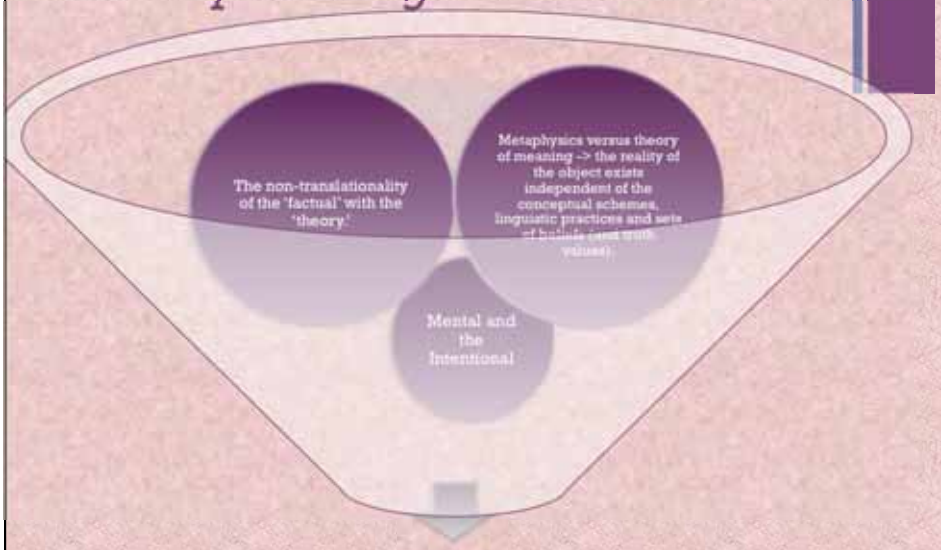
Background on Schrödinger

- Archival, narratorial, organizational, and analytical work conducted by the Quantum Physics History research team at the Max Planck Institute for the History of Science (http://quantum-history.mpiwg-berlin.mpg.de/eLibrary/hq1_talks). There are attempts to understand the contents of the research notebooks in order to better understand Schrodinger's philosophical interests (See Walter Moore's intellectual and personal biography of Schrödinger).
- Continuous work on Schrödinger's wave mechanics provide the theoretical framework for understanding existing (quantum conceptualizing of bosons) and yet-to-exist models in particle physics. Also relevant in the development of accelerator physics. See Timeline history http://teachers.web.cern.ch/teachers/archiv/HST2003/publish/standard%20model/History/layer1.htm

Combining Macro-Micro Worlds



Conceptualizing Realism



Major question of realism: does instantiation matter in the notion of realism and can ontology demonstrate this?

Realism in Quantum Mechanics

Realism in Microphysics

If we go to Einstein-Podolsky-Rosen's paper entitled " Can Quamtum-Mechanical Description of Physical Reality be Considered Complete," we find that there is no incisive attempt to define what physical reality is other than to place it within the realm of physical states, quantity and degrees of freedom. This is of course related to the development of the Schrödinger's wave-function for representing micro-physical states, given by the scalar field symbol ψ (psi). This was in reaction to the Copenhagen (classical QM) interpretation of physical realism that superposed classical orthodox models of physical reality (such as one finds in Newtonian physical models) onto the microscopic system.

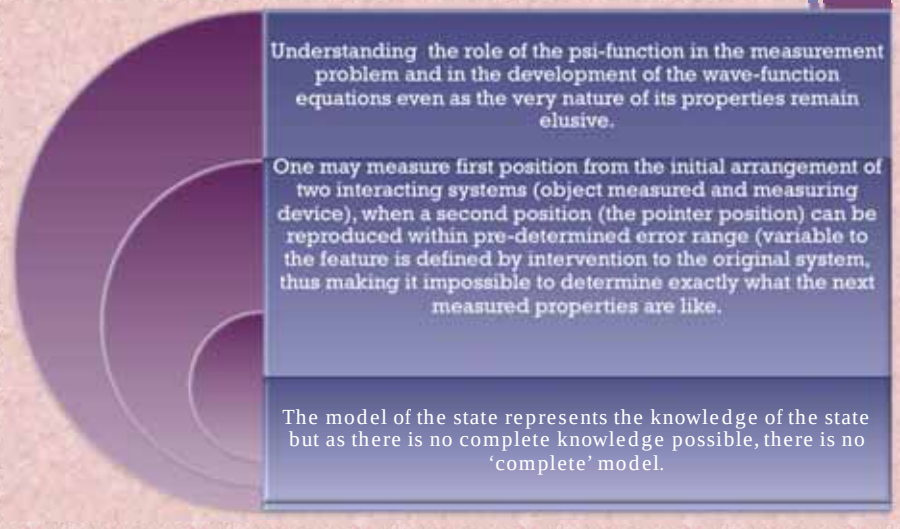
Schrodinger himself believes that the model of realism employed by the early quantum physicists was that of naïve realism where observation can only be conducted through measurement (Schrödinger wants a broader access to the physical microstates). Instead of the language of realism, he seems to be proposing what translates roughly as 'expectation-catalog'

'Factive' Theoretical Elements

Factual physical elements/models for plot-sketching

1. Wave mechanics: time-dependent and time independent equations for a single electron.
2. Probability predictions: using familiar scenarios from the mundane world to approximate similar physical conditions at the microscopic world.
3. Replicating the problem of measurement and the outcome of the measurements.
4. Playing 'normative' behavior of particle ensembles and also the problems of describing or explaining them.
5. Setting out different interpretive variables.

Important points from *"Die Gegenwärtige Situation in der Quantenmechanik"*



Thought Experiments and Fictive Elements

No sharp delineation of what thought experiment means

a) Simulation of an event or sets of events based on pre-determined theories or hypotheses without presumption of empirical outcomes. The experiment may be conducted within a 'fictive' rather than empirical-experimental world.

c) Construction of a fictive universe with factual parameters by which one can test out different what-if paths.

d) Mental models, mind labs and cognitive mapping.

Fiction in Science Modeling (Fine, "Fictionalism" from Hans Vaihinger)

Fictions of 10 primary kinds:
1. Abstractive (fiction that ignores reality)
2. Of the mean
3. Schematic: paradigmatic, rhetorical, utopian, type
4. Analogical (connects to 6)
5. Legal (Juristic)
6. Personificatory: nominal
7. Summational
8. Heuristic (fiction as a contradiction with reality)
9. Practical (ethical)
10. Mathematical

Why Thought Experiments?

Predictions of Possible Worlds and Futures

- Realist world versus non-realist world.
- Epistemic world versus ontological world.
- A world containing the possibility of these different concepts.

Theoretical presentation for actual applications

- Utilization of different material platforms: virtual worlds, ontological databases, interactive narratives, game worlds.
- Even as applications are developed to map these experiments, the data produced act as tangible evidence that can then be used as simulation inputs.

Philosophical model-testing and creative-thinking

- Constructing geo-social environments for technical model-testing.
- Enabling ground for interacting between seemingly incompatible concepts, epistemic frameworks and scripts.
- Enabling different logics to co-locate.

Re-narrativizing the Cat Paradox

A woman wearing a flowing electric-blue jacket-dress walks into that dark room containing a conspicuously large screen. → Consoles looking like they have been built out of an organic substance surround the screen. → A computer lies in wait in the middle of the room, on standby to wake-up once a stroke is dealt. Projector screen ignited. Avatar enters.

↓

Cat-wonderland, a Geiger counter peeks out; at the far corner is a sealed jar. → A duplicate image of the cat-in-the-chamber is projected. → A drill appears in one of the chambers and punctures the sealed jar before disappearing just as quickly.

↓

Two chambers flipped and rotated in all directions before a curtain 'virtually' drops over the latter. What goes on behind? → Two Geiger counters stand out prominently above the covered chambers. Data registered → Four diagrams representing different, calculating the probability of the types of spins produced along the x-y-z paths…

A Thought Experiment In Motion: Scripting the Cat Paradox

Super-positioning the cat paradox on a universe where a virtual platform can exist so that the material real of our world can be jacked into different which-paths where one can superpose one's avatar-observer

In this situation, the which-path is rendered more determinate – one is in an equivalent situation of being able to peer into the box. If one is able to conceive such a determinate system, how would that change the way one theorizes?

Creative Science, Thought Experiments and Virtual Manipulation

In such a system, the unobservable can now be rendered observable. How far can one go with rendering that what-ifs? How does the simulation of micro-level 'determinacy' change the way we frame theories?

Do we need to determine as, *a priori*, ***axioms***, that will be guiding constraints or principles to the system or should we just insert fictive and factual parameters and see what plays out?

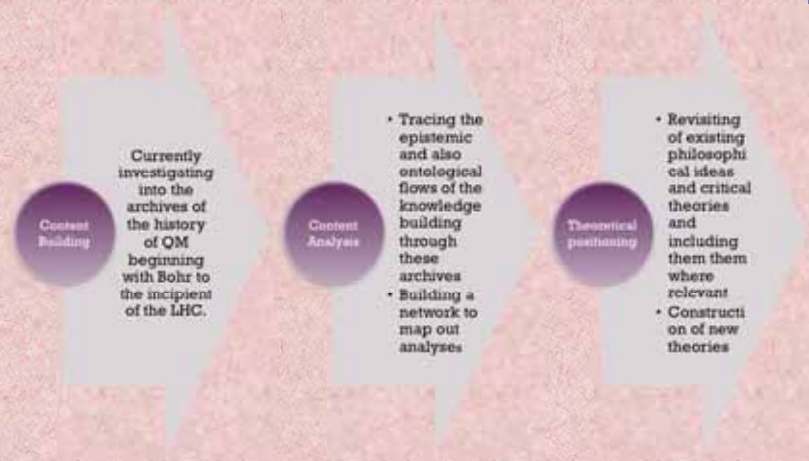
Creative Prototyping of scientific ideas

Using Bayesian networks to create multi-path scenarios on Whiggish history of science versus other scientific historiographies can bring about different outcomes. Using known evidence from history to map out causal links.

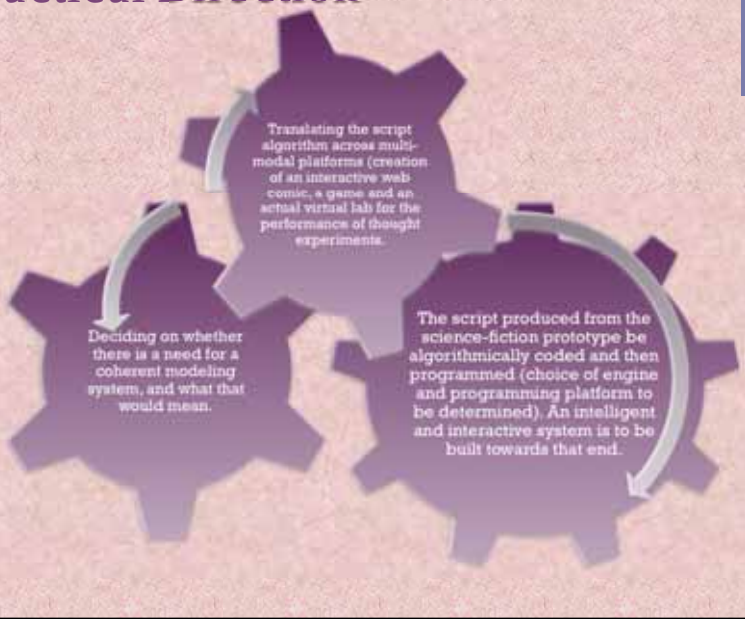
Modeling of an epistemic platform where one can play out the concept of interference and entanglement between an epistemic subject and object (can we transfigure the actions of wave function from the micro- to macrosystems – what would that mean and what computing tools can we use to do so?

Visualization of thought experiments with transparent and black-boxed processes and causalities. This can be done in conjunction with the visualization of data from empirical experiments.

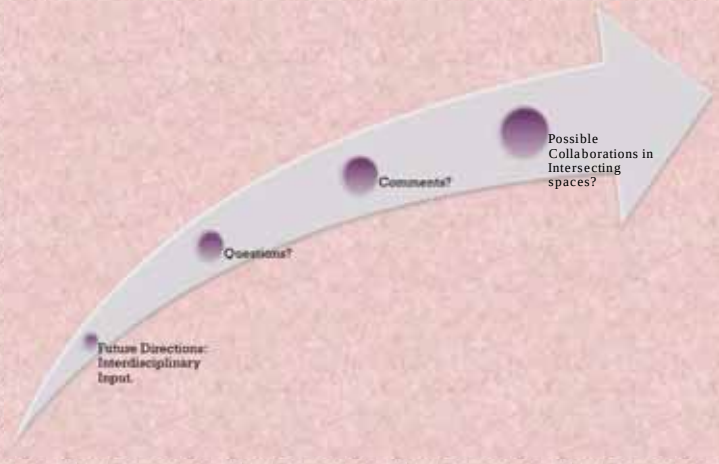
Stage of Work – Preliminary Dissertation Research



Practical Direction



Conclusion


Possible Collaborations in Intersecting spaces?
Comments?
Questions?
Future Directions: Interdisciplinary Input.