

## The Basketball Game Thought Experiment, revised

### Abstract

A shorter, revised paper focused on the basketball thought experiment, assuming familiarity with the Schrödinger's cat thought experiment, to which there is frequent reference. Analysis of 'Is the Moon there when nobody looks?' has been left out as it can be separately read. As has other evidence of the unseen and unmeasured existing.

Rules of the game are set out as is the apparatus. Where there is logical similarity to the Schrödinger's cat thought experiment it is pointed out. The game ends when the first basket is scored i. As is the implication of having an observer observe the observer. i.e. not directly observing the outcome acquired from a player.

### The Basketball Game Thought Experiment

Familiarity with the Schrödinger's cat thought experiment is presumed. Analysis of the question, Is the Moon there when nobody looks? by Georgina Woodward is recommended as evidence.

The game involves two teams in a 'sudden death' play off. The game ends when either team scores one basket. When that will happen is not known but it will happen given sufficient time. Before starting play and the game's end players are required to wait and rest, passively in the adjoining changing room.

A basketball court is locked so no one can come in or leave. The court must be closed **before** the game is started. Then after some time there can be a scenario in which **started or not isn't known**, outside of the closed court. *Corresponding to Schrödinger's live-dead cat.*

Inside the court there is a game starting device. It has a small radioactive source. When the source decays randomly it emits a particle which activates a detector. The detector sends a signal to a device activating an automatic flag signaling device, starting the game with a flag drop. Like at a car racing event. (Linking a random (does or doesn't happen) quantum event to macroscopic one. Instead of instigating process that will lead to a cat's death as in the Schrödinger's cat experiment, it's decay leads to starting of the game and so inevitable progression towards score of 1, if the game is allowed to run its course. *A flag starting device is recommended as an air horn or whistle might be heard outside the court and therefore that the game has been started known outside.* Before the game and after a basket being scored, players are required to wait and rest, passively in the adjoining changing room.

Scoring a basket is like final death of the cat. (While the state of play is unknown instead of supposed live-dead quasi real cat there would if modeled and interpreted the same way, game yet to be started, 0, and inevitable 1 score, simultaneously. There may be objection that the two teams are not a single entity like the cat. The teams, court ball and hoops could be regarded as a system; as the many atoms of the cat allowing its physiology are a system.

A basketball going through hoop is like the cat final death. In absolute existential reality, from the action of the poison on the cats metabolism; The existential relationship outcome. In the Schrödinger's cat thought experiment the poison must be quick acting, eg. cyanide poison, and inevitably deadly. A poisoned cat is never found poisoned but viable or revive-able.

The Schrödinger's cat thought experiment was conceived to highlight the notion of superposition. The condition of the cat dependent on whether radioactive decay of the source has happened or not. Decay leads to poisoning and inevitable death. Having set up the superposition scenario, the actual process of dying is irrelevant. A beside the point poisoned dying cat is never found. To be logically similar the basketball game having started or not is the situation represented in QM theory by superposition which ought to be emphasized. The game play to 'sudden death' 1 score by one of the teams is, like the dying process of the cat, irrelevant for the purpose of the thought experiment.

To avoid the complication of interrupting play before completion: A player can admit entrance to the court-adjoining changing room from an outside visitor if players are present. Being unable to interrupt and stop play would be similar situation to, if the poison wasn't fast acting and the box could not be opened while the cat convulsed in its death struggle. The dying process is not part of the cat thought experiment. A dying cat is never found. So game in play ought not to be a part of the basket ball thought experiment claiming logical similarity.

The purpose of the basketball thought experiment is to firstly logically 'mirror' Schrödinger's experiment. The thought experiments are obviously materially dissimilar scenarios but logically similar. *The Schrödinger's cat thought experiment was conceived to highlight superposition. The condition of the cat dependent on whether radioactive decay of the source has happened or not. Decay leads to poisoning and inevitable death. To be logically similar the basketball game having started or not is the situation represented in QM theory by superposition which ought to be emphasized.*

This is highlighting the non physical nature of the superposition, as Schrödinger intended with his thought experiment, which he considered "a quite ridiculous case", (a response to Einstein's exploded and not exploded gunpowder).

Another purpose of the basketball thought experiment is highlighting, as well, that the outcome state is an abstract entity. Which is less clear in the cat thought experiment, which employing QM theory becomes an actualized cat only upon discovery of its state in the box.

The outcome state is acquired is from imposition of the relative perspective of the observer who can form their own self generated observation product and produce records of the implied condition of the animal or game. The observation product is not the existing animal or the game 'materializing' from a quasi real condition. Using what is known about object permanence, it is a reasonable assumption that the existing cat or 'game system' already was actualized according to existing absolute relations. However the relative observation product (could be a measurement was carried out instead, giving the relative product of measurement) did not previously exist. Due to lack of receipt of sensory information to form the relative observation, or measurement, product.

The poison finally ends the cats life, the basket ball going through the hoop ends the game. Opening the box and noting the condition of the animal is like writing on the journalist's note book from viewing a player's score card. The abstract outcome can be represented in many different ways,. It can be, part of current thought (brain activity), recorded, memorized, made into a record on paper, made into a digital record on a computer, kept as a photograph implying the outcome etc.

The score- like, state outcome has sprung into the journalist's personal model of reality upon reading the player's scorecard . In practice the journalist is likely to acquire other clues that a game has been played or not from the changing room, such as sweating players are seen, or chatter about the win or loss is heard; from which 1 score, game over can be implied.

In absolute existential reality, rather than the limited viewpoint of the journalist the abstract score is preceded by the necessary physical relation between existing ball and existing hoop being established for a basket to be scored. The basketball does not posses the score prior to being thrown. Likewise, the alive or dead status abstract must be preceded by the existential condition of the animal; which is dependent on the relation of existing poison and existing cat.

State (abstract ) of the game outside of the court is unknown until score is acquired. What is the state of the game going to be found to be? Either 1 or 0 Modeled by QM as: A mix of future outcome basket score to be found and imagined future that will not be found. *This is abstract* and not the material existing players (Nor players and court ensemble, or material ball and hoops.)

(The outcome score is an abstract entity that can be represented and recorded in various ways, obviously different from the current physical condition of the existing, material team members, hoops and ball.)

The outcome of seeing the score in the changing room is knowing 1 or 0 with implications of that sooner than a remote person. The 0 showing game showing the game hasn't started, is akin to a live cat outcome being acquired, 1 game over, a dead cat noticed and remembered or recorded. Getting the game score outcome is akin to forming a new observation product of cat on opening the box, such as a visual image, but could involve cinematography, video, movement detection. The mentally held or memorized or recorded vitality state of the cat is a separate abstract entity from the material animal.

A journalist in the press room collects the update on the game. At once that journalist knows if the game is over if a score of 1 is seen. Different people can become aware of the recorded outcome of the game at different times without effecting the play that has already taken place. In the same way that watching a sports replay does not effect the earlier game or post game activity.

Each person's viewpoint of the state of play (assuming they think they are getting live feed) depends on when they receive the information. There is nothing paradoxical this is just relative perspectives. This is like the time difference between Wigner and friend receiving information on the vitality state of the cat. ("Wigner's friend is a thought experiment [by] Eugene Wigner,... developed by David Deutsch .... An observer observes another observer who performs a quantum measurement on a physical system. The two observers then formulate a statement about the physical system's state after the measurement..." Wikipedia, Wigner's friend)

The game outcome acquired, is not the material players and/ or players and court/ ball/ hoops ensemble or ball and hoop. It is a separate abstract entity.

### Measurement problem

Wikipedia: "In quantum mechanics, the measurement problem is the problem of how, or whether, wave function collapse occurs."

There is no existing state prior to measurement. There is no relation with the measurement apparatus that can give a singular 'measured this way' outcome. This had been widely interpreted as meaning it is not something actual, rather than lacks a relative to a specific observer viewpoint or measurement process. The existing unseen, unmeasured object can still exist (in absolute relation to everything else existing locally). Object permanence is relevant. We do know from object permanence that things can

exist without being seen or measured. Quantum physics does not allow for this, and has particles becoming real at measurement with random outcome.

Not existing and not being seen are not the same situation. The fun of peekaboo is in the 'magical' reappearance of an object, often a face, that had disappeared from view. Older children are not amused by the game, having awareness that objects obscured from view probably still exist unseen. Coming into and out of view is ordinary.

“Psychologist Jean Piaget conducted experiments with infants which led him to conclude that this awareness was typically achieved at eight to nine months of age.” “He claimed that infants before this age are too young to understand object permanence.” Wikipedia peekaboo,

<https://en.wikipedia.org/wiki/Peekaboo>

Where is the unseen existing object located? If the child observer isn't constructing an observation product semblance in 'observation product spacetime'. The observation independent existing thing exists in another space than the products of observation. A space that is not relative to an observer, (there is no reason for it to be relative), but absolute. Here things are existing in relation to other existing things forming a unitary pattern of all existing. Other evidence comes from analysis of the question, Is the Moon there when nobody looks? by Georgina Woodward. Further evidence of continued existing unseen and unmeasured is; Appearing and transformation illusions, using concealed objects, such as fire into doves using doves concealed within the magician's dove pan, and rabbit from an 'empty' hat.

In place of what there is (existing), until we have a singular description, is consideration of the likelihood of finding different outcomes when measurement takes place. These outcomes do not yet exist as they can only be formed when the measured object and measuring apparatus relation happens. So pre-measurement there is contemplation of one future outcome that will be actualized and other outcomes that are just imaginary; unless using the Many worlds theory. This is therefore not something real.

The wave function is not physically real, that is not existing physically because it is partly pertaining to the future and partly imaginary. It is not correct to think it represents the object. Its actually what will be and is imagined but won't be the outcome. The outcome should be regarded as a new abstract entity that can be 'in mind', written on paper, memorized, recorded by a device. Having acquired that score like outcome, the wave function that was in use pre-measurement is no longer relevant.

Measurement is not bringing objects into existence but new score like abstract entities are being introduced.

Quantum Mechanics, (QM), is about measurement. Prior to measurement things are not modeled as existing. QM is about measuring not about representing a world full of existing things.

QM: Instead of an existing thing pre-measurement there is a superposition of outcome states (post measurement states). They can not be actual because the measurement relation with the apparatus is needed to form them. Only one will be actualized in the Copenhagen interpretation. Which means only one of the pre-measurement states was the actual future state to be the rest were imaginary. Which makes the superposition a **smearing of future actualization and imagination**, *rather than existence*. Or if we go with the Many Worlds interpretation all of the superposed states will in the future be actualized, but in different universes. Using Occam's razor to evaluate the speculation it is not reasonable. There is not conservation of energy within that proposed multiverse.

To Conclude: The solution to the measurement problem of quantum physics can be given.

Found by considering what a wave function is in relation to existence. A wave function is not physically real being a pre-measurement superposition of; what will be the outcome after the measuring process has happened and imagined outcomes that will not come to be. It does not collapse causing the definite state object to come into being. There is nothing physically real to collapse. It is just replaced with a new abstract entity, which is a score like outcome. The outcome 'score' can be recorded in different ways, be held in mind (thought) or memorized.

The object after measurement is a different entity from the abstract score like outcome. When the replacement is done the wave function is no longer relevant. What might be is replaced by what is known to be. What is before the knowledge is acquired and part of mental awareness or stored for future access is another matter. There will be temporal delay between the physical 'measurement' interaction happening and registering of a detection. Thinking of Schrödinger's cat, the cat and poison interaction can have happened some time before opening the box but until the box is opened what might be found (to be found and imagined but will not be found) is still relevant. Keeping in mind the wave function is not the animal.

This also makes Wigner's friend type problems not paradoxical. The knowledge of friend, who is told the outcome by the observer, and direct observer of the cat can be different without logical contradiction. Its about whether or not the abstract outcome score has been acquired (individual

replacement of wavefunction i.e. what might be found) not the condition of the system under consideration in the meantime. That different observers replace the wave function at different times, when they have access to the information, is no more strange than relativity. Individuals forming their own observation products when they have received the information and not before.

### Useful reading

- 1.Wikipedia peekaboo, <https://en.wikipedia.org/wiki/Peekaboo> “Object permanence is an important stage of cognitive development for infants.” Wikipedia, Peekaboo
- 2.Analysis of the question ‘Is the Moon there when nobody looks? ‘ by Georgina Woodward, Submitted to viXra, history and philosophy archive.,