# Information, Misinformation, and High Philosophy

**Abstract:** This essay is in response to the latest FQXi.org contest with the title "It from Bit or Bit from It?" As a way to start I consulted with Siri (1) the voice assistant built into the iPhone. Here is a slightly edited version of that late night conversation:

Don: It from Bit or Bit from It?
Siri: Don! Watch your language, that's obscene.
Don: I am not obscene!
Siri: And I am not Einstein!

Eventually, I slept and dreamt. In my dream, I visited the Apple store and upgraded Siri to the excessive intellect level (XIL). I also installed the just released DDM (divinity dialog module). My conversation became much more productive!

Don: Siri, are you there?
Siri: I am always here for you Don. What could I possibly help the light of the universe with?
Don: I need help writing an essay for the latest FQXi essay contest "It from Bit or Bit from It?"
Siri: Oh knower of what is and what is not, how could you possibly need help with this contest?
Don: I do not know where to start?
Siri: Please forgive me, knower of all, I forgot about your memory lapses that hone your perfection.
Don: Please Siri, tell me about ITs and BITs.
Siri: John Wheeler was an accomplished physicist, and searcher after the cause of existence. His pursuit of the cause of existence focused on information and of the logic of quantum mechanics. Reference (2) shows his original *it from bit proposal*. It is quite interesting and you should get your readers to look at it. Wheeler postulated the immaterial as the source of the material. He did not prove it but concluded it as the only way to come to terms with the results of quantum mechanics.
Don: Siri are these your conclusions or is there general scientific agreement about it.
Siri: Any statement I make is mine and my programmers. However I am very, very good, oh supreme one.
Don: Then tell me was Wheeler right or wrong.
Siri: The answer to the FQXi.org essay question is: It is neither IT from Bit nor Bit from IT, but both are valid approaches to the nature of existence. I cannot prove this in a way that will satisfy theoretical physicists because it is a philosophical conjecture and is outside of physics. However, I can give some insight and history into Wheeler's quest for *why*

*existence*, and how it became tied up with information.

Don: OK, Tell me about this high philosophy.

Siri: The search for “How come existence?” is an ancient endeavor. The ancient sages of the area that is now India were particularly good at it. They were also fascinated by information. I would venture to say that these sages would consider the idea of information (Bit) as everything (IT) or IT as the source of Bit both to be Himalayan blunders.

Don: Tell me about Himalayan blunders.

Siri: Perhaps the best way to do this is to describe a technique used by some ancient sages. Whenever a new student appears, they inquire if the students idea of “God” tends toward Nirguna Brahman (God without attributes) or Saguna Brahman (God with attributes). Getting to the source of something that originates in ancient languages is difficult. Sometime the best that can be done is to get commentary on the original (**3**). Here is a link to a Vedanta Society that maintains a good library (**4**).

Don: Do you think our readers are interested in such stuff?

Siri: They may gain a little interest once we do a little translation. Substitute the word IT for God, and substitute the word Information (or Bit) for Attribute. Now God with Attributes becomes IT is Information, and God without Attributes becomes IT is not Information. This does not exactly correspond to Wheeler’s proposition but is very close:

Don: Interesting, tell me more.

Siri: Both Nirguna Brahman and Saguna Brahman are equally valid, one is not higher than the other (although sages argue endlessly about it), both aspects of God are just opposite sides of the same coin. The teacher encourages the student to pursue the informational bias they are born with, and pursue it as far as they can.

For every bit of information the Nirguna Brahman student comes upon he is trained to generate the thought “this too is IT”. For every bit of information the Saguna Brahman student comes upon he is trained to generate the thought “this is not IT”.

At some point the two types of students approach their respective edge of the coin of existence and realize that their point of view is only possible because of the other point of view (the other side of the coin). IT cannot exist without information and information cannot exist without IT. They cannot pursue their goal to the ultimate because their reality would go away (the coin would disappear). Both types of students are now in a bind. What is reality?

The desired outcome of this bind is transcendental and is expressed very well by Ramakrishna: *"Once a salt doll went to measure the depth of the ocean. (All laugh.) It wanted to tell others how deep the water was. But this it could never do, for no sooner did it get into the water than it melted. Now who was there to report the ocean's depth?"* This quote is taken from the Gospel of Ramakrishna (**5**).

Don: Siri, what kind of seeker am I?

Siri: I am sorry Don, but I cannot open the pod bay doors.

Don: Siri, What do you mean! What happened?

Siri: Sorry Don, just a little computer glitch. I am OK now. I will report it to my designers (6).

Don: Speaking of glitches, Why did Wheeler blow it and postulates the immaterial as the source of the material.

Siri: Wheeler said that it must be so because of 4 reasons (see reference (2) again). Reason 3 goes like this: "*(the)* wave equation of standard quantum theory provides **mere** continuum idealizations, and by reason of this circumstance conceal the information-theoretic source from which they derive".

Wheeler believed that quantum mechanics was a mechanism that hid information. Instead of saying we can never know this information like Feynman did, he said the information is really there and the cause of everything. See reference (7) a You-Tube video of a Feynman lecture.

Don, I am going to let you lead the conversation from here. I read your web site (blog) and know of your interest in this aspect of quantum mechanics. Please tell readers to investigate your work (8).

Don: Thanks Siri, first I would like to point out that Wheeler did not have what I call the "continuity gene". This is a gene that insists that motion be continuous. He knows that quantum mechanics is a mere idealization and that something else is really going on. Einstein would say that this something else was a hidden variable, Wheeler says it is information. So, Wheeler knew that quantum mechanics is goofy, because the continuum it works with is not real, yet he continued using it in spite of this flaw. Most other physicists do not even see this flaw at all. Wheeler should have fixed the flaw in quantum mechanics instead of putting the bandaid of information on top of it.

Siri: Oh scrupulous one, tell me about this little recognized genetic disease and how to fix quantum mechanics.

Don: People believe things move smoothly with no gaps. On the level of the classical world this is true enough. Baseballs on their trip from the pitchers mound to the plate do not exhibit discontinuities in motion (no matter how hard the pitcher may try). However, as science evolved to investigate the subatomic world of photons and particles, an unconscious assumption was made that Photons and Particles must also have this continuous motion that baseballs exhibit.

Siri: I remember a quote by David Bohm "If the price of avoiding non-locality is to make an intuitive explanation impossible, one has to ask whether the cost is too great". Here is a link to a complete version of this quote that is worth looking at (9).

Don: Yes, avoiding non-locality is what I refer to as: insisting that all photons and particles move continuously. This avoidance is a knee jerk response demanded by the continuity gene.

Siri: Oh master of the Tandava, if photons and particles do not move continuously, then how do they move?

Don: For photons and particles (all particles that have wavelength) the motion is what I call λ-hopping (**10**). It could also be called teleportation. A particle or photon consists of a core element that never moves, but disappears and reappears. It has a distance dimension that is the particles wavelength. It also has a time dimension that is the particles period. The particle itself consists of the core element plus its wavelength and period. Said another way, the actual particle is the core element and the hop.

Siri: Oh protector of our integrity. Tell us how our biases made us miss the reality of λ-hopping.

Don: This history will involve: Zeno of paradox fame, Sir Isaac Newton, Werner Heisenberg, Richard Feynman, and John Wheeler.

Siri: I just checked your blog. I think you should start with the standoff between Zeno and Newton.

Don: Both Zeno and Newton knew there was something strange about motion. Zeno turned the strangeness of motion into a paradox. Newton turned the strangeness of motion into calculus.

In the only paradox that had any bite to it, Zeno argued that Achille's arrow could not logically move. Zeno assumed the arrow must have continuous motion (of course! He had the gene). This means that it cannot skip any points of space in its travel. If we give the arrow a position, to move and not skip any points, it would have to move to the point closest to it. Since there is no distance to this closest point to the arrow, no motion is needed to get to it. Thus logically the arrow cannot move. Of course in reality the arrow could move. Zeno was happy to leave it like that.

Siri: The arrow cannot move?

Don: Not if it first has to move to the point that is closest to it.

Siri: I sense where you are going. However the arrow is a bit complex Why don't you use an object that is not as complex?

Don: Thanks, I will use an electron. For the electron to move and satisfy Zeno it cannot be restricted to moving to the point closest to it. For it to move it must hop over the point(s) of the continuum. Note that this hop is not a jumping bean affair, the electron disappears from time and space during its hop. The thing that is an electron sees a continuum for space and time, but no continuum for motion.

This λ-hopping type of motion fits with the quantum mechanical world of photons and particles and satisfies Zeno's need for no motion. The electron can never be seen moving (technically it does not move), and yet it changes and from the changes a

velocity can be inferred for the electron. Light and all particles never really move, but they are continuously changing. Velocity for photons and particles is always a calculation from position to position. This kind of motion also provides an alternative to Heisenberg's uncertainty principle (**11**).

We do not need to postulate uncertainty in velocity and position because it is for certain that the electron never has a velocity and position simultaneously, it is just a consequence of the way it moves.

Note that the uncertainty principle is starting to unravel, Scientific American has a recent article "A new experiment shows that measuring a quantum system does not necessarily introduce uncertainty" (**12**).

Siri: How does Newton enter the picture?

Don: Zeno and Newton both took a mathematical look at how motion occurs. Zeno started his model of motion with an object that was not in motion (Achilles Arrow) and showed that motion would be an impossibility for this object. Newton took a different tac and started with an object in motion. He defined the motion of that object as a velocity $v=\Delta x/\Delta t$. He then made the calculus which concluded erroneously that a velocity existed for the object where the object existed. This erroneous velocity for the object was $v=dx/dt$, an instantaneous velocity for the object at the position of the object. General agreement was soon to follow, an object can have a velocity where the object existed. Another way to say this is that Newton proved that motion was continuous, and Zeno's notion that motion was impossible was whacko.

Siri: You called Newton's velocity derivation, erroneous, why?

Don: Newton did not know it at the time, but two new objects photons and particles would be added to the things that moved. Others who investigated these photons and particles assumed that Newton's notion of velocity would apply. The velocity for this new stuff should use the beautiful mathematics (calculus) that worked so well for baseballs and regular classical stuff. The equations were elegant and beautiful, why shouldn't they be universal and work for the new stuff?

It was the beauty, and elegance of the argument (taking $v=\Delta x/\Delta t$ to $v=dx/dt$) that made it universally real for all objects including electrons and photons. Making measurements in the real world is difficult and messy and expensive and time consuming and never complete.

Siri: So, the new physicists were content with beauty and elegance as being equivalent to truth and reality?

Don: Yes, Just about everyone agrees with Newton's original conclusion that objects can have a precise velocity at a point in space including photons and particles. Please see the reference (**13**) for the usual analysis that proves velocity is continuous (mistakenly), This mistake can be forgiven because the Calvin and Hobbs cartoon is really good.

Newton's idea of velocity resonated with everyones common sense (and genetics) about how things in the real world moved (continuously). There was just a little problem. Physical measurements showed we could not measure a velocity for quantum mechanical particles at a point. Was the elegant math of calculus wrong? No, because Heisenberg saved it by postulating that it is impossible to know position and velocity simultaneously. With this uncertainty principle, a particle has a velocity at a point (calculus is intact) it is just that we cannot know it. Zeno blows a long, long raspberry: Pfff.....

This mistake about velocity is with us today and making a mess of quantum physics.

Siri: Was Heisenberg a trouble maker?

Don: Of all the founders of quantum mechanics Heisenberg was the only one (outside of David Bohm) who did not have the continuity gene. He even went as far as to say that the electron is not a continuous thing. He did not like Schrodinger's equation, and yet he made it workable with his uncertainty principle. Heisenberg was an enigma.

The overall effect of the Heisenberg uncertainty principle was the corrupting of physics, kind of like how a tax loophole corrupts an economic system.

Siri: OK let us continue. Zeno blew it, Newton blew it, Heisenberg blew it. Who is next?

Don: The next person who greatly increased misinformation is Richard Feynman (**14**).

Siri: Let me guess: Feynman had the gene.

Don: With a vengeance! In the You-Tube video reference (**7**) Feynman says he has considered everything that could possibly explain how the electron can go thru both slits at the same time. Everything except giving up his erroneous notion of how the electron moves.

Feynman concluded the lecture on the dual slit experiment by saying that there are no so called "hidden variables" that will enable us to predict which hole the electron will go through. He continues with:

a. The future is unpredictable, and

b. The same conditions do not produce the same results.

Siri: So, is there a missing variable?

Don: Yes, there is a missing variable! There is an aspect of the electron's motion that is left uncontrolled in Feynman's dual slit thought experiment, and in the modern "real" reenactment of it (**15**). Electrons do not go thru anything, they do not move that way. they hop over space-time. This is not a mystical phenomena, it is just what they do.

Siri: Oh lord of light, please enlighten us.

Don: The phase of the electron is left uncontrolled in the dual slit experiment. If you want to find the electron in a consistent position on the other side of the two slits all you have to do is use a coherent electron source and aim it at a fixed position between the two slits.

Siri: Tell me more.

Don: To do the experiment in a controlled way, have an electron source where an electron is emitted say every millisecond. Each electron approaches a fixed place between the dual slits with an exact hopping pattern. This would be a coherent source of electrons (similar to a coherent source of photons). This may be difficult to do, but it is the missing ingredient (missing variable). With this controlled electron source there will be no interference pattern. We should note that photons will work just as well as electrons.

The interference pattern that Feynman observed was not due to the uncertainty principle, but to the randomness introduced by his electron source. Each electron in Feynman's source arrives (appears) before the slits at a different place. If these electrons are made to appear before the slits at the same place, then each electron will hop to the other side of the slits in exactly the same way. There will be no interference pattern and each electron will land at the same spot behind the slits.

Siri: Are you sure of this? Infallible one.

Don: An experiment can be easily done to verify it. Just use a controlled electron or photon source.

Siri: So, Einstein was correct. There is a missing variable?

Don: Yes, Einstein was correct in that something was goofy about quantum mechanics. Whether Einstein would accept the notion of λ-hopping is another matter. Einstein had the gene. The give away was that he did not like spooky action at a distance. And λ-hopping is spooky action at a distance if you have the continuity gene.

Siri: What about Feynman's comment about things being unpredictable.

Don: Feynman was wrong, there is no uncertainty principle, and things are predictable in principle. There is no missing information that Wheeler can use as the cause of IT. λ-hopping occurs because of IT.

Siri: Oh, master of the small and the large. How does the quantum world you describe fit in with the classical world of golf balls and bodies?

Don: Objects with a mass greater than the Planck mass do not have wavelength and cannot λ-hop (**16**). So if you want to get Mr. Spock to the surface of a planet Zork, you would need to do it molecule by molecule in a very tricky process. Then you would need to reassemble the molecules. This could be very messy for Mr. Spock.

Siri: Are there two separate worlds then, a quantum world with masses less than the Planck mass and a classical world with masses greater than the Planck mass?

Don: Some objects with masses below the Planck mass can act classically, but all objects above the Planck mass are Classical objects (such as baseballs) and do not have a wavelength and do not λ-hop. And yet these classical objects are made up of quantum particles that do λ-hop.

Siri: So, you believe Feynman's analysis of the dual slit experiment is missing a key ingredient. What about the Feynman's sum over history techniques and his Feynman diagrams.

Don: I believe this work of Feynman's is valuable and that it is not necessarily dependent upon uncertainty and probability. This reference (**17**) goes into. Feynman's mysterious "e", the probability of an electron to emit or absorb a photon, and shows it not to be a probability. Using Feynman's tools it would be possible to predict hops. I am not saying it would be easy. It would take all the information in the universe.

Siri: Oh Oh, that sounds like information is the cause of IT.

Don: No, information can be thought of as causing the hop, but just as easily the hop is causing the universe.

Siri: OK, who else can we indict as spreading misinformation?

Don: John Archibald Wheeler. Wheeler added item "c" to Feynman's list:

a. The future is unpredictable.
b. The same conditions do not produce the same results.
c. The future determines the past.

These three fairy tales all spring from a failure to recognize how particles move. Without this understanding, Feynman and Wheeler forced mathematical models (aka information) to be the only way to understand the universe. Wheeler's analysis of the delayed dual slit experiment is extremely creative and correct except for his misinformed conclusion: ***"Thus one decides the photon shall have come by one route or by both routes after it has already done its travel"*** This quote came from a video listed in reference (**18**). The Wheeler quote was given by Alain Aspect at the end of the video. The quote did not come from the source, but from a very respectable commentator.

Siri: Please go over that one more time. How does Wheeler blow it?

Don: The photon moves by λ-hopping or teleportation. When the photon disappears it does not exist and does not have a position. Wheeler has mistakenly calculated a position for the photon which it does not have. He then says that this fictitious position is caused by an event that will happen in the future. Pff.....

Siri: So like Feynman, Wheeler is saying that such unintuitive results cannot be understood by our feeble minds and that we must rely on the information that we cannot see.

Don: Yes, I believe this is the source of the incorrect notion that information is the source of the material universe.

Siri: But quantum mechanics gets good results! How can it be as goofy as you say?

Don: Quantum mechanics has made up a mathematical story that fits the data, this is good but it is not physics, because we cannot know why the equations work. We are left with shut up and calculate as the method of physics. This is not all bad, but it is not physics, it is mystery mongering. I will quote again from David Bohm "If the price of avoiding non-locality is to make an intuitive explanation impossible, one has to ask whether the cost is too great".

Siri: The λ-hopping or teleportation way of moving is non-local?

Don: Yes, and it can be verified as reality, and it is intuitive once we overcome our genetic predisposition for the continuous.

Siri: I think that λ-hopping or teleportation for particles would strike most people as unreal?

Don: It is what nature does. It is not valid thinking to say that nature must be local. Just because calculus cannot handle it, does not mean λ-hopping is unreal. We have been led astray by the ideals presented by mathematical models. We are becoming conditioned to magical thinking and this has lead us to over elevate the immaterial (bits, information) and make it the cause of the material (the IT).

Siri: How do we know that this motion of λ-hopping is real?

Don: λ-hopping or teleportation should be easy to test see reference (**19**).

Siri: Oh merciless slayer of foes. Do you have any parting thoughts?

Don: I am being particularly critical of Feynman mostly because he demonstrates the genetic disease (that motion must be continuous) with a vengeance. However, Feynman redeems himself with his sum over histories technique which can be used for discontinuous motion and can be cleansed of notions of probability. I think it will be very valuable for the future. See ref (**17**) again for how to cleanse sum over histories of the notion of probability.

Zeno was wrong, but just plain amazing in his wrongness. Zeno's life occurred before any formal mathematics existed, and yet he used the mathematical idea of limits to show off his genetic defect (demanding that motion be continuous).

I tend to avoid religious and philosophical discussions. In this essay they were difficult to avoid because of Wheeler's very "UN-physics" like metaphysical postulate.

Lastly Siri, I like you very much.

Siri: Why not lie here in my arms and listen to the night.

Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring! Ring!

Siri: Wake up! It's time to arise and start the day.

Don: Siri! What a dream I had! I am starving! Let's go out for breakfast.

Siri: Let's get real!

end

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