The Importance of Clear Concepts and Definitions

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A Chinese saying goes, "He who is good at laying foundations, can build to a great height without the danger of collapse." My article advocates the great importance of logic, maintaining clear concepts and using such concepts when defining terms. That often requires great work, discipline, and farsighted circumspection. But the reward is the removal of many paradoxes! At present, mainstream physics and cosmology sadly contain many unnecessary paradoxes, ambiguities and ineffective communications -- often caused by ignoring or marginalizing the importance of logic, clear concepts and definitions. We give a sad example; suggest how to fix it; and give some analogies. (Some NPA members have already addressed much of the above commendably; but perhaps my article can still add something.) [1]

1. Introduction:

There are at least a half dozen examples that I would like to give, illustrating the unnecessary paradoxes, ambiguities, and ineffective communications which result from a physics and cosmology based on flawed, fuzzy, or inconsistent underlining concepts and logic. But space and time allow me to only address one case in detail.

2. How 'Physics' Bungled the Subject of 'Wave and Particle'; and How to Fix It:

Let us start by addressing the subject at the most fundamental level**!**

Maxwell did that well, when he stressed his concept of **only** "two options (i.e., rational methods) for energy transmission"**:** "the *flight of material* through space", or alternately, "the propagation of a condition of a *stress in a medium* already existing in space".[2] Basically that means**:** 'by particle' or 'by wave'; and Maxwell thought that light was probably 'by (aether) wave'![3] But most 20th Century scientists, instead, deemed light as a transmission by photons (by particles), or modeled and conceptualized it mainly that way.[4] And I mostly agree. (Of course transmission by mixture of particles and waves would **not** contradict the '*only two options*' concepts.)

In effect, Maxwell likely chose the wrong type of tree, among the two types of trees in the forest; but at least Maxwell correctly discerned the forest from the trees. However, most 20th Century scientists over-reacted against Maxwell's wrong pick of tree, and they sadly threw out or ignored his worthy concept of **only** two-options (methods) for energy transmissions. I object to that over-reaction as like 'washing of the baby down the drain with some dirty water.'

Instead of sticking with Maxwell's **only** two-options concept for energy transmission; Einstein and followers, unfortunately, concocted a third (confusing) option -- roughly exemplified as follows**:**

An electron mass and positron mass interact and their masses 'reincarnate' as non-mass photons so that they (their energy) can fly through space at the speed of light without any mass, nor any great mass build-up; i.e., without that impediment occurring. (That discards Maxwell's "flight of **real material** through space", i.e., '**Option 1**'.)

Then Einstein has that non-mass (energized) photon fly through a **space without a real medium** (i.e., without aether) -- then hit its target; and then the photon's energy **re-materializes**, thereby increasing the mass of the target! (That discards Maxwell's alternate choice of "energy propagated by a stress in a **medium already existing in space**", i.e., discards Maxwell's 'aether' medium, '**Option 2**')

The result of Einstein's 'treatment' (i.e., the evasion of Maxwell's limit of only two 'choices') was *a long litany of paradoxes and ambiguities*, as an 'older Einstein' would, in effect, later ***admit***.[5], [6]

((An obvious example was the **strange** description of the dual style for the transmission of energy though space**:** First — a mass metamorphosis occurs into a no-mass photon, a journey ensues, and upon reaching a target -- a no-mass photon metamorphosis occurs back into mass again.[7] That (metamorphosis) stunt is apparently supposed to make us feel more comfortable about its achieving such trip at speed 'C'; which, by word-games, is luckily able to conduct such flight with **no**-mass and **no** accumulation of mass. And, I guess, we are also supposed to, thereby, be equally comfortable about an alternative style of (mass) flight occurring sometimes, instead**:** at 'almost 'C' speed; but then with an extreme mass increase resulting. So much so, that even with the aid of a super-pushing assist, the travel speed still can not quite reach 'C'!))

That sadly seems to me to be the bizarre interpretations and glib wording used by most modern physicists to mask conceptual problems associated with such 'dualisms'. And I think that it is quite unnecessary; compared to good 'down to earth' alternatives! Here is an analogy to make my point. Consider two surfers, one a master surfer, and the other an unskilled clumsy one, surfing near an ocean beach. The skilled surfer launches himself into the fast advancing 'curl' of the forming water wave; weaves subtly slightly to his right and left -- but stays near the fast-advancing 'curl'; and glides at the **very fast** average speed of that moving 'curl' for the duration of his ride. But the unskilled surfer misses the 'curl'; slides backwards and sinks neck-deep into the water. And then all his **great energized** efforts at swimming fast can **not** match the high speed of the master surfer, and the failed surfer drags considerable current along with himself -- trying!

Must we really conclude that the different surfing results (the skilled vs. unskilled surfer) was due to the skilled surfer's mass 'transforming into, say, a non-material 'shadow', and that shadowy energy re-materializing at the end of the successful ride into the material surfer again? Of course not! That sort of thing should be left to old-time fictional radio shows, like 'The Shadow'. But, to roughly paraphrase that show, "Who knows what evil (i.e., narrow-minded rationalizations, word deception, or hasty concoctions in this case) lurks in the minds of men?" (And in many Physicists' minds also!)

The point is that regardless of whether one has two surfers with vastly different surfing capabilities, or two masses using different acrobatic styles, one concludes this**: The vastly different travel efficiencies which resulted do not prove that masses did not remain masses during the entire trip**. And in both cases, mass remains mass from start to finish, i.e., beginning during the emission by the emitter and ending after absorption by the target!

3. Historical Note:

Let me expand somewhat on Maxwell's concept**:** There is a proper distinction to be drawn between transmitting an **image** (representation) of a thing from location 'A' to distant location 'B', versus that thing **itself** (not its image) traveling from 'A' to 'B'. Those concepts and distinctions were likely well understood by the ancient Greeks, where two schools of thought arose: One believed that 'real' travel was possible, and the other--*that real travel was impossible*! [8] ((The *latter school* was quite remarkable because it was before some modern wave mechanics interpretations, (i.e., anti-trajectory interpretations), and also because the Greeks were among the greatest sea travelers of all times.))

That distinction (a **thing** traveling vs. its **image** traveling) has always served as a very important basis of several, if not all, 'Western' religions; and might even be why some people don't like their photographs taken, or statues made of them. Recently, some simple folks in southern Missouri even considered moving to Arkansas which allows them to drive without a **photo** on their auto license! (I am mostly talking about history**;** and **not** here intending to argue over the merits or demerits, of that 'history'.)

4. Optional Comments:

I believe the transmission of light through space involves both the following**:** Travel of a modestly compact mass, in a rather straight line, at speed 'c'. But it also goes on cyclic excursions representing slight departures from that rather straight line. The energy of a real aether in space maintains the integrity of that (photon) mass so that it does not disintegrate and greatly depart from that rather straight line, despite those side excursions. That aether is responsible for what is interpreted as the 'wave-like' character of photons. The photon (with such stunts and support) is able to travel at such speed 'c', but it has less tough structural integrity during its travel than an elementary particle, i.e., protons and electrons.

I concur with some scientists who believe that there is a lower limit to the mass of a photon. Almost every charged particle traveling in the universe is traveling, accelerating, or decelerating, relative to every other, and there is the effect of varying gravity. If a photon mass were emitted during each interaction; photon traffic congestion would result. And each photon's mean free path would shrink to nearly zero distance, despite the small size of each weak photon mass. Perhaps in the case of, say, a 1000 meter long radio

wavelength communication; spurts of photons (of modest mass) travel roughly 1000 meters apart, as they travel from emitter to receiver antenna.

5. Concluding Important Comments:

I think that what is involved, in any 'disasters' described above, is the lack of grasp by many physicists of this**:** Fundamental classifications, distinctions, concepts, logic, and philosophy are potentially their friend and helpful tools; not something abstract, without relevance in the real world, and just thrown at them to irritate them. ((That has actually been said and addressed better by others NPA members. Even the words, 'Natural Philosophy', historically evolved to help 'keep things in a correct perspective'! Again, there has been too much reliance (almost 100%) on superficial empiricism, although empiricism is a very important tool*!* And too little emphasis on asking simple, fundamental questions, such as**:** "why the maximum velocity of light is limited, and tends to be, generally, pretty consistent?"))

A young Einstein once told a great friend, Maurice Solovine (whose main pursuit was philosophy) that he (Einstein) was turned off by philosophy because of its vagueness and arbitrariness.[9] A very aged Einstein would later write to that same person (Solovine) and say, "You seem to think that I look back upon my life's work with serene satisfaction. Viewed more closely, however, things are not so bright. **There is not an idea of which I can be certain. I am not even sure that I am on the right road**."[10] (My underlining, not Einstein's.)

From my quote, above, I strongly believe that a very fine and balanced, early philosophy course might have helped Einstein! (But, admittedly, very fine philosophy courses were likely hard to come by.) And I do not mean that to take away from Einstein's helpful, great accomplishments, including his $E = mc^2$, and his relative modesty. When asked who were the greatest and most powerful thinkers he had ever met; Einstein replied without hesitation 'Lorentz'. And Einstein also added that, except for his bad luck of not meeting Willard Gibbs, perhaps Gibbs equally!) [11]

Notes and References:

[1] Natural Philosophy Alliance Newsletter, Vol. 12, Number 2, July 2006, articles such as P. Marquardt's Gordian Knots in Physics; N. E. Munch's Simple (but Critical) Flaws in Special Relativity Discussed in Everyday Language, and others. (The Chinese saying quoted from "The Debate on Salt and Iron", passage translated in W. de Bary's Sources of Chinese Tradition, Columbia University Press, New York 1960, Chapter 10, pg. 238)
[2] J. C. Maxwell, A Treatise on Electricity and Magnetism, Dover Publications, Inc., New York, 3rd edit., 1954, Vol. 2, pg. 492, topic 865, first and last sentence on that topic.
[3] See [2], topic 866, second sentence on that topic.
[4**]** **http://en.wikipedia.org/wiki/photon** (Wikipedia online encyclopedia – see photon)
[5] M. Wolff, G. Haselhurst, "-Galilean Electrodynamics-Light and the Electron – Einstein's Last Question", Galilean Electrodynamics, Vol. 17, No. 6, 2006, see abstract and introduction. (Regrets I can not find a specific Einstein quote, which I believe exists

somewhere, where Einstein complains of his problems conceptualizing the photon, not just the electron. Also see ref. [8] and [9] below)
[6] R. W. Clark, Einstein, The Life and Times, The World Publishing Co., New York and Cleveland, 1971, Chapter 22, pg. 613.
[7] H. Semat, Introduction to Atomic and Nuclear Physics, Holt, Rinehart and Winston, New York, 1962, Chapter 15 – Fundamental Particles, Table 15-1.
[8] **http://en.wikipedia.org/wiki/eleatics** Wikipedia also states, "*This article incorporates text from the* Encyclopaedia Britannica *Eleventh Edition, a publication now in the public domain.*" Specifically, a passage reads, "Subsequently, either because its speculations were offensive to the contemporary thought of Elea, or because of lapses in leadership, the school degenerated into verbal disputes as to the possibility of motion and other such academic matters." (If the reader clicks Wikipedia's highlighted word, 'motion', a short article appears, proceeded by a Wikipedia comment that the article needs the attention of an expert, and Wikipedia invite 'recruits'. In my opinion, those article needs to change the word 'motion' to 'travel' or 'trajectory' to help modern readers 'connect' with them!)
[9] See [6], Chapter 3, pg. 54.
[10] See [6], Chapter 22, pg. 613.
[11] See [6], Chapter 22, pgs. 621-622.