

FQXi 2013 Essay Contest: It from Bit, or Bit from It?

Which is what? by Paul Reed

Introduction

1 The question whether 'information' or 'material objects' are more fundamental revolves around, in the first instance, establishing what each can be, because nothing is fundamental if misconceived, and then differentiating them. And in that respect, information must be a representation of something, so the something is primary. Whether the information is, of itself, physically existent or not, is irrelevant.

2 Information presupposes something, which either generates information about itself, or about which information can be generated. There is also a presumption that that something is both definitive and identifiable, otherwise there is no reference for establishing what the information represented and whether it is valid. And if it is not valid, it is useless information. This essay addresses these issues, generically, by differentiating physical existence from alternative possibilities, and physically existent representations of it, and objective knowledge from belief.

The nature of awareness

3 The start point is that there is existence in some form. But by definition, being able to be aware of it necessitates being part of it. Which means that sentient organisms cannot externalise themselves from it, and can therefore only be aware of, what must be presumed to be, a particular form of existence. That is, what has detectability (for want of a better phrase), or at least the proven potential thereof.

4 Awareness involves sensing physical existence. That is, receiving physical input. For reception to occur, ie being in the line of travel of, and physically interacting with, there must be something which is independently existent of the detection systems, even if this is, for us, limited to one particular form of existence.

5 So, whether there 'are' alternative forms of existence is irrelevant to science, because we cannot be aware of them. We can only generate objective information about what it is potentially possible for us to know, which is underpinned by an independent, identifiable, physical process, not philosophy. This then is the something. It is possible to believe in any form of existence, irrespective of, or even in contradiction to, experiential evidence, but we are trapped in an existentially closed system. And hence from the scientific perspective, that is what determines what constitutes the something, and valid information.

6 Another way of expressing this is as follows: an absolute extrinsic reference is never attainable, because that can only ever be the possibility of an alternative. That is, given A (where A is 'is'), there is always the logical possibility of not-A. However, this cannot be defined from within A, as a reference from within not-A is required for that, which is inherently not possible. So all that can be defined is A, from within A, and that that is not not-A. But not what not-A is.

7 The corollary of this is that 'is' (ie A) must be definitive in itself (ie a closed system), and therefore possible to define, albeit only from within. That being so by virtue of the reference as to what is 'of', or 'not of', the system, ie the factor which

determines inclusivity. In the context of existence that reference is detectability. Which encompasses both validated direct experience (ie where the effects of individualism and perception have been discounted), and what has been properly hypothesised (ie proven as potentially experienceable, on the basis of the process and verified experience, if there was not some identifiable issue preventing that). It does not include assertion based on no form of validated experienceability, ie belief.

8 The functional commonality of the sensory systems, and their independence from what is received, all of which is an outcome of evolution, is demonstrated by the following. Irrespective of understanding, any given sentient organism does not affect action which indicates that it is unaware of any given physical input, unless its sensory systems are incapable of detecting it as their evolution did not involve it, or there is a flaw with that particular individual capability.

The received physical representation

9 As sensing involves the receipt of physical input, the question is: what is this? While what is received is physically existent (ie light, noise, vibration, etc), it is a representation of a physical occurrence. Because it is the result of an interaction with that, and has certain physical qualities required to be a representation, ie high frequency of repetition, constancy of outcome, imperviousness to alteration, etc.

10 Hence, the totality of physical existence could be characterised as an existential sequence, and an existential representation of that. The latter being a consequence of the former, ie it is caused as the former progresses and in doing so interacts with certain existent phenomena which results in physically existent representations. Subsequently, that could itself be a factor in the sequence, but not at the time when the occurrence happened and the representation was created.

11 So, light, etc, ie what is physically received, is the ultimate information. It is something, of itself, but it is also a representation of something else. And since it is physically existent, it is independent of the systems which have evolved to detect, and then process, it. Receipt of such a representation has no effect on its physical existence, because that occurred previously. It just ceases to exist in that form upon receipt. And that applies whether the receiving entity is able to utilise what was received or not, as physical existence does not alter in anticipation of what it is going to interact with.

12 That is, a brick would have received the same physical input as an eye, had it been in the same spatial position. Any physically existent entity can, and does, receive any physically existent representation. It is just that the brick cannot then utilise that and thereby create a perception of what was received. While there are issues with that subsequent processing, these are not physical issues. The subsequent processing of what was physically received involves creating a perception thereof, not the alteration of physical form. Obviously, the nature of this processing needs to be understood so that what was physically received, either individually or generically, can be extrapolated. But that is not physics, and no physical theory should attempt to explain the physical circumstance via this subsequent processing.

13 The phenomena involved in capturing and transmitting these representations have physical properties which influence the extent to which the representations can be comprehensive and/or accurate. There are four types of, often interrelated, issue:

- non-existence: what occurred involved a property which did not interact with the phenomena, ie no representation was generated, although something happened.
- non-receipt: no representation has been, or ever will be, received by an entity which can process it, although it existed. That is, no recipient sentient organism was in the line of travel of the effect, or it ceased to exist en route due to interaction with another existent phenomenon, or it has not yet reached any organism.
- deficiency: this revolves around the occurrences in any given physically existent sequence being too many, too small, too frequent, etc, for the phenomena to cope with, ie they are unable to properly differentiate all that occurred, and hence the resultant representation, even in its original form, is deficient in some way.
- alteration: the representation has been altered in some way en route, ie it is not in its original form when received. This could involve delay, distortion, partial elimination, diversion from the original line of travel, etc.

14 Therefore, unless proven to the contrary, it must not be assumed that what is physically received is an entirely accurate, and/or comprehensive, representation of even the form of existence we can know. While it is certainly not a representation of any sort of possible alternative form of existence which we cannot know. Whatever is received will need deciphering, both in the sense of identifying and discounting any alteration/imperfection involved, and then understanding what it represented. Which entails knowing how the creation of the different types of representation happens, vis a vis the different forms which comprise physical existence. And how the representation itself, as a physically existent entity, persists in existence over time and hence what affects it whilst doing so and how.

15 Before that can be accomplished, which is the physics, what was actually received needs to be extrapolated from the perception formed as a result of processing it. This has both a generic and individualistic aspect. Receipt of representations only occurs at the individual level, therefore the processing is susceptible to individual capability and circumstance. Comparison with other individual perceptions will reveal such specific influences, which then need to be discounted.

16 At the generic level, an understanding of the functioning of the processing is required, in order to discern the relationship between any given type of input and output. Again, it must be stressed that this is not physics, as it has nothing to do with the physical circumstance. The simple fact is that the only start point available is a perception of what was physically received, and therefore the process, and the effect that had during conversion must be discounted first.

The nature of what is physically received

17 Leaving aside the fact that it is a representation which is received, there is one fundamental characteristic which needs highlighting. That is, it is always the function of something. But in comparing representations received and thereby identifying differences, there is a tendency to reify those. That is, in the context of this subject, confuse existent information with derived, and possibly flawed, information. This can be illustrated in the context of the concept of space/distance/ dimension.

18 Distance is an artefact of physically existent entities, it being a difference between them in terms of spatial position. That difference does not exist, only the entities do, and they do so in one definitive physically existent state at a time (para 31 refers). So there can only be a distance between physically existent states which exist at the same time. That is, it is not possible for there to be a distance, as opposed to some form of conceptual spatial relationship, between something which exists and something else which does not. Therefore, any given distance is always unique, since it reflects a definitive physically existent circumstance at a given time. The notion which presumes there could be varied results when quantifying it, either in terms of space or duration, is a fallacy. Whatever the measuring methodology, there can only be one result for any given distance.

19 However, distance can be expressed conceptually, ie in terms of duration incurred. The concept being that instead of assessing distance as a spatial quantity, it can alternatively be measured as the duration which would have been incurred had any given entity been able to travel along it, either way. But as this cannot happen because there is no duration during which this can occur, it must be understood that there is no duration, as such. It is just an alternative expression to, and the equivalent of, a specific spatial measure. Failure to understand this results in the flawed application of the equation $x = vt$.

The nature of light

20 Of all the types of representation received, light is the most important. It is a physical effect in photons which enables sight. As light results from an atomic interaction, the speed of the physical phenomenon which the photons interact with is irrelevant, unlike in a collision. Thus the start speed of any given light is always the same, and as with any existent entity, it will continue to move at that speed unless impeded. Also, there is a relentless sequence of such interactions, and light travels in all directions.

21 Hence, when referring to light, it is usually in respect of many different physically existent phenomena, ie different physically existent lights may only be the same (or nearly so) in terms of that aspect of its physical state which when received by the appropriate entity can be processed. Hence, the physically existent entity in its own right, and what physically can be processed, need to be differentiated. The point being that the physically existent state of the latter remains the same (or nearly so) over time, whereas the former, as with any existent entity, does not.

22 One important consequence of the fact that the representation is independently existent of the physical existence it represents is that there is always a delay between the time of existence with the consequent creation of that representation, and the time of receipt of that (if at all). This is particularly important in respect of light, and the source of substantial misconception.

23 Leaving aside any specific environmental influences, essentially, this time delay is a function of spatial position. There being a very important difference between the circumstance where that relative spatial position is maintained whilst light is travelling, and where that spatial position alters whilst light is travelling. Since the rate of change of a sequence being represented by light can appear to alter in the latter case, as the result of a simple optical illusion. This has nothing to do with any

possible difference there might be in the rate of change of the occurrence being represented, and that inherent to light, which might give rise to ‘imperfections’ in the representation (para 13 refers). The effect being considered here is explained as follows:

24 The duration of the delay will vary as a function of the distance involved, and the speed at which any given light travels (or is presumed to do so). Assuming a constancy of light speed for the sake of simplicity, then the perceived (ie received) rate of change of any given sequence will remain the same, so long as the relative spatial position of whatever is involved remains constant. But, when relative distance is altering (ie there is changing relative movement, which involves alteration in relative spatial position), then the perceived (ie received) rate of change alters. Because the delay is ever increasing (or decreasing) at a rate which depends on the rate at which the distances are altering. To the observer this gives the impression that the rate of change is slowing/speeding up, over time, but is an optical illusion, as the actual rate of change does not alter.

25 Einstein failed to differentiate reality from its light based representation. As the two were conflated there was no observational light. In other words, his definition of the second postulate is irrelevant, because that was not what was deployed. In order to calibrate distance and duration he, correctly, used a constant, which he called light, but it was not light, just a constant. So the concept of a dichotomy around the constancy of the speed of observational light is non-existent, and the ensuing attempts to resolve it, pointless.

26 This mistake was counterbalanced by his failure to understand the reference for timing, following on from Poincaré’s flawed concept of simultaneity. So he invoked a superfluous ‘layer’ of time. In effect, Einstein shifted the time differential, which occurs with the receipt of light, to the other end of the physical process, by asserting it to be a characteristic of physical existence. That is manifest in his concept of relativity, which is wrong, as too are many of the assertions which stem from conflating reality with a light representation thereof. These revolve around attributing light, which is just a physically existent entity with a representational quality which enables sight, with an influence in the reality it is actually only representing which it does not have. This remains the most important failure to distinguish something from a representation of that something (ie information). The Copenhagen interpretation is another; while space-time is a model which contradicts how physical existence must be constituted (para 31 refers).

The nature of knowledge

27 The ontological/epistemological conundrum is that we cannot transcend the form of existence available to us, and we receive only representations of that. So any comparison with what ‘actually’ happened is not possible, and neither is it even possible to compare directly with what is happening within our, possibly, limited form of existence. In other words, there is a lack of absolute references, and we only have knowledge of (ie information about), and the ability to compare different experiences in order to assess this. There is no something immediately available to us.

28 So, until proven otherwise, knowledge can, by definition, only be at best what is ‘proven up to that time’. That is, it always has to be assumed that there is a possibility

of more knowledge, which might be additional to, or replace to some degree, previous knowledge. While this could be a function of errors, the point really revolves around the nature of the process whereby knowledge is accumulated. This is the consequence of only being able to define what constitutes 'is', from within, ie solely on the basis of information about. Which, logically, involves comparing everything with everything else. Any given entity will suffice for this referencing process, it is just that, in practice, some references are more suitable than others. Comparability of identified differences must be ensured by maintaining constancy of reference. Which means using the same reference, or discounting for changes of the reference.

29 This process will be completed by default. That is, it will only become apparent when, after sufficient time, no more alternative knowledge is forthcoming, which will indicate that what is then known is both accurate and comprehensive. Assuming, obviously, due process has been followed, ie the knowledge is not completely false. At that point, that knowledge can be deemed to be the equivalent of the form of physical existence we can know. That is, rather than the proviso that the knowledge is the best representation 'at this time', it can be deemed to be 'the same as'.

30 It is critical to understand that we can only know of what might be, but that is irrelevant, one form of existence, and that we can only ever have knowledge of it. Concepts which presume we can know alternative forms of existence, or intimate there is something directly available (ie somehow knowable), against which we can then refer knowledge, are incorrect.

The nature of physical existence

31 Based on input received, we can identify that the form of physical existence we can know has two fundamental characteristics:

- what occurs, does so, independently of the processes which detect it
- it involves difference, ie comparison of inputs reveals difference, and therefore that there is alteration.

32 This means that the physical existence we can know must be existential sequence. The entirety of whatever comprises it can only exist within that sequence in one definitive physically existent state at a time, as the predecessor must cease to exist so that the successor can exist. In sum: to be physically existent, by definition, entails no form of change or indefiniteness in whatever is existent at any given time, and physical existence is a spatial phenomenon, which alters over time. The concept of time relating to the rate at which realities alter, which is measured by the timing system.

33 Apart from the sheer speed at which alteration occurs, and the complexity involved, another factor which masks understanding physical existence as a sequence of discreet physically existent states, is the conceptualisation of it in terms of 'things'. This reflects the general tendency, which while understandable is ontologically incorrect, to identify physical existence in terms of superficial physical traits, which are then deemed to constitute any given 'it'. These result from the differentiation of physical existence at a higher level than what actually occurs, and therefore involve duration and more than one physically existent state in sequence, although this is not recognised. So these 'things' are considered to remain in existence, even with

changes which is obviously contradictory, until sufficient of those defining characteristics are no longer manifest to justify asserting that.

34 In the context of the current topic, this raises an interesting point, ie what should be considered to constitute 'it'? Because it is the physically existent state which is critical, as that defines physical existence at any given time. But the physically existent state of what? It might be that what are regarded as the 'properties' of something are really the something. Or, the something, which may or may not have different elementary forms of substance, is effectively inert, in that it is still the 'properties', which must have physical presence anyway if they are existent (ie capable of having physical effect), which determine existence at any given time.

35 As physical existence is existential sequence and can only occur in one definitive form at a time, this means that there is no physically existent state known as the future. Any concept which involves the notion of change to it, or that it can have some physical influence, is incorrect, because there is nothing in existence to affect, nor anything to invoke an effect. The idea of changing the future is based on the misconception that it is already existent, ie co-existent with the present, and hence potentially alterable, and/or capable of having some form of feedback influence, which it is not.

36 This is properly expressed as the circumstance where a physically existent state (ie effect) occurred which is different from what would otherwise have done so, had the causal factors been different. Which is meaningless, as by definition, any given effect is a function of a previously existent effect(s). What prevailed, and became the cause of the next step in the sequence, was just different from any logical alternative which could have prevailed, but did not, and was therefore not the cause. Neither does the existent state known as the past physically exist. It did have physical existence, but must have ceased to do so when superseded by the next state in the sequence. Any idea which involves the co-existence of physically existent states which occurred at different times is wrong.

37 Finally, this demonstrates how what could potentially be a cause is limited, both in terms of spatial location, and sequence order. Because, nothing can have a physical effect if it is not possible to do so, which means not 'jumping' physical circumstance, and having physical presence. That is, a physical influence cannot occur unless what is involved is spatially adjacent (everything is ultimately interconnected, so an indirect influence is meaningless). Similarly, a physical influence cannot occur unless what involved was in sequential order.

Conclusion

38 The proper identification of what must constitute physical existence for us reveals that a component of that existence is information. Whether information is physically existent or not is irrelevant to whether it is information. Something is information if it is a representation of something else. It being, somewhat obviously, presumed that this entails a valid representation, otherwise it is useless. So what is physically received, eg light, is information. A question does arise as to what actually constitutes 'it'. It may be that the conception of substance and it being affected by physical influences is at best misleading, or even misconceived. Certainly, what defines any given 'it' is its physically existent state at any given time.

39 In terms of knowledge, ie information created about something, the identification of what form of existence is being investigated enables the proper differentiation of knowledge from belief. Essentially, this revolves around experiential validity. Hypothesis is necessary when formulating knowledge, as much of the physically existent information potentially available for receipt is not received, and/or, for identifiable physical reasons, it is not in some way or other a fully comprehensive and/or accurate representation of physical existence. But overcoming these physical issues is entirely different from asserting experiences with no experiential basis.

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