

*COMMENTARIES***Critical Commentary on Ervin Laszlo's Paper
"In Defense of Intuition"**

Dr. Laszlo's hypothesis (2009) is in my opinion appealing on many levels. He proposes that phenomena of apparent transpersonal communication between human beings are due to the intermediary of information-carrying holograms in the reactive quantum vacuum produced by human brain activity. He also suggests that valid information regarding the world in general is available through the same mechanism, on the grounds that all material objects "excite the ground state of the [zero point] field" and produce further such holograms. On this hypothesis we are literally immersed in a sea of information, with the capacity for accessing that information as well as producing more of it by our own thought processes.

To cite just a few areas in which his hypothesis would in theory have considerable relevance, I would mention the concept of instinct as a generic behavior trait of populations of animals, the relation between instinct and psychological archetype as theorized by C. G. Jung, the theory of "morphic resonance" proposed by Rupert Sheldrake, and of course ESP phenomena and telepathy. His theory also could impact the phenomenon of group coordination such as team behavior and the coherence found in a jazz ensemble or a symphony orchestra. Thus some, like myself, might heartily wish that Laszlo's theory might be subject to verification.

That said, I find the present paper, as well as its background in Laszlo's other publications, problematic in at least one crucial respect. In his seminal work on the logic of inquiry, John Dewey made this still-cogent observation: "Whatever is offered as the ground of a theory must possess the property of verifiable existence in *some* domain, no matter how hypothetical it is in reference to the field in which it is proposed to apply it" (Dewey, 1938: 3). If this condition is not met one must consider the hypothesis to be *ad hoc*. It is my opinion that despite the attractiveness of Laszlo's theory, in its current state it is fundamentally flawed for the reason that the phenomena the hypothesis is invoked to explain, appears to be the only evident means of verifying the hypothesis.

If human brains and nervous systems, or even the entire human organism, are offered as the only means of *detection* of Laszlo's hypothetical information-carrying quantum holograms, then it would appear to be theoretically impossible to achieve independent verification of the existence of such holograms. It does not matter how many cases one may cite of apparent coherence of, e.g., brain activity between members of a meditation group or between a "focusing" healer and the person to be healed, because these instances of coordination or coherent psychic or brain phenomena are what is proposed to be explained.

To take one example, Laszlo cites the experiments by Nitamo Montecucco finding that EEG patterns become synchronized over a group of meditators with 50 to 70 percent coordination “without sensory contact.” Laszlo precedes this citation with the flat out assertion that, “A transfer of information through phase-conjugate quantum resonance allows . . . nonlocal, so-called transpersonal communication.” In other words he gives the appearance that the cited experiments are in fact cases supporting his hypothesis. But surely he is here committing the *ad hoc* error. Although his hypothesis is proposed as an explanation of such phenomena there is no verification that it is in fact the causal factor. Aside from the fundamental problem of verifying the existence of quantum holograms, there could be other explanations for such “50 to 70 percent” agreement, including simply the fact that all subjects are engaged in a similar activity whose physiological/psychological nature is not entirely known.

None of his subsequent discussion of entanglement and quantum coherence does anything to support the initial hypothesis. The putative holograms constitute, I should think, a radical step beyond types of coherence phenomena and quantum field characteristics currently identifiable by physics. In my view therefore the onus for Laszlo’s theory is that he must identify some independent means of verifying the existence and nature of the inferred quantum holograms and of independently verifying the supposed causal relation between the hypothetical information carried by such holograms and human cognition. I see nothing in this paper to indicate how such a program of research might be carried forward.

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Comments on Ervin Laszlo’s “In Defense of Intuition”

Ervin Laszlo (2009) makes two central claims. First, he says that human experience includes “spontaneous apprehensions” that have cognitive contents that are about the world but do not reach us via anything we might think of as ordinary sense perception. Though Laszlo wants to avoid disputes about extra-sensory perception by stipulating that he will not use the word ‘perception’ to

refer to these purported spontaneous apprehensions, the experiences he discusses are obviously what many people call “ESP.” Second, he says that these spontaneous apprehensions might very well result from “space- and time-transcending transfers of information” made possible by nonlocal quantum entanglement effects of various sorts. According to Laszlo, there is good reason to suspect that we receive information about the world via a process that involves cytoskeletal structures in our brains receiving “quantum-resonance-based information,” and this information is what gives spontaneous apprehensions their vague, difficult-to-verbalize contents.

In effect, Laszlo is suggesting that parts of the brain itself act as a sense organ, albeit one that receives information via a means of transmission that is arguably much stranger than those involved in our other sense modalities. If Laszlo’s account is correct, then it has profound implications. One important upshot of Laszlo’s paper is that if he succeeds in identifying a plausible means by which the extra-sensory information transfers required for spontaneous apprehensions could occur, he thereby makes the claim that there are spontaneous apprehensions in the first place more palatable to skeptics, since a plausible explanation of how they get their contents would make the available evidence that there are any such spontaneous apprehensions much more epistemically respectable.

Laszlo says that spontaneous apprehensions “seem to convey information on the world beyond the subject regardless of time and distance.” It sometimes appears as if he is thinking of spontaneous apprehensions as experiences that seem to the very people who have them to involve content that must have reached them via a mechanism that involves faster-than-the-speed-of-light transfers of information. If so—and assuming for the moment that this is supposed to be a defining feature of spontaneous apprehensions—the range of experiences in question is quite narrow. After all, while some people certainly do have experiences that seem to them to convey information that could not have been obtained via normal channels of perception, most of these experiences do not also seem from the first-person perspective to convey information that has reached them *in a way that exceeds the speed of light*. (Indeed, it is not fully clear what it would mean for it to *seem* to a person that she has received information that has reached her via a faster-than-the-speed-of-light process.)

Thus, in an important way Laszlo does his project a disservice by sometimes appearing to build in to his characterization of spontaneous apprehensions themselves the notion that these experiences contain information that is somehow space and time transcendent. I suspect that what he really has in mind are simply experiences that seem, to the person who has them, to involve cognitive content that could not have reached the mind via any known, scientifically respectable channels. Laszlo’s proposed mechanism—or, better yet (given the strangeness of quantum entanglement), his proposed *means*—by which spontaneous apprehensions get produced involves quantum entanglement, and this means does transcend space and time in important ways. Importantly, however, Laszlo could be correct (although I am skeptical) about the space and time transcending nature

of the means of producing spontaneous apprehensions without the spontaneous apprehensions themselves seeming from the first-person perspective to involve any content that transcends space and time.

Let's now consider Laszlo's proposed explanation of the occurrence of spontaneous apprehensions in more detail. Suppose that quantum entanglement does in fact serve to get information of some sort from remote regions of the world into the brain in ways that bypass normal sensory inputs. Assume for the sake of argument that quantum entanglement is as robust a phenomenon as Laszlo's account needs it to be, and that the microtrabecular lattice structures in our brains in fact are "informed" in some way via this quantum entanglement. Even if all that occurs in the way Laszlo describes, we are still a good distance away from a workable account of how purported spontaneous apprehensions could get the contents they are supposed to have, for reasons I will spell out in what follows.

Laszlo invokes a concept of information drawn from quantum theory, and he speaks in grand terms about information embedded in nature. It is not clear exactly what is gained by talking of information being embedded in nature in the ways he does, nor is it clear that the same concept of information is at stake when theorists of quantum entanglement talk about information and when cognitive scientists talk about information when discussing mentality.¹ Is this quantum-resonance-based information some sort of merely physical, structural property of the world, such that saying that this information has been transmitted from one location to another is merely saying that there is some sort of causal connection between the two locations, or that some sort of physical isomorphism has been created? If so, then the mere transmission of information between one location and another does not give us even *prima facie* reason to think that there must be any conscious awareness at either end of the transmission, nor does it give us reason to think that the medium through which the transmission occurs must be "active" in any interesting way. Alternatively, it may be that Laszlo's notion of information is much richer, and that the transmissions of information he discusses are supposed to involve something more than is conveyed by a mere causal connection or by the creation of a physical isomorphism between one location and another. It is not obvious what this "something more" would be, but Laszlo's talk about "quanta behav[ing] in a curiously informed manner, appearing to make choices of their own . . ." and about such informed quanta either "hav[ing] a form of consciousness of their own" or being "embedded in a complex informational environment" that is somehow active rather than passive seems to indicate that he has something much more in mind than a bare-bones conception of information-as-physical-structure or information transmission as creation of a structural isomorphism.

On a bare-bones, minimal conception of information and information transmission, claims about information being present throughout nature are interesting and provocative, to be sure—but they are not claims about anything that would really resemble full-blown, conceptually-laden, language-like communication occurring either between parts of the inanimate world or between the inanimate

world and a human mind. On the other hand, on a richer conception of information the claim that such information is present objectively in the world would indeed be the sort of claim that many scientists would dismiss as a problematically “metaphysical proposition” (regardless of whether those scientists are wedded to a widely-discredited view of science that sees proper science as being clearly distinguishable from metaphysics).

Insofar as Laszlo’s concept of information is not perfectly clear, he is in that respect in good company: Many theorists invoke a concept of information that is potentially ambiguous between what I have described as a minimal, bare-bones notion and a richer notion, and this sort of ambiguity is not problematic in all cases. Indeed, in many contexts—scientific, philosophical, etc.—such ambiguities in the notion of information do not cause trouble. There is a potential danger in this case, however. Insofar as the notion of information at work in Laszlo’s project is minimal, then it seems plausible to think about information being objectively in nature and to think about there being unusual information transfers from the world-at-large to portions of the human brain. However, such bare-bones information in the world and such transfers of bare-bones information between the world-at-large and brains do not give us any specific reason to think that the information being “received” by the brain will show up in the cognitively accessible contents of mental states in the way in which information received by successful symbolic communication between two language users will be cognitively accessible to the person who has received such communication. On the other hand, insofar as the notion of information at work is a richer, more communication-like notion, then claims about information transfers between the world-at-large and the brain might lead us uncritically to think that receiving such information from the world will make it likely that the information will appear in cognitively accessible ways in a person’s mental states. There is a risk that the ambiguities in the notion of information might be doing illicit work in making the account seem plausible.²

Nevertheless, however minimal or rich the concept of information is that is at work in Laszlo’s account, merely identifying a means by which such information is present in a person’s brain is not the same as showing that the information in question plays *any* role in the cognitively contentful mental states the person has. Since Laszlo’s spontaneous apprehensions are contentful states (however vague and difficult to verbalize they may be), more needs to be said to establish that Laszlo’s quantum entanglement theory of spontaneous apprehensions is plausible. Consequently, the link between having the information present in the micro-trabecular lattice networks in a person’s brain and having that information show up in a person’s mental states is one that I hope Laszlo focuses on as he further develops his account of spontaneous apprehensions.

To see why merely getting information into the brain is not enough to give us reason to think that such information is cognitively or (if this is different) experientially accessible to the person, consider the following. In whatever relevant sense of the word we might wish to use ‘information,’ all kinds of information is

“in” every human brain. There is information about the physical structure of the brain’s synapses, for instance, contained in the very physical structure of those synapses. There is information about the molecular structures of the myriad proteins and other organic compounds located in the brain contained in the molecular structures of those proteins and compounds. There is information about the microtrabecular lattices in the cells of the brain contained in those very microtrabecular lattices. Ditto for any other physical feature of the brain or anything it contains that we might wish to pick out. There is also information in each human brain about the evolutionary history of *Homo sapiens*, about the toxicants and nutrients to which the particular brain has been exposed over time, about the history of personal relationships had over the course of a lifetime of the individual whose brain it is, etc. However, the mere fact that this information is, in some sense, *in* the brain does not give us even *prima facie* reason to think that it is cognitively accessible to the person whose brain it is.

But perhaps the problem is with the kind of information I have just discussed; perhaps the examples I have just discussed all involve only what I above called “bare-bones” information. If so, suppose instead that the kind of information we are talking about is richer, such that there are information transfers between the world and the brain that are more obviously analogous to whatever it is that occurs when two people successfully communicate with each other using natural language. Even in this kind of case, the mere presence of such information in the brain is not sufficient for us to think that the information is going to show up in the contents of any mental states in any way.

To see why, imagine that we want to tell someone who is a literate speaker of some natural language—say, modern Mandarin—that it is currently raining, and (for whatever reason) we decide not simply to communicate it to her by uttering a sentence aloud, writing her an ordinary ink-on-paper note, or sending her an email to that effect. Instead, we decide to “write” the expression ‘现在下雨了’ (*‘xianzai xia yu le,’* meaning *it is raining*) in her brain. Specifically, we decide to “inscribe” the Mandarin expression directly into the microtrabecular lattices in her neurons. Imagine we have some means of dyeing portions of the microtrabecular lattice networks in her neurons some bright, glow-in-the-dark color without doing our message recipient any significant harm. We inscribe the expression in her brain, in such a way that a literate Chinese speaker looking at her brain in the right way (presumably under a microscope or scanner of some sort) would be able to read the expression. To cover all our bases, we inscribe the expression multiple times, at varying scales: In some cases, we inscribe the expression in very tiny font inside a single filament. In other cases, we inscribe the expression in a slightly larger font across multiple filaments of the microtrabecular lattice network of a single neuron. In still other cases, we inscribe the expression in still larger fonts, such that to “read” it one would need to look across multiple neurons. Imagine further that the “ink” we have used shows up on whatever yet-to-be-developed brain scan we wish to use, such that we can look at displays of various brain scans and pick out the inscriptions of ‘现在下雨了’ that we have produced

in her brain. (I am surely glossing over technical details here, but none of these details is relevant to the point I wish to make.)

Once we have “written” the message in her brain in all of these multiple ways, the information that it is raining is thereby in some sense “in” the person’s brain. Suppose we then ask her to tell us what we wrote. Even without performing the experiment, we have good reason to believe that she will have absolutely no idea what the message says—at least not on the basis of what has been dyed into her microtubules. (Perhaps she will be savvy enough to guess the content of the message, given her knowledge of what the morning’s weather report was and her further knowledge of what kinds of things people who would perform such an experiment would be likely to write.) The mere fact that some linguistic expression that otherwise could be successfully used to make a statement and convey richly conceptual information is now “written” in her brain does not in itself give her *any* access to the informational content of the statement we wished to make, even if she would be able to understand the message if she were to see the same inscription written in normal-sized font on a page in front of her.

Of course, it need not be a linguistic expression that is written in her brain. The same problem would arise for any kind of sign or symbol we might inscribe in her brain in this way. Imagine that instead of inscribing ‘现在下雨了’ in the person’s brain, we use our special ink to draw various pictures of rain falling. We might even (somehow) embed a short video clip somewhere in her microtubules. (Here we would need something more sophisticated than our special ink—think of an InnerYouTube for the brain itself.) In each of these cases, the richly conceptual information about the weather would somehow be “in” the person’s brain, but the mere fact that this information is in there in some way or other does not give us reason to think that it is cognitively accessible to the person, even in the form of vague, difficult-to-articulate mental states that are similar to the spontaneous apprehensions that Laszlo describes.

Thus, even if Laszlo is correct when he suggests that quantum entanglement can somehow get information about the world into the microtubules of human brains in a way that bypasses all normal sensory channels, we do not thereby have good reason to think that such information could explain the contents that spontaneous apprehensions are supposed to have.

Admittedly, it might seem as if information received via quantum entanglement at the microtrabecular lattice is somehow different in relevant ways than the information discussed in these extreme hypothetical cases of writing, drawing, or embedding video clips directly in a person’s brain. For one thing, if Laszlo is right, such quantum-resonance-based information is actually in the microtrabecular lattice much of the time, and it is presumably a natural state of affairs. Still, that does not undermine the point just made: The mere presence of information in the brain, no matter how minimal or richly conceptual that information is, does not by itself give us *any* reason to think that that information is available to the person whose brain it is. It would have to be present in the brain in the right way. Thus, even if we accept Laszlo’s claim that quantum entanglement can get

information (in some interesting sense of ‘information’) from the world-at-large into the brain of a human being, that is a long way from accepting that quantum entanglement provides a good explanation of the purported occurrence of extraordinary experiences that are supposed to have cognitive content that is in no way derived from ordinary sense perception.

Of course, it is *possible* that merely having information about the world present in the microtrabecular lattice would make it, somehow, cognitively accessible to the person in whose brain that microtrabecular lattice resides. But that is not obvious, and the most prominent theories in the cognitive sciences that give importance to that microtrabecular lattice in accounts of consciousness and/or cognitive content are (I think it is safe to say) not yet widely accepted. More work needs to be done here.

Laszlo is not completely silent about these issues, but what he says about the possible link between quantum-resonance-based information about the world being present in the microtrabecular lattice networks of a brain, on the one hand, and the cognitive contents of the spontaneous apprehensions that are supposed to be had by the person whose brain it is, on the other hand, is quite sketchy. Drawing on personal communication with E. Frecska, Laszlo discusses a “direct-intuitive-nonlocal” way of perceiving the world that “involves communication between micro-lattices in the brain and the holographic inference patterns in the vacuum.” He writes, “Apprehension [including spontaneous apprehension] occurs when the frequencies are synchronous: then the quantum-level lattices resonate with the corresponding quantum holograms. In phase-conjugate resonance information is transferred from quantum holograms to the brain.” If that actually happens, that is fascinating—but we still will not thereby have an account that gives us reason to believe that the information from the quantum holograms is at that point cognitively accessible to the person whose brain it is. All we will have is reason to believe that portions of the micro-lattice networks are somehow receiving information from quantum holograms in the world-at-large. Laszlo goes on to cite work by Walter Schemp that might possibly be helpful in explaining how such quantum-resonance-based information in the microtrabecular lattice networks might make its way into purported spontaneous apprehensions, but the relevance of Schemp’s work is not clear from what Laszlo writes in this article. Much more attention to this particular problem of why we should expect that the mere presence of quantum-resonance-based information in the microtrabecular lattice of a person’s brain would make it likely that such information would show up in any sort of mental state the person has would go a long way toward making Laszlo’s project more appealing.

Laszlo concludes his article with a rather modest proposal, saying, “[S]ustained research on the spontaneous nonlocal mode of apprehending the world beyond the brain and body would be justified and meaningful.” Along the way, he talks about a “reductionist-materialist culture inspired by classical science” that rejects spontaneous apprehensions as “hallucinations or fantasy.” According to Laszlo, “The materialist-reductionist paradigm of mainstream science discourages

attempts to investigate spontaneous apprehensions . . .” and scientists who adhere to that paradigm “[f]or the most part . . . content themselves with assuming that evidence for such perception^[3] is illusory, or at best anecdotal.”

Given Laszlo’s self-conscious positioning of his proposal in opposition to a mainstream scientific community that is at best uninterested in investigating what he calls spontaneous apprehensions, has he not succeeded in lowering the bar of credibility at least to some extent by offering us a preliminary account of a means by which spontaneous apprehensions could get their contents? Doesn’t the mere availability of an explanation in terms of quantum entanglement, sketchy though it may be, both lower the epistemic bar to believing that spontaneous apprehensions occur and point the way toward further research? And—insofar as skeptics about spontaneous apprehension base their skepticism in a belief that there is no way in which spontaneous apprehensions could get their contents—doesn’t Laszlo’s preliminary account of these potential, nonlocal quantum information transfers at least undermine a key basis of such skepticism? Finally, is it not problematic to criticize Laszlo for failing to provide an account of why quantum information in the microtrabecular lattice networks would be expected to show up in mental states, when the cognitive sciences in general are still trying to understand completely how information taken in by *any* of the more standard sense modalities makes its way into the mental states a person has?

To be fair, the account Laszlo has offered probably should lower the epistemic bar a little bit for claims that spontaneous apprehensions occur. Insofar as even a sketchy, incomplete account of a means by which purported spontaneous apprehensions could get their contents has been provided, it does make it more plausible that spontaneous apprehensions occur at all. However, we should keep the following in mind when trying to decide just how far Laszlo’s account lowers that bar and serves to justify further research.

First, none of the examples Laszlo himself introduces in his article that purport to show that spontaneous apprehensions occur seem to require that the transfers of information involved themselves transcend the speed of light. Rather, his specific examples—even if accepted at face value—seem to show only that some sort of as-yet-unknown but possibly slower-than-the-speed-of-light connection may be obtaining between two people. Nothing about the particular cases he mentions demands that “space- and time-transcending transfers of information” are involved. Thus, the fact that Laszlo is offering an explanation that would give us space-time transcending transfers of information does not in itself do special work in explaining the kinds of examples he himself offers as being in need of explanation.

Second, although there are many unanswered questions in the cognitive sciences about how the causal processes involved in “normal” sensory perception of the world result in cognitive contents being available in conscious and non-conscious mental states a person has, these accounts typically focus on transfers of information that at some point are channeled through patterns of neural firing. Of course, there are still many unanswered questions about how the information gathered via the exteroceptive and interoceptive senses makes its way “into”

mental states and conscious awareness more generally, but standard theories of ordinary sensation and perception involve patterns of neural firing of some sort or other at a crucial early stage in the process. Laszlo's proposed account of spontaneous apprehensions involves information that is gathered via micro-lattice networks within neurons, and there is no obvious way in which that information would ever make its way into signals sent via neuron firings. Thus, even if Laszlo's suggestions about the robustness of quantum entanglement at the level of brain structures turn out to be entirely accurate, his account will still stand or fall on the plausibility of the claim that information in micro-lattice networks can make its way into mental states without at some key point being "entered into the system" via patterns of neuron firings. If Hameroff-Penrose inspired accounts of the importance of microtubules for consciousness pan out, then perhaps this will not be an insurmountable problem for Laszlo, but the fact that his account seems to be so dependent on these "dark horse" accounts of consciousness turning out to be right puts his overall account in a different, epistemically weaker class of theories than standard theories about sensation and perception in the cognitive sciences.

In conclusion, I suggest that before even Laszlo's modest call for further research into "the spontaneous nonlocal mode of apprehending the world beyond the brain and body" will be particularly compelling, the following will need to happen.

First, we will need to have better evidence that quantum entanglement effects of the sort Laszlo discusses actually occur on the scale and in the sorts of environments required for there to be important amounts of information in the brain produced by such entanglement. Perhaps that evidence is forthcoming, but I think there is no special reason to try to gather such evidence as part of an investigation that is specifically trying to prove that quantum entanglement can account for extraordinary mental states, since there is not much reason yet to think of that as a viable research project.

Second, we will need to have better account of why the mere presence of information of some sort in the microtrabecular lattice of a brain would have any interesting relationship with contentful mental states.

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Notes

¹ I have in mind here the information-theoretic accounts of mental content and consciousness developed by people such as Fred Dretske. See Dretske (1981, 1988, 1997), as well as relevant essays in Dretske (2000). For a short overview of Dretske's theories, see Dretske (1994).

² There are those who would argue that any legitimate conception of information (or of cognitive content or of meaning in general), no matter how rich, must be able to be analyzed in terms of what I am here describing as a minimal, bare-bones, merely structural notion of information. Indeed, Wittgenstein (1921/1961) presents a conception of how that might work (albeit by using quite different terminology), and there are more recent analogues in the philosophical literature. If that is correct, then it might seem as if any apparent “ambiguity” that does not distinguish between a bare-bones conception of information and a conceptually richer conception of information would be unproblematic, since there is not ultimately a significant difference in kind between what is picked out by the two conceptions of information.

A proper assessment of the merits of attempts to reduce information and content to structure would take us too far afield; I will simply say that I am skeptical of such projects (and, in that respect, I side with Wittgenstein’s later criticisms of his early project). In any case, it is far from obvious that richer notions of information can be reduced to a bare-bones structural notion, and Laszlo himself does not take any explicit stand in his article on the matter.

³ Though Laszlo uses the word ‘perception’ at this place in the text, he must really mean to write ‘experience’ instead, given his commitment to “reserving the term ‘perception’ for ordinary sensory perception. . . .”

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Reply to McDaniel and Geisz

I am pleased to have the opportunity provided by the editors of the *JSE* to reply to the discussion papers by Professor McDaniel and Dr. Geisz. My own paper was designed to open up a new hypothesis for discussion and exploration, in the exploratory spirit of the *Journal*. This is the spirit in which I am framing my reply.

Let me address first Professor McDaniel’s “critical commentary.” I am pleased that he has grasped the meaning of the hypothesis I put forward (although I should remark that I do not maintain that material objects excite the ground state of the zero-point field: I maintain that they excite the ground state of the *unified* field that carries inter alia the zero-point energies—an important distinction). But

McDaniel does not object to the meaning and logic of the hypothesis, he questions its validity. His criterion is an observation by John Dewey stemming from 1938: the ground of a theory must possess the property of verifiable existence in some domain, no matter how hypothetical it may be in reference to that theory. This is a rather “classical” requirement in that we now know that “verifiable existence” is not a condition that can be fulfilled in regard to a large variety of scientifically postulated entities, from the Big Bang (now believed to be a Big Bounce) to black holes and myriad entities and processes in-between. The requirement for such level of verification is particularly overstated in regard to fundamentally novel phenomena. Here reasoning by extension of what has been previously “verified” seldom if ever works. If it did, scientific knowledge would grow by accretion; but it grows (also, and perhaps mainly) by innovation. A new paradigm is an instance of massive innovation. As Thomas Kuhn has shown, the old and the new paradigms are generally incommensurable. Reasoning from the old (putatively verified) to the new (yet to be verified) phenomena is seldom possible, and attempting it is likely to fail. With regard to the history of scientific thinking, especially in the natural sciences, observing the Dewey criterion in the strict way McDaniel proposes would have blocked the “revolutions” that had occurred in the last 100 years.

There is another way of coping with new (or newly investigated) phenomena, and that is through the creative leap that Einstein claimed is imagination—and that I maintain is evidence for the role of intuition in scientific research. Had Einstein been asked, as McDaniel asks in regard to the quantum holograms that are part of my hypothesis, “what independent verified evidence do you have for the existence of spacetime as a four-dimensional continuum?” Einstein would have been constrained to respond, none: I have invented it (as physics theory, that is, for it had already existed as pure mathematics in the work of Poincaré). Inventing a theory is entirely legitimate, however. In science, as Einstein (1940) himself pointed out, “we are seeking for the simplest possible scheme that can tie together the observed facts.” If we cannot derive such a scheme uniquely in reference to received scientific knowledge, we must “invent” it. In accounting for physical phenomena in nature the simplest scheme that can bind together the observed facts is a four-dimensional matrix, and in the case of spontaneous apprehension it is phase-conjugate resonance between quantum holograms in the unified field and sub-cytoskeletal structures in the complex macroscopic quantum system we now come to recognize as a proper characterization of the brain.

But the above hypothesis, though partly invented, is by no means ad hoc. Its elements have been independently postulated (“verified,” as just remarked, would be overstating the case); I give a fairly large number of references in the paper. And the hypothesis itself does not stand only by itself: it is based on other pertinent hypotheses that I note in the text and also in the references. (Six of my own books are listed in the references, and they contain a host of additional references.) The criterion applicable to assessing the validity of my hypothesis concerns its internal consistency: its ability to explain the observed facts (through

the simplest possible scheme that can do so), and its consistency with other hypotheses in the relevant domains of scientific inquiry.

I now turn to Dr. Geisz's detailed analysis. At issue here is a dialogue between different conceptual schemes, indeed, paradigms, and addressing that issue requires either an entire tome—or series of tomes—or focusing only on the crux of the issue. I elect to do the latter.

The question posed by Geisz is, how does cognitive content appear in the mind based on spontaneous apprehension? He cannot find in my paper a convincing answer to this, but his question has no convincing answer even in reference to sensory perception. How does a wavelength of light in the visible spectrum translate into the perception of a red dot in one's consciousness? And how does that become meaningful cognitive content? And is such content limited to the more sophisticated kind of information that Geisz associates with signs or symbols—language in general?

Besides the problems of linguistic philosophy, here we encounter the classical body-mind problem. We have brain events, and we have mind events. How are they related? This is the "hard question," but I am not concerned with it in this paper. I am not trying to explain how information received from the world beyond the brain and body is translated into cognitive content. I am "merely" trying to explain how information that does not come via the senses can be received in the brain. My claim is that experiences that do not reach us via our sensory organs can be just as real as those that do. In both cases information from beyond the brain and body produces sufficient effect in the brain to trigger conscious experience.

Information that does not come through the senses often triggers conscious experience, but within the space of a single article I cannot offer "convincing" examples as evidence of this. Keeping an open mind, this is not even required. In any case, I recently published *The Akashic Experience* (2009), a good-sized book where 20 well-known and highly credible individuals, among them scientists, describe such experiences in the first person. And the great majority of people, if queried and not particularly narrow-minded, admit that they have had experiences they cannot account for in terms of sensory perception. Thus the question—at least for me—is not *whether* nonsensory experiences exist, but *how* they exist: how the particular kind of information that originates beyond the brain and the body and is not conveyed by the senses can result in some variety of conscious experience.

It is not my intention to limit spontaneous apprehensions to those that involve the transmission of information beyond the speed of light. I only claim that such apprehensions are not limited by the bounds of space and time—they can convey information from any point in space, and from any time in the past (I am sceptical about whether they can convey information also about the future, but that's another matter). A vast number of experiences testifies to this, in addition to experiences that involve persons, things and events within the perceptible range. Yet in that range how can we be sure that they didn't come through some perceptual means? The truly interesting and pertinent kinds of experiences are those that transcend space and time.

There is more to the concept of information than “bare-bones” physical effect-transmission on the one hand, and linguistically expressible sign- or symbol-based information on the other. The *in-between* is the warp and woof of art and poetry, of mysticism, and religion. There are “ordinary” experiences that are ineffable as well. Shall we dismiss them as unreal? Or shall we try to see if there is a way we can account for their presence in terms no more—but also no less—mysterious than experiences resulting from sensory signal transmission?

To conclude, I am much more modest than Geisz’s analysis asks me to be. I start with the fact that there are experiences that cannot be explained by means of sensory signals triggering neuronal firings in the brain, and conclude that such “anomalous” experiences stem from quantum-resonance between substructures in the brain and information present in the world at large. I do not presume to explain how quantum reception in the brain can produce cognitive content—but this is not explained in the case of the transmission of neuronal signals from the senses either. I also do not go into great detail on how information can be present in nature in a space- and time-transcending holographic mode: I wrote several books on this subject and they are accessible. I merely claim that some information present as conscious experience derives from direct reception by the brain, and that the experience that results—*however* it results—is just as bona fide as the cognitive content that can result from sensory perception. This is a modest claim that, in view of its “lowering the barrier” to some extent in regard to the scientific acceptance of intuition, is perhaps not so modest after all.

Let me conclude my response by emphasizing the importance of seeking an explanation of the phenomenon of spontaneous apprehension, popularly known as intuition. This phenomenon is as old as human culture and consciousness, but in Western science it has been largely dismissed as beyond the ken of legitimate scientific inquiry. Thus I welcome its discussion within the context of such inquiry as an important development. It has major importance in regard to our understanding both of our ability to gain information about the world (“epistemology”), and for our understanding of the nature of the world (“ontology”).

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