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Implicit Cognition and Consciousness in Scientific Speculation and Development

Abstract

Implicit cognition, being phenomenally invisible, is a powerful force in defining and transforming human life. Its nature, moreover, can be defined in two key ways. On the one hand, implicit cognition is reflected influences of past events on subsequent experiences and, on the other hand, implicit cognition can be in some sense independent of explicit cognition. This means that implicit cognition is multi-faceted and informs our experience multi-dimensionally because it is knowledge acquired through experience, something operative in the absence of conscious awareness, and an ever-changing mode in our living and learning process. This paper uses the historical story as a counterpoint to experimental work today to look at the relationship among these areas. Systematic connections are drawn between implicit cognition and consciousness in both the personal and cultural context.

Introduction

Ongoing reflection on the invisible quality of implicit cognition had led me to think there is a value in conceptualizing what implicit consciousness is and how it 'fits' with history in our models of consciousness. This paper probes into these areas by looking specifically at how and why it is that we acknowledge that implicit cognition is 'unseen,' but give little thought to how and why formerly invisible possibilities have been exposed and reshaped. Below I propose we develop an increased awareness of how implicit conclusions inform our personal living in time. Particular attention is given to (1) illustrating the implicit/explicit exchange, (2) demonstrating how implicit ideas have informed cultural communities as well as scientific development and speculation, and (3) integrating the historical difficulties in perceiving cultural habits and assumptions within contemporary cognitive studies and interdisciplinary consciousness debates.

The discussion as a whole is divided into five parts. First, I review some assumptions that have become a part of the Western mind in regard to memory, perception, and consciousness. Then, in the second section, I turn to Baars Global Workspace theory (GWT). Using GWT as a touchstone, I begin to consider what a *scientific* theory of consciousness is and how we 'do' science. I have chosen the GWT because I see it as a functional, experimentally conceived, and connectionist-type theory. [1] More important to this discussion is that it is a psychological theory that begins with the assumption that contexts [2] "are not incidental phenomena that confound our careful experiments: They are *quintessential* in psychology."(Baars, 1988, p. 176). Finally, the GWT also offers a wide range of well-researched particulars that help frame the implicit/explicit relationship and the relationship among theory, experiment, and experience.

I return to history in the third section in order to (1) isolate some of the limitations within the GWT model from a contextual vantage point, (2) demonstrate some areas the theory does not consider, and (3) ask about how we approach unified theories in general. The problems outlined in section three demonstrate the need to consider dualism, which is the topic of section four. Using David Chalmers' *naturalistic dualism*, I speak to the limitations we build into our theories if we adopt a dualistic model for consciousness studies. Finally, in section five, the conclusion, I suggest that neither monistic nor dualistic theories can offer the kind of multidimensional model we need at this point. I propose quantum theory as the best place to look for alternatives and suggest that some kind of naturalistic integration of quantum mechanics with classical ideas might provide a metaphor capable of explaining how the personal, impersonal, and interpersonal/intergenerational modes are related.

1. Historical overview

> In the Western Indo-European languages there are two separate, but not necessarily unrelated, aspects of the idea of truth. One is contained in our English word 'true': to be true to something is to hold fast to that thing and to persevere with it in patience . . . The second aspect of truth that the ancient languages have preserved in themselves comes to us from the Greek *aletheia* usually translated as truth but which literally means 'unhiddenness.' Truth happens when a thing comes forth from the hidden into the open, from darkness into the light, and is revealed for what it is.
>
> William Barrett, *Time of Need: Forms of Imagination in the Twentieth Centur*

The two different views of truth Barrett speaks of above have powerfully influenced our theories of consciousness. What is often unknown about these views is that they actually have their roots in two distinctly different traditions, the Hebraic and the Greek. 3 These two traditions, moreover, offered significantly different responses to many fundamental human questions. Nonetheless, each has had a major impact on the development of Western science, the Western mind, and how the Western tradition sees truth overall. This includes our many *ideas* about logic, origins, perception, intention, and consciousness.

For example, whereas the Hebrews were passionately and intellectually interested in knowing about the world, they coveted the kind of knowledge that did not come from reason alone, "and perhaps not from reasons at all" (Barrett, 1973, p. 79). The Greeks, on the other hand, prized reason above all things. In life this meant that the Greeks had a somewhat prudent relationship to their questions about the cosmos. They wanted to *logically* discover what the self-organizing harmony of the cosmos was and how it came to be. (Cornford, 1991, Guthrie, 1950). The Hebrews, however, saw knowledge in terms of experience.

> "Biblical man . . . had his knowledge . . . through body and blood, bones and bowels, through trust and anger and confusion and love and fear; through his passionate adhesion in faith in the Being whom he can never intellectually know. This kind of knowledge a man has only through living, not reasoning, and perhaps in the end he cannot even say what it is he knows; yet it is knowledge all the same, and Hebraism at its source had this knowledge.(Barrett, 1962, p. 79).

In addition, while both the Hebraic and Greek people had an interest in origins, they positioned their interests from opposite vantage points. The Hebrews 'solved' the problem through their belief that God had created the universe and was responsible for the overall design. As a result, the ancient Hebrews saw knowing how the universe worked as an activity that included deciphering their place within God's plan. This led to a psychological orientation, evident in the first view of truth Barrett mentions, where one holds fast to a thing (in this case a belief) and perseveres with it in patience. The *polytheistic* Greeks, on the other hand, passionately debated what the underlying substance of the cosmos is and what their place and function might be within the self- organizing harmony. Various options were proposed to be the underlying substance (e.g, air, fire, the apeiron, etc.) and many complex ideas emerged as these philosophers engaged with their questions about humanness. Some have claimed (Guthrie, 1950, Snell, 1982) that the quest of the natural philosophers could be characterized by Barrett's second aspect of truth, where things come forth from what is hidden.

If I may oversimplify, all of these ideas were to come together later in Christianity. The synthesis was perhaps primed by Plato's ideas (Gilson, 1941), although he lived long before the actual 'event' and even long before the birth of Jesus. Three aspects of the synthesis are relevant to the topic at hand. First, while it has become popular to attribute the mind/body problem to Descartes and to see Descartes as the 'villain' who brought the mind/body dualism into Western philosophy, dualistic ideas were prominent in Plato and even earlier in Greek thought. 4 This is a key point, for Hebraic thought was also dualistic but the duality was of a significantly different quality. According to the Hebraic view, it was a duality of God and Nature. God was positioned above and was perceived to be of one substance. On the other hand, Nature (which includes humanity) was positioned below and was characterized as being of another substance. Thus in both the Greek and Hebrew view we find the assumption of an overall unity is assumed (axiomatic) and is justified by conceptualizing a duality to sustain the model.

Another intriguing point is that the Greeks are usually perceived to be the people who gave Westerners the idea that sight is the most glorified of the senses. Yet, the visual orientation of the Greeks, which was eventually adopted by the West, was premised on the Platonic model of a cosmology built *within the mind's eye*. It was a logically envisioned phenomenology, not an empirically based one. 5 One key point here is that the Greek views of perception and truth were unlike the Hebrew belief that to be alive and *conscious* was to be in God's presence (Boman, 1960). Another point of note is that the people of both cultures wanted to know (perceive) some-*thing* that was believed to be ultimately invisible to us and this some-*thing* is increasingly assumed to be universal and enduring.

Finally, as Plato indicates, (see *Phaedo 62b*), ideas about the unconscious have a long history and can be easily traced back to Pythagoras who, like Plato, believed the 'real' world is rediscovered in *anamnesis* (recollection) of a perfection known in another domain. Greek recollection, it should be noted, came to be equated with origins and can easily be correlated with the ancient Hebrews interest in origins, which was contrived in terms of how God had created all things including time, history, and the future.

While this overview is significantly oversimplified, it is still detailed enough to offer a foundation for conceptualizing why ideas about insight as well as ideas about ongoing innovation and invention have been difficult to bring into our scientific models. I will demonstrate this more fully as the paper develops and also show that this difficulty exists despite the later influence of Darwinian innovation and the contemporary interest in memses. In other words, as many have noted, (1) consciousness studies is among the disciplines struggling to effectively couple biological and cultural 'emergence' and (2) to date we have no irrefutable understanding of how many paradoxes (often framed in consciousness studies as dualities) come to be resolved in a contextual sense. We also have little tangible understanding of why empirical and theoretical insights that have been defined by *the mind's eye* require maps of translation so that other minds can also appreciate their nuances. In addition, we do not definitively know how our maps are mentally altered and how new worldviews actually enter the arena. Finally, research has yet to reveal exactly what the difference is between ideas that are 'created' and those that are 'remembered.' It is because we know that theoretical adjustments have happened and have altered our implicit/explicit exchange that I want to turn to the power of implicit cognition in relation to consciousness.

2. Baars and the workspace of the mind.

Bernard J. Baars' Global Workspace Theory (GWT) offers an excellent starting point for exploring consciousness today. The GWT associates conscious experience with a rather simple architecture of the psychological system. "[O]riginally developed to deal precisely with the problem of unifying many ambiguous or partial sources of information into a single, unified solution" (Baars, 1988, p. 148), the GWT has three basic components: a global workspace, a set of specialized unconscious, and a set of unconscious contexts that serve to shape, evoke, and define conscious contents. (Baars, 1988). The model, moreover, is premised on the idea that the detailed workings of the brain, like the cells of the human body, are widely distributed. Therefore, there is no centralized command that tells the neurons what to do. Rather the doing is an ongoing exchange similar to actors, audience, and director. Thus, by definition, the central workspace is much like the central staging area of a theater. Five problems, all related to implicit cognition and consciousness in scientific speculation and development, emerge when we probe the model.

First, the methodological design, contrastive phenomenology, is inadequate for studying consciousness as an embodied experience. Rather, as Baars notes, contrastive phenomenology brings evidence and conceptual ideas together. Phenomenology in this mode is defined as the study of consciousness based on subjective experience and contrastive phenomenology is assumed to allow us to look at the involvement of private experience in a scientific way. The rationale is that the contrastive technique of combining experiment, subjective experience, and conscious events allows people to actually report on conscious events - while unconscious ones (sic) can be inferred and studied indirectly and simultaneously (Baars, 1996). Thus the contrastive modeling technique allows one to combine experiment, experience, and events and to bring a variable perspective to consciousness studies. More specifically, a variable is assumed to be present because information is derived from more than one mode (e.g., brain imaging techniques coupled with reports of psychological and subjective experience as recorded by subjects).

I want to assert that this solution side-steps key issues and leaves too much out. For example, some experiments outlined by Baars (e.g., see Baars, 1996) test individuals on their ability to retain particular numbers in their minds while trying to react to stimuli presented to them in the laboratory. Another experiment uses PET scans of an individual playing the computer game Tetris. This experiment takes two scans of the same slice of the brain four months apart. In the first scan, when the subject is learning how to play the game, there is evidence of increased neural activity. The second scan reveals a much duller color. Baars concludes this is evidence of less conscious activity and also concludes this reduction shows the subject has mastered the details needed to fulfill the task at hand. (Baars, 1996). My objection is that these experiments offer no mechanism to speak of consciousness in a living framework, i.e., directly. They are not evaluating consciousness in 'real time' - where context is. They are useful in the sense that they confirm how we do things, but the falsification parameter (try it yourself) does not address falsification per se. It is a verification technique in the sense that it draws conclusions based on test results that merely parallel conscious experience. 6

Antonio R. Damasio's case of Elliot (Damasio, 1994) offers experimental evidence that effectively contextualizes my point. Elliot was a man who performed normally on every test given him - yet was unable to function effectively in life. Damasio summed up the situation as follows:

> While Elliot's preserved performance was consonant with his superior scoring on conventional tests of memory and intellect, it contrasted sharply with the defective decision-making he exhibited in real life. . . . At the end of one session, after he had produced an abundant quantity of options for action, all of which were valid and implementable, Elliot smiled, apparently satisfied with his rich imagination, but added: 'and after all this, I still wouldn't know what to do!'" (Damasio, 1994, p. 49)

The second problem with GWT is that it side-steps rather than solves the homunculus problem. This stems from Baars placement of his model in the tradition of theater models, a tradition he says can easily be traced back at least as far as Plato. 7 This is a very safe comparison 8 and perhaps it is the 'safeness' of it that best explains why GWT includes many of the knotty issues that remain unresolved in Western theories about consciousness. More specifically, the homunculus is usually seen as a director of consciousness and, as many thinkers have indicated, it seems to inevitably find its way into most models of consciousness.

Daniel Dennett is perhaps the most vocal of the theorists in this area. In his book *Consciousness Explained*, Dennett summed up the problem saying that theorists continue to "presuppose that somewhere, conveniently hidden in the obscure 'center' of the mind/brain, there is a Cartesian Theater, a place where 'it all comes together' and consciousness happens." (Dennett, 1991, p. 39). This is precisely what Baars' does, despite his genuine attempt (see below) to make it very clear that his model is *not* a Cartesian theater.

> The Cartesian Theater is a fallacy, *a reductio ad absurdum*, not the sort of thing anyone today would seriously suggest. There is of course no single point in the brain where 'everything comes together.' We do know of numerous well-established brain maps of the world and of the body, and of convergence zones that integrate many different sources of information into some coherent account of current reality. There is solid evidence that some of these brain maps are conscious, and others help shape conscious experience. But no scientific model today commits the Cartesian fallacy. Certainly none of the theater models that have been proposed since the 1950s suggest that all conscious experiences come together in a single point. Real theaters are not constructed that way; they work just fine, and provide productive metaphors for thinking about the brain." (Baars, 1996, p. ix).

I want to assert that the GWT fails to circumvent the homunculus issues because of the exclusion of a non-conscious. 9 This is my third concern. Without a 'non-conscious' there is no 'place' for potential, if we define potential as ongoing innovation and invention in an evolutionary sense. The evolutionary possibility is muted because GWT adopts the traditional valuation on categorizing the particulars into some kind of unified (universal) mode. This kind of model has always rested on the foundational ideas discussed earlier,

where 'origins' are stressed. My point is that the basis of unified theories was premised on determining origins (not innovation) and unified theories become theater model, ("all unified theories of cognition today are theater models" (Baars, 1996, p. ix).

In the historical counterpoint section I will explain why this is a problem through demonstrating that new ideas do come into the workspace. I will also propose that bringing some kind of non-conscious element into the theory would actually offer a means to circumvent the closure that has traditionally inhibited unified theories. My point here is that some kind of adjustment is needed if our theories are to include innovation, invention, future possibilities, and a basis for modeling multi-dimensional domains.

As it now stands, however, the GWT model adopts long-standing contextual assumptions about what wholeness is and they enclose the whole. This means the GWT cannot cleanly address how the interaction among audience, players, and director expands beyond the modes known to components of the theater group - be these "knowing" modes conscious or unconscious. One irony here is that the enclosed space creates a difficulty in speaking about individuals who do not 'fit' the parameters of the theory. It speaks about unconscious representations that shape consciousness, but does not have the flexibility to address what kind of mechanism could reach outside of the parameters of the workspace. Another irony here, as I have noted above, is that Baars is clearly interested in offering a contextual theory. Again, it is specifically because the idea of context is too narrowly implemented that there is a problem in differentiating between implicit assumptions in the form of cultural perceptions that are influencing our present conclusions and what has not yet entered the global arena in any way. 10

I must emphasize that these problems cannot be bridged by the GWT concept of fixedness, which says something is currently outside of one's point of view. Fixedness is unable to speak of open-ended potential since it does not have a means to differentiate between what we do not 'see' and what has never had any tangibility. 11 Fixedness also fails to address how all of our theaters ("brains") - not just the working of one theater (brain / group) - come together in a multi-lateral environment, where new life and thus new brains continually change the nature of what is. This alive, ongoing, and creative dynamic raises the question of how the theater (the theater groups? / each theater group?) is (are) essentially transformed and "miraculously" altered as life enacts its constant process of birth/creation. 12

The problems developed by the omission of a non-conscious (or something comparable) also mean that GWT cannot accommodate imagination, which I see as the fourth problem. While the idea of contrastive phenomenology may be an imaginative one, it has no mechanism to even remotely measure and quantify how this aspect of consciousness happens. Where are imaginative ideas before they enter and change the global workspace?

This leads to my final concern: how do we want to define science, especially in relation to consciousness? If we presume that 'unified' theories are the goal, assuming we want to postulate 'scientific' theories may actually be adding to the measure of difficulty to consciousness studies. My point here is two-fold. First, we are only *beginning* to develop methods for the study of complex systems and the 'invisible' processes that are somehow involved with consciousness. Our methods of quantitative imaging, for example, have helped us *extend* our natural vision and thus have helped us *understand* how the brain works. Even still, researchers today, nonetheless, remain unable to see implicit *assumptions*, even their own. They are also, at least at this point, unable to verbalize what goes on in the brain when we perform functions related to *explicit* conscious - such as face recognition and pattern recognition, although our experimental results are increasing our explicit understandings in these areas. In short, new data offers valuable information and also confirms we have a long way to go. More important, even if we do conjure up a mechanical model of how the brain works, we will still need to recognize that consciousness lives within a social context. This is another way of saying that many social problems would continue to remain unresolved with a mechanistic solution, as they will remain unresolved with a metaphoric marriage of philosophy and experiment. I will return to this point in section four when I address the so-called 'hard' problem in consciousness studies.

Before dealing with this issue directly, however, I want to turn to history. As I do so, I must emphasize that Baars' asserts that contrastive phenomenological modeling 'fits' well with historic scientific modeling techniques. As I will show, the GWT fits well with the philosophical tradition outlined in the first section. It is also like many scientific ideas throughout history in the sense that it holds fast to some ideas (e.g., the value of unifying the variables) as it seeks to explore information. Thus, it is able to bracket information and use experiments to efficiently model variables of interest. These are valuable elements and have served science well. However, as I will now demonstrate, history, shows that discovery and imagination are far from bracketing techniques. They include a re- conceptualization that often entirely alters the plane of our inquiry. This re-conceptualization is a rearrangement that draws upon a different kind of bracketing than what we find in contrastive phenomenology. The difference involves conceptualizing a different *quality* of information, and this new information need not have been conscious or unconscious before becoming explicit. It is not intended, may not have been expected, and also may not have been in the workspace at all. The entry of these ideas, however, has the potential to magnify the shortcomings found within previously *unquestioned* (implicit) assumptions. In addition, when the new ideas enter they add to our global information base.

3. Historical Counterpoint

a. Galileo and Harriot

Thomas Harriot (1560-1621) and Galileo Galilei, (1564-1642) are useful figures in helping to demonstrate that enlarging assumptions can include both an implicit and explicit re-cognition. This is because each of these men saw a different moon when looking through his telescope in 1609 and each left a written record of his observations. 13

Figure 1: Thomas Harriot's earliest drawing of the Moon, dated July 26, 1609, as seen through a six-power telescope.

Click here for image

Thomas Harriot, a mathematician, cartographer, and astronomer, lived in London and (to the best of my knowledge) was the first person known to record a moon observation through a telescope. 14 Of course, Galileo is generally credited with changing how people saw the moon and planetary objects in general. What is fascinating here is that Harriot's journal mentions the moon's "strange spottedness," and he sketched a jagged edge, but made no notation about this edge in his notebook. It was as if he saw the moon, copied what he saw, and did not see it at all because he could not incorporate the visual anomalies with his Aristotelian-based worldview, which held that the moon was an unchanging and perfectly smooth sphere.

Galileo, on the other hand, directly addresses and also renders the difference between what he saw and the Aristotelian belief system in his book *Sideous Nunicus* (1610). Galileo writes,

> "I have been led to the opinion and conviction that the surface of the moon is not smooth, uniform, and precisely spherical as a great number of philosophers believe it (and the other heavenly bodies) to be, it is uneven, rough, and full of cavities and prominences, being not unlike the face of the earth, relieved by chains of mountains and deep valleys. (Galilei, 1957/1610, p. 31)

Figure 2: Galileo Galilei's watercolor of the six phases of the moon, 1616

Click here for image

Many have compared these two responses and noted that the different reactions of Galileo and Harriot raise critical questions about how we 'see' our world. (Holton, 1996, Montgomery, 1996). I would like to extend some of these questions into our investigations of consciousness, for I see them as especially good

questions if we want the conclusions we draw about people who are "normal" (i.e., people who 'see' the world like 'we' do, people who show no evidence of brain damage or impairment, etc.) to be open-ended. These questions include: Why is it that Galileo, who was a professor of mathematics at the University of Podua, was able see the moon is qualitatively similar to the earth and Harriot cannot? Why is it that Galileo can calculate the shadows cast by peaks and valleys that Harriot could not even see? Why does Galileo feel confident with what he sees despite the fact that it contradicts the prevailing Aristotelian worldview? Why is it that after Harriot read Galileo's book and saw his drawings that he, too, was able to see mountains and craters? My conclusion is one well documented by historians of science (e.g., see Holton, 1996, Montgomery, 1996). The difference lies in their training in visualization and how they had learned to use their eyes as a tool of *imagination*.

More to the point, Galileo was raised in Renaissance Italy where the discovery of linear perspective had captured the imagination of all intellectuals. In fact, the first job Galileo ever applied for was a position to teach geometry and perspective at the Florence Academy of Design (Holton, 1996). This shows he had some familiarity with the mathematical techniques used by painters to render three-dimensional phenomena on a two dimensional plane. I believe it was this knowledge that enabled him to translate the image he saw with the lens. Galileo could *see* the rocky terrain because he had studied how bodies cast shadows on different surfaces. Harriot, on the other hand, lived in the verbal English culture where people like Shakespeare, rather than visual artists, were setting the tone of the times. As a result, Harriot, unlike Galileo, did not have the tools to envisage the overall look of what he saw.

In sum, it was Galileo's conceptual relationship to the phenomena that made the difference. Galileo was able to look through the telescope with a qualitatively different 'eye' than Harriot and since Galileo's body of knowledge, like his perceptual understanding of how things fit were not *the implicit and learned cultural perception* held by Harriot, he saw a totally different image. The variation cannot be attributed to sensation or intelligence *per se*. Nor does it speak of abnormality, an essential form of consciousness, or subjectivity *per se*. It does, however, reflect some *quality* of consciousness.

I am asserting that it is this quality of difference that allowed Galileo to contextualize in a distinctly different manner from Harriot. I am also of the opinion that the GWT model could be said to capture how the implicit assumption eventually came into the global workspace - because the model acknowledges that new information can be added to the workspace and that it will make a difference in explicit understandings. Further, Harriot's later drawings of the moon show he revised his ideas about the moon after he saw Galileo's rendering and read Galileo's words. What the GWT *omits* is that if an experimenter who shared Harriot's cultural perspective set up this experiment, Galileo's responses could easily be statistically normalized or tossed aside as "bad data" (because they did not conform to the standard criteria). Of course, if we are scientifically optimistic we can say it is likely others (or even the experimenter) would have eventually confirmed what Galileo's counterpart in the laboratory saw. So the experiment could no doubt be "corrected" over time and this very activity of re-interpretation could even be correlated with some evidence of increased neural activity that would have surely appeared when others learned to "see" the alternative. One could also use "qualia" [15] theories to explain why there had initially been some level of difference between what each perceived and later adjustments made. . . .

b. Johannes Kepler

Kepler's story also offers a good counterpoint to Galileo's since the two men are a part of the traditional historical story we often use to outline how the Newtonian framework came about. [16] More important to this discussion, Kepler's realization of elliptical planetary orbits is an innovation that articulates why neuron activity experiments and explanations like qualia provide an unsatisfactory solution for how implicit assumptions - be they experimentally validated or otherwise - help form our information base.

More specifically, it took Kepler six to ten years to deduce the pattern that he used to create the elliptical formula for planetary orbits. What I want to stress here is that when he simplified Tycho Brahe's observational data into a mathematical form the equation included much that had previously not fit together

in any kind of *logical* way. In other words, Kepler was able to envision and thus author the kind of conceptual breakthrough that really did turn a paradox into a relationship. It was not a contrastive conclusion so much as a breakthrough that proved capable of precisely and concisely correlating what had previously been only a massive amount of *unrelated* information. The exceptional aspect of this is that the insight was not a logical one. Nor did he verify a personal experience or the cultural experience. 17 Rather, Kepler valiantly tried to find a circular solution for planetary rotation, but failed, as he noted,

> " The conclusion is quite simply that the planet's path is not a circle -- it curves inward on both sides and outward again at opposite ends. Such a curve is called an oval. . . . Why should I mince my words? The truth of Nature, which I had rejected and chased away, returned by stealth, through the backdoor, disguising itself to be accepted. That is to say, I laid (the original equation) aside, and fell back on ellipses, believing that this was a quite different hypothesis, whereas the two . . . are one and the same . . . I thought and searched, until I went nearly mad, for a reason, why the planet preferred an elliptical orbit." (from *New Astronomy*, in Koestler, 1959, pp. 333, 338)

From his words it is clear that Kepler did not know at first that the second formula he derived was that of an ellipse. (Koestler, 1959). Moreover, upon discovering this he worked hard to decipher his error before accepting the 'correctness' of the elliptical solution. What I must add to this story is that this 'solution' was not 'in the air' when Kepler lived. It was quite the contrary.

A few points are key here. First, while conic sections were studied by the Greeks, they were not considered of any practical value until Kepler realized an ellipse was the shape of a planet's orbit around the sun. Second, once Kepler envisioned an elliptical formula matched the data he was able to use the information to empirically, logically, and efficiently define a self-consistency in the cosmic pattern. Let me stress that the old circular models of the planetary orbits adequately *described* phenomena and actually matched sensory perceptions *more* accurately than the revision (e.g., it does look as if the sun circles the earth!). The elliptical model, on the other hand, more accurately describes phenomenal mechanics.

The larger point, and I cannot state it strongly enough, is that the elliptical model was a *radical departure from the principle of uniform circular motion which had been considered self-evident and inviolable from the earliest times*. The ellipse was a reversal of an *implicit* (cultural) truth. This *new* idea, moreover, brought more precision to the overall picture of celestial and terrestrial phenomena.

> The numerous observations made by Tycho Brahe, with a degree of accuracy never before attained, had in the skillful hands of Kepler revealed the unexpected fact that Mars describes an ellipse . . . the genius and the astounding patience of Kepler had proved that not only did this new theory satisfy the observations, but that no other hypothesis could be made to agree with the observations, as every proposed alternative left outstanding errors, such as it was impossible to ascribe to errors of observation. Kepler had, therefore, unlike all his predecessors, not merely put forward a new hypothesis which might do as well as another to enable a computer to construct tables of the planet's motion; he had found the actual orbit in which the planet travels through space, (Dreyer, 1953, p. 392)

Four additional points must be stressed here. First, *once the implicit pattern became explicit in a quantitative fashion,* the elliptical idea efficiently changed cosmological assumptions and became acceptable to human consciousness. In other words, what had not even been permitted to be considered -- largely due to how metaphysical constraints were defined in relation to the physical world -- became accepted upon quantification. Again, *once* the explicit equation was contrived, it was possible to *expand* the possibilities to include ideas on orbits that are not circular. 18

Secondly, the explicit ideas were accompanied by a change in Kepler's internal consciousness. Clearly, the fact that the idea is presented in a classical framework -- where there is no room for consciousness -- does not mean that consciousness was not involved. Rather, one can appreciate the beauty of Kepler's insight,

even without any awareness of his emotional response to the discovery. But, and this is my point, his words after the discovery show (see below), his perception was NOT disembodied. It was very much an embodied experience.

> I thank thee, Lord God our Creator, that thou allowed me to see the beauty in the work of creation; I exult in the works of thy hands. See, I have completed the work to which I felt called; I have earned interest from the talent thou hast given me. I have proclaimed the glory of thy works to the people who will read these demonstrations, to the extent that the limitations of my spirit would allow,"(Davis & Hersh, 1981, p. 111).

The fact that the insight was embodied and is usually discussed without acknowledging this internal reaction, to my mind, underlines the *complexity* of merging science and human consciousness. It is precisely this relationship to human experience that is hard to fit into either the idea that the experiment covers all of the territory or the idea that scientific insights are disembodied and thus nullify experience and insight.

Thirdly, once Kepler was able to re-present and explain an alternative in greater detail it becomes possible for others to go through the exercise he had intuited and also perceive how the pattern fit the picture. This repeatability does bring the insight into the global workspace to a larger degree - but the conclusion was not conscious in the way we usually define the word 'conscious' and its imaginative and insightful quality is lost if we categorize it as unconscious. If we assume it was 'waiting to be illuminated' we need to also ask where it was within the workspace. The question 'where is it?' of course, indirectly raises the homunculus question again. My main point here is that the information somehow (magically?) entered into the workspace and it entered despite the fact that the idea was a radical departure from *all* solutions being considered at that time in regard to the cosmological picture.

Finally, there is no reason to assume a Platonic-Christian stance here. There is no evidence that Kepler accessed another domain with his mind's eye, despite his gratitude toward God. 19

4. Dualism

Having asserted earlier that Baars' unification model is limited by virtue of (1) trying to enclose the workspace into a unified whole and (2) its inability to accommodate personal insight suggests we need to consider models that attempt to address these limitations. David Chalmers' philosophical 'hard problem' offers an excellent starting point for this. Chalmers dualism does attempt to grasp the difficulty of enclosing whatever consciousness is and Chalmers does attempt to conceptualize his view in an experiential model. The result is what he calls *naturalistic dualism*.

> "To capture the spirit of the view I advocate, I call it *naturalistic dualism*. It is naturalistic because it posits that everything is a consequence of a network of basic properties and laws, and because it is compatible with all the results of contemporary science. And as with naturalistic theories in other domains, this view allows that we can explain consciousness in terms of basic natural laws. . . . Some might find a certain irony in the name of the view, but what is most important is that it conveys the central message: to embrace dualism is not necessarily to embrace mystery." (*italics Chalmers*) (Chalmers, 1996, p. 128)

I would like to begin to review the model by noting that this categorization of mystery understates why many scientists are compelled to seek new possibilities -- and it is the kind of misrepresentation that has been a problem historically in our views of science as well as consciousness (Ione, 1996). It is also a view of mystery that builds on many of our implicit assumptions about what a scientific model is supposed to accomplish (reify, answer the question, etc.). Given this, I will not detail the philosophical problems Chalmers fails to address here. Instead I will focus on three critical areas that are ignored and question the value of the model as a scientific model of consciousness.

First, Chalmers' view of mystery is problematic. It is a view compatible with the philosophy of science and a view that overlooks that mystery is often an unstated component of why people do science. Stuart Kauffman, a biologist affiliated with The University of Pennsylvania and the Santa Fe Institute, captured the quality I believe Chalmers omits in his introduction to *The Origins of Order*, a biologically based study of self-organization and selection in evolution.

> "Like many other books by scientists, this one is ineluctably autobiographical. It witnesses one mind's sense of mystery. The famous physicist Wolfgang Pauli is said to have remarked that the deepest pleasure in science comes from finding an instantiation, a home, for some deeply felt, deeply held image. I share this odd sense. . . . The greater mystery, after all, is not the answers that scientists contrive, but the questions they are driven to pose. Why? Why this question rather than another? Why this search, hope, despair, rather than another?" (Kauffman, 1993, p. vii)

Secondly, adopting Chalmers idea that accepting paradox may allow us to 'fix' the paradox of phenomenal judgments, 20 does not address the baggage the 'solution' adds to actual inquiry, as many have pointed out (e.g., see the Churchlands, Hardcastle, Dennett, etc.). The problem is that Chalmers appears to be attempting to formulate a theory that fits within the scientific tradition but it is really a theory that fits in with the tradition of the philosophy of science, and the two are vastly different! (Pagels, 1989, Yngne, 1996). Thus, and building on my previous points, Chalmers solution, (i.e., the idea that consciousness is a fundamental property of the universe) is essentially unscientific in spirit. It is, in effect, presupposing some kind of universal and enduring solution and ignoring that a scientific inquiry generally continues to seek new ways of relating information rather than closing the door. It is for this reason that imperfect models are accepted -- despite being imperfect. Science has always known that some models are still better than others and that our better models prove to be viable stepping stones for the ones that will put them out of commission. This is not to say Chalmers does not acknowledge that we are developing the kinds of tools that extend our ability to better probe the various mechanistic questions we have about consciousness. My point is that the focus on logically '*proving*' we can never *completely* account (i.e. reify, explain) subjective experience presents a problem in the arena of how we approach our experience and how we approach the practice of science

This oversight highlights the last Chalmers omission I will discuss in this paper, this being his overlooking that some combination of insight and intelligence always has the potential to change invisible and non-conscious information into information that will become increasingly accessible personally and interpersonally. 21 When this happens it is not because humans are using deft Chalmers-like logic to create fundamentals and universals that supply placebo-like metaphysics. Rather often people develop a deeper organic relationship with how to translate and share experience into life, learning, and re- cognition, as the examples from history (in section 3) illustrated.

In sum, Chalmers' dualism does capture the problem in knowing another's subjective experience but, in doing so, it downplays that people often develop tools that offer better translations over time and interpersonally. Three points emerge here. First, when Chalmers asserts that it is unlikely there will ever be a way to model subjective experience as something that emerges from neural processes he logically positions his argument. Second, since it is an argument that is dependent on how logical conclusions fail to solve the problem of consciousness, the argument is not flexible enough to adequately bring valuation to the kinds of insights that are comparable to Kepler's cognitive discovery. Finally, both problems are accentuated when coupled with the idea that consciousness is a fundamental property of the universe.

5. Conclusion

Coupling the various theories of consciousness we have today with the powerful impact of implicit cognition on our lives, I want to close by saying that we need to consider new ways to consider the puzzle of consciousness. This includes understanding some of the ways the cultural mind has led us to contextualize the issues and seeking to formulate new solutions. The need to define an approach that is other than what we now have inclines me to see quantum mechanics as a useful starting point, for quantum

mechanics has already provided a legitimate base for re-thinking traditional relationships between visible, invisible, and the non-visible.

While actual models are beyond the scope of this paper, I do want to note that many theorists have looked this way. (e.g., Lockwood, 1989, Penrose, 1989, Stapp, 1993). I would also like to add that while I would question the 'dualistic' conclusion, of Henry Stapp, a physicist and consciousness theorist, I do believe his approach is premised on the idea I am trying to present. His model allows for the contextual and is a naturalistic model. It was developed to address what Stapp saw as a recurring logical gap in consciousness studies. More specifically, "Competing theories of the mind-brain connection seem always to have a logical gap, facetiously described as ' . . . and then a miracle occurs'" (Stapp, 1993, p. 4)

What stands out overall in Stapp's theory is that his innovative modeling appears to have the potential to be connective rather than contrastive -- since there is a logical place for consciousness in quantum theory. In addition, it seems likely that the quantum and classical domains will be connected to a greater degree in time and, as better relationships appear, we will have a better metaphor for consciousness. The beauty of quantum theory, in this respect, is that it is a domain that is mechanistic in design and also functionally organic -- in a holistic sense. Traditional models, on the other hand, were developed in a way that really could only position consciousness as if "a miracle happens," given the nature of classical mechanics. Consciousness simply has no 'place' in classically-designed models. They are contrived to exclude consciousness and thus, when we use them to explain consciousness we end up with models that describe? or verify? human perception and sense experience. Of course, given that our models are constructed by us and our questions will no doubt always be informed by how we think and what we feel as we ponder the world around us, our models, in my opinion, will always be incomplete. In this sense all models are incomplete, for all are continually questioned by new generations, exploring their parameters as they endeavor to learn them. Thus, it seems what we need are models that continue to further inquiry . . . models that allow the mysteries to remain . . . models that have enough flexibility to affirm that science, at its best, draws mystery into its investigations . . . models that allow us to remember that we are reflecting upon human consciousness . . .

Endnotes:

1 Baars asserts that his model is "technically not connectionist" (Baars, 1997). Let me note that I am calling it a connectionist-type model because it attempts to illustrate an ongoing exchange in the central workspace. (Baars, 1996)

2 Baars defines contexts as "a system that shapes consciousness experience without itself being conscious at that time . . . Contexts include currently unconscious expectations that shape conscious experiences, and currently unconscious intentions that shape voluntary actions. . . . the word 'context' is not just any mental representation: It is an unconscious representation that acts to influence another, conscious representation." (italics Baars) (Baars, 1988, pp. 138-139)

3 There are many good sources for exploring these views and their differences. (see Barrett, 1962, Boman, 1960, Gilson, 1941)

4 The most accessible example is Plato's Myth of Er, (Republic, Book X) where he offers his views on immortality and transmigration. This belief in two domains was easily combined at a later point with the Hebrew idea of a God (above and of one substance) who created Nature (below and of another substance). Aristotle discusses the problems with the forms and the two sides of Plato at length in Metaphysics. (Plato, 1989)

5 Even Aristotle often put more emphasis on logic than is often acknowledged. The classic example is his saying that men have more teeth than women, never having bothered to count. Of course, since Aristotle was married more than once, counting, while perhaps awkward, was nonetheless possible. Moreover, while the debate on this is ongoing, I want to note that my position is that despite clear differences between them,

Aristotle and Plato shared a cultural experience that I would assert gave them many similar implicit assumptions. (Ione, 1995)

6 Baars has responded to this conclusion. "Some philosophers maintain that the experiential descriptions we have collected in a century of sensory science may parallel conscious experience without actually resulting from it. . . . But this seems utterly implausible to an empirical scientist. If the overwhelming majority of people say a pencil is red, if they can match it with other red things and distinguish it from blue and green pencils; if their eyes have red receptors, and color cells in the visual cortex fire a red code, what else would they be having but an experience of red." (Baars, 1996, p. 34)

7 It should be noted that Baars also says that theater models can also be found in other traditions, such as Hindu thought. My research shows that Hindu theater models have been as problematic as those found in the West. In the case of Hinduism, it might also be said that the problems are similar because of the many ways Hindu metaphysics mirror those of the West. (Ione, 1995)

8 "The safest general characterization of the European philosophical tradition is that it consists of a series of footnotes to Plato." (Whitehead, 1929, p. 53).

9 I am using the term non-conscious to refer to whatever may not be connected to the mind at all. I am also assuming an open-ended evolutionary process, so the unconscious could not by definition be assumed to include what will be in the future. My definition of non-conscious includes the definition as used by someone like Searle, where the term is used to refer to something that is physically real but has no connection to one's mental state (see Searle, 1984, p. 154-155). My definition is also intended to expand that definition so that non-conscious can be used in a way that designates innovative qualities that could not be in a substantive unconscious. The assumption is that the unconscious is something one is not conscious of now, for whatever reason, but being something, there is a connection somewhere. Anything the brain automatically brings to our experience could fit within either category.

10 William James states my position well, saying "The particular intellectualistic difficulty that had held my own thought so long in a vise was . . . the impossibility of understanding how 'your' experience and 'mine,' which 'as such' are defined as not conscious of each other, can nevertheless at the same time be members of a world experience defined expressly as having all its parts co-conscious, or known together. The definitions are contradictory, so the things defined can in no way be united . . . Things are 'with' one another in many ways, but nothing includes everything, or dominates over everything. The word 'and' trails along after every sentence. Something always escapes. 'Ever not quite' has to be said of the best attempts made anywhere in the universe at attaining all-inclusiveness. . . . However much may be collected, however much may report itself as present at any effective center of consciousness or action, something else is self-governed and absent and unreduced to unity." (James, 1987, pp. 729, 777)

11 Again this recognition of the need to deal with this issue can be resolved in many ways. For example, Hinduism has a wonderful way of explaining this. The Hindus use the term netti-netti, which translates as not this, not that.

12 I am less concerned here with thanatological concerns, i.e., the ongoing loss of life within the community due to death and human Angst in regard to death.

13 An intriguing contextual detail, given that the word telescope slips off of our tongues so easily, is that the word telescope actually was not invented until 1611. Some excellent resources on the changing of the moon's image, complete with illustrations, can be found in (Galilei, 1957/1610, Holton, 1996, Montgomery, 1996, Van Helden, 1995)

14 It should also be noted that the historical records indicate that many people had looked at the moon through lenses even before the spyglass was invented. (Van Helden, 1995)

15 I am defining "qualia" as qualities that are intrinsic to our subjective feelings, like the redness of a rose or the smell after the rain.

16 Another interesting example I could have used to make this contrast would have been how William Harvey's meditations on how blood moved about led him to realize that even Vesalius' revisions of Galen's anatomy were insufficient to explain blood circulation. This example, more congruent to how imaging technologies are now changing our understanding of the brain, is the subject of a soon to be completed paper, "Imaging and Consciousness."(Ione, 1998).

17 Einstein used Kepler's discovery of elliptical rotations to articulate how knowledge cannot advance from experience alone - for it builds on how the inventions of the intellect correlate with observed patterns, (Einstein, 1973)

18 Even still, initially David Fabricus, a clergyman and amateur astronomer who maintained a correspondence with Kepler from 1602 through 1609, (Dreyer, 1953) wrote Kepler, "With your ellipse you abolish the circularity and uniformity of the motions, which appears to me the more absurd the more profoundly I think about it. . . . If you could only preserve the perfect circular orbit, and justify your elliptic orbit by another little epicycle, it would be much better," (Koestler, 1959, p. 353)

19 I would say that the reason Kepler said he had to unconsciously repair his circular error, (Koestler, 1959) was that Kepler also uses 'unconscious' in a Platonic sense.

20 "The existence of phenomenal judgments reveals a central tension within a nonreductive theory of consciousness. The problem is this. We have seen that consciousness itself cannot be reductively explained. But phenomenal judgments lie in the domain of psychology and in principle should be reductively explainable by the usual methods of cognitive science. There should be a physical or functional explanation of why we are disposed to make the claims about consciousness that we do, for instance, and of how we make the judgments we do about conscious experience. It then follows that our claims and judgments about consciousness can be explained in terms quite independent of consciousness. More strongly, it seems that consciousness is explanatory irrelevant to our claims and judgments about consciousness. This result I call the paradox of phenomenal judgment." (Chalmers, 1996, p. 177)

21 Of course, the Newtonian insight that one set of laws could apply to the terrestrial and celestial domains is one of the best examples of this. Quantum theory, in effect, has re-vitalized the question of paradox - but has totally different construction and perspective than the division between the celestial and terrestrial mechanics that are a part of the Ptolemaic system.

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