On a Physical Scientific Approach to Transpersonal Psychology

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Transpersonal psychology involves an approach to behavior and the self that transcends ordinary states of mind as well as extends to the larger environment as a whole. Treating the individual, their mind, and behavior in relation to others and the larger natural system utilizing properly developed and practically applicable concepts from physics, chemistry, and biology may provide a successful interpretation that may be more powerful than the standard views of psychology. For instance, basic concepts such as charge pair attraction-repulsion, bonding, and synchronous behavior may be transformed into highly effective and even "spiritual" concepts that can add sophistication to human action, thought, and emotion in a way that is both more naturalistic and transcendent than current definitions in psychology.

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The purpose of this article is to suggest a practicable way in which taking a physical science approach to psychology and behavior can prove to be successful. This methodology might perhaps be considered as effective or potentially more so than ordinary psychological and spiritual perspectives, perhaps imbuing the mind with an additional sense of personal transcendence. But the idea of building a model of psychology or spirituality in a reductionistic way from technical subjects like physics and chemistry is often frowned upon. Such physicalistic approaches are often thought of as being overly mechanical, too simplistic, and entirely inapplicable to complex human beings (Furedy, 2004; Zentall, 2008; Hunt, 2005; Barnes-Gutteridge, 1985). Yet physically derived concepts and terminology are increasingly used by psychologists and behavioral scientists, and by the general public as well. For example, it is quite common to refer to human behavior using physically based terminology regarding "positive" and "negative" actions and experiences, or as involving "momentum." These are terms with clear origins and references in physics. Further, an increasing number of appealing theories are now being published on the topic of a special relation between physics and psychology (Radin, 2006; McTaggart, 2007), although many of these interpretations must be considered hypothetical.

Many of the most popular recent ideas surrounding psychology and physics seem to focus on the idea of special physical effects being enacted through quantum entanglement (Radin, 2006). Quantum entanglement is a relatively recently demonstrated so-called "spooky" phenomenon in physics, one with a long history of skepticism and debate beginning with Einstein's doubts (Einstein et al., 1935). Its application to psychology would presumably be, like the microscopic quantum mechanical phenomenon itself, in the form of a simultaneous-like transmission of knowledge and other nonlocal "action-at-a-distance" effects between brains and minds (Leder, 2005).

But these new ideas, while representing distinct possibilities, may not always be fully realistic and viable, and there may be more potentially feasible approaches. For instance, the contemporary belief in entanglement of minds may be considered highly analogous to the way many thinkers believed thoughts could be directly transmitted through the ether by electromagnetic waves toward the end of the nineteenth century. Those interpretations, while certainly important and useful attempts to apply physical principles to psychology, eventually proved untenable. Other approaches proved to be more practical and immediately employable, for example Freud's (1949) psychoanalytic theory. Given a history of difficulties and limitations when attempting to apply effects directly from physics to psychology, it is therefore an important caveat that it is necessary to be careful when seeking to extrapolate laws from developments in physics or other branches of science to relatively unrelated ones.

Nevertheless, new ideas and concepts in the behavioral and social sciences have often been successfully derived with some help from developments in the physical sciences. At the period during the turn of the twentieth century, Freud (1949) did in fact develop psychoanalysis and his concept of quantities of libidinal "energy" using principles borrowed directly from the newly developed thermodynamics (Lashley, 1924). His ideas included application of conservation of energy principles, cathexis and decathexis as a charge/discharge, and the requirement for a healthy balancing of conscious and unconscious psychological forces. His model strongly meshed with new advances in the physical sciences. In that case, the physical sciences provided invaluable new concepts that led to conceptual insights into the underlying principles and "mechanics" of psychological processes. It is therefore true that in many instances concepts from physics and chemistry proper have been helpful in developing better models of psychology. But there have also been many complications in efforts to apply physics to the complex aspects of psychology, where the two scientific domains and their principles are often not fully commensurable.

The most recent quantum entanglement approach to psychology has probably been spurred due to full experimental validation of the new phenomenon in quantum physics as well as an increasing growing number of experiences of synchronistic effects (Jung, 1955) and related phenomena reported in everyday life and clinical practice (Main 2007; Totton, 2007). Such strange effects in psychology are now typically called "synchronicities" (Jung, 1955) and meaningful coincidences because they seem to reveal an underlying special physical order and simultaneity in the universe, or even an elusive mysterious physical force behind the psyche (Lazar, 2001). For instance, a common example of such an experience might be witnessed during a simultaneous or congruent thought or emotion with another person (Hogenson, 2009) or at a moment of an unusual sense of cognitive alignment with an external set of circumstances. This may sometimes occur when an individual and another person, object, or event are separated by a significant distance and apparently seem to be causally unrelated to each other, establishing what was originally called an "acausal connection" by Carl Jung (1955). The seeming improbability of this type of event combined with its de facto emergence (Cambray, 2002) often leads to a state of surprise or awe and a consequent seeking of alternative explanations regarding its meaning.

For the present, it will be assumed that the source of many such psychological experiences cannot be attributed entirely to psychopathology or other misinterpretations of simultaneous events and meaningful "coincidences," because certainly in many cases they can (Williams, 2010; Reiner, 2006; Krysnki & Tenenbaum, 2007). Yet it can be posited that it is also quite possible that in many cases there is some form of a real physical connection and relation between these ostensibly "acausal" events, revealing itself in what may be a physical ordering in interactive psychology and behavior. These unusual psychological experiences might possibly be better explained in many cases by using a model that is dependent upon physical aspects of a coherent biological and psychological reality that may underlie human behavior.

Such an interpretation would be in contrast to attributing subjective personal synchronistic experiences to seductive ideas of special kinds of "telepathic" transmission of thoughts through an ether or via quantum entanglement or other unobservable forces. Elaborate "intelligently designed" and precisely engineered mechanisms and pathways in biology cannot usually be expected due to the considerable bluntness of evolutionary biology (Gould, 2006; Page, Moser, & Dutton, 2003). Moreover, it is usually not possible to directly apply quantum phenomenon to macroscopic objects, specifically a large biological entity such as the human brain. This is due to the well-known "correspondence principle" introduced by the early quantum mechanical thinkers (Bohr, 1920) that limits the extent of application of microscopic principles as the size scale increases. It may therefore be necessary to look for the origin of actual forces in the more "mundane" physical-chemical properties of nature, and these may be ones that rely heavily upon traditional classical scientific principles.

If a physically based interpretation of psychology is to be used to explain synchronistic effects in the macroscopic realm, then precisely how is it that physical and chemical forces might play their role? Can physical concepts be pragmatically applied to human beings in a relevant and viable way to explain experiences that seem to reveal a unique type of order between individuals and their milieu, and in their relation to the larger "universe"? If so, such an approach would be required to provide some explanation of the correlation between the microscopic and macroscopic worlds, in a way that the effects can be considered both

commensurable and corresponding. Evaluation of the macroscopic forms and functions of biological systems is therefore likely to involve an approach that takes into account larger statistical sums of quantities of mass and energy. This must be the case due to the collections of atoms, chemical structures, and charge states that are required to create active biological organisms. The approach would also be required to describe some sort of a general alignment and coherence between the parts constituting the complex and multifaceted macroscopic system. The latter may be proposed to be caused by the natural physical coordination and synchronization of the behavior of large numbers of atoms and molecules in the microscopic realm, and by the macroscopic coherent behavior of biological beings themselves in relation to each other and their larger environment.

Such a possibility must also be described in a way that is not merely metaphorical, and that is dependent upon the real chemical and biological properties of the substances and modules that create human beings (Gholson & Barker, 1986). It must rely on factors that define the true biological and psychological characteristics of human beings and their natural environment— ones that are functional, observable, and measurable. Such a method would also represent a genuine physical relation to the surrounding environment supporting human existence. Currently, quantum mechanically based descriptions are not applicable in such a way to the macroscopic domain, and have not led to successful working scientific models for psychology. The only exceptions in biology are the small number of examples of specific quantum mechanical behavior at the molecular level of biology, such as in biological electron transfer tunneling and photosynthesis (Moser, 1992; Collini et al., 2010; Arndt et al., 2009). It would therefore be helpful to consider other realistic possibilities for the ways in which the principles and laws of physics and chemistry might be applied to the macroscopic mechanics of psychology (Kim, 2005).

It is a rapidly burgeoning trend to use terminology and concepts derived from the physical sciences in psychology, but the concepts are typically used in a largely "nominal" or loosely descriptive way (Smith, 2006). This may be understandable because rarely, if ever, are psychological concepts identical to the physical ones they are hoped to be modeled with. Additionally, the actual physical underpinnings of the mind may not be obvious to subjective human perception, and represent only one aspect or quality of the many influential parameters involved in interdependent psychology. For instance, it may often be true that two people will change mental state approximately simultaneously, and this is likely to a considerable extent to be due to physical processes from the basic biochemistry of the human brain and body. But these processes may in many ways be subliminal and ancillary to the critically important personal and social decisions that an individual must make, hidden deep beneath the external surface.

Nevertheless, perhaps to a greater extent than ever before, the use of concepts from the physical sciences has moved researchers closer to describing an underlying physical reality and mechanics behind human thought and action. As will be suggested in this paper, the use of basic physical principles, particularly from electromagnetism and chemistry in combination with synchronistic principles, is likely to represent one of the best methods to do this properly.

Historical and Contemporary Development of the Relation Between Electromagnetism and Psychology

There is a long history of both psychologists and physicists who have attempted to apply principles from physics directly to psychological experiences. These efforts have probably gone on throughout human history in various forms, including in the earliest interpretations of "psychic" phenomena and most recently in the form of "psi" and entanglement (Alvarado, 2006; Radin, 2006). However, the most notable landmark studies regarding specific electromagnetic physics principles began after the discovery of electricity and magnetic principles themselves. Perhaps we have all at one time or another heard someone described as "mesmerizing" or having a "magnetic" personality. This is a reference going all the way back to Franz Mesmer's original studies on animal magnetism in the eighteen hundreds, in which he believed strong magnetic fields flowed throughout the body. While his belief in such strong forces did not prove to be fully correct, his ideas did help lead to the eventual development of hypnotism, and in current times it is now commonly understood that small electromagnetic fields do in fact exist around the body (Burr, 1939).

Later, at the turn of the twentieth century, the notable physicist Oliver Lodge also made an admirable attempt to apply the physics principles and technologies he was developing to the mind. He believed that thoughts could be transmitted directly between humans

via electromagnetic waves through the ether, much like they did in the radio telegraphy he helped to pioneer (Raia, 2007). Of course it is now known that an ether propagating electromagnetic waves probably does not exist, unless one chooses to define other kinds of "fabrics" of the universe (Greene, 2004; Wilczek, 2008). But in part due to these past efforts, it has become very clear that certain types of directly transmitted "telepathy" are unlikely to be tenable.

While neither Lodge's nor Mesmer's ideas turned out to be entirely correct, they were certainly admirable and valuable scientific efforts. They led to useful insights into potential human psychological capacities, and suggested new possibilities pertaining to human interaction between dyadic partners and with the larger universe. For instance, Lodge's idea of a kind of resonance or tuning between individuals' brains (Raia, 2007) is an idea that has been investigated and pursued by many others since his time, and is still being actively pursued today. A testament to the legitimacy of his early work, it is now standard practice for researchers to use terms like "social tuning" to describe attempts at matching and creating a shared reality between individuals, whether by ordinary perception or implicitly activated processes (Lun, Sinclair, & Witchurch, 2007).

The efforts to apply physical science principles to psychology continued throughout the twentieth century, of course in Sigmund Freud's own efforts to make psychoanalysis much like thermodynamics, but also very significantly in Carl Jung's idea of synchronicity (Jung, 1955). Jung worked on his ideas about "acausal" synchronous events with the eminent physicist Wolfgang Pauli (Zabriskie, 1995; Pauli & Jung, 2001; Main, 2007). But Pauli concluded the events could not have a direct physically mediated source, and Jung was obliged to agree (Cambray, 2009). Failing to find a specific direct linking physical mechanism, they eventually interpreted the phenomenon mainly in an analogous and metaphorical way to probabilistic and indeterministic quantum mechanical events. They ultimately resorted to an explanation of strange "acausal" synchronistic coincidences, simultaneous thoughts, and precognitions based on a principle of a kind of unknowable alignment with surrounding events and the universe through "constellated" archetypal structures (an "acausal connecting principle"; Jung, 1955).

Like previous researchers, Jung and Pauli could not find and apply a satisfactory specific physical mechanism. They ended up only borrowing the new concept of indeterminism from quantum mechanics rather than developing what might have been a more convincing extensive and rigorous scientific model (Zabriskie, 1995). But new approaches have now greatly improved upon Jung's original ideas. For instance, the aspect of "emergence" of such synchronistic effects has been clarified as due to moments of mental and physical order that emanate from a seemingly chaotic underpinning of unconscious factors (Cambray, 2002). This has been compared to the way functional vesicles or cells emerge in a chemically stable way from a sea of component parts in a previous state of disorder and chaos (Cambray, 2009).

Most of the past historical attempts to apply concepts from physics directly to psychology can certainly be considered heuristically and conceptually helpful. But they have usually been met with a limited amount of success. Most of the ideas were only partially applicable in how they pertain to actual psychological mental mechanisms and behavior (perhaps the possible exception is Freud, who primarily sought to make psychoanalysis only more rigorously physical scientific-like rather than identical to physics). Yet the analogies and comparisons have certainly been helpful in developing better psychological theories and for modeling human thought and behavior more effectively. They have also consistently hinted at and suggested some form of an underlying physical order and unseen forces at work. The attempts seemed to especially take advantage of new physical concepts and ideas from electromagnetism, thermodynamics, and quantum mechanics. In most cases, however, the physical forces usually required substantial modification when applying them to macroscopic biological and psychological behavior.

Currently, there are many new examples similar these historical efforts involving application of the principles of electromagnetism and quantum mechanics. A new class of "metaphors" has found its way into the research lexicon. For instance, it is now a common practice for behavioral scientists to describe emotions as containing a "valence," which refers to emotional states such as happiness or sadness. The term has almost certainly been derived from the description of atomic and chemical valence states, for which the valence would define a formal charge state (+1, -1, +2, etc.). The idea of such states might even be considered to directly correlate

with an actual kind of positive or negative emotional "charge state," as suggested in this paper.

The use of concepts derived from general physics and chemistry, especially regarding electromagnetism and quantum mechanics, is already on its way to becoming a conventional way of describing psychological phenomena. The value of such concepts and their meanings are clear. When referring to an emotion, action, or state of mind as positive or negative, it can more easily be understood as either beneficial or detrimental. Similarly, considering being "on the same wavelength" or "in sync" with another person are highly physical analogies that help individuals to relate to each other. These physical analogies cannot be casually dismissed as merely useless descriptions of reality based on inapplicable physical scientific concepts. Rather, they can be extremely effectual when carefully applied and utilized in proper ways.

As many of these electromagnetic analogies often do fall short in some way, it cannot be overemphasized how important it is to properly tailor and design them for human behavior. This is in a way that most optimally fits the complex factors and specific "mechanics" that define any particular given individual psychological or social event. For instance, describing a candidate in a political election or a team in a sporting event as containing momentum would certainly be a valid way of describing those particular types of activities (Nevin & Grace, 2000). But it is also clear that the concept of behavioral momentum can only be applied to those specific types of events showing a clear kind of "vectorial" trend of either winning or losing. Not all human activities will contain those particular elements of physics, nor is it immediately obvious how to define momentum in psychological terms (in physics it is defined by a mass "m" times velocity, but in psychology the velocity component is not as clear). Thus, for the purposes of the remainder of this article, it will be useful to consider how some of the most basic and important electromagnetic physical principles, in conjunction with synchronistic effects, may be accurately and productively applied to psychology. Further advanced principles may eventually follow from this initial description.

A New Hypothesis: Electromagnetic and Chemical Psychology

In *The Interconnectedness of Reality* (Haas, 2010) I introduce a new way of considering ordinary physical sciences principles (as opposed to strange quantum mechanical ones) that is directly applicable to psychology. I describe how humans and their brains may be accurately described as charged objects obeying the laws of electromagnetism and chemistry. These brains and the body's behavior may act in a substantially synchronous and aligned way with other individuals and the environment. Coordinated and coherent brains may operate much like synchronized clocks separated in space, resulting in what sometimes appear to be special physical effects of simultaneous thought and behavior. Approximately simultaneous changes in mental charge states may result in what are often perceived as synchronicities or "entanglement." For instance, when a pair of individuals simultaneously think of each other (in what might be revealed in the form of an aptly timed e-mail or phone call (Brown & Sheldrake, 2001), coherent internal biological and electrochemical processes may determine the timing. The partners or "halves" of the pair may experience a simultaneity in their thoughts and actions, but do not need to be present in the same physical location for there to be effects of a significant coherence between them. Figure 1 overviews the most basic version of this electrodynamic model.

The charge states responsible for this characteristic of the mind and behavior are proposed to reside in the neurochemistry of the brain, and in conjunction with other systems of the body (e.g., hormonal and other regulatory processes). The states may primarily be created and guided by collections of charge and the electric potential states established by neurons (Haas, 2010). This can be considered in a similar manner as to how currents from groups of neurons are established and measured using EEG when they create a potential at the surface of the brain. However, in this case the charges may represent a more "static" (i.e., electrostatic) net charge or potential state of neurons and collections thereof that change over longer periods of time.

As in classical physics and chemistry, most objects and events, and human beings themselves, may in some way be considered paired and to involve balanced forms of energy. Units of these charge and energy, like in physical chemistry and quantum mechanics, must usually move from one occupied space to another available location. These entities exist in what are typically called "orbitals," or structurally defined spaces and locations. Further, a collection of these complementary constituent parts can be treated as parts of a larger whole integral system, and this system can be treated to a considerable extent as equilibrated but also in an "open" state of

growth or evolution. All of the parts may therefore be considered bound or related in some generally balanced and continually changing space-occupying way within a larger system, and the extent of any given particular individual connection will tend to vary in strength.

The pieces of such an interdependent system, particularly as pertains to a social one, are not necessarily "glued" together in so strong way as to be extremely tightly attached and dependent on a given fixed opposite at all times. A perfect relation of that nature might be the case for strong chemical bonding or the precisely correlated entanglement of the quantum states of particles (Bell, 1964). Rather, as regards relatively flexible and approximating human interactions, there may be a more general and exchangeable pairing relationship between individuals, and between them and their environment. The decisions and qualities of interpersonal relationships will define the preferred and allowed shared behaviors between pairs and groups of people, yet the relations might always be considered paired as equal and opposite charges and forces, perhaps much like partners contributing equally within a "couple." Gravity itself might be said to exhibit just such a pairing effect on the human body, because to the extent a body is attracted to the earth there will always be an equal opposite relation or repulsion of the earth pushing back up. This might conceivably occur in a very specific local pairing way and over longer distances as well (Haas, 2010).

It may be hypothesized that mental states are generally positively, negatively, or neutrally charged, and the idea of attraction and repulsion logically follows as a central physical mental principle. "Bonding" may occur through the mental bonding of charges and energies that are stored within the compartment of the human brain due to its molecular activities. This will correspond directly with the decisions an individual makes, for example whether to be near or far from someone else, and it could not occur through a direct chemical bond as in a covalent attachment and tethering. As common sense would seem to dictate, individuals are generally attracted to people and objects they like and avoid those they dislike. These states of mind and preferences can almost certainly be considered more "electrical."

The molecular activities responsible for these charge states are likely to be created by enzymes such as ion channels and pumps, neurotransmitters, and other chemically charged and polarized molecules within neurons. Charged and polar molecules are ubiquitous

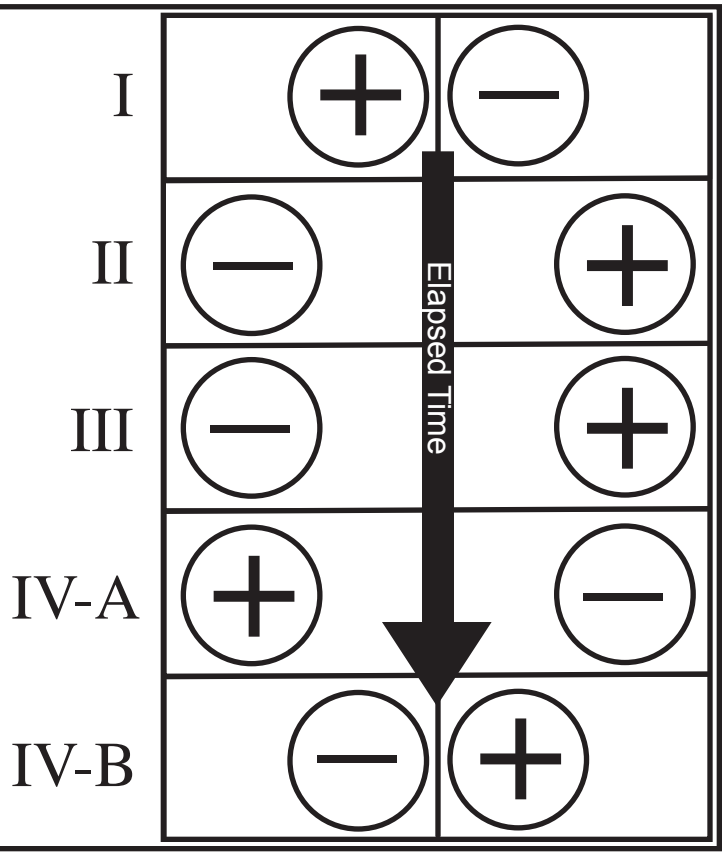

Figure 1. Human Brains as Charged States of Interaction

I. Two individuals become involved through an ordinary interaction due to a paired charged state of their brains (circles represent brains). One person may usually be considered more "positive" and another more "negative" (there is no pejorative connotation implied for the latter). II. After sharing/exchanging their initial charge states, the qualities of their mental states may reverse (perhaps creating a temporary "repulsion"). III. The the individuals become physically separated again, and proceed with their respective though/decision processes. IV. Another transition may then occur roughly simultaneously either (A) in isolation, or (B) when they return to meet again. This sequence is hypothesized to occur through ordinary biological processes and psychology via a subconscious synchronization and coordination. It is proposed that electrochemical molecular activity is fundamentally responsible, as opposed to quantum entanglement.

in cells, and are constantly added to or removed from enzymes as modifications to regulate their activity. For example, inorganic phosphate is net negatively charged, and may be added or removed from ion channel proteins to regulate their activity through phosphorylation (Kandel, 2006). Thus, the forces between brains over significant distances can perhaps be treated as akin to ionic bonds, or capacitor-like storages of charge, for which two interacting compartmentalized halves are generally attracted or repelled from each other and accordingly transported by movement of the body.

The factors that go into human choices and decisions, all the parameters that influence a person's actions, are obviously complex and numerous. However, a person will usually end up at one particular place, doing one particular thing at one particular time, either with one or more other people or alone. The decisions leading to the resulting event, based on a weight between all the factors involved in an array of possible choices, will inevitably lead to a particular outcome that is a largely digital conclusion. Assuming at any given time a single particular choice must be made and that a person will prefer to make the most favorable one, to some extent that choice can be seen as somewhat determined or even predetermined. It will either occur or it will not at a given time and spatial location, and it may also depend on an obligatory aligned or "coherent" relation between two parties.

In a very important sense, people may therefore be considered strongly physically connected and "bonded" with their environment and others. The idea of social "pair bonding" is already an extremely important in concept psychology. It has recently been experimentally shown to occur in a coordinated way through space and in simultaneous time due to prior intervals of synchronization, persisting for a period of time after partners are separated (Oullier, Guzman, Jantzen, Lagarde, & Kelso, 2008; Valdesolo, Ouyang, & DeSteno, 2010). From a physical perspective, the importance of this kind of an interconnectedness of psychological reality cannot be ignored, as it creates a lasting connection that persists through both time and space. Further, "fields" establishing, linking, and "conducting" these effects might very well be considered to be constructed like classical fields of charges. In a sense, individuals must make choices from within a preexistent "field" of possibilities, as they move from one location to another. Regarding conscious thought and action, the brains constituting such a field are likely to vary in their charge magnitudes and strength, or their total potential/kinetic energy states.

The idea of a conscious or empathetic field has been proposed by many others before in a variety of ways (Mansfield, 1996; Brown & Sheldrake, 2001; Tubert-Oklander, 2007; McTaggart, 2007). But a conscious field is likely not to be a "quantum field" that takes advantage of mysterious acausal "entangled" mechanisms or an actual manifestation of the brain outside the body, except perhaps as it exists in culture and other impacts on the surrounding environment. The processes of the brain and body are extremely macroscopic relative to hypothesized quantum fields speculated to support it. Consequently, a psychologically charged field is more likely to be of the same nature as the same sort of ionic "soup" and water-based medium sustaining the molecules and charges that generate molecular biological processes. This soup (even if it is "uncanny") is directly descended from and like that out of which life originally arose in the primordial ocean. Whatever chemical laws have always applied to that original aqueous solution are very likely to be the most relevant to the human brain and body which is made up mostly of water and other chemical components.

The neurobiology and neurochemistry of the brain largely works by the movement of charged molecules and the binding and releasing of chemical and electrochemical energy. The action potentials, neurotransmitters, and ionic gates that determine brain activity act very much like electromagnetic waves and switches. As collective statistical groups, on the whole these biochemical changes probably always represent some specific overall charged state of mind as the mental and emotional state of a brain changes. Additionally, the cognition and emotional processing involved in psychology probably occurs in a highly synchronous and coherent way between individuals and their groups, and between individuals and the natural environment itself. This description of a charge paired physical and mental reality leads to the model presented in Figure 1, which may represent the most basic way to begin analyzing a unit of human psychological interaction using electromagnetic principles.

Discussion and Relation to Transpersonal Psychology

Ideas of a universal kind of attraction have been described in various forms of "spiritual laws" and the like, and may therefore directly relate to transpersonal psychology. But

it is important not to exaggerate the idea of an unrealistic unity or interconnectedness of all matter, for example by postulating a grand sort of overarching "conscious field" (McTaggart, 2007). What is implied here is simply that brains may be charged and that these charge states lead to a general kind of attraction and repulsion between conscious organisms. Collections of such charges might be considered to constitute a "field"; and a change to one any one individualized part will usually require a concomitant change with another part. These changes occur only at certain allowable times and locations, during "windows of opportunity." In explicit psychological terms these events occur first and foremost through the decisions and actions of individuals, but they are also constrained within some range of allowable personal and social limitations and permissions. This may even be considered conceptually analogous to the properties of quantum mechanical orbitals which allow only specific quantized discrete units of change, spin, and so on.

Such a physically based interpretation of reality is neither banal, too simplistic, nor impractical. As regards a transpersonal perspective, the extent of an individual's appreciation and experience of these effects will depend upon their comprehension and understanding of it. Like any transcendent type of philosophy, much depends on the knowledge and skill of the practitioner and thinker (see Figure 2). This approach may represent exactly the kind of vision sought by inspiring early transcendentalist thinkers, like Emerson and Thoreau, who sought a union or relation with nature and her laws in the most intimate way (Thoreau, 1992). Emerson's writings clearly express his opinion of prevalent electric-like forces within the psyche and nature, and this is particularly noteworthy in his aptly entitled essay *Compensation* (Emerson, 1992). The desire for an electrical interpretation of human nature has been noted in Goethe's writing as well (Cambray, 2009), and there are certainly many other thinkers who have made similar allusions.

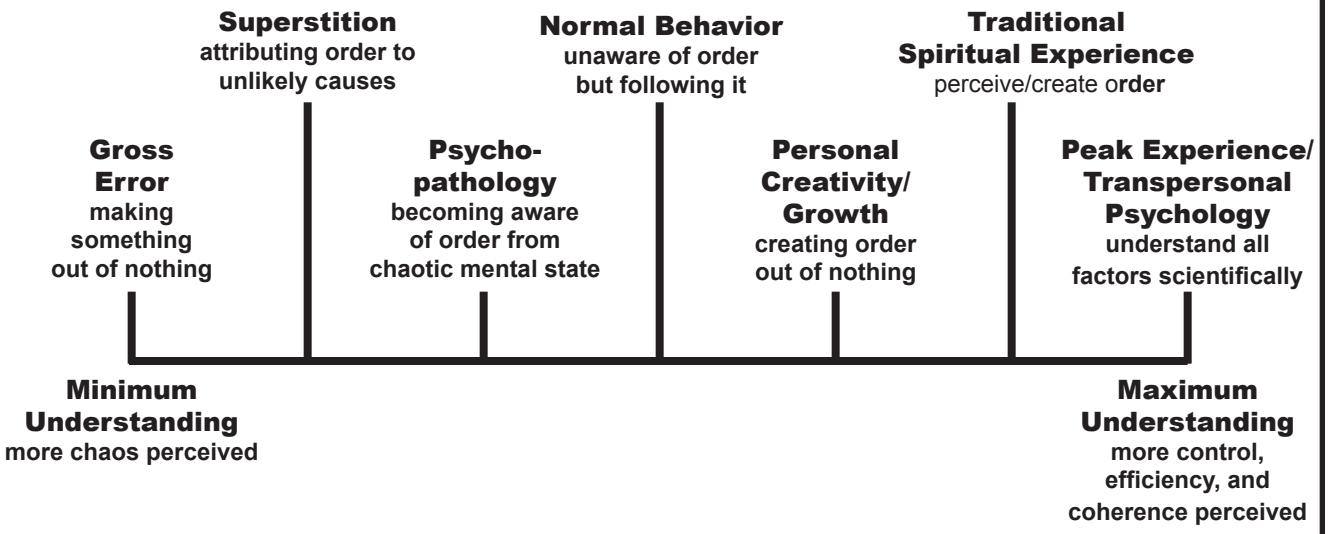

Figure 2. Levels of Physical Scientific Understanding of Psychology and Synchronistic Experience: From Chaos to Scientific Order and Transpersonal Psychology

Continuum of levels of scientific understanding of physical order in psychology and behavior (originally presented at the Synchro Summit, Yale University, 2010). The scale represents the degree to which the modes of understanding take advantage of a physical scientific perspective. It does not imply a value judgment about the different modes of understanding. Ideally, utilizing a physical scientific model would represent an optimal method for achieving a higher awareness in psychological experience and nature. It would transcend a normal habituated consciousness or primitive state of mind. It requires a fully active understanding of the electromagnetic aspects of psychological interaction and charge related activities. Full awareness and control of such aspects might be considered akin to an optimal "peak experience."

The sentiment regarding central balanced physical forces in nature is perhaps most strongly expressed in Eastern philosophies, particularly Buddhism and Taoism, which seek a sort of merging with the natural forces of the universe and liberation from the idea of a separate self. A parallel between Eastern perspectives and Western scientific ideas of forces in physics has long been noted (Capra, 1975). This is particularly exemplified in the concept of yin and yang as active and receptive forms. But the spiritual experience and perception of these often subtle physical effects may require a level awareness beyond gross reality that involves some increased knowledge of both one's own psychology as well as basic scientific principles. Encouragingly, perhaps more than at any time before in history, the layperson him and herself are now beginning to speak in physicalized terms, for example in the polarities of "positive" and "negative." It is now more generally appreciated that for every action there must be some sort of a reaction, in accordance with Newton's Third Law. Thus, physical science concepts are already more appreciated and utilized in everyday life and spirituality, if not in precisely rigorously scientific ways. Nevertheless, the ideas are well on their way to finding a proper place in scientific research, colloquial language, and spirituality.

But it is important to be careful regarding currently fashionable trends borrowing concepts from the intriguing and tantalizing features of quantum entanglement. The entanglement phenomenon pertains to the physics of the smallest quantum particles such as photons and electrons— it is not necessarily directly applicable to psychology using an identical physical mechanism. An increase in psychologically analogous "synchronistic" phenomena has probably increased interest and made the new interpretation more appealing. However, as explained in this paper, it is evident from historical examples that it is often very difficult to make microscopic phenomena correspond directly with macroscopic ones. Jung himself, failing to achieve a quantum mechanical explanation for his synchronicity, concluded that it was far more likely that the powerful forces of the unconscious were dominating through archetypal constellations and alignments of the psyche with the external world. It was not necessarily that there were "spooky" factors at work, only that humans were incapable of perceiving the causes related to their own complicated unconscious processes (Williams, 2010). G. Williams has recently described how this may occur due to the creative growth of the unconscious self at "stuck" moments, as it breaks through and begins to perceive and understand the natural order in the psyche and its relationships with others.

It seems unlikely that brains change state simultaneously with other individuals because they are perfectly coupled like the quantum states of paired photons or electrons in ideally correlated quantum entanglement experiments. It seems far more probable that individuals are emotionally and interpersonally connected with others and that they can often be "in synch" (Haas, 2010; Haas, work in progress). The different physical interpretation expressed here is that at a fundamental level individuals can be electromagnetically charged due to the forms of energy stored in the neurochemistry of the brain. They can also be highly synchronized with each other due to the basic biochemical processes of the brain and body that are often attuned with their experienceable "universe." On the rarer occasions when individuals experience a heightened sense of "resonance" (Mishlove & Engen, 2007) or a special simultaneous thought matching in other ways, it is perhaps best explained as a natural "spike" in biological timing or a sophisticated entrainment and coordination with others (Semin & Cacioppo, 2008). Further, it may even be considered to resemble a peak experience (Csikszentmihalyi, 1991). While the model may also in some ways resemble the phenomenon of quantum entanglement, it is not likely to be identical in its physical mechanism. Like previous attempts to model psychology using the physical sciences, it is probably necessary to specifically and precisely tailor the concept for the psychological events it describes.

Quantum coherence decreases dramatically when approaching macroscopic scales. The decrease in correlation between the two originally perfectly coupled halves is now well-established and experimentally proven by the "decoherence principle" (Yu & Eberly, 2009). While in principle macroscopic objects such as humans do retain some quantum mechanical wave-like properties, these features become far less relevant and vanishingly small when using macroscopic masses and "mass-energies." The de Broglie wavelength becomes extremely small and essentially unobservable. This is not to say some sort of actual quantum entanglement between minds is impossible, but rather, at the present time it seems exceedingly unlikely. So far, the only long range quantum coherence effect that has been shown in a biological system is in photosynthetic light harvesting centers over a

distance of ~20-25 angstroms (10^{-10} meters) (Collini et al., 2010). This distance is relatively miniscule when compared to the distance between humans, which is generally on the order of meters. Occurrence of the effect over a distance of 20 angstroms might even be considered similar to "traditional" biological electron quantum tunneling features that occur at a maximum range of 14 angstroms (when the distance is measured from edge-to-edge of the partnered moieties; Page, Moser, Chen, & Dutton, 1999). Therefore, at the present time, it is very difficult to see how a biological mechanism for a direct mental entanglement link would work (Arndt et al., 2009).

Lastly, it is important to note that experimental confirmation of the model presented here is in principle relatively simple and straightforward. The net charge of the brain should be reflected in its total activity, or the sum activity of key parts relative to others. Indeed, increases or decreases in brain activity are routinely measured using fMRI and EEG. It may remain primarily a matter of properly comparing the difference between cognitively active and receptive states to reveal a net charge or potential difference between a pair of states, either intra-individual or between partners. Such differences in mental and behavioral state may also be directly correlated to the small bioelectric potentials at the functional areas and surfaces of the body. While those polarizations might more feasibly be detectable through close interpersonal human interaction, they will decay rapidly due to the inverse-square law of electric fields.

Summary of Principles

Physical scientific principles hypothesized to be the most applicable to psychology and behavior:

1) Biological organisms, in this case humans, are constructed from microscopic physical and chemical and parts within the natural environment that creates, supports, and contains them. Therefore, at the macroscopic level of behavior and interaction, some of the basic laws must be applicable because of the processes occurring in brains and bodies and the environment on the microscopic level. But this is only to the extent that microscopic events *correspond* to macroscopic ones and where the physical laws are *commensurable* and specifically applicable.

2) At the microscopic level, the constituent parts obey the laws of physics, chemistry, and molecular biology. The most fundamental of these chemical rules for atomic and molecular components is that they generally exist in paired forms that are charged and related in a way based on a balancing of such charges and structures. Therefore, like the most fundamental of its components, the human brain itself may be hypothesized to be charged and is expected to obey a similar kind of balancing of forces.

3) A central physical principle follows as a general kind of attraction and repulsion and "bonding," although many other physically derived principles are likely to apply (but cannot all be discussed here). As pertains to human psychology, the most important fundamental physical characteristics and properties are suggested to be: the nature of conscious brains being charged, interpersonal attraction/repulsion, human bonding, optimal occupancy of spaces and locations, and forms of synchronization and coordination in time and through space.

4) The forces felt by biological organisms in relationship with others and their environment are very real and inescapable, but are often obscured from perception. A kind of equilibrium may exist, which requires a continual expenditure of energy for action and growth to both maintain and move beyond a static equilibrium. Like "equilibrium" or slightly out of equilibrium systems in chemistry and biology, the ongoing processes of life usually require transfers, exchanges, and substitutions at the atomic and molecular level which generally involve either moving up or down a chemical or potential gradient. Analogously and correspondingly, humans may therefore be attracted to those interactions that are the most favorable for them and avoid those which are more unfavorable or painful. This is congruent with both Freud's pleasure principle and Darwin's concept of the struggle for existence. In short, human interactions and decision processes may be analogous to and based upon the concept of "free energy" (ΔG) and products/reactant reactions in thermodynamics.

5) Individuals will usually or always be paired with each other or some aspect of the natural environment. Therefore, when two such halves become separated from each other, they may still exhibit a strong sign of bonding and residues with their partner. These

may often reveal themselves in proxy substitute interactions. But it is important to note that a solipsistically biased perception may sometimes lead to an over or underestimation of the importance of other individuals who are no longer momentarily present. In extreme interpretations, particularly as regards ideas of versions of "telepathy," it might perhaps be believed that others are communicating with an individual directly. However, instead, it may be that both of the individuals change their "charge state" approximately simultaneously in time while separated in location, resulting in what is often believed to be a special synchronicity or quantum entanglement.

Concluding Remarks

This article presents an overview of some of the many attempts to apply concepts from the physical sciences to psychology, especially electromagnetic and quantum mechanical ones. It also briefly introduces a very basic and simple realistic model that may represent a feasible and proper way to begin describing and analyzing human behavior directly with such physical principles. One might wonder whether this is at too basic and simplistic a level when compared to other humanistic theories. At the very least, it may represent a scientifically viable method that is a good starting point for the development of a more comprehensive and complex theory. For instance, behavioral scientists might begin by interpreting the labels and qualities of "positive" and "negative" thought, behavior and reinforcements as precisely that—mental charge states acting within a field of objects interrelated in an attractive-repulsive way.

This approach may be treated as transpersonal because it describes an extraordinary state of the human mind, as well as one that extends to others and the larger environment and nature as a whole. Not only might one's own psychology and social interactions with others be considered more sophisticated through its comprehension, but the individual's relationship with nature and reality may become very direct and highly attuned. It may be possible for individuals to become highly aware of and adept at controlling the physical and spiritual forces within themselves and in their relation to nature through a more "enlightened" intuitive process. This would not necessarily be through ESP-like powers or precognitive abilities involving a special type of psi-like force, but rather through a heightened ability to be more aware of and tuned to their own and others' cognitive and emotional states. This might even be enhanced through practices such as mindfulness which enhance the perception and interpretation of internal and interpersonal cues (Langer, 2009). It may therefore be possible to be conscious of real states of positivity and negativity, and to conceivably gain new abilities to guide and predict behavior based on an understanding of the natural fluctuations and balancing of such forces.

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