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Transpersonal Psychology, Parapsychology, and Neurobiology: Clarifying their Relations

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Neurobiological advances have resulted in growing interest in many psychological phenomena heretofore resistant to scientific scrutiny, including within transpersonal psychology and parapsychology. These advances perhaps can resolve longstanding tensions between these two psychological subdisciplines, which have generally been treated as disparate. To implement such a rapprochement requires more than just additional empirical findings, as theoretical development is also needed. Consequently, we identify some important theoretical problems, such as conventional assumptions about scientific naturalism and materialism that potentially undermine substantive advances in further understanding such phenomena through neurobiology. We also discuss links between parapsychology and transpersonal psychology that can be forged through neurobiology (e.g., identifying specific brain regions that can serve as candidates for future investigations in parapsychology and transpersonal psychology).

Keywords: ***transpersonal psychology, parapsychology, neurobiology, science***

Mainstream psychology has long been suspicious of the worth of one of its subdisciplines, transpersonal psychology (e.g., Ellis & Yeager, 1989). However, this suspiciousness is exceeded by the almost stark rejection of another of its subdisciplines, parapsychology. This is exemplified by how parapsychology is often used in introductory psychology texts to debunk pseudoscience and illustrate supposed problems in critical thinking (e.g., Wade & Tavris, 2008), while specific educational programs meant to dissuade students from any beliefs in parapsychological findings are designed to rectify so-called errors in proper thinking (Beins, 2002). As an example of this effect, one of us was openly allowed to pursue research on transpersonal phenomena as part of his doctoral studies within a mainstream psychology department; simultaneously, he was discouraged from publishing parapsychological data—as that was seen by his advisor as an act that would end all chances for his future acceptance as a legitimate scholar within the academic mainstream (Friedman, 2010).

Nevertheless, both of these psychological subdisciplines share much in common, namely almost all spiritual traditions studied by transpersonal psychologists discuss so-called supernatural events such as the *siddhis* of Hindu yoga (Feuerstein, 1989) and miracles of Judeo-Christianity (Wilber, 1980), which are obviously similar to what parapsychologists study as so-called psychic events. Both subdisciplines also bring into question fundamental assumptions about the nature (or possible "supernature") of the world, such as Tart's (2009) questioning of the fundamental assumptions of materialism that underlie most contemporary scientific efforts, including being the basis of most contemporary approaches to psychology. However, instead of being viewed as closely related subdisciplines, there instead appears to be an interesting tension between parapsychology and transpersonal psychology,

despite the occasional works by scholars who attempt to bridge across them (e.g., Braud, 2004; Tart, 2002). Our purpose in this paper is to juxtapose transpersonal psychology into closer alignment with parapsychology by grounding both within a neurobiological perspective. By this, we do not mean to imply that either of these subdisciplines can be reduced to just neurobiology, as the radical implications of both point beyond such a reduction. Rather we think a neurobiological approach provides a useful lens to see some of their similarities and differences, as could other approaches (e.g., social psychological).

Both prior and subsequent to the emergence of psychology as a formal discipline, scientists and laypersons alike have demonstrated a fascination with psychic phenomena (Broughton, 1991; Leahey, 1987).[2, 3] This fascination is quite controversial, and there are ample published commentaries generated by both counteradvocates (e.g., Alcock, 1990) and advocates (e.g., Tart, 2002) of parapsychology. Occasionally these advocates and counteradvocates have engaged in dialogue with each other, but most commonly they approach their positions from incommensurate, starting assumptions (e.g., that all can or cannot be explained by materialistic reductions) and frequently even cast aspersions on each other's credibility and character (see Krippner & Friedman, 2010a).

However, over the past three decades, significant changes in the attitude of the scientific establishment toward spiritual and transpersonal phenomena have occurred (e.g., with the huge number of scientific papers recently published on spirituality), with an accompanying and refreshing openness to seriously examining such areas as spirituality, mysticism, and anomalous/non-ordinary experience, much of this resulting from new avenues of investigation opened by advances in neurobiology (see Krippner & Friedman, 2010b). It is now not only relatively commonplace to see empirical and theoretical studies on these topics in many of psychology's and psychiatry's most respected journals, but there are also several subdisciplines in psychology that have emerged dedicating themselves to investigating such topics.[4] As proponents of transpersonal psychology (i.e., one of the emergent subdisciplines concerned with spiritual experiences), we see the current climate in the psychological sciences as a boon for research on aspects of human functioning that have been typically marginalized by the broader field of psychology. More specifically, while we ourselves are somewhat critical about the appropriateness of applying only naturalistic and materialistic assumptions inherent in contemporary science to the study of spirituality and transpersonal states (MacDonald & Friedman, 2001), as well as to psychic experiences (Krippner & Friedman, 2010b), we are nevertheless excited and highly supportive of efforts to identify robust neurobiological correlates of these expressions of consciousness through conventional scientific investigative methodologies.

Thus the currency of transpersonal psychology, at least as seen in the light of the growing popularity of spirituality as a field of study, appears to be ascending, while parapsychology largely remains in disrepute. Given the overlap between the two psychological subdiscipines, however, we expect eventually some benefit of the astounding success of spirituality studies to eventually inure to parapsychology. Review of the extant literature, however, reveals to us two overlapping trends that temper our enthusiasm and even raise some red flags pointing to potential problems. First, while parapsychological phenomena often have been tied to religion and spirituality (as seen in both the psychological and religious literature; MacDonald, 2000), little rigorous research has been done to firmly establish the conceptual boundaries between these areas. That is, how are they related, and how are they different? Also, should they be viewed as parts or facets of a larger construct domain or process?

Upon first thought, the distinction between these areas might seem somewhat straightforward. For example, it may be argued that spirituality is generally and best seen as reflecting a universal aspect of human functioning concerning experience of what has been considered sacred and transcendent (as has been advanced by Pargament, 2007), while parapsychological phenomena reflect expressions of consciousness that involve anomalous transfer of information and/or energy, and similar phenomena.

Unfortunately, such delineation does not find clear representation in, or support from, the literature. From a neurobiological vantage, some argue for a model wherein experiential states and possibly even beliefs associated with all three areas are linked to activation of specific regions of the brain (e.g., Persinger, 1983, 1984a, b; Neppe, 1984, 1990). Alternatively, others assert that all such experiences are the product of the fundamental transpersonal (and non-material) nature (or supernature)

of consciousness that itself is intrinsically disposed toward facilitating non-ordinary states as a function of an innate developmental potential toward self-realization and self-transcendence (e.g., Grof, 1988, 1992; Grof & Grof, 1990; Wilber, 1980). Others still discuss these areas as being comprised of complex experiential, cognitive, social, biological, and/or behavioral components (e.g., MacDonald, 2000; Tart, 1979; Walsh & Vaughan, 1993).

To further illustrate with a more concrete example, there is a startling array of definitions and assessment tools available to measure parapsychological, spiritual, and transpersonal constructs that not only demonstrate little congruence in conceptualization but also tend to have generally weak evidence supporting their validity. In several surveys of the available testing literature, we uncovered over 100 measures relevant to this area of inquiry (MacDonald, LeClair, Holland, Alter, & Friedman, 1995; MacDonald, Friedman, & Kuentzel, 1999; MacDonald, Kuentzel, & Friedman, 1999) and our ongoing literature reviews[5] indicate many more have been developed since 1999.

By extension, the lack of conceptual consistency across instruments and studies has contributed to the appearance of a divergent, muddled, and even contradictory body of scientific knowledge concerning the relation of transpersonal and parapsychological beliefs and experiences to conventional areas of psychological functioning (MacDonald & Friedman, 2002). Moreover, the nebulousness of the constructs and their relations to one another have contributed to a tendency of many mainstream researchers and practitioners to selectively look at spirituality/transpersonality as distinct from parapsychology and to exclude the latter from the domain of study (e.g., Miller, 1999; Paloutzian & Parks, 2005; Pargament, 2007; Plante & Sherman, 2001; Richards & Bergin, 1997). However, since almost all religious and spiritual traditions acknowledge the existence of parapsychological phenomena (e.g., siddhis and miracles), the possibility of such phenomena, even outside of a strictly religious and spiritual context, stirs a sense of awe that can only be seen as germane to religious, spiritual/transpersonal studies.

The second and perhaps more insidious trend that we have noticed, one that is essentially the product of the growing interest of contemporary science focused on these phenomena, concerns the manner in which mainstream psychology has been applying the presumptions of scientific naturalism to the explanation of spirituality and parapsychological phenomena. There are two manifestations of this trend. In its extreme and traditional form, naturalism is reified and treated as the only basis for which phenomena of any sort can be defined as knowable by science (see Friedman & Pappas, 2006). As applied to any and all aspects of human experience, this expresses itself as a form of reductionism (e.g., the cause of any human experience is attributed wholly and completely to a neurobiological structure, mechanism, or process and/or its significance is linked to its functional adaptive and survival value). An example of this as it relates to spiritual and/or parapsychological experience comes from the work of Michael Persinger (e.g., 1983), who since the early 1980s has been generating evidence in support of a putatively reductionistic neurobiological model that explains such phenomena as a product of non-ordinary activity in the amygdaloid-hippocampal regions of the temporal lobe. For Persinger, spirituality, religion, and parapsychological experience can be totally understood as aberrant activities of the brain.

A more recent variation of naturalistic reductionism can be found in the area of evolutionary psychology where religion and spirituality, but not so much parapsychological phenomena, are viewed in terms of their functional adaptive and survival value, rather than as being non-normal and, by implication, pathological (e.g., Kirkpatrick, 2005). Regardless, such theories still assume that such experiences and their sequelae/outcomes serve wholly biological, rather than perhaps transpersonal, purposes.

The second manifestation, one that upon first glance seems to skirt the problems with reductionism, relates to arguments maintaining that spiritual and parapsychological experience is ontologically real if a link can be found between subjective reports of experiential states and identifiable neurobiological activity occurring at the time of the self-report. Andrew Newberg and colleagues (Newberg, D'Aquili, & Rause, 2002) are perhaps the best-known proponents of this form of naturalism (though certainly not the only examples—see the work of Beauregard & O'Leary, 2007). In their brain imaging research of meditators and religious practitioners engaged in prayer, Newberg et al. found evidence of differential brain activity at the time when the research participants were reporting a sense of expanded or transcendent sense of self. They concluded, based upon their data, that "mystical

experience is biologically, observably, and scientifically real" (p. 7). To their credit, and unlike those who engage in more extreme reductionism, Newberg and others have not used their findings to argue that spirituality or anomalous experience should be understood in terms of neurobiology alone. Rather, they appear to have left open the possibility that such experience may reflect legitimate transcendent realities. That is congruent with the position of one of us, who has argued that transpersonal psychology should limit itself to naturalistic methods but not discount the possibility of the importance of that which may legitimately be beyond the limits of naturalistic science (Friedman, 2002).

While we are more comfortable with the latter expression of naturalism, since it permits a view of the experience-brain relationship as being correlative rather than causal, both the extreme and moderate versions (of which we will refer to as simple naturalism) do not provide satisfying accounts of spiritual/transpersonal and parapsychological experiences. In particular, and despite efforts on the part of investigators like Newberg et al. (2002) to accommodate the esoteric spiritual literature (e.g., they make reference to the concept of *neti neti* or "not this not that"), they are as guilty as the extremists in engaging in representationalism or in confusing expressions of anomalous experience with the experience itself.

Coming at this from another angle and following the argumentation of Ken Wilber (1990), a preeminent transpersonal theorist (although he now disavows connection to the transpersonal movement), these researchers are engaging in category errors: they confuse methods, levels of knowing, and levels of being—and end up reducing the inherent complexity of experience to only one level. Finally, it seems premature to advance either causal or correlative neurobiological models of spiritual/transpersonal or parapsychological experience when psychological and medical sciences are still grappling with basic issues about how the brain relates to mind and experience (e.g., it is becoming increasingly apparent that simple structural models of the brain do not explain any psychological function adequately and that the brain is as much shaped by experience as it causes experience; Shapiro & Walsh, 2003). This approach of using neurobiology in a reductive way seems to us to run the risk of preempting alternative formulations about the nature and meaning of spiritual and parapsychological experience in a manner that will discourage creative and possibly more fruitful theoretical and empirical developments.

Delineating the Relationship between the Transpersonal and the Paranormal[5]

As we hope the reader can appreciate, there are many reasons to view conventional scientific approaches to spirituality/transpersonality and parapsychological phenomena with some reservation, if not outright skepticism. The problems with simple naturalism, reification, reductionism, and poor delineation and description of the phenomena of interest appear to us to be very real limitations of the available research. If these are not dutifully and diligently addressed and addressed soon, they will likely result in much of the current work having little impact or lasting influence within science—outside of encouraging future scientists to make the same errors in thinking.

The history of psychology is replete with cul-de-sacs of theory and research wherein the well-intentioned efforts of bright and capable people were usurped and ultimately wasted by the groupthink mentality and ostensible hard-science envy characteristic of much of the scientific, psychological establishment (see Krippner & Friedman, 2010a). We believe that transpersonal and parapsychological phenomena are too important to risk any further marginalization; as such, we need to find solutions to these problems. Though we are of the mindset that the paradigmatic assumptions of science will ultimately need to be revised to accommodate the study of transpersonal and parapsychological phenomena (especially those assumptions concerning naturalism and the relationship of language/symbol to experience), this will require extensive discussion, which goes beyond the scope of this paper. Alternatively, the definitional issues appear to be fairly straightforward to address and seem to us to hold the greatest promise of furthering the goals of legitimate inquiry, mostly through the use of the burgeoning work on spirituality as a means of generating meaningful hypotheses for exploring possible parapsychological-neurobiological connections.

While there has been a tendency of researchers (at least within the mainstream) to differentiate and compartmentalize spiritual/transpersonal and parapsychological data, there is growing theoretical and empirical literature to support the integration of the two with parapsychological data being subsumed as an emergent part of spiritual development (e.g., Beauregard & O'Leary, 2007; Braud, 2004; Griffin, 1997; Levin, 2001). One of the earliest and most systematic expositions supporting this position comes from the work of

Patanjali, one of the founders of yoga, who referred to siddhis, or paranormal powers, as something often seen as aspiring practitioners proceed along the spiritual path (Feuerstein, 1989; Taimni, 1961). It is also important to note that the development of such powers is generally seen as distractions (and perhaps even impediments) from a transpersonal perspective, such as pursuit of so-called spiritual enlightenment. Yogic systems are also by no means the only religious/spiritual ones to recognize the existence of parapsychological phenomena as an integral part of spirituality. In his impressive and highly influential spectrum model of development, Wilber (1980) contended that all spiritual and religious systems, both Eastern and Western, acknowledge such potentials. Within his model, Wilber placed the emergence of parapsychological capabilities (ESP, psychokinesis, and other forms of *psi*) at the level of the low subtle self, a stage of development that is witnessed as adepts move past integrated mindbody self to higher *causal* levels of consciousness and awareness. Other seminal transpersonalists, most notably Grof (1992) and Tart (1969), have also advanced models of human consciousness that accommodate parapsychological capabilities as a natural part of humanity's developmental potential. Last in this regard, indigenous healing systems have always posited such capabilities, but have tended to emphasize they be used to help others rather than for personal aggrandizement (Krippner, Johnson, & Friedman, 2009).

Turning to more empirically-based research, there is evidence supporting (a) an association between paranormal beliefs and other more conventional components of spirituality/transpersonality, (b) increased elevations in belief in parapsychological phenomena concurrent to increases in other recognized areas of spirituality/transpersonality and, perhaps most importantly, (c) inclusion of paranormal beliefs and experiences proper in measurement models of spirituality/transpersonality. For instance, Mathew, Mathew, Wilson, and Georgi (1995) developed a measure of spirituality for use in substance abuse research that defined spirituality in terms of six facets, including the following: belief in God, religious practices, mystical experiences, existence of the soul after death, the value of altruism and unselfishness, and belief in paranormal phenomena. When using their tool in a study of 12-step programs such as Alcoholics Anonymous, they found that scores for all six facets increased in people demonstrating more positive outcomes in reducing addictive behaviors.

More substantively, MacDonald (2000) developed a factor-analytically derived measurement model wherein he defined spirituality as a construct domain relatively independent of conventional personality that is comprised of five broad order dimensions labeled Cognitive Orientation toward Spirituality (i.e., belief in the existence of spirituality and its relevance to daily living), Experiential/Phenomenological Dimension (i.e., spiritual, mystical, transcendent experiences), Existential Well-Being (i.e., perception of self as having meaning and purpose in life and as having the resources to cope with adversity), Religiousness (i.e., religious practices and general beliefs of a relationship to a higher power), and Paranormal Beliefs (i.e., belief in the reality of parapsychological phenomena). When he completed a second order factor analysis of these five dimensions, MacDonald found that Paranormal Beliefs and the Experiential/Phenomenological Dimension loaded appreciably on the same factor while Cognitive Orientation toward Spirituality and Religiousness loaded on a separate factor. He ended up identifying the former factor as a dimension reflecting non-ordinary beliefs and experiences.

MacDonald and Friedman (2002) subsequently summarized the findings of the initial research using MacDonald's (2000) model and an associated measurement tool, the Expressions of Spirituality Inventory (ESI). The ESI data revealed that the dimensions concerning spiritual experience and paranormal beliefs produce somewhat similar patterns of associations to a variety of psychological and personality variables (e.g., they are both positively correlated to measures of openness to experience, self-transcendence, and epileptic-like signs; both are unrelated to boredom proneness and social desirability). Interestingly, more so than the other ESI dimensions, the Paranormal Beliefs dimension has been the most likely to show significant relations to measures of psychopathology (e.g., paranoid ideation; MacDonald & Friedman).

In addition, Friedman (e.g., Friedman, 1983; Pappas & Friedman, 2007) has developed a naturalistic, materialistic model of transpersonal self-expansiveness, one that explicitly allows for non-material or paranormal implications to be considered. These are also discussed in terms of the traditional philosophical duality of immanence in relation to transcendence with the argument that there is no inherent superiority to either a materialistic or naturalistic model as compared to a supernatural model (Friedman & Pappas, 2006).

Neurobiological Correlates of Spirituality

Having hopefully established that the domains of spiritual/transpersonal and parapsychological data are strongly related, we now present an overview of what some of the more salient research has shown with regard to neurobiological correlates of spirituality.[7] As we stated previously, our intention is to help identify potential brain structures/regions for which more focused prospective parapsychological research may be attempted.

It is important to note up front that much of the extant research examining neurobiological correlates has tended to center on spiritual experiences and non-ordinary states of consciousness associated with spiritual practices (e.g., meditation, prayer). Less research has involved beliefs, attitudes, and self-appraisal of functioning (all of which seem to be associated with the Existential Well-Being dimension of the ESI). With that in mind, most of the existing research can be classified into one of three categories: (a) clinical neurology and neurobiological research involving known brain pathologies, most notably temporal lobe epilepsy and/or stimulation of the brain, (b) examination of brain activity using electroencephalography (EEG) during or immediately following a self-reported spiritual/transpersonal experience and (c) examination of brain activity during or immediately following a self-reported non-ordinary state of consciousness using brain imaging technologies such as Single Positron Emission Computed Tomography (SPECT) and Functional Magnetic Resonance Imaging (fMRI). We will look at each of these in turn.

Brain Pathologies and Manipulation of Brain Operations

Research and clinical cases involving dysfunctional or damaged brain structures has led to a number of hypotheses regarding the relation of brain regions to spiritual/transpersonal and paranormal experiences and beliefs including, most generally, right hemispheric activity and, more specifically, aberrant temporal lobe activation (Fenwick, 2001). As noted earlier, one of the more widely known psychological investigators of this area is Persinger. He has not only built his temporal lobe continuum model (e.g., Persinger, 1983; Persinger, 1984b; Persinger & Makarec, 1993) on the work done with temporal lobe epileptics (e.g., see Bear & Fedio, 1977; Geschwind, 1983) and on direct stimulation of structures within the temporal lobes (amygdala and hippocampus specifically; Persinger & Makarec, 1993) but has even developed a magnetic helmet (known as "the God helmet"). This device has been used to purportedly induce non-ordinary states (such as a felt sense of presence and mystical experiences) by changing the magnetic fields around the temporal lobes (Persinger & Healey, 2002).[8] As it stands, the temporal lobes and the associated limbic system structures are viewed as one of the most common brain regions implicated in spiritual and paranormal experiences (Neppe, 1984, 1990; Saver & Rabin, 1997).

EEG studies. In general, EEG studies have shown brain wave changes in people engaged in meditation (Hood, Spilka, Hunsberger, & Gorsuch, 1996; Paloutzian & Park, 2005; Tart, 1969). More specifically, in their review of the meditation research, Shapiro and Walsh (2003) summarized the findings of several studies that show "enhanced alpha and theta EEG power and coherence in frontal and central regions of the brain" (p. 98) during meditation. One study of particular interest that they discuss was reported by Travis (2001) who found that varying EEG and autonomic nervous system patterns are found with different types of self-reported experiential states during Transcendental Meditation with self-reported "transcending" experiences showing elevated EEG alpha amplitude and greater levels of alpha coherence relative to other self-reported experiences. A second interesting project was reported by Dunn, Hartigan, and Mikulas (1999) who found EEG differences between meditators and people engaged in closed eye relaxation and between different forms of meditation (i.e., concentrative versus mindfulness).

Beauregard and O'Leary (2007) described a quantitative EEG study of Carmelite nuns encouraged to self-induce a mystical experience while in an isolation chamber. They reported that increased theta activity was found in several brain regions including the insula, the right inferior parietal lobe, the superior parietal lobe, the right inferior and medial temporal lobe, the anterior cingulated cortex, and the medial prefrontal cortex. Finally, Persinger and colleagues have published findings indicating that a variety of non-ordinary states, including mystical experience and glossolalia (i.e., speaking in tongues), are associated with unique EEG profiles for the temporal lobes, but not for other regions of the brain (Persinger, 1984c; Persinger & Makarec, 1993).

Brain imaging studies. Turning next to the work utilizing complex imaging technology, Newberg et al. (2001) and Newberg, d'Aquili, and Rause (2002) examined changes in blood flow in cerebral regions using SPECT in samples of seasoned meditators and nuns engaged in prayer both before and immediately after a meditative/prayer session. They found significant increases in blood flow in several areas including the cingulate gyrus (implicated in executive functioning and involved with attentional processes), the frontal cortex (both inferior and orbital areas), the prefrontal cortex (dorsolateral areas), and decreased blood flow to the posterior superior parietal lobe (which they call the orientation association area). For the latter finding, Newberg and colleagues hypothesized that decreased activation of the association area seems to account for the dissolution of a separate self-sense leading to self-reported mystical and transcendent states of consciousness.

In another study, Lazar et al. (2000) used fMRI to examine brain activity during a session of kundalini meditation in a small sample of experienced meditators. Several specific brain structures were found to demonstrate increased activation including the midbrain, the putamen, the anterior cingulate cortex, and hippocampal structures. Additional analyses done during steady state meditation (as opposed to meditation induction) reported an increased activation in a number of brain organs in the prefrontal, parietal, and temporal lobes (Shapiro & Walsh, 2003). Last, Beauregard and O'Leary (2007) reported the results of fMRI studies of Carmelite nuns asked to recall and relive (in essence self-inducing) a significant past mystical experience. Findings indicated that several brain regions are implicated in mystical experience, including, but not limited to, the temporal lobes, the inferior parietal lobe, the visual cortex, and the caudate nucleus. They concluded that such experiences "are complex and multidimensional and mediated by a number of brain regions normally implicated in perception, cognition, emotion, body representation, and self-consciousness" (p. 272).

Conclusion

Despite the fact that there is still considerable debate about whether or not parapsychological phenomena are veridical (see end note 6 and especially the description of the recently published study by Moulton & Kosslyn, 2008), in so far as they are seen to be associated with spirituality/transpersonality, the research presented here provides several excellent leads on neurobiological, especially anatomical, structures that may be implicated in psi phenomena and experiences involving the appearance of anomalous information transfer. Brain regions involved in executive functions (e.g., prefrontal and frontal cortices), sensory-motor and self-boundary maintenance (parietal lobes), and emotions (e.g., limbic system and temporal lobes with particular emphasis on amygdaloid-hippocampal structures, especially in the right cerebral hemisphere) seem particularly worthy of further investigation. With that stated, recent neuroimaging research suggests that efforts to identify a specific brain organelle (or a limited number of brain areas) associated with spirituality in general or parapsychological events in particular might not be the most fruitful avenue for research. Instead, it may be better to approach the study of neurobiological connections with both parapsychology and spirituality/transpersonality in terms of complex interactions between multiple neurobiological structures and phenomenological experience, as well as possible psychic events. Nevertheless, and in closing, we are very pleased that mainstream science has started to direct its attention toward exploring anomalous experiences (see Cardena, Lynn, & Krippner, 2004) from a neurobiological vantage that includes the topic of spirituality/transpersonality. We hope that an interest in this area will flourish and be increasingly productive in future years, including facilitating an increasing rapprochement between the psychological subdisciplines of transpersonal psychology and parapsychology.

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Notes

1. This is based on MacDonald, D. A., & Friedman, H. L. (2008, August). Correspondence regarding this paper should be send to the first author at University of Detroit Mercy, Department of Psychology, 4001 West McNichols Road, Detroit, Michigan, 48221-3038, USA. Phone (313) 578-0388; email macdonda@udmercy.edu
2. By psychic phenomena, we are referring to transpersonal states and modes of consciousness and experience that indicate that consciousness may operate in a non-local fashion (i.e., is not limited to the location and sensory parameters of the physical body or the brain) and/or involve anomalous information or influence transfer (i.e., transfer of information or influence that does not follow typical sensory and neurological avenues). This includes such phenomena as out-of-body experiences, near-death-experiences, mystical/spiritual experiences, as well as possible events, such as ESP (i.e., precognition [including precognitive dreams], psychokinesis, telepathy, clairvoyance] past-life reports, and spiritualist phenomena (e.g., apparitions, hauntings, ghosts). The term "psi" only includes ESP, psychokinesis, and putative life-after-death phenomena, such as past-life reports and spiritualist phenomena.
3. For example, many of the important figures in the history of psychology, including G. T. Fechner (generally considered the founder of psychophysics, a discipline that arguably represents the beginning of psychology as an experimental science, and author of the *Little Book of Life after Death* published in 1836), F. W. H. Myers (who published the impressive text *Human Personality and Its Survival of Bodily Death* in 1903, one of the first formal efforts to provide a comprehensive study of anomalous psychological events), William James (considered to be the founder of American psychology who served as president of the American Society for Psychical Research founded in the late 19th century), and Carl Jung (an associate of Freud who broke from him and developed his own comprehensive theory of the human psyche, one that addressed psychic events as legitimate expressions of human psychology)

invested considerable energy toward the description and elucidation of what are now generally called parapsychological or psi-related phenomena.

4. These subdisciplines include parapsychology (i.e., the study of psi including organism-organism and organism-environment interactions that appear to transcend contemporary science's understanding of time, space, and energy), transpersonal psychology (i.e., the study of consciousness, experience, and behaviors that appear to transcend conventional notions of self and identity), and, most recently, neurotheology (i.e., the study of religious and spiritual constructs in terms of their neurobiological functions and correlates; see Newberg, D'Aquili, & Rause, [2002]; Ratcliffe [2006]; Shapiro & Walsh [2003]). Humanistic psychology and the psychology of religion are two other psychological subdisciplines that have actively embraced studies of spirituality and associated phenomena, though with much less emphasis than the other areas described.
5. At the time of writing this paper, we along with a third collaborator are continuing our literature survey updates intended to provide information on new instrumentation as well as summaries of the findings of empirical research using tests described in our already published articles.
6. While there is still considerable debate regarding research supporting the ontological validity of parapsychological phenomena (e.g., Bem 1994; Bem & Honorton, 1994; Bierman, Broughton, & Berger, 1998; Hyman, 1994; Storm, 2000; Storm & Ertel, 2001, 2002; Wiseman, Smith, & Kornbrot, 1996), for the sake of this paper, we simply assume that the reality of such phenomena is *potentially* veridical. With that stated, a study by Moulton and Kosslyn (2008) is worth mentioning. Their investigation involved the use of fMRI to investigate whether or not psi phenomena are linked to any specific neurobiological changes. This study is noteworthy because of their efforts to make their design highly sensitive to the presence of psi by utilizing emotionally charged stimuli (presumably conducive to the elicitation of psi) and biologically and emotionally related research participants (e.g., twins), but they found no differences in neuronal responses to psi-conducive stimuli compared to non-psi conducive stimuli and concluded that their findings provide compelling evidence that psi phenomena are not veridical because they did not show any identifiable neurobiological basis. However, Moulton and Kosslyn's data was characterized by non-significant results, bringing into question whether or not this is any sort of definitive test, as they claimed. Thus, the debate over the veridicality of purported psi phenomena continues.
7. While research has examined a variety of genetic, physiological, and neurobiological functions and systems in relation to different aspects and forms of spirituality (e.g., see Comings, Gonzales, Saucier, Johnson, & MacMurray, 2000; Shapiro & Walsh, 2003), we have elected to only cover work examining the relation of spirituality to specific brain structures.
8. As discussed at length by Beauregard and O'Leary (2007), efforts to replicate Persinger's findings with the God helmet have not been always successful. In particular, they cite a study by Pehr Granqvist and colleagues who attempted to repeat Persinger's findings using a double blind study and concluded that personality factors, most notably suggestibility, and not the God helmet itself, seem to best account for Persinger's results.

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