

Psychoactive Substances and Paranormal Phenomena: A Comprehensive Review

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This paper investigates the relationship between psychoactive substances and so-called paranormal phenomena falling within the study of parapsychology. It is primarily concerned with extrasensory perception (ESP)—telepathy, precognition, and clairvoyance—as well as out-of-body experiences (OBEs) and near-death experiences (NDEs). Psychokinesis (PK), aura vision, encounter experiences, and sleep paralysis only make a very limited contribution to this review as they are seldom related to psychoactive drugs within the parapsychological literature. The paper borrows widely, but by no means exhaustively, from parapsychology as well as transpersonal studies, anthropology, ethnobotany, phytochemistry, psychiatry, psychotherapy, psychopharmacology, and neurobiology, particularly neurochemistry. It is organized into neurochemical models of paranormal experience (section 1), field reports of intentional and spontaneous phenomena incorporating anthropological, historical and clinical cases, and personal accounts (section 2), surveys of paranormal belief and experience (section 3), experimental research (section 4), and a methodological critique of the experimental research with recommendations for further work (section 5).

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Ever since the beginning of the 20th century when Western scientists and academics began earnestly turning their attention to psychedelics there has been a clear association between the use of these substances and the transpersonal or paranormal experience. Indeed, those people most readily associated with the discovery and popularization of psychedelics also witnessed and explored both the transpersonal and the parapsychological dimensions that these substances induced, such as Albert Hofmann, Humphrey Osmond, John Smythies, Aldous Huxley, Gordon Wasson, Timothy Leary, Ken Kesey, Duncan Blewett, Walter Pahnke, James Fadiman, and Stanislav Grof, to name but a few (Luke, 2006; Stevens, 1988). The overlap between transpersonal and paranormal experiences is apparent (e.g., Daniels, 2005), but while a great deal has been written in recent years about psychedelic experiences from the transpersonal perspective, a comprehensive review of the parapsychological literature relating to psychedelic experiences is long overdue.

This review focuses primarily on the class of psychoactive substances that largely induce visionary and trance-like experiences. For the purposes of the present review this includes drugs and sacramentals such as mescaline, lysergic acid diethylamide (LSD), psilocybin,

ayahuasca, *N,N*-dimethyltryptamine (DMT), marijuana (which is treated as a psychedelic in the current review), and ketamine, but not opiates or cocaine. This class of visionary substances has been termed differently by different authors, usually dependent upon the connotation they wish to convey about the psychoactive effects or how the substance is used. Within the literature of the present review, they have been termed “mind-expanding” (e.g., Palmer, 1979), “psychotropic” (e.g., Irwin, 1994), “psychodysleptic” (Cavanna & Servadio, 1964), “hallucinogenic” (e.g., Blackmore, 1992), and even “entheogenic” (Ruck, Bigwood, Staples, Wasson, & Ott, 1979), meaning bringing forth the divine within, which is a useful term to convey the apparent divinatory and visionary nature of these substances (for discussions see Letcher, 2004; Ott, 1996; Smith, 2000), although they might be more correctly termed “potential entheogens” as they do not automatically produce such experiences (Krippner, 2006b, p. 1). Finally, there is the most frequently used term, “psychedelic”, which was created in 1956 by Humphry Osmond and means “mind manifesting” (Osmond, 1961a, p. 76). Where specified, the original term used by the authors will be preserved to reflect their orientation to the issue. However, elsewhere, where appropriate, the more widely used term “psychedelic” will be used.

For the purpose of the present paper, a psychedelic drug is:

one which, without causing physical addiction, craving, major physiological disturbances, delirium, disorientation, or amnesia, more or less reliably produces thought, mood, and perceptual changes otherwise rarely experienced except in dreams, contemplative and religious exaltation, flashes of vivid involuntary memory, and acute psychoses. (Grinspoon & Bakalar, 1998, p. 9)

The earliest parapsychology experiments with psychoactive substances were conducted with simple stimulants and depressants, such as caffeine, amphetamine, alcohol, amytal, and quinal-barbitone (e.g., Averill & Rhine, 1945; Cadoret, 1953; Huby & Wilson, 1961; Murphy, 1961; Rhine, 1934; Rhine, Humphrey, & Averill 1945; Soal & Bateman, 1954; Wilson, 1961, 1962; Woodruff, 1943). This work is not included here (for reviews see Palmer, 1978; Ramakrishna Rao, 1966) as this review is instead focused on the visionary substances, which are seemingly more favorable to the production of psi, that Braud (2002) has suggested primarily cause qualitative, rather than just quantitative alterations to the user's state of consciousness, although Rock and Krippner (e.g., 2012) argued that (altered) states of consciousness may be more accurately described as (altered) states of phenomenology. Some earlier reviews of psychedelics in parapsychology are available and have been incorporated into the present investigation (Blewett, 1963; Gowan, 1975; Krippner & Davidson, 1970, 1974; Luke, 2008b; Luke & Friedman, 2010; Parker, 1975; Rogo, 1976; Wilson, 1949).

There are good theoretical reasons for investigating psychedelics as a means of inducing ESP and other paranormal phenomena. Given that an altered state of consciousness (ASC) is assumed to be (for a discussion see Storm & Rock, 2009) a common feature in the occurrence of subjective paranormal experiences (Alvarado, 1998; Baruš, 2003; Honorton, 1977; Parker, 1975) and has often been incorporated into experimental attempts to induce ESP (see Luke, 2011a; Palmer, 1978, 1982; Schmeidler, 1994), then visionary drugs are, potentially, a reliable means of accessing such a state. Several researchers have documented some of the mind-altering features of the visionary-drug experience that are considered conducive to the production of parapsychological experiences and phenomena (see also Braud, 2002). These have been categorized thus:

1. Increase in mental imagery, in both vividness and quality, and the dreamlike state (Blackmore, 1992; Osis, 1961a, 1961b; Progoff, 1961; Tart, 1968, 1994)
2. Altered perception of self-identity, such as unity consciousness: The mystical experience of becoming one with everything in the universe (Krippner & Fersh, 1970; Nicol & Nicol, 1961; Osis, 1961a; Pahnke, 1968; Tart, 1994)
3. Altered body perceptions and dissociation (Blackmore, 1992; Tart, 1994). This is of particular interest with respect to the out-of-body experience (OBE)
4. Distorted sensory input (Blackmore, 1992)
5. Increased absorption and focused attention (Millay, 2001; Tart, 1968, 1994)
6. Increased empathy (Blewett, 1963; Nicol & Nicol, 1961; Tart, 1994). This is of interest to telepathy, and indeed, elevated empathy is associated with use of psychedelics generally (DeGracia, 1995; Lerner & Lyvers, 2006)
7. Emotional flexibility (Blewett, 1963), which may also assist in negotiating the fear of psi (Tart, 1994)
8. Increased alertness and awareness (Huxley, 1961a; Nicol & Nicol, 1961; Osis, 1961b; Tart, 1994)
9. Increased inwardly focused attention and awareness, and decreased external and bodily awareness (Dobkin de Rios, 1978)
10. Increased spontaneity (Osis, 1961a)
11. Sensitivity to subtle changes (Parker, 1975) and intensity of feeling (Osis, 1961a)
12. Physical relaxation (Blackmore, 1992), although Tart (1968) questions its occurrence
13. Increased suggestibility (Huxley, 1961a; Tart, 1968)
14. Increase in intuitive thought processes (Tart, 1994)
15. Reduced critical conscious faculty and increased optimism towards impossible realities (Nicol & Nicol, 1961; Osis, 1961b; Tart, 1968, 1994)
16. Increased openness and extroversion (Rogo, 1976)
17. Release of repressed and unconscious material into the conscious mind (Rogo, 1976)
18. Complex distortions, and transcendence, of space and time (Garrett 1961b; Nicol & Nicol, 1961; Tart, 1994; see also Dawson, 2005; Mayhew, 1956; Shanon, 2001; Whiteman, 1995)

This last feature of the psychedelic experience is probably of paramount importance for the experience of ESP when it is considered that precognition, telepathy, clairvoyance, and possibly OBEs all represent radical departures from Newtonian concepts of time and space. Smythies (1983) has suggested that the psychedelic experience originates from the collective unconscious outside of space and time, and Jung agreed with Smythies' idea. Millay (2001) offered that psilocybin and similar substances are important for studying psi because they allow us access to nonlocal space-time. Jansen (1999) also supposed that the same might be possible of ketamine, which became popularly used at the same time as Bell's theorem of nonlocal space-time was becoming seriously considered, enabling some to report the experiential equivalence of the concept. Indeed, the Berkley-based Fundamental Fysics Group that formed in the 1970s experimented with psychedelics to inspire their investigations of both psi and Bell's theorem—neglected as it was by mainstream physics at that time—which eventually lead to the birth of what is now the multi-billion dollar research enterprise of quantum information science (Kaiser, 2011). More recently, something akin to this may also be evident with the psychedelic substance DMT, which sometimes provides users with the perception of many more than the usual four space-time dimensions, perhaps comparable to what physicists discuss in M-theory (Luke, 2010c). Keeping with the times ketamine is also now reported to induce such extra-dimensional percepts too (Newcombe, 2008), as is the semi-synthetic psychedelic salvinorin B ethoxymethyl ether (Mercury & Feelodd, 2008).

In addition to these temporary alterations that occur during the psychedelic experience, it is arguable that long-term ideological alterations may occur that might also be psi-conducive. For example, enduring changes in concepts of reality may occur with the use of psychedelics (Conway, 1989; Strassman, 2001), such that optimism about unseen realities, both during and after the experience, leads to a greater openness to, or belief in, psi and the paranormal. In a follow-up survey of 113 LSD-psychotherapy clients (with an 82% response rate) 78% reported an increased tendency to view telepathy and precognition as possibilities warranting investigation (International Foundation for Advanced Study, 1962). It has even been stated that the psychedelic experience is itself, by common consent, paranormal (Unger, 1963). Furthermore, the distinguished medium and psychical

Psychoactive Substances and Paranormal

researcher Eileen Garrett (1961b) asserted that the use of LSD had made her a better, more accurate sensitive and she related certain psychedelic states to the mediumistic pre-trance state of euphoria, although she specified that the LSD experience was not the same as the mediumistic trance (Garrett, 1961a). Huxley (1961a) proposed that LSD is invaluable in training participants to use their subjective faculties to enhance their psi ability.

Besides the subjective aspects of the psychedelic experience, there are other theoretical reasons for investigating paranormal phenomena with drugs: Because paranormal phenomena are brain-mind experiences, neurochemicals—and therefore psychoactive drugs—would be expected to be involved in the process. It is highly likely that all ASC, including potentially ESP-conducive states, involve alterations in brain chemistry. Indeed, several psychedelic-neurochemical models, discussed in the following sections (also see Luke & Friedman, 2010), have been proposed, primarily based upon subjective paranormal experiences occurring with certain substances and their specific neurochemical action. It is entirely feasible that genuine paranormal experiences are mediated in the brain through the action of specific endogenous (made within the body) molecules (Vayne, 2001). This does not simply imply that neurochemicals are the sole cause of paranormal phenomena, but they may rather just be a part of the process. As the novelist Aldous Huxley once said in relation to mystical experiences and the use of psychedelics—they are the occasion rather than the cause.

1. Psychedelic/Neurochemical Models of Paranormal Experience

1.1 Brain as filter

Aldous Huxley (1954) also was prominent in promoting Henri Bergson's (1896/1990) theory of the brain as a filter of memory and sensory experience, acting to reduce the wealth of information available to awareness lest people become overwhelmed by a mass of largely useless and irrelevant data not needed for the survival of the organism. It was Bergson who suggested that, if these filters were bypassed, humans would be capable of remembering everything that had ever been experienced and perceiving everything that has happened everywhere in the universe (e.g., as in clairvoyance). It was also Huxley who applied this theory to psychedelics by suggesting that these mind-

International Journal of Transpersonal Studies 99

manifesting drugs override the “reducing valve” of the brain (Huxley, 1954, p. 12), allowing humans access to both psychic and mystical experiences. This was a notion that Huxley eruditely paraphrased for the title of his book from the quote by the English poet and mystic, William Blake (1906/1793), “If the doors of perception were cleansed, every thing would appear to man as it is, infinite” (p. 26).

Huxley’s (1954) rather basic conception never received a more formal operationalization of the specific drug actions that may be involved, but research into the neurochemistry of psychedelics lends some support to his notion. For instance, Vollenweider and Geyer (2001) proposed that information processing in cortico-striato-thalamo-cortical (CSTC) feedback loops is disrupted by psychedelics via 5-HT (serotonin) receptor agonism (specifically 5-HT_{2A} receptors), thereby inhibiting the “gating” of extraneous sensory stimuli and inhibiting the ability to attend selectively to salient environmental features. Furthermore, psychedelics are also thought to induce presynaptic release of glutamate from thalamic afferents, leading to a simultaneous overload of internal information in the cortex. It is thought that these combined information overload effects are at least partly responsible for the hallucinogenic experience with these drugs, which are known to induce greatly altered or amplified incoming sensory information, as is indicated by an increased startle effect (Vollenweider, 2001).

Research into the neurobiology of psychedelics in humans has only just resumed after decades of dormancy, so the current understanding of the action of these substances in the brain remains limited. One of the few studies to have been conducted, however, also offers some unexpected support for Huxley’s reducing valve theory. Looking at the blood flow around the brain following the ingestion of psilocybin, it was expected that certain regions of the brain would have more activity, given the overwhelming intensity of strong psychedelic experiences, and yet, counter-intuitively, there was no single brain region that increased in activity, and the brain’s activity was reduced overall (Carhart-Harris, 2011; Carhart-Harris et al., 2012). The main areas demonstrating reduced cerebral blood flow were the cerebral hub regions of the thalamus, anterior and posterior cingulate cortex (ACC & PCC), and medial prefrontal cortex (mPFC). Significantly, the usual positive coupling between the mPFC and the PCC—which forms part of the default mode network

thought to be important in introspection and high level constructs such as self and ego—was reduced leading to “a state of unconstrained cognition” (Carhart-Harris et al., 2012, p. 2138).

This psychedelic disruption of the sensory gating function discussed by Vollenweider (2001), and the reduction of activity in the default mode network discussed by Carhart-Harris (2011) could also underpin the neurochemistry of ESP, whether elicited with any number of psychedelics or, indeed, without the intervention of such exogenous chemicals (though perhaps via endogenous chemicals such as DMT). Indeed like psychedelics, psi experiences and events have variously been conceptualized in relation to an inhibition of the ordinary sensory inhibition, often in conjunction with elevated psychosis and creativity, such as with the concepts of latent disinhibition (Holt, Simmonds-Moore, & Moore 2008), transliminality (Thalbourne, 2000; Thalbourne & Houran, 2005), boundary thinness and schizotypy (Simmonds & Roe, 2000), and self-expansiveness (Friedman, 1983; Pappas & Friedman, 2007). It may be noted that psychedelics have also been long associated with both creativity (e.g., Dobkin de Rios & Janiger, 2003; Krippner, 1985) and psychosis (Osmond & Smythies, 1952).

Despite the simplistic appeal of the anti-reducing valve action of psychedelics as a neurochemical model of psi, considerable gaps still remain in the current understanding of the neuropharmacological action of psychedelics in humans. Since the early 1970s, until relatively recently, practically all psychedelic research has been conducted with animals and there remain no definitive generalizations that can be made about the main neurotransmitter receptor sites involved, as psychedelics vary considerably in their chemical makeup and their ligand (i.e., a ligand is a molecule, such as a neurotransmitter, that triggers a response in a target protein) affinity (Ray, 2010). For instance, dissociative anesthetics such as ketamine are commonly N-methyl-D-aspartate (NMDA) receptor antagonists, whereas the simple tryptamines, such as psilocybin, are apparently 5-HT_{2A} agonists. Speculations about the cause of the hallucinogenic effects of psychedelics generally include the activation of 5-HT_{1A}, 5-HT_{2A}, 5-HT_{2C}, dopamine, and glutamate pathways, although it is generally believed that classic psychedelics primarily work by stimulating 5-HT_{2A} receptors, particularly those expressed in the neocortical pyramidal cells (Lee

& Roth, 2012; Nichols, 2004), although this is certainly not the case for all psychedelics (e.g., mescaline; Ray, 2010). Electrophysiology and receptor studies have revealed that both NMDA antagonists (e.g., ketamine) and classic serotonergic psychedelics (e.g., LSD) may actually enhance glutamatergic transmission via non-NMDA receptors in the frontal cortex. This may indicate a common mode of chemical action in the brain responsible for such similar experiences with these divergent molecules (Vollenweider, 2004); this serotonin/glutamate receptor-complex model of drug action is receiving high-profile attention again for psychedelics as a possible comparative model of psychosis (e.g., González-Maeso et al., 2008).

Despite the lack of understanding of the neurobiology of psychedelic action, and lack of generalizability across so many diverse substances, recent advances would appear to support the Bergson-Huxley notion of brain as a filter capable of being deactivated by chemicals, and furthermore this notion, including the parts pertaining to ESP, is now gaining ground once more among theorists of consciousness (e.g., Kastrup, 2012). Indeed, recent theoretical developments (Smythies, 2011) suggest that NMDA antagonism, such as via ketamine, bypasses the reducing valve/filter action of the brain (see section 1.4 following below for a discussion).

1.2 β -carbolines, tryptamines, and psi

Advancing on earlier suggestions about the pineal gland's involvement in psi (e.g. Miller, 1978; Sinel, 1927), Roney-Dougal (1986, 1989, 1991, 2001) has developed an endogenous neurochemical-perspective of psi based on the action of the pineal and several hallucinogenic substances found in ayahuasca, the visionary Amazonian brew reported to induce a range of paranormal experiences. The common neurotransmitter serotonin is known to be most active in the pineal gland, where it follows a circadian rhythm and is converted at night into melatonin (5-methoxy tryptamine, or 5MT) and the β -carboline, pinoline (6-methoxy tetrahydro- β -carboline, or 6-MeO-TH β C), which regulate sleep cycles. The pineal may also create other β -carbolines, such as 6-methoxyharmalan, a harmala alkaloid. These β -carbolines block the neuronal uptake of serotonin making it available for use, and inhibit the enzyme monoamine oxydase (MAO), which breaks down certain tryptamines such as *N,N*-dimethyl tryptamine (*N,N*-DMT, or simply DMT) and 5-methoxy tryptamine (5-MeO-DMT). MAO inhibitors, such as pinoline

or the harmala alkaloids, make serotonin available at the pineal where, with the aid of pineal enzymes (methyl transferases), it can also be converted into 5-MeO-DMT, DMT, and bufotenine (5-hydroxy-*N,N*-dimethyltryptamine, 5-HO-DMT), which are endogenous visionary substances also found in certain ingredients (such as *Psychotria viridis*) of ayahuasca brews and other shamanic visionary substances, even some of animal origin (e.g., the Sonoran desert toad, Rudgley, 2000). In vivo biosynthesis of DMT might also occur through the conversion of the common, nutritionally essential, amino acid tryptophan (Jacob & Presti, 2005; Shulgin & Shulgin, 1997).

However, these endogenous visionary tryptamines are not orally active, as they are denatured by the MAO enzymes present in the stomach, but ayahuasca brews also contains plant additives (such as *Banisteriopsis caapi*) containing a range of harmala alkaloids that inhibit MAO and allow the complementarily ingested visionary tryptamines to be active in the brain. It is this action of the β -carbolines (particularly harmine) in ayahuasca that is these days considered their primary purpose as admixtures in the brew (e.g., McKenna, 2004), though this may not always be the case as subjectively potent ayahuasca decoctions occasionally do not actually contain DMT when analyzed (Callaway, 2005). Nevertheless the harmala alkaloids are also known to induce visions themselves and Roney-Dougal (1986, 1989, 1991, 2001) originally implicated β -carbolines, such as the endogenous pinoline and the exogenous harmala alkaloids, as inducing psi-conducive states, either naturally during dreams (Callaway, 1988) or artificially by causing waking dream states. Roney-Dougal (2001) also later acknowledged that the β -carbolines may exert their visionary effects by potentiating the effects of ingested visionary tryptamines like DMT or 5-MeO-DMT when consumed in combination with them, as in ayahuasca. Further to Roney-Dougal's proposals, it is my speculation that the β -carbolines may also induce visions by contributing to the endogenous manufacture of visionary tryptamine substances, either when taken alone or in combination with such tryptamines, perhaps even indicating endogenous DMT or related tryptamines as the primary or even sole cause of such visions. This may account for why harmala alkaloids are less effective and slower than DMT at inducing visions (see Shulgin & Shulgin, 1997). In essence, ayahuasca contains two types of visionary chemicals, one type (β -carbolines,

e.g., harmine) that helps to both create and potentiate the effects of the other type (tryptamines, e.g., DMT), potentially mimicking the nocturnal chemistry of the pineal and its supposed control over natural visionary states, such as dreams (Callaway, 1988), mystical experiences, and NDEs (Strassman, 2001).

Roney-Dougal (1989, 1991, 2001) suggested that the pineal gland and its neurochemistry is important in the occurrence of psi phenomena and points to the association made by yogis between the pineal gland and the ajna chakra, the yogic psychic center that controls psi-experiences in those with awakened kundalini (Miller, 1978; Satyananda, 1972). Further to this, Naranjo (1987) noted that both kundalini and ayahuasca experiences, being similar in many respects, also feature the same serpentine imagery, further speculating that they probably have the same neurochemistry and result in the same bioenergetic activation.

There is also some possibility that pineal gland activity or DMT production can be stimulated by certain esoteric yogic practices, such as kechari, which involves pressing the tongue into the far rear roof of the mouth to stimulate the production of amrit, a yogic nectar that reputedly causes DMT-like ecstasies, which is supposedly secreted in the brain following prolonged practice (Motoyama, 2001; Satyananda, 1996). Some support for this speculation comes from Strassman's (2001) observation that the pineal gland is formed in utero from the tissue of the roof of the mouth rather than in the brain, and later migrates to its unique ventricle position just outside the blood-brain barrier, directly above a critical cerebrospinal fluid byway, and this tentatively suggests that pineal stimulation via the roof of the mouth may be possible. Furthermore, manifestation of very specific body vibrations said to be classic kundalini symptoms are supposedly quite reliably induced with substances such as DPT (*N,N*-dipropyl-tryptamine) and 4-Acetoxy-DIPT (*N,N*-diisopropyl-4-acetoxy-tryptamine), which are even more obscure psychedelic tryptamines than DMT, but close relatives of it (Toad, 1999a, 1999b). Similarly, Grof (2001) has reported spontaneous kundalini arousal occurring during psychedelic psychotherapy sessions and surveys (see section 3.2.3 & 3.2.4 to follow) of kundalini experiences have found them to be related to drug use (DeGracia, 1995; Thalbourne, 2001).

Roney-Dougal (1989, 1991, 2001) also indicated that the pineal gland is sensitive to—possibly changing

its chemical production—the same fluctuations in geomagnetic activity that appear to be associated with spontaneous psi-activity, possibly related to pineal melatonin (Persinger, 1988) or DMT fluctuations (Hill & Persinger, 2003)—for a review see Roney-Dougal, Ryan, and Luke (2012). That the pineal gland is central to psi is further supported by anthropological research, to follow—although experimental evidence is lacking—that suggests that DMT and the harmala alkaloids found in ayahuasca are psi-conducive, along with clinical research that suggests that pinoline and melatonin regulate sleep cycles and dreaming, during which spontaneous psi experiences most often occur (Roney-Dougal, 1986, 1989, 1991, 2001). Durwin (2001) has further suggested that the total isolation in the dark undergone for either the first 9 or 18 childhood years of the lives of trainee shamans of the Andean Kogi causes pineal gland deformation (presumably by melatonin/pinoline overproduction) that is responsible for their renowned divinatory skills.

Some tentative support for the notion that ESP performance is directly predicted by pineal gland activity is also evident with experimental research that demonstrated prepubescent children score better on ESP tests at 3 a.m., when the pineal's nocturnal chemicals (melatonin, etc.) are supposedly at peak concentrations in the brain, rather than at 9 p.m. (Satyanarayana, Rao, & Vijaylakshmi, 1993). This effect was not evident with a comparable group of pubescent children, which the authors suggest might be expected because the pineal is less active after infancy. A more extensive follow-up investigated dream-ESP and circadian pineal rhythms among young adults finding a significant improvement in dream precognition scores at 3 a.m. compared to 8 a.m. (Luke, Zychowicz, Richterova, Tjurina, & Polonnikova, 2010, 2012) with scores in the same direction but non-significant in a replication study (Luke & Zychowicz, 2011), providing some tentative support for the notion that ESP may be linked to circadian pineal rhythms.

Roney-Dougal (2001) has also drawn parallels between the ostensibly psi-conducive nature of the shamanic trance state, psychotic states, psychedelic states, and the dream state, which she suggested all belong to the same continuum—perhaps somewhat akin to Thalbourne's (1998) concept of transliminality, the proclivity for psychological material to cross thresholds in or out of consciousness—and that they all show suggestive evidence of being regulated by the

same neurochemical processes. Recently, the discovery of trace amine receptors in the brain for which DMT shows greater affinity than does serotonin—its more common neuro-amine cousin—has led to a resurgence of interest in endogenous DMT in the mediation of mental health (Jacob & Presti, 2005).

1.3 DMT, near-death, and other anomalous experiences

After extensive research investigating the phenomenological effects of administering intravenous injections of DMT, Strassman (2001) has independently hypothesized a role for DMT similar to that suggested by Roney-Dougal (2001). Strassman echoed the same neurochemical action of the pineal as Roney-Dougal, and similarly proffered that psychotic, dream, meditation, and mystical states all occur through the overproduction of DMT, implicating DMT as a “reality thermostat” (Strassman, 2001, p. 327). However, Strassman indicated the action of DMT, not β -carbolines, as primary in producing these states and alternatively proposed that the pineal gland and endogenous DMT are central during extraordinary events, such as birth, death, and the near-death experience (NDE).

To support this view Strassman noted that the anatomy of the pineal, suspended in cerebrospinal fluid outside of the blood-bathed brain, is independent enough to resist activation by normal stresses and yet is optimally situated to deliver DMT directly to the middle brain regions where DMT-sensitive serotonin receptors are involved in mood, perception, and thought. Furthermore, access to the brain in this way eliminates the need for DMT transportation in the blood—where it would be broken down by MAO enzymes anyway—thereby negating the need for a pumping heart for delivery. Jacob and Presti (2005) also noted that DMT is virtually unique among endogenous neurotransmitters in that it is a molecule small enough to have blood-brain barrier permeability. That melatonin exerts its influence slowly over a period of a day or more, and so does not need the pineal’s unique location, further supports the supposed postmortem function of DMT. Strassman further speculated that the pineal might continue to produce postmortem DMT for a few hours. He also noted that the NDE has psychedelic and mystical qualities, and that the DMT experience often shares the same features as an NDE. Some of his DMT study participants reported NDEs and death-rebirth experiences, with many others reporting a newfound fearlessness of death. However,

that the participants may have been inadvertently primed for these experiences cannot be ruled out because they were told in the briefing to expect feelings of death or impending death. Nonetheless, independent survey research indicates that DMT users sometimes do report death-like and near-death-type experiences (Luke & Kittenis, 2005).

To Strassman’s (2001) surprise many of the participants in his DMT study reported contact with sentient beings during the experience, often described as elves, dwarves, imps, gremlins, clowns, reptilian beings, and aliens, but also as spirits, gods, or just as a presence, which was commonly supremely powerful, wise, and loving. Such prevalent encounter experiences with DMT use (for a review see Luke, 2011b) are seemingly so unique and reliable (e.g., Meyer, 1993) as to have had the impish characters popularly dubbed the “self-transforming machine elves” (McKenna, 1991, p. 16), and whose tangible reality has been hotly debated by other DMT-experience researchers (Carpenter, 2006; Kent, 2005, 2010; Luke, in press; Pickover, 2005). Strassman suggested that fluctuations in endogenous DMT levels were also responsible for the frequent reports elsewhere of alien abduction, which share the newfound fearlessness of death and visions of energy tunnels, or cylinders of light, in common with DMT experiences. Following personal experiences with ayahuasca, Severi (2003) likewise noted the similarity between NDEs, traditional psychedelic-induced shamanic initiations, alien abduction experiences, and heightened psychic sensitivity, as have previous researchers (e.g., Harvey-Wilson, 2001; McKenna, 1991; Ring, 1989, 1992). However, Barušs (2003) pointed out that, despite the similarities, DMT and alien abduction experiences lack specific similarities, such as the absence with DMT of the classic “grays” (small gray aliens). Nevertheless, Hancock (2005), also having experienced DMT and ayahuasca, argued that there are substantial similarities between aliens and elves, whether induced through DMT or else appearing in historic-folkloric legends and testimonies, speculating that the latter also have a DMT-induced etiology and, adopting the theory proposed by Vallee (1969), that these elves of folklore are the prototype encounter/abduction experiences. It should be noted that few experiencers ever doubt the reality of their encounters with either aliens (Mack, 1999) or DMT entities (Strassman, 2001), perhaps with the exception of Kent (2005, although see Kent, 2010) in this latter

category, and most actually consider them to be more real than most ordinary experiences. Additionally, like alien abduction reports, Strassman notes that his DMT study participants reported being probed and having things inserted into them by the beings, however, it should be noted that this might have been induced by the medical nature of his experiments and the use of intravenous injections and equipment for monitoring vital signs.

Incidentally, although neither Strassman nor other researchers originally pointed this out, it is apparent that some of the DMT experiences reported in his study, particularly the negative ones, share several features in common with sleep paralysis (e.g., see Cheyne, 2001), particularly the sense of presence, reports of one's chest being crushed, strange whistling, whining, and whirring sounds, and the terrifying paralysis of both body and vocal chords (Strassman, 2001). Alien abduction experiences and NDEs are also associated with sleep paralysis (see Sherwood, 2002), and indeed Strassman (2008) later noted the apparent relationship between sleep paralysis and DMT experiences, although caution has been raised about claiming too many anomalous phenomena can be explained by DMT, as this ultimately explains nothing, and further phenomenological analysis is needed (Luke, 2008), such as that conducted by Cott & Rock (2008), although a direct comparison of such experiences is needed. Nevertheless, there certainly warrants something to research here regarding a DMT etiology for sleep paralysis.

Curiously, experiential reports from research programs in the 1950s and 1960s (outlined in Shulgin & Shulgin, 1997; Torres & Repke, 2006), indicate that the endogenous 5-hydroxy-DMT (bufotenine), a very close relative to DMT with similar neurochemistry, is seemingly able on occasion to cause feelings of constriction in the throat and the crushing of one's chest, as well as anxiety and fear reactions, much like sleep paralysis, possibly implicating it as a co-chemical factor in such experiences, along with DMT. Additionally, in South America and the Caribbean the entheogenic cohoba snuff is made from one of the few traditionally-used plants in which bufotenine is active, *Piptadenia peregrina*, and is used specifically to contact spirits (Cohen, 1970; Torres & Repke, 2006), perhaps somewhat like the sensed presences of sleep paralysis and numerous DMT experiences. However, Ott (2001) pointed out that the circulatory crises in

the earlier bufotenine research were most likely due to psychological factors caused by the enforced nature of the experiments—conducted as they were on psychiatric patients and prisoners with limited consent—because such experiences were absent during Ott's own extensive self-experimentation, and nor do indigenous users of plants containing bufotenine worry about or report respiratory arrest (Torres & Repke, 2006). In any case the breathing difficulties associated with sleep paralysis may be more to do with the paralysis of conscious bodily functions caused by being asleep, and the inability to inhale at will. Furthermore, sensed presence, as opposed to direct perception of an entity, as often occurs with sleep paralysis, may be more common with other substances, such as *Salvia divinorum* (Aardvark, 2002; Addy, 2010; Arthur, 2010) (meaning something like “diviner's sage”), although systematic phenomenological research is needed.

In evaluation of the role of the pineal gland and endogenous psychedelics in the activation of psi and the NDE, it has yet to be shown that psi can be produced with these substances under controlled conditions. In addition, both psi experiences and NDEs might be induced with other psychoactive substances, as shown in the following sections, although this criticism has been countered by Strassman (2001) with the possibility that other psychedelic substances may also stimulate the pineal and endogenous DMT by their action. However, this proposal is little more than conjecture. Furthermore, although there is good reasoning for the hypothesis that DMT is made in the human pineal, this is yet to be proven and remains speculative, like many of Strassman's and Roney-Dougal's suppositions at the present time.

According to Strassman (2001), although the lungs, liver, blood, and eye all contain the enzymes necessary to convert tryptamine to DMT, the pineal gland is especially rich in them and also has high concentrations of serotonin ready to convert to tryptamine. So while the pineal-DMT hypothesis is currently unproven (Hanna, 2010), it is certainly feasible, especially when it is considered that the chemical conversion of tryptamine to DMT can be demonstrated *en vitro*. The only attempt thus far to support the hypothesis directly has been Strassman's attempt to isolate DMT from 10 human pineal glands extracted from cadavers. No DMT was detected in the glands; however, neither the bodies nor the glands were freshly frozen and any chemicals present may have degraded before analysis (Strassman, 2001).

Thus far DMT has been found to be naturally occurring in the brains of rodents (Kärkkäinen et al., 2005), and in the highest concentrations in humans in the cerebrospinal fluid (for a review, see Barker, McIlhenny, & Strassman, 2012), but not the brain, let alone the pineal. Furthermore, although the pineal contains methyltransferase enzymes, as Strassman (2001) indicated, the particular one thought to be crucial for *en vivo* DMT production (indolethylamine N-methyltransferase, or simply INMT) has as yet not been found in the human brain or pineal gland although, curiously, DMT was found in rabbit brain tissue, despite the absence of INMT (Kärkkäinen et al., 2005), perhaps indicating that INMT is not necessary for the production of DMT. Furthermore, McIlhenny (2012) pointed out that most INMT mapping research only establishes where enzyme translation is occurring, as they are based solely on INMT mRNA studies. A recent study (Cozzi, Mavlyutov, Thompson, & Ruoho, 2011) using a fluorescent INMT antibody suggests the presence of INMT in three Rhesus macaque nervous tissues samples, including the pineal gland. Evidence of INMT in primate pineal glands indicates better potential for Strassman's human pineal-DMT production hypothesis, nevertheless direct support is still lacking. However, absence of evidence is not evidence of absence, and the pineal gland is difficult to research *en vivo* and DMT is an under-researched substance, particularly in humans. DMT is also difficult to detect (Barker et al., 2012) and belongs to the most controlled category of drugs in most countries, so, currently, the jury remains out on the pineal-DMT hypothesis.

Overall, despite their incompleteness, the pineal/ β -carboline/DMT models of psi and NDE do offer unique neurochemical perspectives on paranormal experience around which further research can be framed. Additionally, although neither author has speculated on the others' ideas, their models are not incompatible with each other; however, they may begin to answer the question of why such visionary molecules as DMT are made within humans at all. For a further discussion of DMT, brain action and anomalous phenomena, see Luke (2011b).

1.4 Ketamine and NDEs

A proliferation of reported cases of NDEs with the use of ketamine (Jansen, 1997a, 1999, 2001) and the similarity of aspects of the ketamine experience to that of the NDE (Morse, Venecia, & Milstein, 1989; Rogo,

1984)—despite Morse's (1997) later contentions that the evidence for this is weak—has led to the development of a neurochemical model of NDE based upon the action of this psychoactive substance (Jansen, 1990, 1997a, 2001). A dissociative anesthetic—also reported to induce experiences of telepathy, precognition, clairvoyance, psychokinesis, communication with the dead, kundalini experiences and an increase in synchronicities (Case, 2003; Jansen, 2001; Luke & Kittenis, 2005; Wyllie, 1981)—ketamine acts by binding to the phencyclidine (PCP) site of the *N*-methyl-D-aspartate (NMDA) receptor, blocking the action of the neurotransmitter glutamate. Jansen indicated that potentially life-threatening circumstances (e.g., hypoxia, ischemia, hypoglycemia, temporal lobe epilepsy) can initiate a glutamate flood, which results in neurotoxicity through the over-activation of the NMDA receptors (for further details, see Smythies, 2011). This NDE trigger may be accompanied by a flood of neuroprotective agents that also bind to the NMDA receptors preventing damage, in much the same way as ketamine. Like Grinspoon and Bakalar's (1979) speculation that the brain synthesizes a chemical similar to ketamine in times of stress, Jansen proposed that “endopsychosins,” which bind to the same receptor site as ketamine, would be discovered as the neuroprotective agents that cause an ASC, like that of ketamine, termed the NDE.

Although parsimonious, Jansen's (1997a) ketamine model of NDE has been both duly criticized and well defended. It has been argued that unlike NDEs, ketamine trips frequently induce fear (Strassman, 1997) and are not considered “real” (Fenwick, 1997). However, as Jansen (1977b) likewise contested, it is becoming increasingly recognized now that NDEs are also commonly reported to be distressing or traumatic (Atwater, 1994; Montanelli & Parra, 2000) and, furthermore, ketamine experiences are also more often than not reported to induce a sense of peace and pleasantness (Corazza, 2008; Luke, 2007). In support of the perceived reality of the ketamine experience, there are documented accounts of people who have had an NDE and then later a ketamine experience, and who reported the experiences being the same (Jansen, 2001). In support of this, Grof (1994) found that several cancer patients had NDEs during psychedelic therapy (most likely with LSD) that were very similar to later spontaneous NDEs.

In further criticism of Jansen's model, it has been argued (Fenwick, 1997; Greyson, 2000) that the

clarity and clear memory of the NDE experience is not consistent with cerebral dysfunction. However, it is arguable that Jansen's model does not stipulate the necessity of cerebral dysfunction for a NDE, merely the threat, or even just the perceived threat of it, and Jansen (1997b, p. 87) pointed out "there is no reason to suspect that the NDE mechanism would never be activated spontaneously." Furthermore, Jansen (1997b) regarded clarity of consciousness as a nebulous term in the discussion of altered states, as the term is loaded towards the ordinary state of consciousness. Some researchers (e.g., Greyson, 2000; Smythies, 2011) have further contested that, despite the possibility that the endogenous peptide alpha-endopsychosin is a candidate, no endopsychosins have yet been identified or proven to exist, and Jansen (2001) conceded that this may initially have been a false lead and has suggested a number of alternative endogenous NMDA antagonists as candidates: N-acetyl-aspartyl-glutamate, kynurenic acid and magnesium, all of which protect brain cells from excito-toxic damage (Jansen, 2004). Nevertheless, Thomas (2004), following Jansen in his search, has identified technical flaws with these speculated endogenous "NDE-ogens" and has instead proposed the neuromodulator agmatine as the most likely candidate. The debate continues.

In further criticism of the model, Parker (2001) noted that one-drug/one-experience theories were abandoned in the 1970s and that, along with Greyson (2000), he further noted that ketamine appears to have multiple effects in the brain and multiple experiential features, some of which include those of the NDE. Jansen (1997b) earlier countered this latter criticism with the proposal that factors of set and setting are paramount in determining experience with all ASCs, be they NDEs or ketamine-induced states, so experiences are expected to vary. Parker (2001), like Siegel (1980), added that other drugs also produce features of the NDE, although Jansen (1997b) has asserted that these NDE-features are typical with ketamine but are not typical with other drugs, except for PCP and ibogaine (Bianchi, 1997; Jansen, 2001) which are NMDA antagonists (or more specifically called NMDA-PCP receptor blockers).

However, in support of Parker's (2001) criticism, Roll and Montagnò (1985) have noted the similarity between NDEs and LSD experiences, as reported by Grof (1994). Reports of NDE also occur with the use of other dissociatives, like dextromethorphan (DXM) (White, 1997), and carbogen (Meduna, 1950), as well

as with high doses of hashish (Siegel & Hirschman, 1984), and tryptamines like 5-MeO-DMT (Shulgin & Shulgin, 1997) and the ayahuasca (meaning "the vine of the dead") derivative, DMT (Strassman, 2001). Yet, Strassman (2001) did not find Jansen's model incompatible with his own DMT model of NDE, but rather asked why a neuroprotective agent like ketamine should also be psychedelic as there is no obvious benefit to the near-death visionary experience, other than enabling consciousness to have awareness of its departure from the body.

Recently, electrophysiology and receptor studies have revealed that both NMDA antagonists, such as ketamine, and classic hallucinogens, such as LSD, may actually enhance glutamatergic transmission via non-NMDA receptors in the frontal cortex. This may indicate a common mode of chemical action in the brain responsible for such similar experiences with these divergent molecules, though further investigation is required (Vollenweider, 2004). Given the similarities between NDEs, ketamine experiences, and other drug experiences, Rogo (1984) proposed that the NDE-like effects of ketamine are more often interpreted as NDEs because it has so often been used in a medical setting, further suggesting that ketamine-induced NDEs are less prevalent with recreational use than with anesthetic use, though this has not been systematically investigated to my knowledge.

To the author's knowledge, the only systematic investigation of the ketamine hypothesis, besides Jansen (2001), is that of Corazza (2008), who compared 36 cases of apparent NDEs induced by ketamine with 36 cases of NDEs reportedly caused by a cardiac arrest or other life threatening circumstances. Both groups showed a high degree of similarity in certain experiential features, with a roughly equal prevalence among the groups of experiences involving altered perceptions of time, speeded up visions, and the occurrence of ESP (25%), but the ketamine group were more likely to report unity with the universe, and the cardiac groups were more likely to report dissociation from the body, visions of light, and encounters with deceased or religious beings. However, Corazza asserted that the evidence indicates that NDEs can be induced through ketamine, although they may not be identical to those occurring naturally.

The study is not without its limitations; however, as outlined by Luke (2009), as the ketamine participants were recruited on the premise that they felt

that they had had an NDE on ketamine, which Jansen (2001) reported only occur to about 12% of ketamine users. Furthermore, it is unclear if the respondents are describing a specific ketamine experience or an experience more generally, as most of the respondents had taken ketamine between 10 and 2000 times, though a similar number of cardiac arrest experiences is very unlikely for the comparison group. Nevertheless, Corazza and Schifano (2010) acknowledged the limitation that their findings are based on a self-selected, nonrandomized, limited size sample. Subsequently, ketamine can at best be thought of as an occasional NDE trigger or mimic, but is not a wholly repeatable or reliable source of NDEs (Luke, 2009). Nevertheless, cardiac arrest and the experience that ketamine invokes appear to be similar enough to genuine NDEs that leading consciousness researchers Hameroff and Chopra (2010) have called for its use in prolonging end of life brain activity (by delaying neurotoxicity) to allow terminally ill patients to have more conscious deaths.

More recently, having first researched the parapsychological potential of psychedelics in the 1940s, Smythies (2011) identified several apparent flaws with Jansen's K-NDE model. First, an NMDA-antagonist model of NDE is too general because the glutamate receptors can be found in all regions of the brain and yet the NDE phenomena suggest the activation of only specific brain regions, and furthermore ketamine does not appear to produce global brain NMDA-antagonism (although this latter point may argue against the first). Second, ketamine, Smythies argued, cannot actually stimulate the action potential of the neurons it binds to, but rather affects the modulation of the strength and number of synapses (i.e., the neuroplasticity), so it cannot immediately affect the brain regions required to stimulate the NDE. This second argument, however, seems somewhat contradicted by the phenomenological evidence that suggests that ketamine *can* in fact stimulate NDE-like phenomena and so presumably *does* activate the appropriate brain regions, at least indirectly.

Finally, Smythies (2011), contested that if the NMDA-antagonism explanation for NDEs were true, one would expect to see a relationship between NDEs and *grand mal* epilepsy—during which massive cerebral glutamate overload occurs. However, according to Smythies, the relationship is only apparently reported by one study (Britton & Bootzin, 2004), and is in any case weaker than the relationship between epilepsy symptoms

and disturbed sleep patterns, although, in argument against Smythies, this weaker relationship may be accounted for by the infrequent occurrence of NDEs relative to sleep disturbances. Furthermore, counter to Smythies' conjecture, several other researchers have speculated about the link between NDEs and temporal lobe epilepsy, drawing parallels (Blanke & Dieguez, 2009; Jansen, 2001; Morse, Venecia, & Milstein, 1989; Neppe, 1989; Persinger & Makarec, 1987; Saavedra-Aguilar & Gómez-Jeria, 1989), although admittedly the NDE-epilepsy link is incomplete (Neppe, 1989), and epilepsy might best be thought of as one of several possible NDE triggers, as Jansen (1997a) originally proposed, rather than an explanation for NDEs. Ultimately, Smythies (2011) proposed that the excitatory NMDA receptor system, which runs continuously even while asleep, actually *is* the Bergson brain filter mechanism (discussed earlier in section 1.1) that ordinarily prevents people from experiencing what Aldous Huxley (1954, p. 11) called "Mind at Large": mystical and paranormal consciousness (i.e., an NDE). Consequently, Smythies asserted that NDMA antagonism, such as via ketamine or a natural NDE, bypasses the brain's natural filter action, leading to all manner of paranormal and transpersonal experiences. Much as Smythies should be applauded for morphing the two theories together, the same might be said for psychedelically induced serotonergic action as for glutamatergic action, so in effect this says little more than what Huxley originally proposed and what is now known about psychedelic neurochemistry (see section 1.1).

Overall, despite over simplification and generalization, the ketamine model of NDE offers the most complete neurochemical explanation of the NDE so far and, as with the DMT model, does not necessarily assume a materialist reductionism to explain the data—unlike Siegel (1980) for example—although some commentators (e.g., Sakellarios, 2005) have erroneously assumed that it does. Furthermore, the model can be easily tested and refined. For instance, there is evidence to suggest that the non-competitive antagonism at the non-glycine site of the NMDA receptor in particular is linked to the event of dissociative anesthesia and altered sensory perceptions that are familiar to ketamine. This would indicate that relatively novel substances like HA-966 (1-hydroxy-3-amino-pyrrolidone-2), which acts in this particular neurochemical manner (Bonta, 2004), could induce NDEs in blind conditions comparable to those

occurring ordinarily, though this remains to be seen. In research with monkeys, HA-966 induced EEG patterns characteristic of sleep despite the animals remaining completely alert, which may be related to Jansen's (2004) observation that the same 60% of the population that do not recall their dreams also do not recall their ketamine experiences during anesthesia, a proportion apparently equivalent to the number of people who do not report having had some kind of NDE. Alternatively, in order to test the K-NDE theory, it has been suggested to administer ketamine to those who have had a natural NDE and compare the two (Kolp et al., 2007). Assuming ketamine NDEs to be genuine, ultimately, however, the question remains of whether chemically induced NDEs utilize alternative pathways or the actual NDE pathway (Fracasso & Friedman, 2011).

Bringing personal observations (Luke, 2005) to the K-NDE debate, it seems apparent that the degree of general anesthesia induced by ketamine is relative to one's motor control ability and what Grosso (1976) identified as the degree of being out-of-body: Factors that are more pronounced with the positive S-isomer of ketamine rather than the negative isomer (Domino & Warner, 2010), further indicating how entwined these effects are, specific as they are to just one ketamine molecule type. Such relationships between sensory and motor impairment and reported body image have elsewhere been found with local anesthesia (Paqueron et al., 2003), though obviously not full blown OBEs. Retuning to the personal observations, in repeated ketamine experiences I observed that the initial stages of anesthesia and out-of-body-ness are accompanied by increasing difficulty in controlling one's body and a growing sense of body dysmorphia, in a non-clinical sense, in that part of one's body may appear longer (macrosomatognosia) or shorter (microsomatognosia), as described by Frederiks (1963). For example, on one occasion I recall being unable to successfully maneuver out of the door because my legs appeared to be the approximate distance of an entire football pitch away. It is observed that the relatively changing gradation in increased anesthesia, body dysmorphia and motor control continues, with a sufficient dosage, as the trip intensifies towards a full-blown out-of-body experience, total anesthesia, and ultimately no motor control.

Indeed, while some K-OBEs are accompanied by autoscapy, even awareness of one's body can disappear at the peak of a high dose ketamine experience, even to

the point of not realizing one actually has a body but instead just experiencing the present as a single point of consciousness and nothing more. On one such occasion I was seemingly privileged to a view of earth from space and yet I did not even know who or what I was, let alone that I was human and apparently had a body. This relatively changing relationship between anesthesia, motor control, out-of-body-ness, and even body-ownership-awareness is apparent on both entering and exiting the ketamine experience, although seemingly more so in exiting (although in reverse), as the entrance to a ketamine experience can often be abrupt, with a swift and intense onset, whereas the departure is more gradual. Such first-person psychonautics can report a good deal about both psychedelic states, especially ketamine states (Newcombe, 2008), and parapsychological phenomena (Luke, 2011c) and such methods are witnessing somewhat of a revival after a long hiatus since the era of William James' (1902) classic experimentation with nitrous oxide, another NDMA antagonist. Survey research also shows that ketamine induces OBEs and autoscapy far more often than other (non-anesthetic) psychedelics (Wilkins, Girard, & Cheyne, 2011), as had been previously speculated (Luke & Kittenis, 2005), the question remains of why anesthesia should accompany an OBE/NDE: Does the anesthesia cause the perception of being out of one's body, and therefore leads to a feeling of dying or of having died, or does the near-death experience provoke an OBE and subsequent anesthesia as a defense against likely pain? Observing the ketamine experience from the recipient's perspective, it appears that the anesthesia occurs because one's consciousness is no longer connected to one's body, and certainly the OBE and anesthesia are intimately connected, but why and how deserve further investigation and may shed light on the neurobiological factors of OBEs and NDEs.

1.5 Dopamine and paranormal beliefs and experiences.

Taking a purely materialist reductionist view of paranormal experiences by attempting to account for them exclusively in terms of beliefs arising from faulty cognitions—what Irwin (2009) called the cognitive deficits hypothesis—a loose neurobiological model for the explanation of paranormal beliefs has arisen that posits the dopamine neurotransmitter system as the primary facilitator. Put forward by Krummenacher and colleagues (Krummenacher, Brugger, Fahti, & Mohr, 2002; Krummenacher, Mohr, Haker, &

Brugger, 2009) the theory suggests that, although activity of the endogenous neurotransmitter dopamine is classically implicated in *enhancing* cognitive and perceptual decisions by improving the signal to noise ratio of neuronal transmission, paradoxically, hyperdopaminergic activity is associated with psychotic symptoms, schizophrenia and even schizotypy (for a brief review, see Krummenacher et al., 2009), and so excess dopamine may be accountable for delusional thinking stemming from an increased tendency to find patterns in apparently random data—what the psychiatrist Klaus Conrad (1958) called apophenia. According to Brugger and colleagues (e.g., Pizzagalli, Lehmann, & Brugger, 2001) paranormal believers—and so most likely paranormal experiencers too—have been shown to be more inclined towards apophenia than skeptics, thereby accounting for the increased creativity apparently associated with paranormal thinking and its similarity to some psychotic symptoms: a combination of creative and delusional dimensions being indicative of the positive phenomenology of schizotypy (Eckblad & Chapman, 1983).

Direct research into what might be most accurately called the hyperdopaminergia-apophenia hypothesis is somewhat limited at this time, consisting of only two studies, with somewhat mixed results. The first study (Raz, Hines, Fossella, & Castro, 2008) attempted to relate paranormal belief as a phenotype to hyperdopaminergia as a genotype via what Raz et al. (2008) called the “COMT dopaminergic gene” (p. 1336), building on preliminary findings in behavioral apophenia dopamine research by Krummenacher et al. (2002) and studies associating schizotypy with dopaminergic genes (e.g., Avramopoulos et al., 2002). COMT (Catechol-O-methyltransferase) is an enzyme that degrades catecholamines such as dopamine, and the COMT protein is encoded by the COMT gene. Utilizing questionnaire measures of paranormal belief, 107 psychology students were genetically screened for three COMT allelic forms, successfully identifying approximately one quarter of the sample with high COMT activity, a quarter with low activity, and half with intermediate activity. However, failing to support the hyperdopaminergia-apophenia hypothesis those with decreased COMT activity, and hence greater hyperdopaminergia, reported no more paranormal beliefs, abilities or experiences than the higher COMT activity participants. Undeterred, Raz et al. (2008)

pointed to the observation that attempting to unravel links between single gene polymorphisms that influence neurochemical function, and consequently individual differences in cognitive function, may be difficult when using distal phenotypes such as questionnaire measures, and that more proximal measures like brain imaging might be more promising. Indeed behavioral genetics is in a state of epistemological crisis after the lack of hard findings from the recently completed Human Genome Project (e.g., see Maher, 2008), so it may well be too soon to expect good data relating paranormal beliefs to genes, particularly single genes, even if they are related.

The second study, by Krummenacher et al. (2009), sampled 20 paranormal believers and 20 paranormal non-believers and administered levodopa—an active precursor to dopamine in the brain—in a randomized placebo controlled between-subjects study. Participants were given two signal detection tasks, one with words (tapping left hemisphere processes) and one with faces (right hemisphere), that presented either word/non-word or face/non-face stimulus pairs tachistoscopically for just 140 milliseconds. Participant responses were assessed for both their tendency to make correct guesses relative to incorrect ones, their sensitivity index (d'), and their tendency to respond with a positive or negative bias, their response tendency (C), both measures being independent of each other. Findings indicate that skeptics had significantly greater sensitivity to signal detection than believers in the placebo condition but, contrary to expectations, increased dopamine lead to a significant *decrease* in sensitivity in skeptics and had no effect on believers. These findings challenge the view that dopamine generally assists in signal detection, and Krummenacher et al. (2009) suggested that the opposite may actually be true in some cases, especially with presumed *hypodominergic* individuals (i.e., skeptics). Additionally, the authors argued that the lack of change in sensitivity in believers administered levodopa may be due to a plateau effect caused by high cerebral dopamine baseline levels; however, such a suggestion is somewhat *post hoc* and, even if it were true, the authors do not comment on why the dopamine-enhanced skeptics had lower sensitivity (i.e., greater sensory apophenia) than either believer group.

Whereas the sensitivity measure findings are puzzling, the response bias measure results are somewhat more straightforward, in the control scenario at least. As was expected, in the placebo condition believers had a

greater tendency to respond in the affirmative (favoring a Type I error strategy), whereas skeptics had a greater tendency to respond in the negative (favoring a Type II error strategy), the difference between the groups being significant. However, against expectation, in the levodopa condition these tendencies in each group were diminished so that there was no significant difference between skeptics and believers, although the trend remained. Specifically, compared to their placebo controls, dopamine-enhanced believers were more cautious of making false positive decisions (i.e., more conservative), and skeptics were less prone to make false negative decisions (i.e., more liberal, so that in effect both believer groups were less polarized in their responses. Contrary to the linear dopamine-apophenia relationship originally proposed, these results may indicate differing baseline dopaminergic activity in skeptics and believers and the possibility that there is a non-linear relationship between task and dopamine levels, perhaps an inverted U-shape, possibly modulated by individual differences in belief. However, these findings should be replicated first and more direct measures of baseline dopamine (e.g., spinal dopamine metabolic marker assay) should be made before these findings and *post hoc* interpretations are given much weight. Furthermore, as the authors noted, use of a between- rather than within-subjects design is far from ideal, leaving too much faith in the randomization of the small groups and no certainty in equivalence of baselines in dopamine responsivity and behavioral performance, and so further studies would benefit from a cross-over design.

Aside from the current lack of research on the hyperdopaminergia-apophenia hypothesis and the somewhat confusing mixed results, this line of research seems worthwhile pursuing further, although it suffers from additional limitations. One is that it aims to boil down paranormal experiences to misperceptions and misjudgments of the pattern recognition type, which, even if one allows for the fact that the authors *a priori* preclude the possibility of genuine paranormal phenomena, this approach does not account for the swathe of other cognitive deficits that are also given to account for paranormal beliefs, such as poor judgments of probability and randomness, egocentric bias, selective remembering, confirmation bias, and more (Brugger & Mohr, 2008). Indeed a study investigating probability inferences in those under the influence of ketamine, versus matched controls and schizophrenic patients,

shows that the ketamine group were no different from the placebo group, whereas the patients were shown to exhibit a jump-to-conclusions response concerning probability inferences (Evans et al., 2012). Although ketamine is primarily an NMDA-antagonist, it also has direct effects on dopamine receptors (e.g., Kapur & Seeman, 2002), and so the lack of probability inference effect with ketamine does not complement a dopamine explanation for paranormal experiences within the cognitive deficits paradigm. Other psychological factors supposedly related to paranormal experiences, such as the propensity for false memories, also show no relationship with self-reported recreational drug use generally (Wilson & French, 2006).

So in this respect the dopaminergic approach does not currently incorporate many of the multitudinous psychological explanations for paranormal beliefs and experiences. Furthermore, the wealth of evidence, to follow, relating increased paranormal experience—and to some extent experimentally controlled production of ESP—to the ingestion of psychedelic substances does not particularly support a dopamine-based theory of paranormality either, as dopamine activation is neither primary nor ubiquitous with psychedelic substances. Typically, classic tryptamine psychedelics (such as LSD and psilocybin) are thought to exert their effects via serotonin activation, particularly via the 5-HT_{2A} receptor subtype (Lee & Roth, 2012). Nevertheless, it is thought that 5-HT_{2A} receptor stimulation can activate dopamine release (Diaz-Mataix et al., 2005), and Previc (2011) asserted that all the various psychedelic neurochemical pathways to “altered states of consciousness with distorted reality” (p. 43) ultimately lead to elevated levels of dopamine in the brain, although such reasoning rather ablates the intricate nuances of psychopharmacology and disregards primary neurochemical pathway activation as in any way important. Furthermore, although some psychedelic substances (e.g., LSD, psilocin, DMT) do have relatively high affinities for certain dopamine receptors (Ray, 2010), dopamine is rarely considered to be a primary neurotransmitter site for psychedelic effects. Indeed, the primarily dopaminergic recreational drugs, such as amphetamine and cocaine, have been found to be either unrelated or negatively related to paranormal experiences and beliefs (for a review see Luke, 2008b; and see section on survey data, to follow), contradicting the dopamine-paranormal belief/experience hypothesis. Indeed, if Previc were right about psychedelics exerting

their effects via the dopamine system, then one would expect amphetamine and cocaine to be psychedelic too, which they are not.

Furthermore there are numerous psychedelics strongly associated with paranormal experiences that do not have dopaminergic action, such as the k-opioid agonist salvinorin A (Ray, 2010) and anticholinergic agents like scopolamine and hyoscyamine—which are found in nightshade family plants like datura (Katzung, Masters & Trevor, 2012). Overall—with scant direct research, mixed and complex findings, and poor generalizability of the hypothesis to a) other psychological explanations and b) most of the psychedelic-parapsychology literature—at the present time, Krummenacher, Brugger, Mohr, and colleagues' (Krummenacher et al., 2002; Krummenacher et al., 2009) dopamine-apophenia conjecture remains very much rudimentary and unsupported.

1.6 Overview of psychedelic/neuro-chemical models of paranormal experience.

The preceding sections outline five neurochemical models germane to explaining psychic experiences, namely the brain as filter, β -carboline and tryptamine, DMT, ketamine and, finally, dopamine models. Aside from the latter, all of these models draw upon the action of psychedelic substances in particular and remain open to the possibility that psi and other so-called paranormal phenomena may be genuine. It should be noted, however, that no one psychedelic model may ultimately be the correct one, as psychedelics may work in many ways (e.g., dissociatives are both NMDA antagonists, as well as mu-opioid agonists); nevertheless these models provide important avenues for future research and begin to help develop more complete neurobiological models of apparent paranormal cognition or merely paranormal belief, and, indeed, more complete models of consciousness itself. The importance of understanding the apparent paranormal effects of psychedelics is clear and the evidence in support of this relationship is next reviewed and evaluated.

2. Field Reports of Paranormal Phenomena

2.1 Anthropological and Historical Reports

Despite apparent prejudices by anthropologists against reporting such phenomena traditionally (Winkelman, 1983), the anthropological and ethno-botanical literature remains replete with examples of ostensibly paranormal phenomena occurring with the traditional use of psychoactive plants. Commonly these

plants are taken in ritual context for the express purpose of accessing altered states conducive to clairvoyance, precognition, telepathy, out-of-body travel, psychic diagnosis, psychic healing, and spirit communication, which provoked the mycologist Wasson (1964) to label them as the keys to extra-sensory perception. Archaeological evidence suggests such practices have existed the world over for millennia (see Devereux, 1997). However, the paranormal effects of particular plants are not necessarily arbitrary. Shamans who use the ayahuasca brew in Amazonia report having control over whichever particular paranormal function the brew elicits through the discerning use of psychoactive admixtures that may “make you travel, make you see” or “teach you to heal” (Andritsky, 1989, p. 78). Indeed, when the harmala alkaloid harmine, the first psychoactive compound isolated from the ayahuasca decoction, was discovered by Guillermo Fischer Cárdenas in 1923 it was named “telepathine” (Beyer, 2009) because of its apparent psychical properties, as reported by Zerda Bayon (1912). Zerda Bayon illustrated this with the case of Colonel Morales who, after ingesting ayahuasca, beheld a vision of his dead father and his sick sister. About one month later he received the same news by messenger. It seems unlikely that the news could have arrived first by non-paranormal means, as the group was deep in the jungle 15 days' travel from the nearest communications outpost.

Clairvoyant states induced with the harmala alkaloid-containing *Perganum harmala* shrub in Morocco have also been reported (Rudgley, 2000). Additionally, there are many more accounts of such apparent ESP with ayahuasca reported in Luna and White's (2000) anthology of classic ayahuasca experiences, as well as elsewhere (e.g., Beyer, 2009; Bianchi, 1994; Dobkin de Rios & Rumrill, 2008; Gorman, 1992; Kensinger, 1978; McGovern, 1927; Shanon, 2002; Weil, Metzner, & Leary, 1965; Wilson, 1949). Typically, the earliest reports from explorers and anthropologists of the Upper Amazon were of either OBEs or experiences of someone discovering via visions that some distant person known to them, usually a relative, had just died (Luke, 2010a). In addition, Naranjo (1967, 1973) gave harmaline to 30 naïve urban elite Chilean participants who inexplicably reported the same images of snakes and jaguars, or big cats, as are commonly reported in traditional South American ayahuasca visions (Naranjo, 1987; Shanon, 2002). Visions of jaguars and snakes with harmaline have also been reported elsewhere (Shulgin

& Shulgin, 1997) and one second-hand story from late sixties Haight-Ashbury (the temporal-spatial epicenter of psychedelic counter culture) proffered that someone once experimented giving ayahuasca to Eskimos and, devoid of the cultural milieu typical of ayahuasca use, they still saw huge cats in their visions, although it is unlikely that this research ever took place (Weil, 1980). Furthermore some of the participants in Naranjo's study were convinced they had seen these images by traveling out-of-body in time and space. Ott (1993) noted, however, that harmaline only occurs in minimal quantities in tested ayahuasca decoctions and so cannot be accountable for the psychoactive effects of the brew. Nevertheless, Strassman (2001) found that administering DMT (the most psychoactive constituent of ayahuasca) induced a similar certainty of space-time travel and resulted in the inordinately frequent occurrence of images of DNA, an image which Narby (1998) found commonly featured in the ayahuasca healing visions of Amazonian shamans, but was most often represented by snakes. It has recently been suggested, amid some controversy, that the geneticist Francis Crick was under the influence of LSD when he had a vision of the double helix structure of DNA in 1953, a discovery for which he was awarded the Nobel Prize (Rees, 2004).

Prior to this news report, which came after Crick's death, the anthropologist Narby (2000) took three molecular biologists to the Peruvian Amazon for their first visit there and for their first encounter with ayahuasca. The two female biologists both had encounters with plant teachers whom they perceived as independent sentient entities, and all three scientists received valuable information from their visions that helped inform their research, and which ultimately changed their world view. For instance, "the American biologist, who normally worked on deciphering the human genome, said she saw a chromosome from the perspective of a protein flying above a long strand of DNA" (Narby, 2000, p. 302). Similarly, the biochemist, Kary Mullis, who received the Nobel Prize for inventing the polymerase chain reaction (PCR) that significantly advanced DNA research, said that taking LSD had been invaluable in helping him experience the mental imagery that allowed him to visualize sitting on a DNA molecule to watch the polymerase go by (Mullis, 1998).

Further reports of the ritual use of psychoactive plants for the induction of paranormal abilities are commonplace among indigenous peoples from every

inhabited continent. These range from the use of pituri (*Duboisia hopwoodii*) in Australia (Australian Institute of Parapsychological Research, 2004) to the use of San Pedro cacti (*Trichocereus pachanoi*) in Peru (Luke, 2012a; Sharon, 1990) and peyote cacti (*Lophophora Williamsii*) in Mexico (Slotkin, 1956), *Amanita muscaria* mushrooms by the Ojibwa in Canada (Wasson, 1979) as well as suburban Muscovites and Siberian tribes-people in Russia (Ostrander & Schroeder, 1997; Wasson & Wasson, 1957), the use of datura among the Chumash of California (Driver, 1969), and the use of *Psilocybe* mushrooms (Stamets, 1996; Wasson, 1962) and *Salvia divinorum* by Mazatecs in Mexico (Soutar, 2001) to name but a few. Indeed, anthropologist Dobkin de Rios (1984, p. 60) has suggested that "the single most important function of plant hallucinogens in the Amazon area is to divine the future." Efforts to document the diversity of these traditional "shamanic" plants indicate there are about 100 distinct genera, let alone species, of such traditional plants that are reported to induce visionary states and are used ethnomedically (Schultes & Hofmann, 1992), with new ethnobotanical discoveries continually being made. However, few parapsychologists have conducted research with these plants or their users in their traditional environment, although with Wasson, Puharich (1959) attempted a remote viewing experiment with the *Psilocybe*-using Mazatecs in Mexico in 1955, but the experiment was aborted when instead Wasson and his co-expeditioner, Richardson, became the first researchers to be initiated into the mushroom cult. Nevertheless, Richardson (1990) reported personally having had an apparently precognitive vision, during what is documented as the first non-indigenous *Psilocybe* genus (i.e., "magic") mushroom trip.

A cross-cultural taxonomical study of shamans, shaman-healers, healers, and mediums, posits that, although these groups share many of the same characteristics, there is a clear division between those who do, and those who do not, use psychoactive plants and the differing paranormal activities they perform (Winkelman, 1989). Levine (1968) credited the botanist Schultes with the suggestion that the prevalence of vision-inducing plants among the herbarium of "primitive" societies is based upon a differing concept of illness, which has spiritual rather than physical causes. Contrary to Schultes, Winkelman suggested that the difference in the use of hallucinogens was due to cultural and developmental variances. Shamans from

hunting and gathering societies and shaman-healers from agricultural subsistence societies both frequently use hallucinogens for the purposes of healing, divination, hunting-magic, and malevolent acts, whereas healers and mediums from sedentary and politically integrated societies as well as agricultural subsistence societies, do not use hallucinogens to access their altered states, which they use for healing and divination only.

Yet it appears that these cultural differences have occurred only recently in the developed world, as it has been suggested that the ancient Greek oracles, including the Pythia of Delphi—the seeresses that anteceded the divinatory Goddess Python—also used the *solanaceae* family of psychedelic plants (henbane, belladonna, mandrake, and datura) for divination (Masters & Houston, 1966; Parker, 1975; von Bibra, 1855/1994). Indeed the ancient Greek name for henbane was “pythonian” (Rudgley, 2000). It is also well documented historically that Northern European witches also utilized these plants for psychic purposes (see Andrews, 1997; Rudgley, 2000). Indeed, similarly to the Greeks, the Northern Europeans gave the name “alruna” to their visionary seeresses, in common with the German name for mandrake, “alraune,” both of which stem from “rune,” the Germanic divinatory letter system (Müller-Ebeling, Rättsch, & Storl, 2003). No doubt, the traditional Northern European practice of pharmacologically accessing visionary states all but died out with the witches during the Inquisition, between the fourteenth and seventeenth centuries (Grob & Harman, 1995). It is probable that a combination of changing concepts of illness, the development of a sedentary, politically integrated society, and the influence of the Inquisition or colonization were responsible for the virtual disappearance of the traditional indigenous use of psychoactive plants for paranormal purposes in Europe and North America.

At the end of the 19th century, pioneering psychological explorers in the West rediscovered the vision-inducing qualities of novel plant substances, such as mescaline (Ellis, 1898), whereas others explored new synthetic visionary chemicals like nitrous oxide (James, 1902), with some early psychical researchers dabbling in both (Dunbar, 1905). By the middle of the 20th century the Swiss chemist Albert Hofmann had discovered LSD—experiencing its OBE-inducing properties—and isolated, named, and synthesized psilocybin and psilocin, the psychoactive derivatives of the visionary

Psilocybe mushroom genus (Hofmann, 1983; Luke, 2006). The ascribing of the word psi to psychic phenomena during this period, however, may only be a coincidence. By the turn of this millennium there were around 200 psychedelic compounds known to science, a figure estimated to likely rise to 2000 compounds by the year 2050 at the current rate of discovery, increasing exponentially by a factor of ten every fifty years, starting with the two that were known in 1900 (Shulgin, 2004, 2010). Despite the rapidly upwards bending curve of Shulgin’s formula, current quantities may even exceed it, as a good guesstimate puts the number of *potentially* psychedelic compounds now known to man at about 2000 (J. Hanna, personal communication, August 12, 2012), given that there are something like 1300 documented phenethylamine compounds *alone* (including substances like mescaline, MDMA, & 2CB) known at the current time (Shulgin, Manning, & Daley, 2011), though they may not all be effectively psychoactive and have not been sufficiently tested as yet. However, a conservative estimate would put the number of known, tried, and tested psychedelics at between 250 (J. Hanna, personal communication, August 12, 2012) and 300 to 400 (Shulgin, 2010). Furthermore, a more recent projection puts the total number of undiscovered drugs (not necessarily psychedelic) at 1×10^{60} (Reymond & Awale, 2012), more than visible stars in the sky, and so Brown (2012b) anticipated a near limitless number of psychedelic compounds to arise, especially when factors of nanotechnology, neurostructural engineering, and other technological advances are additionally considered. Nevertheless, Brown’s projection is purely speculative, but it is safe to say that humans have not yet discovered all the psychedelic substances that will ultimately be available, and that there may be many more to come, and, with each one offering a different type of ASC, there remain many states yet to be discovered. Brown (2012b) even fancied that specific psi-inducing psychedelics may be intentionally engineered in the future.

2.2 Personal Views and Experiences

Since the discovery of psychedelic compounds by the academic community and their popularization among the intelligentsia by the novelist Aldous Huxley (Smythies, 1960), there has been a steadily growing number of reports of paranormal experiences occurring with the use of these compounds. Several parapsychologists and psychical researchers, primarily from the 1950s and 1960s when psychedelic research

was at its peak, have endorsed the research of psi with psychedelics (e.g., Assailly, 1961; Broad, 1962; Hoffer, 1961a, 1961b; Johnson, 1955; Kern, 1964; Laidlaw, 1961; Paterson, 1961b; Price, 1948; Thouless, 1960; Tibbs, 1963; West, 1965). Even J. B. Rhine, the father of modern parapsychology, ran some informal psychedelic sessions in 1961 at the Rhine Research Centre in Durham with the then Harvard psychologists Timothy Leary and Richard Alpert (Black, 2001; Horn, 2009; Stevens, 1988), although there was apparently too much spontaneous laughter erupting for anyone to credibly test for anything (S. Abrams, personal communication, August 14, 2006; S. Krippner, personal communication, January 19, 2006).

Notably, many other parapsychologists have reported personal ESP experiences with the use of LSD (Cavanna, 1961; Garrett, 1961b; Millay, 2001; Osmond, 1961a; Servadio, in Alvarado, 1995), peyote/mescaline (Langdon-Davies, 1961; Millay, 2001; Osmond, 1961a), psilocybin (Cavanna, 1961; Krippner, 1967; Millay, 2001) *Amanita muscaria* (Puharich, 1962), and ayahuasca (Severi, 1996, 1999). Krippner's apparent precognitive vision of President Kennedy's assassination while on psilocybin serves as a good example (Krippner, 1967, 2006a). Though, of course, merely consuming a psychedelic is no guarantee that an experience of ESP will follow, as Price (1964) aptly demonstrated self-experimenting with mescaline. However, other psychical researchers, sometimes following their own experiences, have noted the apparent tendency for ESP production with the use of psychedelics, including no less than four Parapsychological Association presidential addresses (Dean, 1967; Heywood, 1978; Hastings, 1973; Luke, 2010b; Radin, 1989; Servadio, 1961; Stevenson, 1981). Furthermore, some have recommended that other psi researchers personally explore psychedelic states of consciousness to aid in their understanding of the concept of psi (Cavanna, 1961; Heywood, 1961). The most highly experienced LSD psychotherapist, Stanislav Grof (1980), also advised that an intimate knowledge of the transpersonal realms created by psychedelics is essential for parapsychologists. Personal accounts of ESP have also been reported by leading psychedelic mycologists (Stamets, 1996; Wasson & Wasson, 1957).

Beloff (1968) asserted that greater reporting of ESP on college campuses would have been evident if drugs induced psi particularly, to which Tart (in Beloff, 1968) replied that many students took paranormal

events in conjunction with psychedelics very matter-of-factly, due to their prevalence. This point was further echoed by the suggestion that users of psychedelic drugs frequently report vivid ESP experiences but that they remain largely unpublished (Stafford & Golightly, 1967). Yet, Heywood (1961) found several incidences of psi with LSD within the "well-evidenced" SPR spontaneous-case collection. However, more recently, Vayne (2001), echoing Tart, has suggested that among practiced users of psychedelics, dubbed *psychonauts*, the telepathic experience is so common that it is hardly remarked upon. Luke (2004c) agreed with Vayne but further offered that, even so, many (less well-evidenced) anecdotal reports could be found on contemporary resources on the internet. Psychedelic drug information sites (such as www.lycaem.org and www.erowid.org) have amassed a large online archive of experiential psychedelic reports, among which are accounts of ESP experiences with substances as diverse as ketamine, *Salvia divinorum*, *Psilocybe* mushrooms, ayahuasca analogues, and 3,4-methylenedioxymethamphetamine (MDMA, or ecstasy) mixed with baby Hawaiian woodrose seeds, a natural source of lysergic acid (Anonymous, 2004a, 2004b, 2004c, 2004d, 2004e, 2005).

Similar reports of frequent ESP experiences with such substances from within the psychedelic community are also available elsewhere in the literature (e.g., Eisner, 1989; Gaskin, 1990; Krippner, 2006a; Krippner & Fersh, 1970; Lilly, 1967, 1978; McKenna, 1991; McKenna & McKenna, 1994; Millay, 1999, 2004a, 2004b, 2005, 2006, 2010; Osmond, 1968; Saunders, 1993; Scully, 2010; Stevens, 1989; Turner, 1994; Wyllie, 1999; Zelnick, 2005). Indeed, the notion of experiencing a telepathic group mind, or "tribal telepathic understanding" (Nuttall, 1970, p. 249) through "tripping" became so prevalent among the psychedelic culture of the 1960s that prospective psychedelic users were told they might expect such an experience (Leary, Metzner, & Alpert, 1964) and commonly it became known as "grokking" (Stevens, 1989; Wolfe, 1971). Currently, the same notion is still apparent among psychedelic users (e.g., MoDu, 2003) and the largest public-edited internet encyclopedia indicates that ESP-type phenomena are a common fourth-level experience on a five-level spectrum of psychedelic experience intensity (Wikipedia, 2005), though clearly this is not academically evidential but rather an indication of commonly held notions, among Wikipedia editors at least. Although notably,

PK is seldom reported in the literature, save for the odd exceptional report (e.g., Shulgin, 2004), and it has been suggested among occultists that chemical agents are only useful for “receptive” magic/psychic purposes, such as traveling clairvoyance, divination, and spirit evocation or invocation (e.g., Carroll, 1987; Vayne, 2001; Xeper, 2005). The use of psychedelics for such magical purposes now appears to be growing in popularity among occultists and is seemingly far more prevalent within the literature than it used to be (e.g., see Louv, 2005; Kent, 2010).

2.3 Clinical

A review of the literature from the clinical setting reveals surprisingly few published psychiatric inpatient reports, although there are some epidemiological studies (see section 3.2.1) relating to psychedelics and paranormal experience. This may be due to any number of factors, such as the lack of any such spontaneous phenomena within the psychiatric population, or the medicalization within psychiatry of paranormal experiences as delusion or hallucination. Indeed, Mogar (1965) noted that early psychoanalytic and behaviorist researchers using LSD were prejudiced against ESP phenomena. Yet, there is one study, a psychiatric-interview survey with users of LSD (Abraham, 1983), that reports precognitive experiences as one of the symptoms of the LSD flashback phenomena, now called hallucinogen persisting perception disorder (American Psychiatric Association, 2000).

On the other hand, there are many accounts of paranormal experiences with psychoactive drugs from within psychedelic psychotherapy, particularly that involving LSD (Grof, 1975, 1980, 1990, 2001; Harman, 1963; Holzinger, 1964; Levine, 1968; Masters & Houston, 1966; Pahnke, 1968) and psychedelics in general (Eisner, 1995; Laidlaw, 1961; Stolaroff, 2004). Tart (in Levine, 1968), quoted the International Foundation for Advanced Study, which in the course of between 300 and 400 psychedelic therapy sessions has reported the incidence of ESP with strong evidence seven times, which is a considerably higher incidence of psi than that reported to have occurred in non-psychedelic psychotherapy (Tornatore, 1977a, 1977b). As one specific example of this line of research, the percentage of clients reporting telepathic communication during LSD-assisted therapy changed from 49% in the first psychotherapy session to 80% in the second session (Blewett & Chwelos, 1959).

The psychiatrist Stanislav Grof, generally credited with the most expertise in this field having conducted

more than four thousand psychedelic therapy sessions over a two decade period, reported observing patients experiencing OBEs, ESP (particularly precognition), accurate remote viewing, and space-time travel on a daily basis (Grof, 1975, 1980, 2001). Despite acknowledging that there was a danger of data contamination and a difficulty of verification, Grof (1980) contended that the occurrence of ESP was relatively frequent and that LSD could induce states conducive to an unusually high incidence of ESP (Grof, 1975). Often the reports of telepathy could have been merely self-deception, but other times there was apparently objective verifiable communication at work (Grof, 1980). Grof further found the common occurrence of OBEs, both within and independent of this physical plane, often with traveling clairvoyance and clairaudience. There were also occasional NDE experiences reported (Grof, 1994). Most frequent was the occurrence of extraordinary coincidences or synchronicities, yet only among those clients who experienced transpersonal breakthroughs within the psychedelic session (Grof, 1980). Finally, Grof (1990) also reported two events, rare in the literature, of clients under LSD who experienced visions of the dead that provided apparently unknown, but verifiable information. One such event occurred to the wife of the late psychedelic-psychical researcher Walter Pahnke. During an LSD session, Mrs. Pahnke had a vision of her dead husband who requested her to return a book concealed in her attic. Although she claimed to have had no prior knowledge of the book, she managed to locate and return it. Of course, it is possible that the knowledge of the book already lay in her subconscious (Stokes, 1997).

One of the most astonishing reports of psi occurring within the clinical setting came from the psychiatrist Paul (1966), who reported taking the mushroom *Amanita pantherina*. This was her only psychedelic experience and was part of an ESP experiment being conducted by Puharich (see Puharich, 1959, 1962). Paul had an incredibly intense trip, complete with apocalyptic visions followed by salvation through overwhelming love, and was unable to complete the experiment. However, on return to her practice, two of her clients reported extraordinary events at the time Paul had been tripping. One patient had amnesia for the same three hours on Friday evening following the consumption of his first-ever (non-psychedelic) mushroom meal, and upon remembering his experience,

recalled that he had experienced the same apocalyptic fears as Paul had experienced. The other patient could not remember what she had done that evening but on investigation discovered that she had gone to the house of a secret lover and waited outside, love-struck, for two hours, but was prevented from taking any irrational action by her friend, who later informed her of the event. Both patients had a strong bond with the therapist and had expressed an interest in ESP. Paul interpreted the event as a case of spontaneous telepathic tripping, complete with amnesia on the part of the receivers, perhaps demonstrating a certain unpredictability in the experimental induction of psi with psychoactive drugs.

2.4 Evaluation of Field Reports

In summary, there is a wealth of reports of the spontaneous occurrence of ostensibly paranormal phenomena with the use of psychedelic substances. Yet this does not mean that these experiences are necessarily genuine paranormal events: Aside from the usual arguments for and against spontaneous phenomena as evidence for the paranormal (e.g., see Pekala & Cardena, 2000; Stokes, 1997), the fact that respondents had consumed a visionary substance may be reason to question their perception and interpretation of the experiences, at least for those cases which are not substantiated by evidence or independent observers. Nunn, Rizza, and Peters (2001) have found that cannabis use is related to delusional ideation, although it is not directly related to delusional conviction; however, the relationship between psychedelic use and the propensity for false memory and poor probability judgments has not been established (Kapur & Seeman, 2002; Wilson & French, 2006). Furthermore, Shanon (2003) pointed out that the usual definitions of hallucination in the psychological literature fail to adequately encompass the diverse and complex nature of experiences that occur with psychedelics, and nor can assumptions be made about the ontology of such psychedelic-induced visions. Indeed, many people who have had paranormal psychedelic experiences reported how real the experience seemed, often being felt as more real than the ordinary waking experience (e.g., Hofmann, in Grof 2004; Shanon, 2003; Strassman, 2001). It has also been reported that psychedelic-induced mystical experiences feel no less real than previous spontaneous mystical experiences (Doblin, 1991; Exman, 1961; Greeley, 1974; Griffiths, Richards, McCann, & Jesse, 2006; Pahnke, 1966; Pahnke & Richards, 1966; Roberts, 2001; Smith,

2000; Smith & Tart, 1998; Watts, 1968), the same being true for NDEs (Jansen, 2001).

In defense of drug-induced altered states, Devereux (1997) has suggested that, "it is a culturally engineered cliché to dismiss such states as being somehow delusional" (p. 243). Furthermore, Smythies (1960, 1983) has taken issue with the concept of dulled and hallucinatory psychedelic states and insisted that these hallucinations are more than just images from a poisoned brain. Additionally, LeShan (1968) has mocked the assumption that ordinary reality is somehow more real than the psychedelically induced ASC, whereas Tart (1977) questioned how natural is the ordinary state of consciousness, built through a lifetime of socialization. Tart (1972, 1998, 2000, 2001) further questioned the idea that rationality only occurs in the ordinary state, and proposed the establishment of state-specific sciences (for further discussion see Walsh, 2003)

No matter what their epistemological status, however, these experiences do offer a phenomenological spectrum of evidence around which to orient further research. Furthermore, the similarity in reports between those occurring spontaneously in exploratory, therapeutic, and accidental contexts, and those induced intentionally in the traditional ritual context, gives credence to the shamanic use of these substances for supposedly paranormal purposes. By contrast, other traditional psychoactive substances, such as alcohol, coffee, and cocaine are not contemporaneously reported to induce spontaneous paranormal phenomena, and neither are there folk beliefs that suggest they do. Nevertheless, Rogo (1975) wondered whether the occurrence of psychedelic-induced ESP experiences exceeded that of normal ESP experiences, a question that may be partially answered by survey research.

3. Surveys

When reviewing the survey research one immediately notices two trends. First, virtually all of the surveys reported here were published since the 1970s, after the period when most psychedelic research was conducted and the unlicensed use of these drugs mostly became illegal in Europe and North America. Secondly, most of the following surveys have primarily focused on paranormal experiences or belief and have only recorded drug use information as one of many possible co-variables, often omitting to distinguish among the different substances. Only a few studies (DeGracia,

1995; Kjellgren & Norlander, 2000; Tart, 1993; White, 1997) have approached users of psychoactive substances as the target sample.

3.1 Surveys of Belief in the Paranormal

Investigating belief in the paranormal with the Mental Experience Inventory (MEI), Kumar, Pekala, and Cummings (1992) additionally utilized a sensation seeking scale that included a yes/no question about recreational drug use. Of an opportunity sample of 574 psychology students, drug users reported greater paranormal and psi-related beliefs; however, results were reported in terms of the larger sensation-seeking measure as significant main effects. In a more direct assessment of the relationship, Gallagher, Kumar, and Pekala (1994) transformed the MEI into the Anomalous Experiences Inventory (AEI; Kumar, Pekala, & Gallagher, 1994), adding a Drug-Use subscale to complement the other four subscales relating to Anomalous/Paranormal Belief, Experience, Abilities, and Fear. The AEI was successfully validated against other paranormal experience and belief scales using an opportunity sample of 400 psychology students. The AEI Drug-Use subscale correlated positively, although only very weakly, with the AEI Anomalous/Paranormal Beliefs subscale ($r = .16, p < .01$) and with Tobacyk's (1988) paranormal belief subscales: Belief in Psi ($r = .10, p < .05$), Belief in Witchcraft ($r = .12, p < .05$), Belief in Superstition ($r = .11, p < .05$), Belief in Spiritualism ($r = .17, p < .01$), Belief in Extraordinary Life Forms ($r = .13, p < .01$), but not Belief in Precognition. Drug use correlated negatively with Traditional Religious Beliefs ($r = -.14, p < .01$).

In addition, some items in the AEI Drug-Use subscale correlated with Tobacyk's (1988) Revised Paranormal Belief Scale, although only very weakly. Overall, paranormal belief correlated negatively with heroin use ($r = -.12, p < .05$) but positively with the use of LSD ($r = .11, p < .05$) and mind-altering substances ($r = .15, p < .01$). There were no significant correlations found for marijuana, cocaine, or alcohol. The same correlations were found between the AEI Anomalous/Paranormal Belief subscale and some AEI Drug-Use subscale items (mind altering substances, $r = .18, p < .001$; LSD, $r = .15, p < .01$), but also including marijuana ($r = .16, p < .01$), but not heroin. Additionally, for all categories of drugs except heroin there was a small significant negative correlation with the fear of psi (from $r = -.12$ to $-.24$), whereas alcohol use correlated positively with fear of psi ($r = .13, p < .05$). The lack of a consistent significant

correlation between paranormal belief and marijuana use runs counter to Tart's (1993) finding that 76% of marijuana users believe in ESP. This difference may be due to cohort differences, such as culture and their reasons for using marijuana, or that Tart's marijuana sample were mostly also experienced with LSD (72%, with 36% classified as heavy psychedelic users; Tart, 1971), a drug that Gallagher et al. (1994) did find to be related to paranormal belief. Furthermore, it should be noted that the items of the AEI Drug-Use subscale only register nominal yes/no responses, whereas more sensitive ordinal drug-use measures would have been expected to demonstrate stronger correlations, if the relationships were linear. Nevertheless, correlations from this study reported here are uncorrected and should be accepted with some caution because of the use of multiple inferential tests.

Pekala, Kumar, and Marcano (1995a, 1995b) sought to find a relationship between the subscales of the AEI and measures of hypnotic susceptibility and dissociation on a similar opportunity sample of 413 psychology students. Supporting the Gallagher et al. (1994) study findings, the Drug-Use subscale correlated positively, and somewhat more strongly, with Anomalous/Paranormal Beliefs ($r = .25, p < .001$) as well as negatively with Fear of the Anomalous/Paranormal ($r = -.14, p < .01$), although no breakdown of the results for the Drug-Use subscale was given for the different substances. In addition, overall drug use was found not to correlate with dissociation or hypnotic susceptibility, although marijuana was a special case (see Pekala et al., 1995b).

A later opportunity sample of 107 students (Houran & Williams, 1998) were surveyed using the AEI to explore the equivocal relationship between belief in the paranormal and tolerance of ambiguity. Further support was demonstrated for the small but significant relationships between drug use and anomalous/paranormal belief ($r = .22, p < .05$) and fear of the anomalous/paranormal ($r = -.18, p < .05$). Tolerance of ambiguity was found to correlate minimally with both paranormal belief and drug use ($r = .23, p < .05$), and more so with psychedelic drugs (LSD, marijuana), rather than cocaine, alcohol, or heroin.

Simmonds and Roe (2000) used the AEI in relation to schizotypy, temporal lobe lability, and personality correlates with an opportunity sample of 145 psychology students. Similarly to previous surveys,

there was a small significant correlation between drug use and anomalous/paranormal belief ($r = .20, p < .05$). Drug use was also found to relate to complex partial epileptic signs (CPES) as measured by a subscale of the Personal Philosophy Inventory developed by Persinger and Makarec (1987), which they had predicted would be the case. However, it is apparent that several items of the CPES are consistent with experiences often reported in other ASCs, drug-induced or otherwise, so such a correlation might be expected anyway. Furthermore, neither of these correlations remained significant when the alpha level was recalculated using a Bonferroni correction for multiple tests, although the relationship between drug use and belief remains consistent with these other surveys, so this correlation is probably genuine, albeit small.

A later survey (Thalbourne, 2001) using the AEI sought to replicate the relationship found by Gallagher et al. (1994) between drug use and belief in the paranormal, and in addition investigated this relationship with respect to transliminality and to kundalini experiences. Transliminality was measured using the 29-item Transliminality Scale (Thalbourne, 1998), before it was rasch-scaled for age and gender bias. Using an opportunity sample of 125 psychology students, Thalbourne found a small significant positive correlation between the AEI subscales: Drug-Use and Anomalous/Paranormal Belief ($r = .24, p < .01$), supporting previous findings. There was a suggestive but non-significant negative correlation between drug use and fear of the anomalous/paranormal. There was also a significant positive correlation between drug use and transliminality ($r = .29, p = .001$) and the New Age Philosophy (NAP) subscale of the Tobacyk's (1988) Revised Paranormal Belief Scale ($r = .23, p < .01$). There was, however, no significant correlation with Tobacyk's Traditional Paranormal Beliefs (TPB) subscale, and reanalysis of Thalbourne's data by Houran and Lange (2001) found the difference in reports of drug use in relation to NAP and TPB to be significant ($p < .001$, uncorrected for multiple analyses), reinforcing their argument for two distinct paranormal belief groups. Furthermore, drug-use did not correlate with Thalbourne and Delin's (1993; non-rasch scaled) Australian Sheep-Goat Scale, a different paranormal belief scale (Thalbourne, 2001).

These findings partially support Gallagher et al.'s (1994) small positive correlation of drug use with the Tobacyk Belief in Psi subscale, yet to what extent is

not discernable because Thalbourne's (2001) results were reported in terms of just two collapsed subscales rather than the full seven. The same is also true of correlations between Anomalous/Paranormal Belief and the Drug-Use subscale, although of note, very few respondents used heroin ($n = 3$) and cocaine ($n = 6$) compared to LSD ($n = 26$) or marijuana ($n = 61$), indicating that correlations with those reporting drug use ($n = 57$, obviously some of the respondents did not consider marijuana to belong to this category) were largely in terms of psychedelics rather than other drugs.

A *post hoc* analysis of the relationship between transliminality and drug use revealed there were small, but significant, positive correlations (ranging from $r = .20$ to $.27$) between transliminality and all of the AEI drug-use categories (mind-altering substances, marijuana, LSD, cocaine, and heroin) except for alcohol. Thalbourne (2001) suggested that this relationship may be due to the need to use drugs to escape the unpleasant aspects of the transliminal state, or that drug use may be a means of promoting the psychic phenomena of which high transliminal scorers may have become deprived. Both of these hypotheses might prove to be somewhat correct, but only for differing substances. It is highly unlikely that psychedelic drugs are used to escape the transliminal state because these substances are actually more likely to cause the opposite effect, although some non-psychedelic drugs, such as opiates/opioids might help to escape transliminality. Indeed, Vayne (2001) has suggested psychedelics are expressly used to access liminal states. Alternatively, Thalbourne has speculated that an "openness to experience" trait underlies the relationship between drug use, transliminality, and paranormal experience.

In a follow-up survey (Thalbourne & Houran, 2005), an opportunity sample of 200 psychology students completed the Revised Transliminality Scale (Lange, Thalbourne, Houran, & Storm, 2000), and an extended version of the AEI Drug-Use subscale, which included two extra items, one relating to ecstasy (MDMA) and one relating to speed (amphetamines). As previously, though somewhat less so, drug use was found to correlate marginally, although significantly, with transliminality ($r = .21, p < .005$, one-tailed). Furthermore, scores on the Oxford Happiness Questionnaire demonstrated that transliminality was not related to happiness and that the majority of high transliminals were happy, offering support to McCreery and Claridge's (1995)

notion of the pathology-free “happy schizotype” prone to paranormal experiences. However, unhappy high-scoring transliminals reported significantly more drug use than happy high-scoring transliminals ($t = 1.98, n = 77, p < .05$), somewhat supporting Thalbourne’s (2001) speculation that transliminality, akin to psychosis, can be a unhappy state that such people attempt to escape from with drugs. Unfortunately, Thalbourne and Houran’s findings sweep several different types of drugs—including psychedelics, narcotics, stimulants, and alcohol—together under one umbrella, revealing very little about which of these very different drugs relate to each particular syndrome. For instance, given the system of scoring in this study, it is easily possible that the use of just one drug, such as alcohol, entirely accounts for the differences in substance use between happy and unhappy transliminals, and further research begs more specific analyses.

Here Metzner (2005) pointed out that, aside from merely varying in how they activate or relax one’s nervous system, psychoactive drugs may also be classified along a hedonic continuum of pain and pleasure, reflecting Thalbourne and Houran’s (2005) simplified notions about drugs and the quest for happiness. However, taking a transpersonal approach, Metzner further indicated that drugs may also be considered along a third dimension of consciousness expansion and contraction, such that psychedelics are essentially conscious expanding, whereas opiates, alcohol, cocaine, and amphetamines, being focally restrictive and addictive, are consciousness contracting. Thus, a range of drugs can be used when seeking stimulation, sedation, or happiness, but only specific drugs, psychedelics, will lead to consciousness expanding experiences, and perhaps even ostensibly paranormal ones too. Arguments may prevail over precise definitions and classifications here, but the point remains that psychological research would most likely benefit from a recognition of the experiential differences between drugs rather than just a recognition of their legal status and a crude categorization of them based only on that (Friedman, 2006).

3.2 Surveys of Paranormal Experiences.

3.2.1 Psychiatric epidemiological samples.

Recently, a wealth of epidemiological psychiatric research has surveyed reports of cannabis use and schizotypal symptoms, finding fairly consistent correlations between them (for a review, see Castle & Murray, 2004). Items relating to telepathy and other kinds of thought

broadcasting have been often included, and it deserves mentioning that the subscales in which these items appear tend to correlate with cannabis use (e.g., Johns et al., 2005). However, although relevant, this research is largely indirect to the present review as incidence rates for specific types of paranormal-like experiences are rarely reported, but rather form part of more general subscales.

More specifically, in a quasi-experimental design with 196 university students, Nunn, Rizza, and Peters (2001) found that cannabis use, but not alcohol use, was positively related to unusual experiences (such as the possession of special, almost magical powers), but use of either drug was unrelated to depression or anxiety. Furthermore, cannabis use was related to delusional ideation but not distress, further supporting the notion of the happy schizotype, although cannabis and alcohol use combined was related to delusional conviction. Nunn et al. suggested that schizotypal traits may predispose subjects to cannabis use or that cannabis use may result in high schizotypy scores. Although some prospective studies have been conducted in this area, there are often so many possible confounding factors involved in such research that directions and sources of causality remain entirely speculative (see Castle & Murray, 2004).

3.2.2 Clinical populations. Finding numerous paranormal experiences reported in a DXM-users survey (see section 3.2.4 to follow), White (1997) sought to explain the survey results in terms of temporal lobe dysfunction (TLD). Tentative indirect support comes from a survey of a convenience sample of 100 neuropsychiatric patients where a positive recreational drug-use response was used, among other measures, as a predictor of TLD, with TLD correlating well with reports of subjective paranormal experience (Palmer & Neppe, 2003). However, the recreational drug-use measure utilized a blanket definition that lumped together the use of a variety of different psychoactive drugs and moreover treated drug use alongside brain injury as causative factors in TLD, although there is no clear reasoning given for doing this. In this study, recreational drug use was taken to be either of the following: prolific marijuana use; the three times use of hallucinogens, LSD, mescaline, or PCP; or six months’ use of heroin or amphetamine. However, it was reported in a later paper that, when gender was controlled, there were no relationships between subjective paranormal experiences and any of the categories of drug use or

brain injury with this sample (Palmer & Neppe, 2004), although results may be due to underpowered statistics with only six respondents in this group.

3.2.3 General and student samples. Several major surveys of psychic experiences have included questions regarding the use of psychoactive drugs. The first series of surveys of this nature utilized a psychic experiences questionnaire created by Palmer (1979) for use in a randomly distributed postal survey. The questionnaire was completed by 354 townspeople (T) and 268 students (S), treated as different samples, with response rates of 51% and 89% respectively. Those who acknowledged the use of mind-expanding drugs also responded positively to being an ESP agent, having a recurrent spontaneous PK experience (T only, $p < .01$, although Palmer urged caution with these two results because of low responses), haunting experience (T only, $p < .05$), aura vision (S, $p < .05$), and OBEs (S, $p < .01$). Despite reported drug-use differences between samples, equal proportions from each group (T: 29%; S: 28%) reported psi experiences actually occurring during use. Kohr (1980) criticized the analysis for not reporting the chi-squared statistic and for using an underpowered test.

Kohr (1980) surveyed a special sample of self-selecting respondents ($n = 406$) from the Association for Research and Enlightenment, an organization whose membership represented those intrigued by the legacy of the renowned psychic and Christian mystic Edgar Cayce. Using Palmer's (1979) questionnaire, Kohr failed to find any association between subjective paranormal phenomena and the use of mind-expanding drugs, although figures for drug use were not actually reported. It is suspected that the drug use statistics were not reported in this study because its incidence was quite low. The Kohr sample was both older (61% over 40 years) and markedly more religious (40% = very religious) than the Palmer samples (over 40 years, T = 51%, S = 0%; very religious, T = 8%, S = 9%), and, as stated earlier, Gallagher et al. (1994) found traditional religious beliefs to correlate negatively with drug use. Roney-Dougal (1984) surveyed a different special sample, attendees at an occult conference, about their psi experiences. Of the 33 respondents, 30 (91%) reported psi experiences, of which 12 (40%) reported the use of mind-expanding drugs. This indicates both the slightly higher reported use of psychedelics (36% of the sample) and the greater reporting of paranormal experiences among occultists compared to other populations, though this observation may not be reliable.

Another survey (Usha & Pasricha, 1989a, 1989b) modified Palmer's (1979) questionnaire, particularly the demographic questions, to suit the needs of an Indian student population ($n = 328$; response rate 79% using opportunity sampling). Use of mind-expanding drugs was reported by 11%, who were also significantly more likely to be Hindu ($p < .05$) or male ($p < .01$), probably largely due to the sacred use of marijuana among many Indian men, mostly Hindus. Of those reporting drug use, 18% reported psi experiences during the drug experience, somewhat less than Palmer's 28-29%. Similar to Palmer's work, the use of mind-expanding drugs was positively associated (chi-squared) with OBEs ($p < .01$), and additionally with waking ESP ($p < .05$), apparitions ($p < .01$), and déjà vu experiences ($p < .01$). Except for apparitions, these three experiences tended to correlate significantly with other psi-relevant experiences such as lucid dreaming, meditation, and mystical experiences. None of the studies using Palmer's 46-item questionnaire (Palmer, 1979; Kohr, 1980; Usha, & Pasricha, 1989a, 1989b) made any corrections for multiple inferential analyses, so results should be accepted with some caution.

Returning to the surveys of paranormal belief among students reviewed in the previous section (3.1), these studies also investigated anomalous/paranormal experiences, and Kumar et al. (1992) found drug users reported significantly more of these. The later series of five surveys (Gallagher et al., 1994; Houran & Williams, 1998; Pekala et al., 1995a, 1995b; Simmonds & Roe, 2000; Thalbourne, 2001), utilizing the Anomalous Experiences Inventory (Gallagher et al., 1994), each reported a significant positive relationship between the Anomalous/Paranormal Experience and Drug-Use subscales. Correlations ranged from $r = .13$ (Gallagher et al., 1994) to $r = .29$ (Thalbourne, 2001), and Pekala et al. (1995a) additionally found that drug use was positively correlated with a Shamanic or Encounter-like Experiences subscale ($r = .23$; $p < .001$), which included items relating to OBE and contact with spirits. Furthermore, Pekala et al. (1995b) reported correlations between the use of certain substances and subjective psychic experiences occurring under the influence of drugs, although results were only given for high hypnotically susceptible participants ($n = 56$; for the AEI Drug-Use subscale $r = .57$, $p < .01$; mind-altering substances $r = .34$, $p < .01$; marijuana use $r = .30$, $p < .05$) and high dissociative participants ($n = 59$) (Drug-

Use subscale $r = .58, p < .01$; mind-altering substances $r = .30, p < .05$; LSD $r = .41, p < .01$; cocaine $r = .34, p < .01$.

Thalbourne (2001) also found a relationship between drug use and kundalini experiences ($r = .28, p < .01$) measured using the 32-item Kundalini Scale (Thalbourne & Fox, 1999). It was suggested by Thalbourne that the relationship between paranormal experience, drug use, and the kundalini experience either indicates that certain drugs may trigger a kundalini experience or that the use of drugs may alleviate it. Alternatively, it was proposed that the relationship between these factors may also indicate a need for non-standard sensations, or that the physiological aspects of the kundalini experience were being misinterpreted as paranormal. This final supposition is not consistent with long established tantric teachings that warn of genuine psychic kundalini experiences called "siddhis" (e.g., Satyananda, 1996). Furthermore, as an alternative to Thalbourne's interpretations, the results may simply be due to an overlap of subjective psychic experiences common to both the kundalini and the drug experience, as suggested by Naranjo (1987) and demonstrated by DeGracia (1995) in the following section (3.2.4). Perhaps the activation of the pineal gland and its chemistry, as supposed by Roney-Dougal (e.g., 2001) and Strassman (2001), underlies both factors, resulting in subjective paranormal experiences. Indeed, Roney-Dougal (1989, 1991) noted that the pineal gland is considered by some yogis to be primary in the control of kundalini psi experiences, and there is other putative evidence (see section 1.1) that suggests such a link.

3.2.4 Psychedelic-users samples. DeGracia (1995) conducted a self-selecting internet survey with 61 experienced psychedelic users about their experiences of kundalini-like phenomena. Of those responding, 58% had used psychedelics more than 20 times, most frequently LSD (95%), and psilocybin (82%). The respondents revealed a large overlap between reported psychedelic experiences and those experiences commonly arising in spontaneous kundalini awakenings. Of particular interest, psychedelic drug users frequently reported an enhanced sense of empathy (75%), OBEs (40%), intuition, psychic powers, and the recall of past lives (no statistics given). That the use of psychedelics is related to both paranormal and kundalini experiences is further supported by the survey findings of Thalbourne (2001), as discussed in section 3.2.3

One of the first surveys (Ditman et al., 1969) to explore paranormal experiences with psychedelics

randomly gave 99 alcoholics receiving treatment one of the following three drugs: LSD (the only psychedelic of the three), methylphenidate (a dopaminergic stimulant, also known as Ritalin), or chlordiazepoxide (the first benzodiazepine, a sedative/hypnotic). Those taking LSD reported significantly more of the paranormal-type phenomena, having more experiences of transcending time and of having an OBE supporting findings with the AEI that dopaminergic stimulants (i.e., cocaine) are not conducive to paranormal beliefs.

A survey (Tart, 1970, 1971, 1993) conducted in California in 1970 with 150 experienced users of marijuana recruited by discrete snowball sampling found even higher reports of paranormal experiences than the student and general samples discussed above (section 3.2.3). The marijuana-user sample consisted of 76% students, and 72% of the sample had tried LSD, although only 7% had tried hard narcotics (e.g., presumably heroin). With regard to experiences under the influence of marijuana, 69% reported telepathy (rising to 83% in a later sample), 32% reported precognition, 13% PK (defined as magical operations that cause an effect), and 50% reported seeing auras, with heavier users reporting significantly higher frequencies of these experiences in each category (Tart, 1971). OBEs were reported by 44%, with 53% of this group reporting a least one OBE under the influence (Tart, 1971). In comparison, a later survey (Luke & Kittenis, 2005) found that somewhat smaller percentages of experienced cannabis users (i.e., those using it often or more frequently, $n = 60$) than in Tart's study reported the occurrence of telepathy (20%), precognition (12%), psychokinesis (12%), and auras (22%) while under the influence. Yet, the percentage reporting OBEs either with or without cannabis (62%) was larger than in Tart's study (44%). The use of Californian students at the epicentre of the psychedelic scene at that time may at least partially account for Tart's heightened findings, perhaps because these respondents were more psychedelically active and responsive, and consuming higher quantities and grades of cannabis than in the 2005 survey.

A survey, similar to DeGracia's (1995) investigation of transpersonal drug experiences, was conducted in Sweden with an anonymous snowball sample of 16 experienced psychedelic drug users (Kjellgren & Norlander, 2000). Of those returning questionnaires (94%), 37% had used psychedelics more than 20 times, mostly LSD (75%) and psilocybin (75%).

Respondents indicated the occurrence of OBEs (53%), telepathy (60%), the loss of the sense of a discrete self (47%), psycho-geographical traveling (62%), contact with entities (20%), time-travel (40%), animal shape-shifting (53%), and visions of mythological beings (33%), all under the influence of psychedelics. All respondents reported having some psi experiences, with heavier users and, similarly to Usha and Pasricha (1989a, 1989b), those practicing mind-expanding, spiritual, or ritual techniques or preparation reported more of these experiences than infrequent users. However, significant differences in the quantity of experiences between low and high users only occurred for the experiences of telepathy ($U = 12, p < .05$, two tailed) and gaining knowledge of oneself, and for a combined index of all paranormal experiences ($U = 7, p < .05$), though uncorrected for multiple analyses. This partially supports the hypothesis that subjective paranormal experiences occur more frequently during the use of psychedelics, although alternative explanations are possible. Furthermore, 31% of the sample reported that their views on life after death have been influenced by their use of psychedelics, and 44% had become less afraid of death through their experiences, although 12% had become more afraid.

In further support of the notion that greater psychedelic use is associated with more paranormal experiences, a limited survey of 67 psilocybin-containing mushroom users found that only 9% of those taking low doses (less than 5 dried grams of *Psilocybe cubensis*) had experiences of telepathy, whereas 28% of those taking higher doses—what McKenna (1991) called a heroic dose—had telepathic experiences (Hurst, 1994).

Of particular interest to the present review are the results of an incidental internet survey (White, 1997) of subjective paranormal experiences with the use of the dextromethorphan (DXM). Commonly used in cough remedies DXM is a synthetic drug that results in similar subjective experiences to other dissociatives, such as ketamine and PCP. White was concerned about the use of DXM and had a “frequently asked questions” report regarding DXM posted on an internet-based psychoactive drug information site (www.erowid.org). The published survey, unfortunately without statistics or demographics, was the product of reports sent to White from people who had used DXM, often unwittingly as a simple cough remedy, and had experienced a number of subjective paranormal experiences. White was surprised at the reports and was originally very reluctant to

take them seriously, until he received so many that he collated, categorized, and published them.

Many of the experiences reported by White (1997) are consistent with experiences common to ketamine use (Jansen, 2001; Corazza, 2002) and include the following: visions of energy ribbons; a disturbing sense of infinity; a sense of presence of a profoundly powerful, loving, and intelligent being (as is also quoted with DMT use, a very different substance—Strassman, 2001); déjà vu; jamais vu; a loss of sense of causality; memory loops; a sense of presence; OBEs (most often to a different dimension but also on the corporal plane outside of one’s body); NDEs; contact with entities, spiritual beings, and other free-floating consciousnesses (also reported by Carpenter, 2006; Xeper, 2005); occasional ESP, including clairvoyance; and the intuitive understanding of complex ideas such as a math student understanding Gödel’s Incompleteness Theorem for the first time. Most of these experiences have since elsewhere been reported in an online user journal, *The DXM Zine* (Gelfer, 2007). It is noted there were no reports of PK, although some felt that they could slightly influence the laws of probability. These reported experiences are independently consistent with a psychiatric inpatient report of an apparently accidental overdosing with a cough remedy containing DXM (Price & Lebel, 2000). Reported symptoms included the experience of observing oneself from outside of one’s body (OBE), becoming “just thoughts,” 360° vision, vision within people, and “delusions” of telepathy, all of which ceased when the DXM wore off.

Taking a more taxonomic approach than earlier research, Luke and Kittenis (2005) sought to determine which of a range of psychedelics are related to which paranormal experiences in particular. The online survey pooled responses from 139 self-selecting respondents recruited via both parapsychology and psychedelic interest groups. The percentage of respondents who had tried an illicit drug even once ($n = 110$) and who reported a psi experience while under the influence (47%) was somewhat higher than the 28-29% and 18% found previously with general and student samples (Palmer, 1979; Usha & Pasricha, 1989a, 1989b), as might be expected from this non-ordinary sample.

The study also corroborated many of the observations made in previous research. For example, supporting Strassman (2001), DMT was widespread in inducing entity contact experiences and OBEs, although

primarily to other dimensions, and like 5-MEO-DMT, DMT commonly gave the experience of dissolving into a universal energy. The hypothesis that DMT is fundamental to the NDE (Strassman, 2001) was partially borne out by the relatively widespread reporting of the, albeit generalized, death-like experiences (dying, rebirth, or memory of a past life) although such experiences seemed to be relatively more widespread with 5-MEO-DMT, as observed elsewhere (Luke, 2005; Roney-Dougal, 2001; Shulgin & Shulgin, 1997).

Reports of “sensing an intelligence or spirit being in an ingested plant or substance” were found to be most widespread where respondents were under the influence of plant-based substances: psilocybin-containing mushrooms, ayahuasca, mescaline-containing cacti, and *Amanita muscaria*, but especially with *Salvia divinorum*, as has been documented elsewhere (Aardvark, 2002; Addy, 2010; Arthur, 2010; Doyle, 2012; Horner, 2012; Miller, 1994; Vayne, 2001). For a discussion of interspecies encounters on psychedelics see Krippner and Luke (2009). Such plant-spirit experiences also occurred with the use of the cannabis plant, although the most widespread experiences with this drug were clairvoyance and OBEs on this plane and, primarily, telepathy, making this substance a prime candidate for ESP research, as has already been advocated by Tart (1993) for a number of reasons. The dissociative DXM is also a potential candidate for further ESP research, particularly collective ESP experiences, supporting earlier reports of psi occurring with its use (Gelfer, 2007; Price & Lebel, 2000; White, 1997). There were also relatively widespread reports of telepathy with LSD and particularly with MDMA, a drug, categorized as an empathogen, that is characterized by its capacity to induce empathic experiences and that has elsewhere been reported to induce telepathic experiences (Brown, 2012a; Eisner, 1989; Saunders, 1993). *Psilocybe* genus mushrooms too demonstrated some relatively widespread capacity to accompany psi experiences of all kinds, particularly clairvoyance, but even PK to some extent. However, possibly because of the more infrequent experience of PK, there did not seem to be any one substance that was related to it, with the possible exception of *Psilocybe* mushrooms, mescaline, and LSD, although none of these convincingly.

In keeping with the previous findings of correlations, ranging from $r = .13$ to $.29$, between the

occurrence of paranormal experiences (including mystical experiences) and the use of all drugs (excluding prescription drugs) as measured with the AEI (see section 3.2.3), the Luke and Kittenis (2005) study also found a positive correlation of $r = .46$, $p < .001$. The greater correlation in this study most likely was due to the use of different sample types, and variations in the questions used. In addition, an overall correlation was calculated between the frequency of paranormal experiences and the frequency of drug use (excluding alcohol and prescription drugs) that gave a small positive value of $r = .31$, $p < .001$, supporting Kjellgren and Norlander’s (2000) and Tart’s (1971) finding that greater psychedelic use is related to more paranormal experiences.

3.3 Surveys and Out-of-Body Experiences (OBEs)

The connection between psychoactive substances and OBEs has received special attention. An inspection of the SPR files led Whiteman (1956) to summarize that approximately a third of “separation” (OBE) cases were initiated by physical conditions, including drugs, although which drugs are not specified. Drug type is clearly of relevance, however, as a study experimentally comparing LSD with Ritalin and benzodiazepine experiences also found that LSD induced a significantly greater degree of OBEs (Ditman et al., 1969). Since the 1950s and 1960s several OBE surveys have incorporated questions relating to drug use. Combining two convenience samples of students ($n = 192$), Blackmore (1982) reported that of the 35 (18%) claiming to have had at least one OBE, 13 (37%) occurred when taking drugs, most often LSD or marijuana. A later questionnaire survey with students (convenience sample, $n = 96$) found 31% claimed to have had an OBE, and they were significantly more likely than those who did not claim to have had an OBE to have taken drugs such as cannabis, LSD, or opium derivatives (Blackmore & Harris, 1983).

In a similar survey of students from an opportunity sample ($n = 200$), Myers, Austrin, Grisso, and Nickeson (1983) utilized the OBE question from Palmer’s (1979) questionnaire and found a significant, but small, correlation between reported OBEs and the use of mind-expanding drugs ($r = .23$, $p < .001$). Similar to the 18% of Blackmore’s (1982) study, 22% of the Myers et al. sample reported the occurrence of OBEs, with 42% of these having used mind-expanding drugs compared to only 20% using such drugs among those

not reporting OBEs. Furthermore, 50% of the OBE experience group ($n = 45$) reported some psi-related experiences during drug taking, compared to only 4% of the non-OBE group ($n = 155$), perhaps indicating a commonality in the etiology of drug-induced psi and OBE experiences.

Although these surveys (Blackmore 1982; Blackmore & Harris, 1983; Myers et al., 1983) suggest that the use of psychedelic substances is an important correlate of OBEs in the student population, this relationship is less pronounced in other populations. A later randomized postal study (Blackmore, 1984) with a sample of people who had reported OBEs revealed that only 18% of respondents reported OBEs occurring after taking drugs and medicines (type not specified). Blackmore (1992) concluded that hallucinogenic drugs undoubtedly help induce the OBE and were more useful for this than other drugs (e.g., stimulants, tranquilizers, sedatives, and alcohol), although she added that OBEs still occur rarely with psychedelic drug use and there was no specific OBE-inducing drug, despite Lilly's (1978) assertion that ketamine is virtually a chemical road to the OBE. However, Blackmore (2005) later reported an OBE in a self-experiment with ketamine and conceded that, more so than other drugs, ketamine "often involves feelings of body separation" (Blackmore, 2003, p. 356).

The Blackmore OBE surveys (Blackmore 1982, 1984, 1986; Blackmore & Harris, 1983), and that of Myers et al. (1983), support the findings of the earlier survey of psychic experiences by Palmer (1979). In Palmer's study, a higher percentage of the student sample than the townspeople sample reported OBEs (S: 25%; T: 14%; $p < .01$), which Palmer attributed to the likely greater use of mind-expanding drugs among the student sample. Of the townspeople, 7% reported the use of mind-expanding drugs compared to 32% of the student population, although Palmer suspected that the student figure was a gross underestimate, possibly due to the illegality of drug use or the interpretation of the term "mind-expanding drugs" to exclude marijuana. It is not specified why Palmer should consider the student sample to be less likely to report their drug-use than the townspeople. In addition, 13% of the townspeople and 21% of the students reporting OBEs said that at least one OBE had occurred under the influence of such drugs, figures that compare more similarly to the 18% reported for the general OBE population (Blackmore, 1984) than to the 37% and 42% in the student OBE groups

(Blackmore, 1982; Myers et al., 1983, respectively). In a review of the OBE survey literature, Irwin (1994) agreed with Palmer that the higher reports of OBE experiences among students (20–48% compared to 8–15% in the general population) were probably due in part to students' more frequent experimentation with "psychotropic" drugs. However, Irwin suggested that it was probably also due in part to other factors, such as education and familiarity with surveys.

Using Palmer's (1979) questionnaire, Kohr (1980) failed to find any relationship between OBEs and drug use with the members of the Association for Research and Enlightenment—previous criticisms still standing—although Usha and Pasricha (1989a, 1989b) did find such a relationship with Indian students. The occurrence of OBEs in the Indian sample was positively associated with the use of mind-expanding drugs (chi-squared = 6.87; $p < .01$) supporting Palmer's findings, although no proportion was given for comparison. Tart (1993) also found that 44% of marijuana users reported OBEs, with 58% of these indicating that their OBE occurred since using marijuana, with 54% of those experiencing OBEs reporting at least one experience whilst actually under the influence of marijuana (Tart, 1971). Most of Tart's sample were also students (72%), supporting Alvarado's (2000) suggestion that the relationship linking psychedelics with OBEs shown in student populations is not evident among the non-student populations, although this assertion is arguably too exclusive of non-student drug-users. For instance, in surveys with psychedelic-users, DeGracia (1995) found that 40% had an OBE while under the influence, and in Kjellgren and Norlander's (2000) sample, of which only 25% were students, OBEs under the influence of psychedelics were reported as 53%, a figure comparable to Tart's marijuana group (54%).

Reports of OBEs are also prevalent in other surveys among users of dextromethorphan (White, 1997). The OBE has also appeared within numerous experiential reports of those who have used either nitrous oxide or ether (Crookall, 1961, 1964; Schroll, 2011), LSD (Eastman, 1962; Grof, 1975, 1980; Lilly, 1969; Whiteman, 1965), PCP (Rudgley, 2000), DMT (Strassman, 2001), 4-HO-MET (Kjellgren & Soussan, 2011), *Salvia divinorum* (González, Riba, Bouso, Gómez-Jaraboa, & Barbanoj, 2006), pituri (Australian Institute of Parapsychological Research, 2004), harmaline and ayahuasca (Andritzky, 1989; Bianchi,

1994; Luna & White, 2000; Naranjo, 1967; Roney-Dougal, 1986, 1989), a host of other plant psychedelics (Schultes & Hofmann, 1992), and even certain simple carbon dioxide and oxygen gas mixtures (Meduna, 1950). That OBEs are also frequently reported to occur with the use of ketamine (Blackmore, 2003; Curran & Morgan, 2000; Jansen, 1997a, 1999, 2001; Lilly, 1978; Muetzelfeldt et al., 2008; Pomarol-Clotet et al., 2006), even apparently veridical ones (Hanna, 2003), is further echoed by a widely distributed UK Department of Health (2004) information booklet, aimed at teenagers, subtitled Facts about Drugs, that states the primary experiential effect of ketamine is an OBE. Furthermore, a taxonomic survey of psychoactive substance use phenomenology found that, out of a possible 17 different transpersonal experiences, OBEs (to another dimension) were the primary experience of both DMT use and ketamine (Luke & Kittenis, 2005). Indeed, a recent online survey (Wilkins, Girard, & Cheyne, 2011) of 192 recreational drug users found that ketamine was the primary predictor of OBEs among a number of so-called recreational drugs (alcohol, cannabis, MDMA, amphetamine, and LSD/hallucinogens), though DMT was not listed specifically. It is also documented that the ancient Indian psychoactive sacramental, Soma, was capable of inducing OBEs (Spess, 2000).

Early OBE researchers were well aware of the occurrence of these experiences with psychoactive drugs and categorized them differently from OBEs with “natural” causes, suggesting that they were of a different type (Eastman, 1962) and of inferior quality (Crookall, 1961, 1972). Blackmore (1986) disagreed, suggesting that a distinction between drug and non-drug experiences was not evident. Similarly, Grosso (1976) stated that both drug and non-drug OBEs have the same characteristics and that the OBE is the extreme manifestation of a normal human process. Grosso further proposed that drug states nicely demonstrated this continuum of out-of-bodyness by exhibiting a range of body-image alterations, from feeling taller to being completely bodiless, offering the most promising means of experimental OBE induction (see section 1.4 for a discussion). Nevertheless at this time, a systemic comparison of the various chemically-induced OBEs and more spontaneous ones is long overdue.

A recent survey substantiates Grosso’s (1976) notion by finding that 32% of a sample of 28 first-time users of ayahuasca report alterations in self-body

image, ranging from fusion with the environment to the complete separation of the conscious self from the body. All respondents were new members to one of two particular Brazilian syncretic Christian churches that use the jungle decoction ayahuasca as a sacramental (Barbosa, Giglio, & Dalgalarrodo, 2005).

3.4 Summary of Survey Research

In summary, the findings from the survey research indicate a small but consistent relationship ($r = .16$ to $.25$) between belief in the anomalous/paranormal and drug use, although the size of this relationship was more pronounced for the marijuana users in Tart’s (1993) study. Furthermore, these studies support the hypothesis that psychedelics can induce some paranormal phenomena, although the same arguments for and against the genuineness of field reports (section 2.4) also prevail here. In the surveys reported here, with either student or general samples, those reporting ESP, apparitions, and anomalous/paranormal experiences were found to be significantly more likely to use psychedelics. One study found the same for recurrent spontaneous PK (sometimes called poltergeist phenomena) as well, although only tentatively (Palmer, 1979). Furthermore, of those reporting the use of psychedelics, 18-83% reported psi experiences—most commonly telepathy but also precognition—actually occurring during drug use, with heavier users reporting more experiences where specified. Yet, the occurrence of PK during drug use was only reported among a very small proportion of marijuana, psilocybin, mescaline, and LSD users. OBEs are also an occasional or common feature of psychedelic experiences and are reported to occur with a wide variety of drugs and wide variety of users, particularly students.

A weak relationship between paranormal experiences, the use of psychedelics, and kundalini experiences has also been found in two studies, and there is also a weak, but repeated, correlation between transliminality, drug use, and paranormal experience with Australian psychology students. Where specified, the relationship with paranormal experiences, belief in the paranormal, transliminality, and tolerance of ambiguity is reduced compared to psychedelics with respect to cocaine, heroin, and alcohol, perhaps reflecting Metzner’s (2005) classification of these as consciousness-contracting drugs. The same is also true for the negative relationship with the fear of psi found with psychedelics, which is not apparent with heroin and actually reversed with alcohol, although replication and analyses for

specific classes of drugs is necessary. Correlations between self-reports of cannabis use and thought transmission in psychiatric research are apparent, often indirectly, though such experiences are also more widely commonly reported in the apparent absence of pathology, with or without cannabis. Many of the surveys fail to adequately identify which substances lead to which experiences, although a switch to such taxonomic research is now evident (Luke & Kittenis, 2005).

4. Experimental ESP Research

Several experiments have attempted to elicit psi directly through the controlled consumption of psychedelics. These experiments have been reported quite differently, sometimes as entire monographs in excess of 100 pages or at other times as footnotes within another published report, often without useful details and statistics. The majority of these experiments were essentially pilot studies and were mostly conducted during the psychedelic research period of the 1960s.

4.1 Forced-Choice Designs

Forced-choice designs are those in which the target is chosen from among just a few known target types, as with the classic Zener cards. Whittesley (1960) reported on the use of LSD (no dose specified) in a forced choice ESP task with 27 participants, using mostly psychiatric outpatients receiving psychotherapy (with LSD presumably). Using ESP cards concealed within opaque envelopes, participants performed two runs of 25 guesses, one before and one after dosing. Neither performance yielded significant deviations from mean chance expectation (MCE), although a chi-squared analysis of the extent of variance revealed a significant reduction in variance ($p < .001$) for scores in the experimental condition. Under the influence of LSD, participants had reported that the card guessing-task was “ridiculous, petty, mundane, etc.” (p. 221), and Whittesley suggested such an exceptional lack of deviation from MCE was due to participants feeling so constrained. Little can be said of the methodological merits of this simple experiment because little detail is given, but it is questioned whether the variance analysis was pre-planned.

Making similar use of ESP symbols, Pahnke (1971) reported a pilot study with five participants given a high dose of LSD (200–400 micrograms) and tested 8–9 hours later. The results did not reveal an increase from pre-drug scores for the experimental condition.

Pahnke cited the long delay in testing from dosage and, somewhat similarly to Whittesley (1960), the use of an ESP machine with sterile symbols as counterproductive factors. Pahnke proposed that future research would benefit from the use of familiar sender-receiver pairs, with both under the influence, and the use of a stimulant (e.g., caffeine or amphetamine) along with a psychedelic such as 3,4-methylenedioxyamphetamine (MDA) or 2,5-dimethoxy-4-methylamphetamine (abbreviated as DOM, but also known as STP). Despite Pahnke’s reported failure, the psychiatrist Grof (1970) reported his own experience taking LSD in one of Pahnke’s experiments in which Grof successfully described a remote target in each of three attempts. Grof (1970) aptly described the dissonance between the task and the experience that occurs to the psychedelic participant, a mixture of both complete acceptance and fear of psi, when he wrote:

When I got the third correct answer in a row, the feelings [of a universe where no laws of time and space exist] were so powerful that I could not continue. The reason for discontinuation of the ESP experiment was a strange mixture of a conviction that it was absurd to test the obvious and, on the other hand, a metaphysical fear of confusion that would follow if I had to give up the usual concept of time and space and with it all the related reference points we feel so secure with. (p. 3)

Prior to using free-response procedures with LSD, Masters and Houston (1966) also experimented with an ESP-card guessing procedure. With each participant performing ten 25-card runs, only 4 out of the sample of 27 participants did better than chance. Those few participants performing better were known very well by the trip guide and had reported a high degree of empathy (with the guide presumably). Masters and Houston noted that participants very quickly became bored with the task and complained that it was “psychedelically immoral” (p. 90) to have them perform card guessing while tripping.

As part of a larger series of individual ESP tests with 36 participants under the influence of psilocybin, Asperen de Boer, Barkema, and Kappers (1966) found that, in ten 25-card runs, no individual scored significantly better than in their own no-drug control condition. The results of the 29,000 ESP-card trials for the 36 psilocybin and 44 control participants

(a few participants did multiple conditions) were significantly above chance ($p < .01$) overall. However, a closer inspection of the results showed that, when compared as a group, those in the psilocybin condition scored higher (MCE = .2; mean correct = .214, $p < .05$) than the control condition (mean correct = .206, $p = .09$), although the difference between the groups was not significant. However, there is some indication that order effects reduced any difference between the groups, because the psilocybin condition always occurred after the control condition, possibly resulting in test fatigue, as described in the following section (4.2.1).

Kugel (1977) reported very briefly on the results of a telepathy experiment with LSD, in which test scores actually declined under the influence of LSD in comparison to the periods before and after intoxication. Participants had been given trial by trial feedback and it was noticed that there was a very strong tendency for participants to respond to this feedback by responding with the same call after a hit and a different one after a miss, the latter action being known as the gambler's fallacy. Analysis revealed that this feedback susceptibility increased under the influence of LSD, possibly accounting for the poorer test performance. No further details about the methodology or statistical results were provided in this paper.

In an indirect experiment with participants selected for good psi scoring, Palmer, Tart, and Redington (1976) found a positive correlation between scores on an automated ESP-symbol guessing task in the laboratory and the reported frequency of marijuana use outside of the laboratory, with a negative correlation between ESP scores and alcohol consumption (see Tart, 1993). However, a follow-up study (Tart, Palmer, & Redington, 1979) failed to replicate these results, although Tart (1993) suggested that this was due to the difference in sample groups and the rising popularity of marijuana as a social drug rather than as a tool of self-development. Tart explained this with the observation that the subjective effects of marijuana are highly susceptible to changes in psychological set and expectation, echoing Weil's (1972) suggestion that marijuana is primarily just an active placebo. Nevertheless, direct experimental telepathy research with marijuana by the parapsychologist Dr. Thelma Moss was apparently unsuccessful (Rogo, 1976), though no original research papers on this are readily available. Even so, some similar findings to the original Palmer et al. (1976) study were found when scores on

a secure non-intentional forced-choice precognition design task with 100 participants (Luke, Delanoy, & Sherwood, 2008) was correlated positively ($r_s = .27$, $p = .008$, two-tailed) with the reported number of consumed psychedelics over the lifetime.

Despite earlier cautions (e.g., Masters & Houston, 1966; Pahnke, 1971; Whittesley, 1960) that ESP-card tests are too boring to those affected by psychedelic drugs, two later studies (Tinoco, 1994; Don, McDonough, Warren, & Moura, 1996) found further support for the forced choice task boredom factor with the use of ayahuasca in Brazil. In a series of 825 ESP-card guessing trials conducted in two 90-minute sessions with one sender and one receiver, both under the influence of ayahuasca, no significant deviation from MCE was found (Tinoco, 1994). A second automated ESP-card precognition test involved one of the previous participants in 625 trials over two separate sessions lasting one hour and 40 minutes each, the scores of which were slightly below chance but not significantly so. However, it is apparent that no control condition was evident for comparison. As in earlier studies, both participants reported that the tasks were boring and that the tests lost their meaning and importance because it was more important to live the visions of the moment.

As part of a larger investigation into EEG variations with ayahuasca use, Don et al. (1996) similarly found no significant deviation from MCE with a small group of (presumably experienced) participants using the an automated ESP task under the influence of ayahuasca, though again, like Tinoco's (1994) study, without non-drug controls. Despite the poor preliminary psi-task results, which Don et al. attributed to methodological factors, the use of ayahuasca was shown to significantly increase 40-Hz (gamma) activity within the occipital-temporal-parietal area, particularly when the participant's eyes were closed. It was noted that amplification of this kind has often been observed during successful psi-tests in previous studies with gifted participants. Don et al. hypothesized that the reported psychic effects of ayahuasca were due to this particular 40-Hz activity amplifying unconscious psi information to conscious levels; however, an independent ayahuasca-EEG study by Stuckey, Lawson, and Luna (2005) failed to replicate the power increases in the gamma frequency range, but instead found increased gamma coherence across the cortex with ayahuasca when compared to control periods.

Unlike most of the other forced choice designs, a series of successful experiments were reported by Puharich (1959, 1962), one of which utilized a 10-image unseen picture-matching test with participants who had ingested the psychedelic mushroom *Amanita muscaria*. Preliminary exploratory work had led Puharich to report the subjective feeling of telepathy himself, and one of his gifted participants perfectly matched two sets of ten unseen pictures in three seconds. Controlled experimental work with 26 unselected participants in independent trials revealed an overall chance occurrence of hits in the control picture matching series (106/1140; MCE = 114) compared to the experimental group (141 hits; $p < .01$), indicating a positive effect of the mushroom on ESP, later repeated in a telepathy-type design.

4.2 Free Response.

4.2.1 Psychometry (object reading). Several experiments have opted for a free-response design, which is arguably more conducive than forced choice in eliciting meaningful responses from participants under the influence, and psychometry has been especially popular. In an exploratory study, using a special sample of six mediums, Osiris (1961a) administered 100 or 125 micrograms of LSD to each of them prior to a psychometry test. Five performed at chance whereas one was extremely successful. Although further details were not provided about the successful participant, Osiris noted that the others were too absorbed in either the aesthetic pleasure of the experience or the quest for philosophical knowledge. The mediums distinguished the visions from normal perception and stated that the LSD experience was unique and caused a sense of profound unity with the world unlike that occurring during psychic experiences. Osiris advised continuing research with drugs where the experiments were brief (only 20 mins.), as longer sessions appeared impractical and were thought to result in negative scores because participants would lose interest. Limited information is provided about this study, although it is assumed that participants were not experienced with psychedelics.

Smythies (1960, 1987) reported a preliminary psychometry investigation—planned more like a remote viewing task—conducted in 1950 with one volunteer using mescaline. Although the participant was unable to discern the targets under adequate blind, remote-viewing style conditions, informal questioning about the target location typical of psychometry tasks elicited promising responses. Similarly using mescaline, a series

of pilot studies with three participants “failed in card-guessing tests but showed encouraging success in tests with free material, particularly token objects” (Rush & Cahn, 1958, p. 300), though, unfortunately, further details were not given in this paper. Further to these preliminary reports, Marti-Ibanez (1965) gave a second-hand account of success with mescaline in a series of unpublished telepathy experiments conducted at the Pasteur Institute in Paris. Likewise with mescaline, presumably in self-experiments, Breederveld (1976, 2001) reported success in consistently winning above chance at roulette experiments in casinos using real money, although the mescaline was only one of several mostly successful methods. Nevertheless, Breederveld’s success echoes anecdotal reports concerning the pioneer psychedelic researcher, Al Hubbard, who, after apparently developing his psychic ability through the use of LSD (Stevens, 1988), became somewhat notorious for winning on gaming machines in casinos, his reputation being such that he was politely escorted out when he reached a certain limit of earning (Krippner, 2006a).

The most extensive object-reading test of participants under the influence of psychedelics formed part of a battery of ESP tests conducted in a large-scale psilocybin study (Asperen de Boer, Barkema, & Kappers, 1966). In a no-blind repeated-measures design, 44 no-drug control and 36 test participants (30 participants did one of each condition, whereas a few other participants did multiple conditions) given 10 or 20 mg. of psilocybin, were individually tested for four hours for ESP performance with ESP-cards, object reading, traveling clairvoyance, telepathy, and clairvoyance tests regarding both people and objects. Using a complex system for evaluating the success of the free-response tests, the experimenters jointly estimated the degree of probability for each statement given by the participants and then determined the extent to which the probability of correct statements outweighed the number and probability of incorrect statements. All participants were considered to have performed better than chance overall in the object reading, traveling clairvoyance, and clairvoyance-for-persons tests, but those in the psilocybin condition were not considered to have performed better than those in the control condition. However, the free-response results were combined for these three tests so that no separate comparisons between the groups on these tests were reported. Overall performance on the telepathy test revealed 3 hits out of 220 sessions, where 7

were expected by chance, making comparisons between the groups of little relevance, and similarly little success occurred with the clairvoyance-for-objects test.

Asperen de Boer et al. (1966) concluded that it is not possible to induce ESP with psilocybin, although Bierman (1998) argued that their participants should be pitied for having to do such a range of boring and strenuous tests while tripping, a burden unlikely to be imposed in modern research. Parker (1975) also criticized the study for promoting a scientific methodology at the expense of interpersonal factors. Furthermore, Asperen de Boer et al. made little account for the methodological shortcomings of the psilocybin condition, even though they reported that more than half of the psilocybin participants, mostly drug novices, were distracted by their visions. The authors did note, however, that there may have been some order effects because the psilocybin condition always occurred after the control condition. Of the five participants who completed two control trials, four did worse in the second trial, possibly indicating fatigue effects independently of the drug. Asperen de Boer et al. also reported briefly on a previous series of more promising unpublished psychometry trials with LSD that were conducted prior to switching to the psilocybin, which they considered to be less distracting. Out of several LSD participants some exceptionally accurate accounts of object reading were given, for which Kappers (1983) later suggested only a paranormal explanation seemed possible.

4.2.2 Other clairvoyance experiments. Perhaps the first psychedelic ESP experiment was conducted by the French researcher Rouhier who gave mescaline to six subjects, one of whom temporarily developed very detailed and accurate clairvoyant abilities and was able to describe the contents of a nearby room (Rouhier, 1925, 1927). The same sentiment was reported by the man who coined the term *psychedelic*, Humphry Osmond, after his own mescaline experiences in 1951. Osmond (1961) also reported that, in 1957, he and his fellow researcher Duncan Blewett, both under the influence of mescaline, successfully transmitted telepathic information in an informal experiment to such a degree that an independent observer became acutely panicky at the uncanniness of the event, though, unfortunately, no formal experiment with a larger sample is reported.

Using the more popular substances of the 1960s, Cavanna and Servadio (1964) reported extensively on a repeated-measures clairvoyance design with the alternate

use of LSD and psilocybin in what was primarily an ideographic, psychoanalytic study. In a series of three control, five psilocybin, and four LSD trials, three participants performed in a single-blind (water placebo) free-response clairvoyance test. In each trial there were 10 targets of combined, yet incongruous, elements (e.g., a foot with an eye), which Parker (1975) unduly criticized for being improbable. Only one participant had a positive attitude towards psi phenomena and all were inexperienced with psychedelics. Participants were given low doses of LSD (40, 50, and 75 micrograms) and psilocybin (10 mg), much criticized by Blewett (1965) for failing to consider the possible dose-dependent nature of psychedelic-induced ESP. Yet despite the low doses and extensive psychological screening one participant had an anxiety attack in the first LSD session, which the authors attributed to demand characteristics expressed through the anxiety and anticipation of the experimenters.

The participants' mentations were rated for correspondences by three experimenters and then independently by two blind judges, with reasonable correspondence between the judging groups, though Blewett (1965) argued otherwise. Compared to the control conditions, the blind judges' results with both the LSD and psilocybin showed a clear improvement in ESP ability, with some accurate correspondence with about one in five of the targets for both drugs. Notably, no success at all was achieved in the three control conditions, though unfortunately no estimation of the probability of the results was given, nor were inferential statistical analyses possible because the design had no decoy targets in the judging process, as duly criticized by Smythies (1965). Although the results are positive, caution is raised concerning any inferences drawn from so few trials. Cavanna and Servadio (1964) suggested that further research should make use of: stronger emotional targets, greater emphasis on interpersonal relations, and use of free association rather than interview.

A study of some indirect relevance investigated the effects of low-dose LSD (65 micrograms) on apparent subliminal perception with five participants (Freidman & Fisher, 1960). Participants were shown a bold image faded out below the subjective threshold of (conscious) discrimination with several layers of paper and presented after a blank control image in repeated trials. Analysis of free-response descriptions of the hidden image by independent judges revealed that participants gave significantly more accurate descriptions of the target

in the experimental condition under the influence of LSD compared to the control condition, and that these participants also performed significantly better with LSD in the experimental condition than they had done six weeks previously without LSD. The results were interpreted as indicating the enhancement of subliminal perception with LSD; however, they might also be due, partly or wholly, to the enhancement of ESP with LSD. This is because the design mimics an ESP-study design in protocol, and there is some evidence to suggest that ESP is an active factor in subliminal perception research (Stanford, 1990). Alternatively the results may be due to poor methodology, such as order effects, quasi-experimental design, and expectation or other bias due to the lack of blind controls across all conditions and the repeated use of the same subliminal target image. Furthermore, according to Cheesman and Merikle (1986), the mere perception of information from between the subjective and objective threshold, as in this study, is not strictly subliminal perception, but unconscious perception.

Based upon earlier recommendations to avoid boring and repetitive test procedures with participants under the influence of psychedelics, a series of pilot ganzfeld experiments with cannabis (marijuana) and psilocybin were conducted (Wezelman & Bierman, 1997; Bierman, 1998). In the first series, Wezelman and Bierman utilized a no-sender auto-ganzfeld set-up with 40 participants pre-selected for experience with marijuana. In a randomized crossover design, participants performed two trials each, one self-dosing marijuana condition and a control condition. All but four participants, who became nauseous and dropped out after the first session, completed both trials. A planned mixture of subject judging or external judging was used. The control condition had a hit rate of 15% (MCE = 25%) compared to 30% for the marijuana condition, and Bierman (1998) noted that the score for the marijuana condition was mainly due to the external judges, particularly one experimenter-judge who was also using marijuana. However, scores for the experimental group were not significantly different from MCE.

Wezelman and Bierman (1997) also reported on findings from a no-sender ganzfeld pilot-study conducted with six psilocybin-experienced participants performing two trials each under the influence of psilocybin. There was no control condition. Utilizing a buddy system to deter bad trips, pairs of receivers performed the

ganzfeld together. With only subject judging this time, participants in the psilocybin group scored 7 direct hits out of 12 trials (58%), a figure that even with only a few trials is significantly deviant from MCE ($p < .05$), although uncorrected for a stacking effect (see Milton & Wiseman, 1997, p. 93).

4.2.3 Telepathy experiments. Bierman (1998) continued with the previous work, this time in a telepathy design using a within-subjects control condition with 20 psilocybin-experienced participants who each performed one control and one psilocybin ganzfeld trial with a sober sender. Participants in the psilocybin condition scored at chance (25%), whereas in the control condition they performed slightly below (20%), with no significant difference between the two. However, a *post hoc* analysis of the results for negative and positive clips revealed an interaction between target emotionality and drug state, with a much higher hit rate for positive clips (44%) than negative clips (8%) in the psilocybin condition and a reversal of this effect in the control condition. This interaction was explained in terms of psilocybin participants possibly detecting the positive ESP targets, but blocking the negative images to deter bad trips, given that participants were tripping alone this time; however, the reverse effects for the control condition are not as easily explicable. Bierman interpreted this result as suggesting that psychoactive drugs affect psi performance and that target emotionality and the psychological set of the participant may interact to alter the results. It is also worth noting that ganzfeld experiments with psychoactive drugs are likely to induce a unique, possibly combined, state of consciousness, unlike the usual drug or ganzfeld experience alone, given that the ganzfeld environment is considered by many scholars to already induce a unique kind of ASC (e.g., Wackerman et al., 2000). However, this idea needs further verification.

Coming from the field of psychedelic experimentation rather than parapsychology, towards which they reported being skeptical, Masters and Houston (1966) conducted a series of ESP experiments in which they demonstrated a much greater degree than their contemporaries of familiarity with the effects of the drugs being used. They provided an experienced trip guide, with whom most participants were familiar, and utilized experienced trippers as participants. The study had 62 receivers, with their guide as the sender of the 10 static image targets, and only the receiver

under the influence of LSD. Using independent judges, the majority of the 62 receivers (77%) gave free-recall responses approximating the target at least 2/10 times, with five of these participants approximating the target image 7/10 or 8/10 times. The remaining 14 participants (23%), who performed worse, were either unknown to the guide, anxious, or primarily interested in their own personal psychological narrative rather than the ESP task, though these observations may be *post hoc*. Sometimes, receiver statements also matched non-target thoughts of the sender. But Parker (1975) noted that non-verbal communication from the guide could not be ruled out. Once again, no estimation of the probability of describing the target image is known, because no decoy images were used in the judging process and no comparison was made to a control condition to establish if LSD actually improved scores. Nevertheless, accuracy rates were similar to those reported in the clairvoyance procedure of the same nature by Cavanna and Servadio (1964), where LSD and psilocybin scores exceeded those in control conditions. Cavanna and Servadio further reported an exploratory sender-receiver telepathy design with one LSD trial and one control, where only the receiver took LSD. The results indicated accurate comparisons in approximately one in three of the targets for LSD, with a rate of only one in ten for the no-drug control condition.

Following up from a previous forced-choice ayahuasca ESP study (Tinoco, 1994), Tinoco (2011) conducted a free response task in 1995 with three participants under the influence of ayahuasca acting as senders and receivers in a telepathy-type task. No use of decoy targets was made in the judging procedure, nevertheless three independent judges concluded that there was no correlation between the target and the response in any of the 15 trials; however, no exact probability of getting a hit can be calculated with this method, and the interpretations of the judges are subjective. Furthermore, no control group was used for comparison, it is not clear how the targets for sending were initially chosen, and participants complained that they were not getting any visual imagery and, as with the two previous ayahuasca studies, that the task was boring in such a state.

Finally, Puharich (1962) followed up his earlier success at clairvoyance with *Amanita muscaria* with a demonstration for four Los Angeles news reporters, who also acted as participants and who were either skeptical or

hostile towards the idea of drug-induced psi. The design relied on a computer-recorded random number-series guessing task with a non-drugged sender elsewhere, though where was not specified so sensory leakage cannot be ruled out. Participants scored at chance in the control condition (35 hits in 297 trials, nonsignificant) and after ingestion of *A. muscaria* repeated the test (average 40 mins. later) and made a combined score of 65 hits in 432 trials ($p < .005$). Scoring returned to chance after two and half hours, as they had in the previous clairvoyance experiment, although participants still reported feeling that their intuition was active. Puharich (1962) attributed the results to the neurochemical action of cholinergia heightening the ESP function by activating the parasympathetic functions (slow heart rate, etc.) indicative of the trance state. However, this explanation is somewhat erroneous because the psychoactive principles in *A. muscaria*—muscimol and ibotenic acid—can both calm and stimulate the central nervous system, respectively, whereas the cholinergic chemical, muscarine, is now known to be only a trace and psychologically inactive constituent of the mushroom (Michelot & Melendez-Howell, 2003). There is also the possibility that optional stopping occurred in this latter experiment as indicated by the different number of trials in the control and experimental conditions, and Krippner (2006a) also raised concern that Puharich's research, as with Masters and Houston (1966), was reported in a self-authored book rather than a peer-reviewed journal.

4.3 Summary of Experimental Research

Due to the exploratory nature of most of these experiments, it is difficult to fully assess their efficacy using psychedelics to produce ESP (no PK experiments having been attempted). In most cases this could have largely been improved with an adequate control condition without order effects (Palmer, 1978), and the blind use of decoy targets in the judging process. Procedures using subjective probability estimates by experimenters (such as Asperen de Boer et al., 1966) are now virtually obsolete in parapsychology because they are so difficult to assess and are prone to bias (Parker, 1975). In the one ESP-card experiment to use a control condition, scores in the psilocybin condition were significantly different from chance and were also superior to the control condition, although not significantly (Asperen de Boer et al., 1966). Nevertheless, it is apparent that those experiments using ESP-card type symbol guessing procedures were largely unsuccessful compared to chance expectation.

The use of the symbol-guessing procedure has been widely criticized for being far too mundane under the influence of psychedelics (Grof, 1980; Masters & Houston, 1966; Pahnke, 1971; Parker, 1975; Rogo, 1976; Stafford & Golightly, 1967; Smythies, 1960; Tart, 1968; Whittlesey, 1960). Even so, using *Amanita muscaria*, Puharich (1962) demonstrated that forced-choice procedures could be successful with picture-sorting tasks. More engaging, free-response procedures have demonstrated at least some success in all but one of the studies that have used psychometry, although rarely with any control condition for comparison. A clearer indication of possible psychedelic-induced ESP, even at times in comparison to a control condition, comes overall from the clairvoyance and telepathy designs, except for the Asperen de Boer et al. (1964), Tinoco (2011), and the marijuana ganzfeld studies (Wezelman & Bierman, 1997). Replication, however, is needed and, in some cases, with better methodology and pre-planned analyses. It remains curious that no formal explicit experiments with precognition or PK have been performed, particularly the former because powers of divination are traditionally attributed to many plant psychedelics.

5. Methodological Critique of Experimental Research

When consideration is given to what has been learned from these largely pilot studies, experimenters and commentators alike have highlighted the difficulties involved in attempting to test for psi with participants who have taken a psychedelic. Aspirin de Boer et al. (1964) suggested that the participant's willingness to perform in the task was important, but given that participants have difficulty maintaining alertness, self-control, focus, interest, and orientation to the task (Edge, Morris, Palmer, & Rush, 1986; Millay, 2001; Rogo, 1976), it seems much more important to consider the participant's "capability" to perform in the experiment rather than their mere willingness. Parker (1975) notes that a participant's increased sensitivity to subtle influences under psychedelics is both a boon and a bane to research. Indeed, using psychedelics to induce psi is a double-edged sword, namely all of the reasons cited in the introduction that make such research alluring also make participants poor test subjects. This is because participants may become engrossed in the experience (Rogo, 1982), the aesthetic rapture (Osis, 1961a; Smythies, 1960), the quest

for philosophical knowledge (Osis, 1961a), a deep soul-searching self-examination (Blewett, 1963), one's own personal drama (Millay, 2001; Parker, 1975), and the flow of thoughts (Ryzl, 1968). In addition, participants may have difficulty communicating because of the lack of adequate language (Lilly, 1969), the overwhelming flood of ideas and emotions (Ryzl, 1968) and the speed of change of the internal experience (Blewett, 1961b, 1963). The experience of dissociation (e.g., with ketamine) can also hinder communication when participants become no longer present or aware of their physical environment and, as Huxley (1961b) pointed out, there is a need to assure participants of their identity once constructs of space and time disappear. Blewett (1961a) further warned of other unwanted psychological reactions that may occur if participants attempt to either escape from or rationalize their experience.

However, it is apparent that these obstacles to research may be greatly alleviated or even eliminated if participants are experienced with the use of psychedelics (Blewett, 1963; Parker, 1975; Tart, 1977). Indeed, about a quarter of inexperienced participants are expected to have intense spontaneous mystical experiences during their first trip (Wulff, 1997, 2000). Yet, very few of the studies reviewed here (only Bierman, 1998; Masters & Houston, 1966; Wezelman & Bierman, 1997) specifically reported the use of participants experienced with these psychedelics, although it is worth noting that those that did were relatively more successful than those that used inexperienced participants. Further to this, it has been suggested that experienced psychedelic participants can be better trained to stabilize their experience (Millay, 2001; Tart, 1977) and may even naturally train themselves to stabilize experiences through repeated use (Levine, 1968). Regardless of training, it has been strongly advised that participants be allowed to stabilize their experience before testing begins (Blewett, 1963, 1965; Millay, 2001; Parker, 1975; Tart, 1977). Pahnke (1968) further recommended an 8- to 12-hour pre-dose preparation period when working with terminal cancer patients, although Ludwig (in Tart, 1968) questioned the necessity of this in a parapsychological context.

Stabilization of the experience may even be expedited by inducing hypnosis prior to drug administration (Parker, 1975; Tart, 1968) in what has been called the "hypnodelic" state (e.g., see Levine & Ludwig, 1965; Ludwig 1968; Tart, 1967). Alternatively, Ryzl (1968) reported re-inducing LSD states through

hypnosis, as is also reported elsewhere, although it was uncertain how successful this was (Ludwig, 1968), though success inducing other drug states (e.g., MDMA, heroin) has also been reported (Hastings, 2006; Hastings et al., 2000; Ludwig & Lyle, 1964). Similarly, Farber (2000) has described the successful re-induction of psychedelic states using hypnotic anchoring techniques available in neuro-linguistic programming. Perhaps, the entire psychedelic experience can be stabilized and anchored during test trips with experienced users and then later re-induced, with or without hypnosis, so that no psychedelics are actually taken during the test procedure. Testing for psi under such “controlled flashbacks” may overcome most of the stipulated problems, and have the added advantage of investigating Rogo’s (1976) question of whether it is the neurochemical action of the drugs or the state induced that can seemingly produce psi.

Although some researchers (Halliday, 1961; Nicol & Nicol, 1961; Paterson, 1961a; Smythies 1960; Tart in Levine, 1968) suggest that using good psi scorers, psychics, and mediums in drug studies would improve scoring, Eileen Garrett (1961b) noted that although LSD enhanced her mediumistic experience it would not improve forced choice test-scores. Echoing this, the Osis (1961a) experiment has shown that using mediums did not prove any more successful than the use of normal participants in the other psychometry experiments. This was probably due to all the problems mentioned already that occur more with inexperienced psychedelic users, indicating that sample selection should primarily seek to select experienced users over psi-effective participants, although, presumably, ideal participants would be both, though not necessarily.

Considering aspects of timing, several authors have offered advice, though no formal studies have been conducted. Both Ryzl (1968) and Grof (1980) suggested that the optimum period for testing psi during the LSD session was towards the end when the effects were leveling off, as in the Masters and Houston (1966) experiments, yet Pahnke (1971) disagreed. From extensive personal experience, Copley (1962) suggested testing for ESP once the trip had finished. As regards to the duration of the psi-task, rather than the extended test periods favored by some researchers (e.g., Asperen de Boer et al., 1964; Tinoco, 1995), Osis (1961a) suggested 20 minutes should be the maximum for optimum performance.

Some consideration has also been given to the optimal substance. Pahnke (1971) recommended

combining stimulants with psychedelics, whereas Asperen de Boer et al. (1966) chose psilocybin over LSD, due to it being milder, with which Cavanna and Servadio (1964) agreed. Indeed, LSD has a much longer duration of action than psilocybin and as Blewett (1963) noted, 10-hour trips are hard to staff. Ryzl (1968) also questioned the utility of LSD in psychedelic psi testing and proposed that the ideal substance, if it can be synthesized, should inhibit cortical activity to suppress the stream of thoughts, depress sub-cortical activity to block incoming stimuli and excite spheres of the cortex involved in ESP production, yet maintain rational insight, and increase suggestibility. However, such a designer drug is far in the future, though such psychochemical engineering may one day be possible (Brown, 2012b); moreover, there are an increasing number of ethnobotanical substances becoming known that have traditionally been used for psychic purposes, which have not yet been thoroughly tested, or even tested at all (e.g., *Salvia divinorum*).

Tart (1993) further suggested that marijuana was an ideal substance for psi experimentation because of its wide familiarity within the public, its mild psychedelic qualities and its reputed ability to induce psi, experientially at least. Puharich’s (1962) apparent repeated success with *Amanita muscaria* also needs replicating. Furthermore, other non-psychedelic chemical psi research, such as de Pablos’ (2002) unsuccessful first-person precognitive-dream drug-study, could also be replicated with the use of psychedelic substances that have actually been reported to induce psi in dreams. For instance, there are reports of precognitive dreams, by both traditional users and by modern consciousness researchers, with substances such as *Calea zacatechichi* (Devereaux, 1997; Díaz 1979; Mayagoitia, Díaz, & Contreras, 1986), *Silene capensis* (Hirst, 2000, 2005; Sobiecki, 2008, 2012), and tree datura (*Brugmansia*; Metzner, 1992; Schultes & Hofmann, 1992). Other substances seem best suited to other experimental designs too, for example, telepathy-like experiments might also benefit from the empathogenic effect of substances like MDMA, as the one participant under its influence in a remote detection experiment did exceedingly well (Brown, 2012a). The use of a placebo in a double-blind or blind control condition, as in Cavanna and Servadio (1964), is of questionable utility in this type of experiment because at anything less than sub-threshold doses the participant is likely to easily detect the effects of the drug; nevertheless, researchers should be aware that placebo drug effects

have been demonstrated in ESP research when coupled with positive false feedback on task performance (Pitman & Owens, 2004).

Several researchers have also commented on the importance of dosage (e.g., Braud, 2002; Levine, 1968). Blewett (1961b) warned that giving participants low doses of LSD may not be sufficient to break through the barrier between the normal and the full-blown psychedelic state and can be merely disorientating rather than transformative, and he later suggested that doses up to 1,500 micrograms of LSD (a very large dose) need investigating, because ESP might be dose dependent (Blewett, 1965). Support for this logic is also evident in escalating dose research with DMT (Strassman, 2001). It is additionally advised that experienced participants control their own dosage (Tart, 1977), as in the experiment by Wezelman and Bierman (1997). Participant's self-reports of the depth of the altered state were also considered better than dosages as indicators of subjective effects (Tart, 1977). Self reports using the Hallucinogenic Rating Scale were also considered better indicators of dosage than physiological measures (Strassman, Qualls, Uhlenhuth, & Kellner, 1994), though the use of a scale of transpersonal experience, such as the Self-Expansiveness Level Form (Friedman, 1983; Pappas & Friedman, 2007), would also likely be fruitful in discerning the relevant depth of the psychedelic ASC. Furthermore, some researchers (e.g., Parker, 1975; Tart 1968, 1977) have noted that the issue of dosage is largely irrelevant in comparison to the influence of the psychological factors of set and setting, as originally noted in psychedelic research by Leary, Litwin, and Metzner (1963). In discussion of this, Wayne (2001) suggested that the influence of psychological factors on psychoactive drugs can vary their effects so much that the drug can be thought of primarily as an experience, composed of set, setting, and substance.

Factors considered important in determining psychological set include the participants' expectations, attitudes towards themselves, idiosyncratic perceptions, and emotional orientation to the experiment (Levine, 1968; Tart, 1968). It is also deemed imperative to engender a sense of self-surrender, acceptance, and trust (Blewett, 1963). Factors considered important in determining psychological setting include those that are ordinarily considered under demand characteristics (Parker, 1975; Tart, 1968, 1977), particularly the experimenter's attitude, which should be warm, friendly,

and supportive (Blewett, 1963). Psychological issues induced through interpersonal relations within the laboratory become magnified when participants are on psychedelics (Blewett, 1963; Parker, 1975). Cavanna and Servadio (1964) highlighted this when one of their participants had an anxiety attack concurrent with their own anxiety, which led them to advise that the experimenters themselves should be experienced users of the psychedelic substance under investigation, as also advised by Strassman (2001). Tart (1968) also recommended that the experimenter should guide the experience towards the goal of the study, and has criticized previous work for assuming psychedelic states automatically induce psi, because, as noted by Tart, Osmond, and Beloff (in Levine, 1968), and Puharich (1959), in traditional scenarios the shamans who use these substances usually have extensive training and experience. It is further suggested that the experimental task be shaped to the state of the participant, not vice versa (Tart, 1977), and utilize the strong motivation, directed awareness, and complex ritual that is found in shamanism (Copley, 1962; Grof, 1980; Tart, 1968). Grob and Harman (1995) have also urged the integration of aspects from shamanic practices into scientific procedure so that there is attentiveness to factors of set and setting, such as intention, expectation, preparation, group identification, and formalized structure, as well as the integration of the experience in the following months. Indeed a multi-method approach to studying psychedelic shamanic practices is advised, so that ethnography can inform suitable experimentation (Giesler, 1984, 1985; Luke, 2010a). Nevertheless, Storm and Rock (2011) pointed out that, in psi research with psychedelics, researchers need to be aware of the difference between shamanic techniques and merely shamanic-like techniques; for example, the latter may lack the purpose of serving one's community. Furthermore, Tart (1977) has recommended the implementation of mutual research, where participants are considered as co-investigators, to reduce experimenter bias and enhance a sense of participation, trust, and motivation.

6. General Summary and Conclusions

Even though the subjective paranormal experiences, clinical observations and anthropological reports are subject to all the usual criticisms and rebuttals that apply to non-experimental cases (e.g., see Stokes, 1997) there is a growing body of reports, rooted in thousands of years of

traditional psychedelic use, that supports the notion that genuine paranormal phenomena do occur. Nevertheless, as evidence this data is not scientifically rigorous, yet it has great value in mapping the phenomenological terrain of paranormal experiences with psychedelics. This body of reports is further supported by correlations from surveys linking psychedelic use with the increased reporting of paranormal experiences and belief in the paranormal, although again, self-reports have more phenomenological merit than evidential value. Furthermore, even though it can be considered little more than exploratory at this stage, the experimental evidence is more positive than not and proves promising so far, illuminating both methodological pitfalls and possibilities.

It is apparent that parapsychopharmacology is a multidisciplinary endeavor pooling expertise from anthropology, ethnobotany, phytochemistry, neurobiology, psychopharmacology, psychiatry, psychotherapy, transpersonal psychology, and indeed parapsychology. It also owes much to the non-academic explorers of consciousness, be they shamans, occultists, or psychonauts. It is a branch of research that is still very much in its infancy, and, along with other fields conducting research with the use of psychedelics, has been operating very quietly since the late sixties until a gentle turn in the tide during the last decade or so has seen experimental research resumed (see Grob & Harman, 1995). Nevertheless, further experimental research continues to need strict ethical and often governmental approval before it can proceed, requiring lengthy applications (see McKenna, 2004; Strassman, 2001). Several years ago, Tart (1977) recommended bypassing these difficulties by casually enrolling participants who were already using psychedelics, rather than having the experimenter administering the substances directly. An example of this kind of experiment involved several thousand Grateful Dead fans, renowned for their psychedelic consumption, who acted as senders in a series of dream telepathy experiments with some success (Krippner, 1999; Krippner, Honorton, & Ullman, 1973; Roberts, 2004). Indeed, taking what Giesler (1984, 1985) calls a psi-in-process approach and keeping naturalistic variables intact, group experiments may be one way to access the kind of group telepathy experiences that people tripping in groups sometimes report (e.g., Grey, 2007; Nuttal, 1970; Stevens, 1989; Wolfe, 1971), especially on DXM (Luke & Kittenis, 2005). However, without the grounded and controlled atmosphere of a concert or shamanic ceremony, psychedelic group ESP experiments

run the risk of turning into bacchanalian scenes, as once witnessed by Puharich's wife (Hermans, 1998).

However, now resumed, direct parapsychological research with psychedelics needs expanding beyond the Netherlands and Brazil—the only place where experimental psi-chedelic research has been conducted since the 1970s—and treating these substances like any other drug worthy of investigation within a medical or therapeutic context has recently proven a fruitful means of inquiry for many researchers (Doblin, 2004; Grob & Harman, 1995), although psi research does not readily attract such funding at the present time. Nevertheless, it should be noted that psychedelics are considered as sacramentals by the spiritual and religious groups that use them and they must be utilized and researched with respect. It is also clear that besides trying to replicate the promising free-response studies, further experimental psychedelic research should utilize protocols that maximize psi effects, and this work can then simultaneously enhance process research methodology by indicating optimal conditions for psi through the psychologically magnifying effects of these substances. For instance, Bierman's (1998) psychedelic psi research may have revealed the apparent psychic blocking of negative images, and, from earlier experiments, forced-choice tasks are clearly too mundane. Research should also seek to study these substances in the shamanic context in which they have most effectively been used, designing appropriate test protocols for traditional settings. A recent example of which is Hirukawa et al.'s (2006) apparently successful demonstration of psi using a field random event generator in an ayahuasca ritual with the Santo Daime church in Brazil.

Additionally, following in the footsteps of William James, there has already been some return to self-experimentation with psychoactive drugs by de Pablos (2002, 2004), who has developed a viable protocol for testing one's own precognitive dreaming abilities with drugs, which might easily be adapted to waking experimentation as well. All experimental research should also be designed and conducted with an appreciative consideration of Tart's proposals for the creation of state-specific sciences (Tart, 1972, 1998, 2000, 2001). In the future, parapsychologists might ask their participants about their drug use, and researchers investigating the use of psychedelics might once more include questions relating to paranormal experiences (e.g., Echenhofer, 2005). Furthermore, with an ever

growing number of substances being discovered and a large natural data pool of psychedelic users, there is a need for more thorough and focused phenomenological research that investigates and identifies the types of paranormal experience that occur through the use of each of these diverse psychedelic substances (Luke, 2004a, 2004b, 2004c; Luke & Kittenis, 2005).

Finally, there is much that can be offered to transpersonal studies from the investigation of parapsychopharmacology, and vice versa. Certainly it is clear that no study of the extraordinary phenomena of the psychedelic state would be complete without the insights and perspective of transpersonal psychology. Indeed, many of the exceptional experiences encountered with psychedelics involve parapsychological elements and yet they also go beyond the ordinary scope of parapsychology into the wider transpersonal realms (Luke, 2012b), such as entity encounters (e.g., Luke, 2011b) and profound mystical experiences (Luke & Kittenis, 2005). It is also somewhat inevitable then that this course of research is as likely to culminate in transformation for the researcher as it is in evidence for the genuine existence or otherwise of psychedelically induced paranormal phenomena (Luke, 2011c). It is also illuminating at this point to consider this research in terms of Tart's (2002) evaluation of these related fields of enquiry, where parapsychology is to transpersonal psychology what physics is to engineering: One researches the fundamental technical nature of the subject matter so that the other may apply it. In the current case a great deal can be learned, as Tart reminds, about the fundamental nature of mind through the study of parapsychology and—by looking to the psychedelic dimension—about the neurochemical mediation of exceptional aspects of consciousness in particular. Ultimately, however, it is down to transpersonal psychologists how they use this knowledge and apply it, though, fortunately, the history here tells us that wisdom usually prevails.

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