THAT DEEP INTERNAL VOICE:

CONTROLLED ADMINISTRATION OF SALVIA DIVINORUM

by

Peter H. Addy

A dissertation submitted

in partial fulfillment of the requirements

for the degree of Doctor of Philosophy

in Clinical Psychology

Institute of Transpersonal Psychology

Palo Alto, California

June 3, 2010

I certify that I have read and approved the content and presentation of this dissertation:

Jenny Wade, Ph.D., Committee Chairperson	Date
William Richards, Ph.D., Committee Member	Date
Christopher Bache, Ph.D., Committee Member	Date

ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346

Formatted according to the Publication Manual of the

American Psychological Association, 6th edition.

Abstract

That Deep Internal Voice:

Controlled Administration of Salvia Divinorum

by

Peter H. Addy

Basic scientific research was performed by administering the psychedelic plant *Salvia divinorum* to 30 human participants. A placebo-controlled, double-blind, randomized study design was used that incorporated quantitative and qualitative data collection and analysis to study the subjective experience of *S. divinorum* and consequences of use after 8 weeks. Participants were screened using the Structured Clinical Interview for DSM Disorders-I and semi-structured interviews for medical and psychological issues in order to minimize the chance of a negative reaction. An Emergency Medical Technician was present during administration of either 1000 mcg salvinorin A or placebo dose. Vital signs, observable behavior, and the Hallucinogen Rating Scale (HRS) were administered to all participants. Interviews were also audiotaped and transcribed to elicit themes based upon thematic analysis. Thirty participants had a mean age of 39, were experienced with psychedelics, and well-educated. Two 2-way ANOVAs were used to determine differences between groups based upon sex (women and men), dose (active and placebo), and time (before and after). Pulse rate dropped 5.3 bpm between time measurements. Participants talked, laughed, and moved more often on an active dose. All 6 HRS subscales were significantly elevated on an active dose. No sex differences were noted. Participant experiences displayed 10 common themes presented in depth through qualitative analysis, profiling the phenomenology of this state, including cognitive alteration, synesthesia, and immersion in another reality.

During an 8-week follow-up interview no participants met DSM criteria for substance abuse or dependence of *S. divinorum*. Positive aftereffects were noted more frequently than negative aftereffects. Use of this plant is increasing, and medical professionals should be aware of what an *S. divinorum* experience can look like and how to treat a user. This study serves as an introduction to the plant, its use as a psychedelic, physiological and phenomenological effects, and indications for future research.

Epigram

Res ipsa loquitur.

(The thing itself speaks.)

Salvia divinorum

Acknowledgements

I am particularly grateful for Anne Huffman and David Lane, my nurse and EMT respectively, without whom this research never would have been possible. Doctors Jim Fadiman, D. Christopher Dryer, Arthur Hastings, and Jenny Wade provided invaluable support during my project. The Multidisciplinary Association for Psychedelic Studies awarded me a generous research grant. Daniel Siebert provided standardized dosages of the plant. Dr. Rick Strassman provided his HRS scale and much advice.

Also thanks to my dissertation support group, which variously included Chanda, Claire Marie, Haydn, Karyn, Kate, and Lyssabeth.

Table of Contents

List of Tables

Tables Page

Chapter 1: Introduction

After a long hiatus, research into psychedelic chemicals involving human participants has resumed. Studies have recently been published regarding the subjective effects of N,N-dimethyltryptamine (DMT) (Strassman & Qualls, 1994), psilocybin and mystical experiences (Griffiths, Richards, McCann, & Jesse, 2006), cognitive and subjective effects of ketamine (Lofwall, Griffiths, & Mintzer, 2006), and the potential of psilocybin and lysergic acid diethylamide (LSD) to treat cluster headaches (Sewell, Halpern, & Pope, 2006). Research is currently underway investigating medical marijuana (Vastag, 2003) as well as the effectiveness of 3,4-methylenedioxymethamphetamine (MDMA) in treating posttraumatic stress disorder in the US (Mithoefer, 2006-2007), Switzerland (Oehen, 2006-2007), and Israel (Mojeiko, 2006). A common complaint among researchers of psychedelics is that the majority of such substances are currently prohibited in the US and most other countries (Strassman, 1991), making research difficult.

Salvia divinorum is a plant of the mint family that grows in Oaxaca, an isolated region of central Mexico. The indigenous people of the region, the Mazatecs, regard *S. divinorum* as a sacred plant and their curanderos (healers) use the plant for such shamanic purposes as divination, finding lost objects, and both physical and spiritual healing (Ott, 1995b). The plant was given its Latin name, which means "sage of the diviners," after R. Gordon Wasson took a cutting of the plant for botanical identification in 1962 (Epling & Jativa-M, 1962).

Salvinorin A is the main active principle of *S. divinorum*. When smoked, salvinorin A is active in as little as 200 mcg (Siebert, 1994). Neither *S. divinorum* nor salvinorin A are controlled by the Food and Drug Administration (FDA) at this time. This fact, along with its

relative obscurity, makes it of research and clinical interest as well as a potential substance of abuse among nontraditional users (users not associated with the Mazatec people).

Studies on *S. divinorum* to date have focused mainly on in vitro and nonhuman animal research. In mice, salvinorin A does not affect heart rate, galvanic skin response, or pulse, even after acute high doses, nor does it seem to affect extracellular serotonin levels (Mowry, Mosher, & Briner, 2003). In mice and rats, salvinorin A may produce antinociception (John, French, & Erlichman, 2006; McCurdy, Sufka, Smith, Warnick, & Nieto, 2006). Nociception refers to a measure of behaviors in nonhuman animals which is suggestive of experiencing pain. Antinociception is distinct from the word analgesia due to the former's description of behavior suggestive of pain and the latter's description of human experience of pain. Salvinorin A reduces or blocks nociceptive behavior in mice and rats. It is likely that salvinorin A produces antinociceptive effects mediated by the kappa opioid receptor (KOR) system (Mowry et al., 2003).

In both rodents and nonhuman primates, evidence suggests salvinorin A is a KOR agonist (Butelman, Harris, & Kreek, 2004). KOR agonists are currently being studied for therapeutic potential. KOR agonists do not produce the dependence and self-administration of other opioid agonists, such as morphine, but KOR agonists do produce analgesic effects in humans. Much research is being conducted on the possible benefits of KOR agonists in treating pain without risk of dependence.

Studies involving human participants are scarce. All published studies confirm the unique psychoactive nature of *S. divinorum*, but do not provide in-depth analysis of the experiences. For example, Siebert (1994) confirmed salvinorin A to be the active principle of *S. divinorum* and described several types of experiences common to using salvinorin A, including potentially

psychedelic and transpersonal experiences, by people who were not traditional users of the substance. Baggott, Erowid, and Erowid (2004) conducted a web-based survey of 500 users of *S. divinorum*. They reported positive aftereffects much more frequently than negative aftereffects. Hanes (2001) presented a case report of a woman with refractory, treatment-resistant depression who appeared to benefit from regular sub-psychoactive doses of oral *S. divinorum* leaves. Hanes (2003) later reported beneficial effects of *S. divinorum* on treatment-resistant depression in several other cases. In addition to antidepressant effects, he mentioned general "psychospiritual" growth as a result of regular ingestion. Finally, Bucheler, Gleiter, Schwoerer, and Gaertner (2005) recounted the case of a 19-year-old boy who reported subjective effects of inebriation, including a sense of depersonalization and vestibular hallucinations (feelings of floating). This limited scholarly evidence suggests possible benefits of *S. divinorum* use among non-traditional users, including transpersonal experiences (Bucheler et al., 2005; Siebert, 1994), antidepressant effects (Hanes, 2001, 2003), and psychospiritual growth (Hanes, 2003).

Curiously, salvinorin A may cause "depressive-like symptoms" in rodents (Carlezon et al., 2006), yet several humans have reported antidepressant effects (Hanes, 2001, 2003). Also, animal models also suggest salvinorin A may have antinociceptive properties (John et al., 2006), although human research has neither confirmed nor disconfirmed that hypothesis.

Besides studying the experiences of nontraditional *S. divinorum* users, their behaviors can also be studied. Several authors have written that *S. divinorum* is or may become abused (Baggott et al., 1994; Valdes, 1994). Such concerns have facilitated legislation outlawing *S. divinorum* in Delaware, Louisiana, Missouri, and Tennessee, as well as in Australia, Belgium, Denmark, Italy, South Korea, and Sweden. Through researching the experiences and behaviors of nontraditional *S. divinorum* users, legislators might one day be able to propose legislation

actually based upon evidence, rather than opinion. The current research will attempt to delve into the experience and the behavior of the nontraditional user of *Salvia divinorum* and/or salvinorin A.

The same indigenous people who use *S. divinorum* sacramentally also use mushrooms containing psilocybin and morning glory seeds containing lysergic acid amides (LSAs). The latter two chemicals currently are illegal in the United States. The reasons why these chemicals were outlawed are complex, but it is clear that neither chemical was outlawed based upon scientific evidence. Psilocybin and LSAs are both indoleamine psychedelics that have no potential for addiction, have established methods for safe use, and possess potential medical and other therapeutic benefit. It is likely that salvinorin A will be subject to the same irrational regulatory process, one of the reasons for some urgency in discovering more about this substance while researchers can still investigate it freely. Existing evidence from anthropological and clinical sources suggests *S. divinorum* may facilitate transpersonal and psychedelic experiences. As such, research into salvinorin A will be able to inform discussions of human consciousness and spirituality, especially as they relate to the kappa-opioid receptor system, as well as give a more holistic description of substance use and abuse among non-traditional users. The present study has investigated the subjective experience of smoking salvinorin A. The substance has been administered in a double-blind, placebo-controlled, crossover study gathering quantitative and qualitative data immediately and 8 weeks after use.

Chapter 2: Literature Review

Salvia divinorum is a plant of the mint family found in central Mexico. The plant was first identified and named by Epling and Jative-M in 1962 (Ott, 1995b), who named the new *Salvia* after the supposed divinatory properties of the plant. It is a perennial shrub generally growing to 1.5 m in height with square stems and white and purple flowers (Munro, 2006). The indigenous Mazatec people employ the plant for healing and divination. In their culture sometimes the healer takes the medicine, sometimes the patient, and often both together. People traditionally eat the leaves or drink a water infusion of the leaves in order to treat a variety of physical symptoms in their patients, as well as to experience visions that relate to psychospiritual healing (Ott, 1995b; Valdes, Diaz, & Paul, 1983).

The history of Western understanding of this plant is well documented. For a thorough review, see Ott (1995b). R. Gordon Wasson gave the first English description of the psychoactive effects of the plant. Wasson had previously made popular the use of psychedelic or "magic" psilocybin mushrooms by the Mazatecs of central Mexico. Wasson wrote that, when these mushrooms are not available, the healers would instead use a water-based infusion of *S. divinorum* leaves. He was able to attend a ceremony using these leaves, which he briefly described: "There was not the slightest doubt about the effect, but it did not go beyond the initial effect of the mushrooms—dancing colors in elaborate, three-dimensional designs" (Wasson, 1962, p. 84).

The next and most thorough description came in 1983, when Valdes published articles based on his doctoral dissertation (Valdes, Diaz, & Paul, 1983). Valdes described two sessions taking the plant with a local curandero. The Mazatec religion is a combination of traditional beliefs and Christianity, and so to prepare for the ritual the curandero called upon the Holy

Trinity, Saint Peter, and Mary, the mother of Jesus. The participants were cleansed through prayer, tobacco, and the smoke of copal resin before they drank a water infusion of *S. divinorum* leaves. The sessions began shortly after dusk, and after the cleansing ritual all lights were extinguished. Valdes summarized the sessions in five points:

> 1. Various sensations were reported by the subjects while lying or sitting down in quiet darkness. These included flying or floating and traveling through "space," twisting and spinning, heaviness or lightness of the body and "soreness."
>
> 2. Physical effects also accompanied the experience. There was an intoxication that produced dizziness and a lack of coordination on trying to move about. The recording of the second session revealed slurred speech and awkward sentence patterns. Diaz had a decrease in heart rate accompanied by a chill. Both subjects had a normal pupillary response to a light shined into their eyes.
>
> 3. Even though the subjects were aware of the sensations and the physical incoordination [*sic*] produced by the Salvia infusion, they claimed their minds seemed to be in a state of acute awareness. The experience was not like intoxication from alcoholic beverages.
>
> 4. Previous reports of *S. divinorum* ingestion emphasized the mildness of its effects, and the shortness of their duration. It has been shown, however, that under the appropriate conditions of quiet and darkness it was possible to experience effects which lasted for hours. The visions produced were readily terminated by noise or light.
>
> 5. There is apparently an aspect of the Salvia intoxication that leaves the subject's mind in a receptive state. This was well documented in the second session when both subjects spoke out fairly continuously. Diaz began by describing plants and flowers. After he finished speaking Valdes began with a similar vision. When Diaz lamented his inability to see the religious figures as described by the curandero, he apparently triggered off Valdes, who saw such imagery for the rest of the session and during the ride in the car. As Valdes described a castle, Diaz began to see one also. (Valdes, 1983, pp. 80-81)

As part of Valdes's dissertation he managed to clone one of the *S. divinorum* plants and bring it to a greenhouse at the University of Michigan. This clone, and Valdes's articles, thus brought this plant to the attention of Western science. The two sessions in which Valdes took part were tape-recorded and transcribed. Additional accounts of traditional sessions exist as well (see Ott, 1995b).

Several unique substances have been isolated from *S. divinorum* leaves. Ortega, Blount, and Manchand (1982) first isolated the major constituent and named it salvinorin A. Siebert

(2004) recently discovered that salvinorin A is primarily located in the glandular trichomes on the underside of the leaf; dispelling the previous notion that salvinorin A was uniformly present in the plant. Valdes (1983) classified salvinorin A as a neoclerodane diterpenoid, although that chemical taxonomy is not accepted by all (Ott, 1995b). The chemical is unusual in several respects. Structurally, it does not contain either nitrogen or a benzene ring (Munro, 2006), in contrast to almost all other known psychoactive substances. It was the first discovered naturally occurring nonnitrogenous opioid agonist. Behaviorally, salvinorin A is extremely potent, causing effects at doses as low as 200 mcg. The only psychedelic substance more potent than salvinorin A is LSD, which has a threshold dose of 40 mcg (Ott, 1995b).

Salvinorin A is the principle psychoactive chemical, but other chemicals have been isolated from *S. divinorum*. Valdes et al. (1983) isolated the compound salvinorin B. Schmidt et al. (2005) developed a method of determining salvinorin A and B in various body fluids. They first presented evidence suggesting salvinorin B forms as a metabolite of salvinorin A, and that salvinorin B is not psychoactive. Ansonoff et al. (2006) suggested that salvinorin B is not psychoactive in mice. Valdes et al. (2001) later isolated salvinorin C, and Munro (2006) successfully identified and isolated salvinorin D-F as well as three other novel terpenoids, which he labeled divinitorin A-C. Siebert (2004) has stated that salvinorins B and C are not psychoactive, and Munro's findings agree with that statement. Munro ran several in vitro experiments with the salvinorin analogues and determined that only salvinorin A showed any activity at the KOR. The majority of research has been on salvinorin A, and that is the main focus of this review. Salvinorin A and the opioid system may have implications for the field of experimental transpersonal psychology, which is the focus of this study.

Psychopharmacology

The most well studied neurotransmitter system in the human brain is undoubtedly the opioid receptor system. Opioid use and dependence has become a rising social problem with no current preferred method of treatment. The potential negative side effects of opioids have limited their clinical utility, despite their being the best analgesics available. Thus, studies of a relatively obscure, naturally occurring substance may provide needed information to facilitate the creation of a new line of analgesics. The majority of research on salvinorin A is related to analgesia.

The existence of opioid receptors was first demonstrated in 1973, followed soon after by the discovery of three specific g-protein-coupled receptor subtypes (Metcalf & Coop, 2005). In 1977, the μ (mu) and δ (delta) receptors were discriminated, and in 1981, the κ (kappa) receptors were discovered. Four endogenous peptides have been found that bind to the opioid receptors: endorphins, enkephalins (DOR agonists), endomorphins (MOR agonists), and dynorphins (KOR agonists).

The opioid receptor system is based in the ventral tegmental area (VTA), where opioid neurons project to the nucleus accumbens (n.acc.), striatum, prefrontal cortex, and amygdala (Hasebe et al., 2004). From the n.acc. dynorphin neurons project to the substantia nigra, while enkephalin neurons project to the globus pallidum. The opioid system regulates levels of dopamine (DA), glutamate, and GABA in the above-mentioned brain regions.

The effects on DA make the opioid system interesting to researchers. MOR and DOR agonists, such as the psychostimulants cocaine and methamphetamine, increase extracellular levels of DA, particularly in the n.acc. and striatum (Hasebe et al., 2004). Cocaine, for example, inhibits the reuptake of DA in the n.acc. and VTA. This likely leads to the euphoria and self-administering behaviors that can lead to dependence and addiction. Selective MOR agonists are

also positively reinforcing, meaning animals will compulsively self-administer such compounds, indicating high addictive potential.

In contrast, stimulation of the KOR decreases dopamine release in the n.acc. This activity leads to effects which have generally been described as dysphoric, and sometimes psychotomimetic. Research suggests that KOR agonists do not lead to self-stimulating behaviors. Indeed, given a choice mice and rats will avoid KOR agonists if at all possible (Zhang, Butelman, Schlussman, Ho, & Kreek, 2005). KOR agonists may be able to modulate the behavioral effects of psychostimulants and lead to effective treatments for psychostimulant abuse and dependence. Animal models have shown synthetic KOR agonists reduce self-administration of cocaine (Prisinzano et al., 2005) and morphine (Hasebe et al., 2004).

The effects of salvinorin A seem to be similar to that of synthetic KOR agonists, excluding the effect of dysphoria. In 2002, Roth et al. presented evidence that salvinorin A binds selectively to the KOR system, and is a potent agonist. Researchers using mouse (McCurdy, Sufka, Smith, Warnick, & Nieto, 2006), rat (Carlezon et al., 2006), rhesus monkey (Butelman, Harris, & Kreek, 2004), and zebrafish (Braida et al., 2006) models have looked into the mechanism of action for salvinorin A and have confirmed in all animal models that salvinorin A is a selective KOR agonist.

A second therapeutic possibility is related to the first. KOR agonists are being studied for their therapeutic potential in pain management, as discussed above. KOR agonists produce analgesia without physical dependence. However, they do reportedly produce dysphoria and sometimes psychotomimesis (usually perceptual disturbances). These unwanted side effects have limited their therapeutic application so far, but research is continuing.

A third aspect of salvinorin A psychopharmacology that may be relevant to human experiences is the effect of the chemical on movement. Selective KOR agonists decrease dopamine levels in the striatum, which has been linked with the modulation of movement (Prisinzano et al., 2005). Carlezon et al. (2006) examined the potential for depressive-like effects using two behavioral models for studying depression in rats. Both tests revealed a dose-dependent effect suggestive of avolition, which could be expected with lowered DA levels in the nucleus accumbens and caudate putamen. The n.acc. is involved with motor coordination, and decreased DA levels may lead to altered mobility or perhaps immobility.

To summarize, salvinorin A has shown potential to block (a) the perception of pain, (b) the effects of other opioid drugs, and (c) the ability or desire to move. It may cause dysphoria and psychotomimesis, although the context of observation alters the definition of what is observed. As previously stated (Addy, 2007), “if clinicians are interested in the analgesic properties of [a drug], perceptual alterations may be noticed and described merely as hallucinations” (p. 3) or psychotomimetic activity.

One study showed unexpected behavior of salvinorin A. While it is well established that salvinorin A is a KOR agonist, Braida et al. (2006) showed a cannabinoid (CB1) antagonist eliminated the effects of salvinorin A. They noted that the naturally occurring CB1 agonist delta-9-THC (the active chemical in marijuana) and the KOR agonist salvinorin A are both terpenoids, and both produce similar psychological effects such as “analgesia, sedation, dysphoria, and perceptual distortion” (p. 446). Neither Siebert's (1994) nor Roth et al.'s (2002) bio-receptor screenings of salvinorin A included the CB1 neurotransmitter. More research must be conducted in order to clarify the possible role of the CB1 receptor in salvinorin A effects. The many effects

of salvinorin A, including antinociception in animals and psychotic-like effects in humans, can better be understood once the behavior of salvinorin A at neural receptor sites is understood.

Also of note is the first toxicological investigation of salvinorin A, conducted by Mowry, Mosher, and Briner (2003). They observed no effect on the heart rate, body temperature, or galvanic skin response of rats after acute, high-dose administration. The researchers did observe a nonsignificant rise in blood pressure. They also observed no effects in the liver, spleen, kidney, bone marrow, or brain tissue of mice exposed to daily doses for 2 weeks. They concluded that salvinorin A has a low toxicity, with possible effects on blood pressure.

Salvinorin A in Humans

Two types of research have been conducted on *S. divinorum* and salvinorin A. The above-mentioned animal research is an example of traditional professional scientific research. A few professional articles have appeared concerning human use of the plant. Many more articles exist of an amateur quality. The word amateur, in this sense, refers to people who conduct research as a hobby, with or without professional training. Most amateur research into *S. divinorum* has been psychonautical in nature. A psychonaut is someone who explores his/her own mind or psyche, often using chemically facilitated altered states of consciousness as a vehicle for exploration (Ott, 1995a, 2001).

Nonscholarly psychonautical research. Perhaps the most well documented amateur research into the plant is in the pages of *The Entheogen Review* (Aardvark, 2002; The Entheogen Review, n.d.), a quarterly publication of underground research into psychedelic chemicals. Since its inception in 1992, amateur researchers have described experiences and experiments with *S. divinorum* and salvinorin A. The word entheogen means creating or manifesting the divine within (Ott, 1995a) and is an alternative to the word psychedelic. *The Review* contains references

to many of the scholarly works discussed in the present paper, including Valdes (1983) and Siebert (1994). The audience of *The Entheogen Review* was considered relevant enough for both Valdes and Siebert to publish articles in *The Review* (included in Aardvark, 2002).

The collection of articles edited by Aardvark (2002) suggests that experiments with *S. divinorum* and salvinorin A were relatively rare before 1994. Until Siebert (1994) published his findings, which are discussed below, it was unknown how to best prepare and ingest the plant. Dosage of salvinorin A and concentration of the chemical in various parts of the plant was also unknown at the time, thus contributing to inconsistent data reported by amateur psychonauts.

Another notable piece of amateur research is the book *Salvinorin: The Psychedelic Essence of Salvia Divinorum* by D. M. Turner (1996). This book, out of print since the author's death but freely available online, contains most of the collected knowledge about the chemical at that point in time, including many unique pieces of information. For example, Turner includes several experience reports, including the first ever human experience of pure salvinorin A, made by Daniel Siebert in 1993. Turner wrote of Siebert, "During his experiments, Siebert felt the plant's spirit was issuing a kind of intuitional guidance, encouraging him to continue with the extraction process and discover a means of achieving a full Salvia experience" (Turner, 1996, ch. 3, para. 2). According to the report Siebert purportedly gave to Turner, the first human experience of salvinorin A was with 2.6 mg (in contrast to the "standard" 0.5-1.0 mg dose range Siebert currently recommends) and consisted of loss of familiar corporeal and temporal existence:

> I suddenly realized that I had no actual memory of ever having lived in any other state of consciousness but the disembodied condition I was now in. . . . In this state all the points of time in my personal history coexisted. One did not precede the next. (Turner, 1996, experience 12, para. 4)

This book was highly regarded among early psychonauts (Aardvark, 2002) but is probably unknown to mainstream science. This book, like most of the research and literature on the plant, has stayed esoteric.

The clandestine approach to *S. divinorum* research was and is largely on purpose. *The Entheogen Review* quotes attorney Richard Glen Boire as saying

> It's not that a substance exists that triggers its [regulatory] scheduling, nor is it that people are in fact using it—even large numbers of people, it's when this fact becomes known that the wheels of the anti-drug laws start to spin. So, in my opinion media attention on any currently legal entheogen is always bad. (Boire as cited in Aardvark, 2002, p. 134)

Siebert echoed this concern in his article in *The Review*. He wrote that if pure salvinorin A were made easily available to recreational and psychonautical users, the chemical and plant "will get negative attention, and it will become scheduled. We will just be adding one more potentially valuable plant ally to the list of species that are already feared and condemned in our society" (Aardvark, 2002, p. 86). This legitimate fear has limited the exposure of many valuable scientific discoveries made by psychonauts from reaching mainstream science (see Addy, 2007, for further examples).

Professional scientific research. Some scholarly research has been published on the subject. As will be discussed below, Siebert (1994) first determined that salvinorin A was the main active principle of the plant. Since then, one human subject trial has been conducted (Pichini et al., 2005), and no description was given of the behaviors or experiences of the participants. Researchers have given surveys to nontraditional *S. divinorum* users over the Internet (Baggott, Erowid, & Erowid, 2004) and in Spain (Gonzalez, Riba, Bouso, Gomez-Jarabo, & Barbanoj, 2006). Two clinicians (Bucheler, Gleiter, Schwoerer, & Gaertner, 2005; Hanes, 2001, 2003) have written case reports on the behavioral and health effects of *S. divinorum*. These seven articles comprise the current known scholarly literature related to *S.*

divinorum use and humans.

Siebert (1994) conducted the first research on salvinorin A using human participants. First, Siebert gave fresh *S. divinorum* leaves to 6 participants in a within-subjects repeated measures design. He initially had participants swallow a water-based leaf mixture, followed several days by having participants hold the same mixture in their mouths without swallowing. Results indicated the psychoactive effects were related to the oral mucosa, not the stomach. Second, Siebert tested salvinorin A on a group of 20 individuals. The group swallowed capsules of salvinorin A, sprayed an alcohol-based salvinorin A mixture inside their mouths, and inhaled a vaporized compound of salvinorin A. The group's experiences suggested to Siebert that the stomach does not absorb the chemical, the oral mucosa inefficiently and inconsistently absorbs the chemical, and inhaling salvinorin A vapors is "most efficient" (1994, p. 54).

Siebert observed that absorption through the oral mucosa led to effects in 5-10 minute, a plateau for 1 hour, and then subsided over 1 hour. Absorption of smoke through the lungs led to effects almost instantly, a plateau for 5-10 minutes, then subsided over 20-30 minutes. Experiences varied based on set and setting, but Siebert distinguished certain common themes which he minimally described:

> (a) Becoming objects (yellow plaid French fries, fresh paint, a drawer, a pant leg, a Ferris wheel, etc.); (b) Visions of various two dimensional surfaces, films and membranes; (c) Revisiting places from the past, especially childhood; (d) Loss of the body and/or identity; (e) Various sensations of motion, or being pulled or twisted by forces of some kind; (f) Uncontrollable hysterical laughter; and (g) Overlapping realities, the perception that one is in several locations at once. (1994, p. 55)

Siebert also noted that experiences appeared equally as intense between vaporization of salvinorin A and sublingual absorption of *S. divinorum* leaves.

Pichini et al. conducted the only other human research trial with salvinorin A. Pichini et al. administered dry *S. divinorum* leaves to 2 participants in order to determine effective ways to

detect salvinorin A in biological fluids. Participants smoked 75 mg dry leaves and experienced intense hallucinations starting 30 seconds after inhalation, peaking after 3-5 minutes, and lasting 15-20 minutes. The researchers observed salvinorin A was most easily detected in urine, with no significant detection in plasma, saliva, or sweat. The only mention of the experiences of the two participants was, "Both volunteers experienced intense hallucinations" (2005, p. 1656), which was elicited during an informal, post-session interview.

Baggott et al. conducted an Internet-based survey in order "to help gather evidence . . . that salvinorin A could be safely administered to a small set of experienced users in a lab setting. This provided the primary focus of the survey: consequence of use, lasting effects, and usage patterns" (2004, p. 12). Most of the 500 participants were male (93%), 23 years old (range: 13-68), and living in the United States (77%). Participants responded to a survey whose "questions were mostly multiple-choice and numerical-answer with a few open-ended responses" (p. 12). Only 4% of participants reported persisting negative effects, primarily anxiety.

The authors looked specifically for the seven criteria for substance dependence delineated in the *Diagnostic and Statistical Manual of Mental Disorders-IV-TR* (American Psychiatric Association, 2000), and found 0.4% of participants met the criteria. The criteria, which Baggott et al. (2004) did not mention in their article, are tolerance, withdrawal, taking the substance in a larger amount than intended, a persistent desire to cut down use, spending a great deal of time obtaining the substance, giving up important activities due to substance use, and continuing substance use despite knowledge of problems related to use.

Many respondents (26%) reported improved mood and "antidepressant-like effects" lasting 24 hours or more after use. This is consistent with (or possibly influenced by) the case reports published by Hanes (2001, 2003), which are discussed below. *S. divinorum* users may

have been influenced by prior writings on the topic of *S. divinorum* experiences. The website this survey was advertised on is The Vaults of Erowid, an online library and non-profit organization which aims to be a source of nonjudgmental information "documenting the complex relationship between humans and psychoactives" (Erowid, 2006) for the purpose of harm reduction. This website lists several scholarly articles, including Hanes (2001) on possible antidepressant effects of *S. divinorum*. Prior knowledge of Salvia-related literature may have biased respondents.

Gonzalez et al. (2006) recruited 32 nontraditional *S. divinorum* users in Spain through convenience sampling for a one-time face-to-face semi-structured interview. Most participants were male (56%), 25 years old (range: 18-40), high school graduates (72%) attending university (69%) full-time (53%). All participants used other psychoactive substances in addition to *S. divinorum*. These additional substances were listed, in descending order of frequency of use: cannabis, alcohol, ecstasy [*sic*], cigarettes, cocaine, psilocybin mushrooms, LSD, amphetamines, opiates, benzodiazepines, and others. Regarding *S. divinorum* use, most participants had first experienced the plant recently, 88% within the last year. Participants generally smoked a crude extract of salvinorin A used to fortify leaves into "5x" or "10x" extracts which facilitated an intense to very intense experience. Euphoria and dissociation were the two most commonly cited positive aspects of the experience, and its short duration the most common negative aspect. Only 1 participant reported social problems because of use; his friends, who did not use substances nonmedically, were worried about his experimenting.

Gonzalez et al. (2006) also administered three questionnaires to his 32 participants, all of which quantitatively measure subjective effects of substance use. The Hallucinogen Rating Scale (HRS; Strassman, Qualls, Uhlenhuth, & Kellner, 1994) is composed of six subscales. Five subscale ratings were consistent with other psychedelics tested with the HRS in previous

literature (ayahuasca, DMT, ketamine, psilocybin, and MDMA; see chapter 3 for more details). The one subscale score that was atypical was the "volition" subscale, which indicated the psychedelic effects of *S. divinorum* were more incapacitating than any other substance tested with the scale. This supposed avolition is consistent with animal data that KOR agonists induce avolition.

The second quantitative measure of subjective experience was the Addiction Research Center Inventory (ARCI) (Martin, Sloan, Sapira, & Jasinski, 1971). The ARCI profile of *S. divinorum* users was similar to that of people who used psychedelics such as ayahuasca (a beverage containing DMT and other psychoactive compounds), except for the elevated scale measuring sedation. The ratings on the HRS and the ARCI both suggest a lack of movement, consistent with animal data. Gonzalez et al. (2006) noted that the ARCI profile of the *S. divinorum* users was more characteristic of KOR agonists than of 5-HT agonists.

Third, Gonzalez et al. (2006) administered the Altered States of Consciousness (APZ) (Dittrich, 1998) scale to the *S. divinorum* users. Results suggested derealization and visual phenomena with *S. divinorum* were very pronounced. The authors conclude: "The pattern of responses . . . would reflect a psychedelic effect profile accompanied by a highly modified perception of external reality and a decreased ability of the individual to interact with themselves or their surroundings [*sic*]" (2006, p. 5). These three scales gave some account of the experiences of nontraditional *S. divinorum* users.

Two authors have described case reports of *S. divinorum* users. First, Hanes (2001, 2003) stated the clinical and research possibilities of *S. divinorum*. He presented a case report of a 26-year-old woman in Australia with treatment-resistant depression who manifested improvement after receiving sub-psychoactive oral doses of *S. divinorum* leaves every 2 to 3 days in

combination with occasional psychoactive doses. She would chew and hold in her mouth 0.5 to 0.75 g dry leaf for 15-30 minutes, two of three times per week. The woman also claimed to benefit from "occasional" intoxicating doses of *S. divinorum* consisting of 2-4 g taken in the same method as above. Hanes reported a total remission of depressive symptoms for the past 6 months. Additionally, he conveyed his client's claim that psychoactive doses of the herb "had engendered a kind of 'psychospiritual' awakening, characterized by the discovery of the depth of her sense of self, greater self-confidence, increased feelings of intuitive wisdom, and 'connectedness to nature'" (2001, p. 634).

Later, Hanes (2003) wrote a follow-up report in which he described six additional patients who claimed beneficial effects of *S. divinorum* on treatment-resistant depression. From Hanes's seven case reports and discussion with over 20 individuals who reported positive effects of *S. divinorum*, Hanes gave the following list of symptoms of regular *S. divinorum* use: significantly reduced scores on quantitative measures of depression, mood enhancement, increased feelings of relaxation and self-awareness, interest in meditation and hypnagogic states, and lightheadedness. Although Hanes (2003) did not list the measures in question, Hanes (2001) mentioned the Hamilton Depression Rating Scale as a quantitative measure of depression. The other conclusions come from a mixture of client self-reports and Hanes's observations as a therapist. Hanes concluded by briefly mentioning possible transpersonal implications of *S. divinorum* use:

> Several patients have reported benefits of a broadly "psychospiritual" quality from their unsanctioned occasional use of larger doses of this herb, incorporating such experiences as loss of body awareness (e.g., becoming numbers, household objects), being present in an alternate reality, ineffability (difficulty describing the experience with words), nature mysticism, and increased intuitive insight. (2003, p. 19)

Unfortunately, he did not go into greater detail in either article.

Second, Bucheler et al. (2005) recounted the case of a 19-year-old boy in Germany who admitted using *S. divinorum*. The boy reported he smoked or chewed the leaves twice a week for 6 months, without obvious deleterious effects to his health, social, or academic life. He reported the experience peaking at 5 minutes and lasting 30 minutes total. He described the following experiences after using the herb:

> Being disconnected from his own body . . . hovering above the floor . . . mature insight not only into his own personality but also into philosophical or ethical problems . . . prickling of the skin, fever-like hot flashes, muscular tremor . . . ringing in the ears. (2005, p. 2)

The boy denied negative psychological effects, and described a gradual tolerance over a period of 6 months: "Nevertheless, he reports his impression that the amount of Salvia material, necessary for one trip, will have to be increased gradually in order to maintain the original effective strength" (p. 2).

To summarize, salvinorin A is best absorbed by smoking or holding in the mouth. It is extremely potent and short acting, possibly antidepressant, with few reported negative consequences. Nontraditional users may at present be primarily educated young adult males who seek dissociation, perceptual disturbances, and transpersonal experiences in order to have fun and enjoy themselves and/or to explore their minds and realities. Salvinorin A inebriation may be unique from that of other psychoactive substances. Several authors have called for more research into the possible applications of the plant and chemicals.

Conclusions

Animal and human data agree on certain points. The effects of salvinorin A have a very short duration of several minutes up to 1 hour, depending on the method of administration. A low dose of salvinorin A in zebrafish had stimulant properties, and low doses have been reported as antidepressant in humans, perhaps due to similar stimulant properties. The experience of taking

salvinorin A led to immobility in rodents and humans. Finally, few if any observed long-term negative health consequences result from regular salvinorin A dosing.

Salvinorin A may stimulate CB1 receptors in zebrafish. If the same activity occurs in humans, it would be important to understand. Salvinorin A can cause conditioned place aversion or preference, apparently depending on dose. If salvinorin A has reinforcing properties indicative of addictive behavior, this too would be important to know.

No researchers have explored and documented the subjective experiences of nontraditional *S. divinorum* users in depth. In order to form a more complete picture of *S. divinorum*, as well as a more complete picture of cognitive neuroscience and the nature of experience, *S. divinorum* user data should be taken as valuable data.

Chapter 3: Research Method

Before discussing the research design, it is important to clarify several issues regarding a study of this kind owing to the current political and regulatory climate surrounding the use of psychoactive substances in the United States. The plant *Salvia divinorum* is a botanical preparation. The United States Food and Drug Administration (FDA) classifies such a preparation as either a cosmetic, dietary supplement, drug, or food based upon the intended use of the botanical in question. If the botanical is considered a drug, then the FDA is required to regulate all clinical trials. The FDA defines a drug as a substance used or studied with the intention of preventing, diagnosing, curing, mitigating, or treating a disease (Federal Food, Drug, and Cosmetic Act, 2004). The current study was not subject to regulation by the FDA because this study did not involve a drug but rather a dietary supplement. This is an important distinction. The FDA defines a substance based upon the intended use of that substance in research and, if applicable, marketing (U.S. Department of Health and Human Services, 2004).

The intent of the current study was to investigate *S. divinorum* as a dietary supplement. The FDA considers a dietary supplement any substance used to affect the structure and/or function of the body, or else to affect a person's general wellbeing (Federal Food, Drug, and Cosmetic Act, 2004). The current study did not intend to cure, diagnose, mitigate, prevent, or treat any disease using either *S. divinorum* or salvinorin A. The only claim being made was that the taking of *S. divinorum* may affect (a) the structure and/or function of the body, and/or (b) general well being.

Similarly, the Drug Enforcement Administration (DEA) did not need to be involved in this study (C. L. McEnry, personal communication, August 14, 2007). Neither *S. divinorum* nor salvinorin A are controlled substances at a federal level, so there are no laws for the DEA to

enforce. There are no federal restrictions upon a study of the type explained here. However, a number of safeguards are built into this research design to uphold ethical and safety standards. They are presented in the appropriate sections below. A thorough discussion of the unique risks associated with human use of psychedelic substances is put forth in Johnson, Richards, and Griffiths (2008), the ideas of which are evident in much of this study's protocol.

The current protocol was a randomized double-blind study of experiences of salvinorin A. This study was the third conducted with human participants, and the second to assess the subjective effects of this dietary supplement. Although few clinical trials have been conducted, all evidence suggests that salvinorin A can be safely administered to human participants in a controlled setting. An animal study (Schmidt et al., 2005) has suggested a sex difference in absorption and metabolism times for salvinorin A, but this has not been examined in humans. Schmidt et al. injected pure salvinorin A into four rhesus monkeys and collected blood samples to determine pharmacokinetics. They noted a slower distribution and elimination of salvinorin A in female subjects, indicating a difference of effects based on sex.

The current study was intended to describe comprehensively and systematically the subjective experiences facilitated by *S. divinorum* and to test whether use leads to extended subjective or behavioral consequences 8 weeks after use. In order to study this, each participant experienced two conditions: placebo and an active dose of 1000 mcg salvinorin A. Participants were measured before and 50 minutes after receiving the substance.

Three hypotheses were tested in this study. The null hypotheses were: (a) there is no significant within-group difference between the mean vital sign scores obtained at baseline and after intervention, (b) there is no significant difference between males and females on any

measurement, and (c) there is no significant within-group difference between receiving an active dose or a placebo on any measurement.

The quantitative measures used to test these three hypotheses will be described below. In addition, qualitative data were gathered for content analysis and the generation of recurrent themes. A description of an experience was sought. Qualitative data were gathered from recorded and transcribed interviews conducted immediately and 8 weeks after taking the substance. These transcriptions were analyzed to compare and contrast the quantitative data in order to gain a more accurate picture of the experiences under study.

Participants

Thirty psychedelic-experienced physically healthy individuals were recruited for this study. The first 30 volunteers who qualified were included. If any participants stopped or were withdrawn, additional participants were recruited. Sixteen participants were biologically male and 14 biologically female.

To be included as participants, volunteers needed to have a history of psychedelic substance use, be between the ages of 25 and 65, and be fluent and articulate in English. These criteria strengthened the possibility that the participant would be able to give a detailed description of his or her experiences. Individuals 25 years old or older were included under the assumption that more life experiences are generally correlated with more ego strength and, therefore, less likelihood of a negative psychological reaction to the experience.

Having previous experience with psychedelic substances can be operationally defined as experiencing at least one profound alteration in consciousness that comes on suddenly. Such an experience can be facilitated by a classical indoleamine hallucinogen such as LSD, phenethylamine such as MDMA or mescaline, dissociative such as ketamine, or previous

experience with *S. divinorum*. For the purposes of this study marijuana was not considered psychedelic. Psychedelic-experienced participants were probably less likely to panic or have other negative reactions to the substance. Having a prior history of psychedelic substance use was also likely to decrease negative reactions, as well as provide subjective comparison data if and when the participants compared their experiences with salvinorin A to experiences with other chemicals.

Additionally, all participants lived within a reasonable distance (as decided by each participant) of Palo Alto, where the sessions were conducted; were willing to commit to substance intake, experimental sessions, and follow-up sessions; and agreed not to eat for 6 hours before each session. Pre-menopausal women agreed to have a negative pregnancy test, to use an effective form of birth control, and to not be nursing. Female participants were excluded if they were or intended on becoming pregnant during the course of the study. No known animal or human studies have investigated any effects of salvinorin A on pregnancy or fetal development. To err on the side of caution the current study did not investigate this area either.

Finally, all participants had to be willing to refrain from taking the following chemicals during the study period, unless with prior approval of the research team or with the permission of their physician: (a) prescribed medications (excepting birth control, thyroid hormones, and other medications approved by the research team); (b) other psychoactives (excepting caffeine and nicotine); and (c) nonprescribed medications, including herbal supplements (excepting non-steroidal anti-inflammatory drugs or acetaminophen).

Volunteers were excluded from participation if, after a screening interview and a report from their physician, they: (a) reported a history of bipolar I disorder, any dissociative disorder, posttraumatic stress disorder, or any psychotic disorder; (b) had evidence or history of significant

physical disease, including asthma and other respiratory diseases; or (c) were not able to give adequate informed consent.

The purpose of excluding volunteers with previous psychotic symptoms was to decrease the possibility of negative reactions, which is a benefit for both the study and such individuals. Neither inclusion nor exclusion based on religious or spiritual practices occurred. Previous reports suggest broadly spiritual consequences of salvinorin A use, and a decision was made not to bias this possible outcome by either including only spiritually-inclined people or excluding such people.

Set and Setting

It is important to note here that I have undergone special study and training to support the safety and well being of the participants and ensure their ethical treatment. All interactions with the participants were based on two main sources. The first was the Psychedelic Emergency Services, or PsyEMS, work by the Multidisciplinary Association for Psychedelic Studies (MAPS) (Mojeiko, 2007 Winter). MAPS volunteers provide free, walk-in counseling and services to individuals undergoing difficult emotional experiences, including experiences facilitated by psychoactive and psychedelic substances. MAPS provides this service at large public events where difficult emotional experiences and substance use may be common, such as the Burning Man event. MAPS has served over 500 people since they began sending volunteers to this week-long event in 2004. I have received training in MAPS PsyEMS and have worked with many experienced facilitators/helpers to allow and encourage participants to go through and explore a psychedelic experience. (Although MAPS promotes many research studies using psychedelic chemicals as drugs, PsyEMS does not administer, or promote the use of, any psychedelic substance as a drug, including *S. divinorum*.)

The second source was Stolaroff's (2004) book on Leo Zeff, a psychedelic therapy pioneer. Zeff developed his method between 1961 and 1988 by facilitating the psychedelic experiences of several thousand people individually and in groups. He was a trained Jungian analyst who used psychoactive and psychedelic substances such as LSD, MDA/MDMA, psilocybin, harmaline, mescaline, and ibogaine to facilitate personal transformation, existential personal responsibility, and deepening spiritual identification. Zeff's method, as described by Stolaroff, did not include using any substances to affect disease or for any medical condition. The chemicals were instead used to affect general well-being. Several interview questions and a prayer were taken from Stolaroff's book, and Zeff's style of interacting with participants and ways of structuring the environment influenced the present study protocol.

An additional part of the participants' set was their expectations around what substances they would be taking, in what dosages, and how long it would take said substances to become psychoactive. Throughout the procedure participants were deceived into thinking they may be given any dosage of salvinorin A up to and including 1500 mcg. Participants were also told they may be given an inactive placebo of dried *S. divinorum* leaves. This deception was intended to help reduce expectation bias among the participants, as discussed in more detail in Griffiths et al. (2006). All deception was revealed and explained to each participant after he or she completed the follow-up interview.

All sessions took place in the William James Center (WJC) of the Institute of Transpersonal Psychology (Palo Alto, CA). The WJC consisted of two rooms. The outer room was an office with several desks and chairs where participants could read and fill out forms. This room connected to an inner room where most of the study took place. The inner room was approximately 10' x 10' with no windows, a lamp and two chairs. In the center of the room was a

large burgundy reclining chair with optional footrest for the participant. To the right of the recliner was a table with various art supplies, a box of tissues, and bottled water. These are all within easy reach of the participant. There was a second, smaller, office chair for the researcher and a floor lamp in one corner. Two Japanese-style scroll paintings adorned the wall facing the chairs. The room was small, but did not feel cramped, and was maintained at a comfortable temperature. During the sessions, music (Gorecki, 1976) was played in this room at a low volume. This was to help standardize the environment across sessions and provide nonverbal support.

In addition to the researcher and the participant, an emergency medical technician (EMT) was present during the two sessions that involved inhaling a substance. The term "EMT" will be used throughout this document to refer to a professional who is currently licensed or certified in patient assessment and emergency medical treatment. This individual needed to be experienced in emergency medicine in the unlikely event of a negative physical reaction. If the EMT recorded vital signs outside the accepted safe range (as determined by the EMT training) at the beginning of the experimental session, that session was to be canceled and rescheduled. Two EMTs were recruited for this study: a male EMT and a female nurse. What effect, if any, the gender of the EMT had upon the participants will be discussed later.

Instruments

Three quantitative assessments were administered during the course of this study. The first was a screening measure filled out by the researcher, the second was an objective report of participant behavior filled out by the researcher during the experience, and the third was a subjective report filled out by the participant immediately after the experience.

Structured clinical interview. The Structured Clinical Interview for DSM Disorders (SCID) is a semi-structured interview for making DSM-IV Axis I diagnoses. The current study used the research version, non-patient edition (SCID-I-RV/NP) (First, Spitzer, Gibbon, & Williams, 2002), which was designed for non-clinical research assistants to administer to non-inpatient or "normal" volunteers for research studies. The SCID-I-RV/NP can take between 15 and 60 minutes to administer, depending on which modules are used and the extent of the participant's history. The current study used the following modules: current and past manic episodes from module A, psychotic symptoms (module B), and posttraumatic stress disorder from module F.

Reliability and validity of the SCID are well established. However, there are many versions of the SCID, many target populations, and many ways to test reliability. The SCID has been administered using the criteria of the DSM-III, DSM-III-R, and DSM-IV in order to assess for a variety of Axis I disorders among clinical and nonclinical participants of varying ages and backgrounds.

The SCID-I has been comprehensively studied for both reliability and validity. Reliability can range from good to poor, depending on a variety of factors (Zanarini et al., 2000; Zanarini & Frankenburg, 2001). Most reliability studies involve either joint interviews or a test-retest design. In joint interviews, several clinicians observe the interview and independently diagnose the participant; these diagnoses are then compared to the SCID diagnosis (Segal, Kabacoff, Hersen, Van Hasselt, & Ryan, 1995; Skre, Onstad, Torgersen, & Kringlen, 1991). Test-retest studies involve a participant being administered the SCID twice over a period of days or weeks (Williams et al., 1992). Joint interview studies tend to report higher reliability than test-retest studies. Properly training the interviewer increases reliability. Also, the more severe the

symptoms of the interviewee, the more reliable the SCID diagnoses. As an example, the diagnosis of schizophrenia has been reported with an agreement (kappa value) of 0.94 (Skre et al., 1991) and 0.65 (Williams et al., 1992), and posttraumatic stress disorder has been given an agreement of between 0.77 (Skre et al., 1991) and 1.0 (Zanarini et al., 2001).

Validity of the SCID-I has been reported as well (Shear et al., 2000; Steiner, Tebes, Sledge, & Walker, 1995). The problem with validity is that there is no "gold standard" for psychiatric diagnosis with which to compare an SCID diagnosis. Shear et al. (2000) found moderate to low agreement between an in-patient's official diagnosis on his or her chart and SCID diagnosis. They assumed the chart diagnosis was wrong and the SCID was accurate. There is no way to tell which standard is more accurate when dealing with something as nebulous as a psychiatric diagnosis. Even so, the SCID has been used as a screening instrument in numerous research studies. As mentioned, the more severe the presenting symptomatology, the more reliable the SCID diagnosis. Used as a screening assessment in the present study, the SCID-I-RV/NP should reliably screen out obviously psychotic volunteers.

Monitor rating questionnaire. The Monitor Rating Questionnaire (MRQ) (Appendix A) was based upon a questionnaire of the same name developed by Griffiths et al. (2006) to document the effects of the psychedelic chemical psilocybin on human participants. The current MRQ was modified, and comprised 19 descriptions of observable behavior in the participant. It was filled out by the researcher during each experimental session.

The current MRQ also accommodated the differences in length of experience: a psilocybin experience may last 7 hours if taken orally, whereas a salvinorin A experience may last 0.5 hours if inhaled. Additionally, as the MRQ was filled out by the researcher, rather than the participant, only behavioral symptoms were included in the present version. Nineteen

physical characteristics were listed in the MRQ that have been used to describe salvinorin A inebriation in the literature.

For each 10-minute time period 14 behaviors (runny nose, sneezing, vomiting, eyes open, eyes closed, watery eyes, talking, laughing, non-speech noises, paranoid thinking, yawning, movement while sitting, movement while standing, physical contact with monitor) were rated on a scale of 0-10 based upon the number of minutes during which the participant engaged in the behavior. Five behaviors (dilated pupils, goosebumps, sweating, lack of coordination, unresponsive) were marked as either observed or not observed during each 10-minute period. This allowed for quantitative assessment of the behavioral effects of salvinorin A inebriation.

Hallucinogen rating scale. Strassman et al. (1994) developed the Hallucinogen Rating Scale (HRS) to assess the psychological effects of hallucinogens, specifically DMT. Strassman was not satisfied with previous rating scales like the APZ and ARCI (discussed above in relation to Gonzales et al., 2006) due to their decidedly negative bias against psychedelic states (Strassman, 2000). The HRS consisted of 100 items answerable on a five-point Likert scale ranging from *not at all* to *extreme* and took approximately 30 minutes for a participant to complete. Scores were grouped into six subscales:

> (1) Somaesthesia—interoceptive, visceral, and cutaneous/tactile effects; (2) Affect—emotional/affective responses; (3) Perception—visual, auditory, gustatory, and olfactory experiences; (4) Cognition—alterations in thought processes or content; (5) Volition—a change in capacity to willfully interact with themselves, the environment, or certain aspects of the experience; and (6) Intensity—strength of the various aspects of the experience. (Strassman, Qualls, Uhlenhuth, & Kellner, 1994, p. 99)

The HRS has been used to measure and rate subjective experiences facilitated by ayahuasca (Grob et al., 1996; Riba, Anderer, Jane, Saletu, & Barbanoj, 2004; Riba et al., 2002; Riba, Rodriguez-Fornells, Strassman, & Barbanoj, 2001; Riba et al., 2001), DMT (Gouzoulis-Mayfrank et al., 2005; Strassman, 1996; Strassman, & Qualls, 1994; Strassman, Qualls, & Berg,

1996; Strassman, Qualls, Uhlenhuth, & Kellner, 1994), ketamine (Bowdle et al., 1998; Gouzoulis-Mayfrank et al., 2005; Krupitsky et al., 2002; Lofwall, Griffiths, & Mintzer, 2006), psilocybin (Griffiths et al., 2005; Moreno, Wiegand, Taitano, & Delgado, 2006), and MDMA (Johanson, Kilbey, Gatchalian, & Tancer, 2006; Tancer, & Johanson, 2007). The HRS has also been used in delayed retrospective assessments, meaning participants were asked to fill out the form based on recalling a past experience. This retrospective method has been used to study ayahuasca (Riba, Rodriguez-Fornells, Strassman, & Barbanoj, 2001) and *Salvia divinorum* (Gonzalez et al., 2006).

Reliability of the HRS was investigated by Riba, Rodriguez-Fornells, Strassman, et al. (2001). They showed acceptable internal consistency for four of the six HRS scales; Intensity and Volition did not reach reasonable alpha values of consistency. They additionally explored a two-factor analysis of variance suggesting that the Volition scale measures something independently of the other five scales. The Intensity scale might be inconsistent because of the smaller number of items (4) that make up that scale.

Riba, Rodriguez-Fornells, Strassman, et al. (2001) also tested the validity of the HRS as compared to another common measure of subjective drug activity, the ARCI. Validity was assessed among the six scales of the HRS, a global HRS score, and the five scales of the ARCI. Three significant correlations were found. The ARCI LSD scale measures dysphoria and "psychotomimetic effects" (2001, p. 217) and correlated with the HRS Perception and Somaesthesia scales. The ACRI A and BG scales measure stimulant effects and correlated (negatively) with the HRS Volition scale. Finally, a non-predicted correlation was found between the ARCI PCAG scale, which measures sedation, and the HRS global score, which Riba, Rodriguez-Fornells, Strassman, et al. made up by adding the six HRS scales together. This last

correlation suggests that, according to the ARCI, hallucinogens such as DMT are of a generally sedating nature. To conclude, the HRS will allow for quantitative assessment of the subjective effects of salvinorin A inebriation.

Recruiting

Participants were recruited through word of mouth and flyers (Appendix B) referring to "a study of states of consciousness brought about by a naturally occurring psychoactive substance used sacramentally in some cultures" (Griffiths et al., 2007, p. 269). These flyers were distributed to relevant groups that meet locally or online. The first 30 volunteers that passed the screening procedure were included in this study. If any participant dropped out during steps 1 through 4 (see below), additional participants would have been recruited.

Procedure

Thirty healthy individuals were recruited for a double-blind study. Participants were randomized into two groups, controlling for sex. Each group experienced two conditions, in counterbalanced order. The conditions were: placebo, a 25 mg sample of non-modified *S. divinorum* leaf containing negligible amounts of salvinorin A; and high dose, 1000 mcg salvinorin A dissolved onto 25 mg *S. divinorum* leaf. Previous research has reported doses as low as 200 mcg psychoactive, and as high as 1500 mcg, without unpleasant physical or psychological symptoms. Salvinorin A was supplied by The Salvia divinorum Research and Information Center (Malibu, CA). Participants met with the researcher for a total of four sessions, totaling approximately 7 hours over the course of 12 weeks. Participation consisted of five steps.

Step 1. The initial screening interview took place over telephone or email (see Appendix C). The individual was told briefly about the purpose of the study, risks and benefits, time involved, and confidentiality. Inclusion criteria assessed over the phone included age, sex,

experience with psychedelic states, and personal history of psychotic disorders. Due to the sensitive nature of admitting to substance use, possibly illegally, the initial screening asked only about experience with psychedelic states of consciousness. If the volunteer met all criteria and was interested in proceeding, we scheduled an in-person interview.

Step 2. The second interview was conducted in person at ITP. First, the volunteer was given an informed consent document (see Appendix D) that the researcher and volunteer went over together and signed. The signatures of both participant and researcher on the informed consent document should fulfill all state and federal regulations related to informed consent.

Second, relevant sections of the SCID-I-RV/NP were administered, as described above. The researcher completed the SCID based on the volunteer's responses and behavior. Third, a semi-structured and informal interview (Appendix E) helped to establish rapport and put the volunteer at ease before more sensitive questions were asked.

Fourth, the participant was shown the smoking apparatus. A placebo dose was placed into a metal smoking device commonly referred to as a "pipe." The volunteer was asked to place the end of the pipe opposite of the "bowl," which contained the plant matter, in his or her mouth, ignite the material with a commonly available lighter and inhale all the smoke in one breath, and hold that breath for up to 15 seconds. This pipe was purchased and used solely for this study, and the mouthpiece was cleaned with 70% isopropyl alcohol after each use. This step was to familiarize participants with the act of smoking if they were not already familiar, as well as the smell and taste of *S. divinorum* leaf. The placebo contained a negligible amount of salvinorin A and affected neither the structure nor function of the body nor general well being. This screening interview took 90-120 minutes to complete. This was the only one of the four meetings not audiotaped.

Step 3. Participants were instructed to only drink alcohol-free and caffeine-free liquids for 6 hours before the session. The researcher introduced the participant to the EMT, who had signed the appropriate confidentiality form (Appendix F). Upon arrival female participants were given a urine pregnancy test in ensure inclusion criteria were maintained. Each participant was randomly assigned to one of two groups using a natural random number generator, stratified by sex and counterbalanced for condition. The entirety of step 3 was audiotaped, and the tapes professionally transcribed. Transcribers also signed the appropriate confidentiality document (Appendix G).

After both parties were ready to proceed the EMT noninvasively recorded temperature, pulse, rate of respiration, and blood pressure. The researcher and participant then moved into the inner room and talked for 20-30 minutes in order to gain awareness of current set and setting (see Appendix H). This included affect, mood, expectations, fears, physical symptoms, recent dreams, and other things that may have influenced the session. To reiterate, nothing therapeutic was intended in this study, but the supportive set and setting was utilized in order to encourage relaxation, letting go, and the building of rapport.

The participant was given the pipe containing dried *S. divinorum* leaf standardized to contain either 1000 mcg or a negligible amount of salvinorin A. The participant was instructed to smoke the substance as described previously. The researcher filled out the MRQ every 10 minutes for up to 80 minutes. Various creative expression materials were in the room, including paper, crayons, and colored pencils. These materials were available during the entirety of the session.

The researcher and participant discussed the experience (see Appendix I). The researcher and participant talked for 30-60 minutes about the experience, utilizing a semi-structured

interview style but allowed for divergence of conversational topics. After the MRQ had been filled out for the last time and the discussion came to an end the researcher called the EMT into the room again. The EMT recorded vitals again, then left. Following the interview, the participant was given the HRS to complete and offered light snacks (usually chocolate and nuts). The participant was reminded to call the researcher in the event of any negative or unpleasant aftereffects and advised to write about his or her experience before going to sleep that night. The entirety of step 3 took approximately 2 hours and was audiotaped.

Step 4. Step 4 was essentially the same as step 3, including audiotaping of the experimental session. Whichever dosage the participant was not given in step 3 was given in step 4. The steps were conducted approximately 1 week apart.

Step 5. Approximately 8 weeks after completing step 4, the participant and researcher met at ITP for a final interview (Appendix J). The participant was asked for any final thoughts or comments on his or her experience, as well as suggestions for the researcher or research protocol. The participant was also told of the deception and reasons for doing so. This interview was also audiotaped and transcribed, and took 30-60 minutes.

Data Analyses

Quantitative data. Physiological measurements such as blood pressure (BP), heart rate (HR), temperature, and respiration rate were recorded approximately 20 minutes before and 50 minutes after smoking. HR and BP were measured by a computerized monitoring device. Temperature was measured by a digital oral thermometer. Respiration was observed by the EMT. The HRS was completed by each participant after each session, and the MRQ was completed by the researcher during each session.

Three analyses were conducted. To reiterate, three hypotheses were tested quantitatively: (a) No significant differences in physiological measures before versus immediately after administration of salvinorin A; (b) a nondirectional difference in physiological and MRQ scores between males and females, based on the findings of Schmidt et al. (2005); and (c) higher scores on quantitative assessments of subjective experience (HRS) and objective behavior (MRQ) for participants taking the active dose compared to placebo, due to the fact that salvinorin A is psychoactive. A 2 x 2 (Time [pre, post] x Dose [active, placebo]) repeated measures analysis of variance (ANOVA) will be used to investigate the effect of taking the substance on the physiological measures. A 2 x 2 (Sex [female, male] x Dose [active, placebo]) mixed measures ANOVA will be used to investigate the effects of sex and dose on the dependent variables.

Qualitative data. The participants gave detailed accounts of their experiences during each of the experimental sessions. All participant accounts were content analyzed by the researcher in order to elicit themes. Themes were compared across sex and dosage to determine subjective differences between groups.

Additionally, qualitative data were compared to quantitative data. For example, participants spoke and moved during the session, which was recorded by audiotape and the MRQ, but later did not recall having done so. It was particularly useful to compare female and male qualitative reports to lend evidence to the second research hypothesis, mentioned above. The audiotapes were kept in a locked file cabinet at all times and transcribed by a professional. Transcripts were split into individual codes or "meaning units" which were grouped together into themes. These themes helped elucidate the subjective experiences of nontraditional *S. divinorum* users. After analysis was complete the tapes were destroyed.

Qualitative data consisted of interview transcripts for the session in which the participant received the active dose as well as the follow-up session. Any comments written on the HRS were also analyzed as qualitative data. Data were analyzed using thematic analysis, as outlined by Braun and Clarke (2006). Thematic analysis was chosen as the method is "essentially independent of theory and epistemology" (p. 79). I chose an inductive semantic approach within an essentialist paradigm. I chose to consider the surface meanings of the data, what people described as opposed to what they meant within a larger sociocultural context. The themes I created are linked to the data themselves, rather than to any theoretical orientation.

Chapter 4: Results

A total of 32 participants were enrolled in this study between July 2008 and January 2009. Two participants chose to withdraw from the study after informed consent but before the administration of any substance. One man did not have the time, while one woman stated the practice dose made her feel paranoid, "like I was on THC which I have never liked." The final makeup of participants was 14 women [47%] and 16 men [53%].

Each participant was assigned to one of two groups, and one of two Emergency Medical Technicians (EMTs). Thirteen people (43%; 6 women [20%], 7 men [23%]) received the active dose in the first session followed by the placebo dose in the second session. For the remaining 17 participants (57%; 8 women [27%], 9 men [30%]) the order was switched. The woman EMT was present with 12 (40%; 3 women [10%], 9 men [30%]) of the participants; the male EMT with the remaining 18 (60%, 11 women [37%], 7 men [23%]). Each participant saw the same EMT both times. A one-sample *t*-test suggested that order, $t(29) = 0.724$, $p = .475$, and EMT, $t(29) = 1.099$, $p = .281$, were randomly assigned.

Participants waited a mean of 26.2 days (*Mdn* = 14.5, range 5-149] between enrollment in meeting 1 and assignment in meeting 2. There was a mean of 14.2 days (*Mdn* = 8.5, range 3-56) between the two sessions. The follow-up interview was conducted a mean of 50.6 days (*Mdn* = 43, range 37-86) after the second experimental session. Follow-up interviews were conducted between September 2008 and March 2009. All 30 participants completed the follow-up interview; there was no attrition during the study. This study lasted a mean of 87 days (*Mdn* = 82, range 51-152) from enrollment to follow-up.

The majority of the sample were between the ages of 25 and 49, with a mean age of 39 for the sample overall (women *M* = 39, men *M* = 40) (See Table 1). One male participant refused

to give his birth date, saying he did not believe in age. He appeared to be in his early 30s.

Table 1

Age of Participants

Age	Participants (%)	Women (%)	Men (%)
25-29	10 (33)	6 (20)	4 (13)
30-39	8 (27)	3 (10)	5 (17)
40-49	2 (7)	0	2 (7)
50-59	5 (17)	3 (10)	2 (7)
60-65	4 (13)	2 (7)	2 (7)
Unknown	1 (3)	0	1 (3)
Total	30 (100)	14 (47)	16 (54)

Most were unmarried. Nineteen participants (63%) had never married, 7 (23%) were currently married, and four (13%) were divorced. Eighty percent did not have children (See Table 2).

Table 2

Relationship Status of Participants

Status	Participants (%)	Women (%)	Men (%)
Married	7 (23)	2 (7)	5 (17)
Divorced or Annulled	4 (13)	3 (10)	1 (3)
Never Married	19 (63)	9 (30)	10 (33)
Have Children	6 (20)	3 (10)	3 (10)

All participants lived in the San Francisco Bay Area, mostly in the Silicon Valley area, especially Mountain View (27%) and Palo Alto (23%). On the whole it was a well-educated sample. Forty-three percent had completed a Bachelors degree, 30% a Masters degree, 23% had some college education but no degree, and 3% had a doctoral degree (See Table 3).

Table 3

Education of Participants

Education	Participants (%)	Women (%)	Men (%)
Some College	7 (23)	3 (10)	4 (13)
Bachelor	13 (43)	6 (20)	7 (23)
Masters	9 (30)	5 (17)	4 (13)
Doctorate	1 (3)	0	1 (3)
Total	30 (99)	14 (47)	16 (52)

Use of psychoactive substances was assessed as part of the screening procedure. Twenty-two participants (73%) drank alcohol in the month previous to participating in this study. The mean number of drinks consumed for the month was 24 and the median was 12 (as shown in Table 4).

Table 4

Alcohol Use in Past Month

Number of Drinks in Past Month	Participants (%)	Women (%)	Men (%)
0	8 (27)	4 (13)	4 (13)
1 – 7	9 (30)	4 (13)	5 (17)
10 – 14	5 (17)	2 (7)	3 (10)
24-26	4 (13)	2 (7)	2 (7)
36	2 (7)	1 (3)	1 (3)
60	1 (3)	1 (3)	0
180	1 (3)	0	1 (3)
Total	30 (100)	14 (46)	16 (53)

Fourteen participants (47%) reported smoking marijuana in the last month (see Table 5). The mean number of times smoking during the month was 20 and the median was 4.

Table 5

Marijuana Use in Past Month

Number of Times Using in Past Month	Participants (%)	Women (%)	Men (%)
0	16 (53)	7 (23)	9 (30)
1	2 (7)	2 (7)	0
2	1 (3)	1 (3)	0
4	5 (17)	2 (7)	3 (10)
6	2 (7)	1 (3)	1 (3)
20	1 (3)	0	1 (3)
30	1 (3)	0	1 (3)
90	1 (3)	1 (3)	0
105	1 (3)	0	1 (3)
Total	30 (99)	14 (46)	16 (52)

Eleven of the 30 participants (5 women [17%], 6 men [20%]) reported previous experience with *S. divinorum*. Mean first reported use of *S. divinorum* was 2003 (women M = 2004, men M = 2003, range = 2000-2008). Mean most recent use was 2005 (women M = 2005, men M = 2004, range = 2000-2008).

Excluding *S. divinorum*, participants reported experiences with between one and 10 other psychedelic substances. Other popular substances are reported in Table 6.

Table 6

Previously Used Psychedelics

Psychedelic Substances Previously Used	Participants (%)	Women (%)	Men (%)
Psilocybin	25 (83)	14 (47)	11 (37)
LSD[a]	21 (70)	8 (27)	13 (43)
MDMA[b]	15 (50)	8 (27)	7 (23)
Mescaline	10 (33)	3 (10)	7 (23)
Ayahuasca	9 (30)	4 (13)	5 (17)
DMT[c]	4 (13)	1 (3)	3 (10)
Ketamine	3 (10)	1 (3)	2 (7)
Nitrous Oxide	3 (10)	1 (3)	2 (7)
Ibogaine	2 (7)	1 (3)	1 (3)
LSA[d]	2 (7)	0	2 (7)
Amanita muscaria	2 (7)	0	2 (7)
DXM[e]	2 (7)	0	2 (7)
2-CB or 2-CE[f]	2 (7)	0	2 (7)
5-Meo-DMT[g]	2 (7)	0	2 (7)
Nutmeg	1 (3)	0	1 (3)
DOM[h]	1 (3)	0	1 (3)
Jimson Weed	1 (3)	0	1 (3)
Total	105 (351)	41 (136)	64 (214)

[a]d-lysergic acid diethylamide. [b]3,4-methylenedioxymethamphetamine. [c]N,N-dimethyltryptamine. [d]d-lysergic acid amide. [e]dextromethorphan. [f]4-bromo-2,5-dimethoxyphenethylamine or 2,5-dimethoxy-4-ethyl-phenethylamine. [g]5-methoxy-N,N-dimethyltryptamine. [h]2,5-dimethoxy-4-methylamphetamine.

The year of first and last use of a psychedelic ranged from 1966 to 2006 (*M* = 1991, women *M* 1995, men *M* 1990) and 1987 to 2008 (*M* = 2004, women *M* 2008, men *M* 2008), respectively. When asked if *S. divinorum* was "a marijuana alternative," 25 participants responded negatively while the other 5 reported not knowing or having never thought about it

before.

Twenty-seven participants (90%, 13 women [43%], 14 men [47%]) reported being actively engaged in a spiritual discipline, such as meditation or yoga. Experiences reported by more than one person are shown in Table 7. In answer to the question "Do you currently practice any spiritual or religious disciplines?" 3 people mentioned church: Catholic Church, the Native American Church, and Santo Daime (a Brazilian syncretic church). However, when asked how they heard about the study, an additional 4 people (2 women, 2 men) mentioned attending Santo Daime services at least semi-regularly.

Table 7

Spiritual Disciplines

Spiritual Activities Engaged in Regularly	Participants (%)	Women (%)	Men (%)
Meditation	16 (53)	7 (23)	9 (30)
Yoga	8 (27)	2 (7)	6 (20)
Prayer	5 (17)	3 (10)	2 (7)
Mindfulness	4 (13)	3 (10)	1 (3)
Church	3 (10)	2 (7)	1 (3)
None	3 (10)	1 (3)	2 (7)
Dance	2 (7)	0	2 (7)
Shamanism	2 (7)	1 (3)	1 (3)
Total	43 (144)	19 (63)	24 (80)

All but 3 participants reported experiencing non-ordinary states of consciousness without the facilitation of psychoactive substances, some through their spiritual practice, but others from different sources, such as being in nature. Experiences reported by more than 1 person are shown in Table 8.

Table 8

Non-Ordinary, Non-Drug-Induced States of Consciousness Reported

Trigger	Participants (%)	Women (%)	Men (%)
Meditation	12 (40)	5 (17)	7 (23)
Being in Nature	12 (40)	7 (23)	5 (17)
Spontaneous	6 (20)	4 (13)	2 (7)
Yoga	5 (17)	2 (7)	3 (10)
Exercise	2 (7)	1 (3)	1 (3)
Total	37 (124)	19 (63)	18 (60)

The sample included a significant number of people with strong associations to psychology. Eight participants (27%, 5 women [17%], 3 men [10%]) reported being in therapy at the time of the first interview. All 8 said they would discuss study participation with their therapist prior to the second meeting. Seventeen participants (57%, 8 women [27%], 9 men [30%]) were related to the Institute of Transpersonal Psychology, the school where this study took place. Fourteen were current or former students, and the remaining three were the significant others of current students.

Quantitative Results

Vital statistics before and after sessions. Data were entered into and analyzed using SPSS Statistics 17.0. All dependent variables were analyzed for normality using a 1-sample Kolmogorov-Smirnov test (1-KS). Results indicated that diastolic and systolic blood pressure, pulse rate, and temperature were normally distributed, but that respiration rate was not (see Tables 8 – 12 under column "KS," normal distributions are >.05). These scores were examined with a 2 x 2 (Time [pre, post] x Dose [active, placebo]) repeated measures analysis of variance (ANOVA). Three null hypotheses were associated with these data: (a) no difference in vitals by

time, (b) no difference by dose, and (c) no influence by joint effects of time and dose. For this ANOVA, significance levels were evaluated using a Bonferroni-adjusted alpha of $p < .0125$ to correct for Type I errors. Results are discussed below, and the ANOVA itself is shown in Appendix K.

Diastolic and systolic blood pressures (BP) were assessed before and after each of the two experimental sessions. Results are displayed in Tables 9 and 10. All KS values are greater than .05, indicating the means are normally distributed for both measures. No significant differences were noted between time, dose, or sex on either diastolic or systolic blood pressure.

An almost-significant effect for dose was observed on systolic blood pressure taken after the session, $p = .022$, mean placebo BP 75.1, mean active BP 77.1. An almost-significant effect for time was found on diastolic blood pressure, $p = .039$, mean before diastolic BP 80.4, mean after BP 76.1. An almost-significant effect for sex was observed on diastolic blood pressure taken after the session, $p = .006$, mean women BP 124.57, mean men BP 132.22. This means that systolic BP measured after the session was lower with a placebo dose, diastolic BP was lower after a session, and diastolic BP measured after the session was lower in women.

Table 9

Diastolic Blood Pressure

Dose	Time Assessed	*M*	95% CI	*SD*	Range	*KS*
Active	Before	81.7	[77.1, 86.4]	12.4	60-99	.888
Active	After	77.1	[72.5, 81.6]	12.2	60-97	.61
Placebo	Before	79.1	[74.4, 83.7]	12.5	60-99	.803
Placebo	After	75.1	[71.6, 78.6]	9.4	60-95	.969

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Table 10

Systolic Blood Pressure

Dose	Time Assessed	*M*	95% CI	*SD*	Range	*KS*
Active	Before	130.4	[124.5, 136.3]	15.8	96-158	0.966
Active	After	132	[125.5, 138.5]	17.5	94-171	0.855
Placebo	Before	129.1	[122.9, 135.4]	16.8	98-167	0.919
Placebo	After	125.3	[120.5, 130.1]	12.9	106-153	0.991

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Pulse rate was measured in beats per minute (Table 11). The results of the ANOVA indicated a significant main effect of time on pulse rate, $F(1, 29) = 9.522$, $p = .004$, partial $\eta^2 = .25$, $r = .5$. Pulse rate dropped an average of 5.2 bpm from pre to post measurement times. An almost-significant effect of dose was noted for pulse rate taken after the session, $p = .031$, mean placebo pulse rate after session 64.1, mean active pulse rate after session 68.3. Pulse rate in general was lower after a session, especially with a placebo dose.

Table 11

Pulse Rate

Dose	Time Assessed	*M*	95% CI	*SD*	Range	*KS*
Active	Before	71.2	[66, 76.4]	13.9	42-103	0.974
Active	After	68.3	[63.6, 73]	12.5	50-98	0.997
Placebo	Before	71.6	[67.2, 76]	11.8	51-99	0.987
Placebo	After	64.1	[59.2, 69]	13	44-105	0.779

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Respiration rate was recorded as breaths per minute. Results are shown in Table 12. The table indicates that scores are not normally distributed (KS < .05). As such, median scores are

reported in addition to mean scores, as median scores reflect a more accurate picture of central tendency in non-normal distributions. Respiration rate was analyzed using a Wilcoxon Signed Rank test (Appendix N). An almost-significant interaction for dose was found on respiration rate taken after the session, $p = .012$, active median 17, placebo median 16.

Table 12

Respiration Rate

Dose	Time Assessed	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Active	Before	17.8	[16.8, 18.8]	17	2.7	12-24	0.05
Active	After	17.4	[16.2, 18.6]	17	3.2	10-24	0.083
Placebo	Before	17.3	[16.1, 18.4]	16	3	12-26	0.003
Placebo	After	16.1	[15.2, 16.9]	16	2.3	10-20	0.004

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Temperature was recorded in degrees Fahrenheit, as shown in Table 13. No significant changes were noted for temperature between dose, time, or sex conditions.

Table 13
Temperature

Dose	Time Assessed	*M*	95% CI	*SD*	Range	*KS*
Active	Before	97.39	[97.12, 97.66]	0.73	95.8-98.7	0.521
Active	After	97.12	[96.8, 97.44]	0.86	95-99	0.311
Placebo	Before	97.07	[96.67, 97.48]	1.08	94-99.1	0.983
Placebo	After	97.3	[97.03, 97.58]	0.74	96-99	0.754

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

As mentioned, three hypotheses were tested in this study. Hypothesis 1 stated: there is no significant within-group difference between the mean vital sign scores obtained at baseline and

after intervention. For Hypothesis 1 the null could not be rejected for temperature, systolic and diastolic blood pressure, and respiration rate. The null could be rejected for pulse rate, which dropped significantly between measurement times.

MRQ measurements for active and placebo dose conditions. The Monitor Rating Questionnaire (MRQ) (Appendix A) comprised 19 descriptions of observable behavior in the participant. It was filled out by the researcher during each experimental session. These behaviors were recorded in one of two ways. First, for each 10-minute interval 14 behaviors (runny nose, sneezing, vomiting, eyes open, eyes closed, watery eyes, talking, laughing, non-speech noises, paranoid thinking, yawning, movement while sitting, movement while standing, physical contact with monitor) were rated on a scale of 0-10 based upon the number of minutes during which the participant engaged in the behavior. Second, five behaviors (dilated pupils, goosebumps, sweating, lack of coordination, and unresponsiveness) were marked as either observed or not observed during each 10-minute period. This allowed for quantitative assessment of the behavioral effects of salvinorin A inebriation.

For data analyses, ratios were used rather than raw numbers. For example, participant 4F laughed 23 times in 50 minutes. The MRQ was filled out in 10-minute intervals, so 4F's laughter ratio is 23/5 = 4.6 (the highest recorded laughter ratio). If a participant had laughed 23 times in 60 minutes, the ratio would have been 23/6 = 3.8 instead. This use of ratios, while complicated, controlled for the fact that sessions involving an active dose lasted significantly longer than sessions with a placebo dose (more on that below).

Four items on the MRQ were not analyzed. No participant was observed sneezing, vomiting, having goosebumps, or being unresponsive. All MRQ variables, including length of session, were analyzed using a 2 x 2 (Sex [female, male] x Dose [active, placebo]) mixed

measures ANOVA, shown in Appendix L (within subjects and interaction effects) and Appendix M (between-subjects effects). Three null hypotheses were associated with these data: (a) no difference in MRQ or HRS scores by sex, (b) no difference by dose, and (c) no influence by joint effects of sex and dose. For this ANOVA, significance levels were evaluated using a Bonferroni-adjusted alpha of $p < .00263$ to correct for Type I errors. No main effects for sex were noted, and no interaction effects between dose and sex were noted. Main effects for dose are presented below.

Length of session (Table 14) was measured from time of first vital sign measurements to time of last vital sign measurements. All MRQ observations were recorded within this time period. The 2 x 2 ANOVA results indicated a main effect of dose on length of session, $F(1, 28) = 47.996$, $p < .001$, partial $\eta^2 = .63$, $r = .8$. An active session lasted on average 14.4 minutes longer than a placebo session.

Table 14

Length of Session

Dose	*M*	95% CI	*SD*	Range	*KS*
Placebo	55.2	[50.6, 59.8]	12.3	39-88	0.611
Active	69.6	[65.1, 74.1]	12	41-94	0.835

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Ocular effects. Data for eyes open, eyes closed, watery eyes, and dilated pupils are displayed in Table 15. As shown, eyes open and eyes closed were normally distributed, and means were compared using the aforementioned mixed methods ANOVA. Watery eyes and dilated pupils were non-normally distributed, and were analyzed using a Wilcoxon Signed Rank Test (Appendix N) to assess for differences by dose and a Mann Whitney U Test (Appendix O)

to assess differences by sex. No significant differences were noted for either sex, dose, or an interaction effect.

An almost-significant effect for dose was observed for time spent with eyes closed, p = .028. Average time spent with eyes closed was 25.8 min for a placebo dose and 25.4 min for an active dose.

Table 15

Ocular Effects Noted in MRQ

Dose	Measure	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Placebo	Eyes Open	5.318	[4.539, 6.097]	5.835	2.086	1-8.5	0.607
Active	Eyes Open	6.138	[5.354, 6.922]	6.5	2.1	0-9	0.595
Placebo	Eyes Closed	4.682	[3.903, 5.461]	4.165	2.086	1.5-9	0.607
Active	Eyes Closed	3.645	[2.920, 4.37]	3.4	1.941	1-10	0.715
Placebo	Watery Eyes	0.007	[-0.007, 0.02]	0	0.037	0-0.2	< 0.001
Active	Watery Eyes	0.153	[-0.096, 0.403]	0	0.668	0-3.6	< 0.001
Placebo	Dilated Pupils	*					
Active	Dilated Pupils	0.007	[-0.007, 0.02]	0	0.037	0-0.2	< 0.001

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

*Variable is constant.

Vocalization. Data for talking, laughing, non-speech noises, and paranoid ideation are displayed in Table 16. Main effects of dose were noted for talking and laughing scores, as shown in the 2 x 2 ANOVA: talking $F(1,28) = 39.37$, $p < .001$, partial $\eta^2 = .58$, $r = .78$; laughing $F(1,28) = 12.09$, $p = .002$, partial $\eta^2 = .3$, $r = .55$. Remembering that the MRQ values are ratios, not raw scores, a little math must be used to interpret these scores. For example, one participant had a laughing average of 1.295 on an active dose, and an active dose session lasted an average

of 69.6 minutes. This means that the participant laughed an average of 1.295 x 6.96 = 9 times per session with an active dose and 3 times per session with a placebo dose. A participant talked on average 24 times per session with a placebo and 42 times with an active dose. Non-speech noises were not significantly different between groups, as shown by non-parametric tests in Appendices P and Q.

An almost-significant effect of sex on time laughing was noted, $p = .017$, women mean 1.23, men mean 0.59. On average, a woman laughed 6.8 times per session, while a man laughed 4 times per session.

Table 16

Vocalization Effects Noted in MRQ

Dose	Measure	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Placebo	Talking	4.346	[3.918, 4.774]	4.585	1.146	0.6-6	0.516
Active	Talking	6.025	[5.559, 6.491]	6.1	1.248	3.6-8	0.815
Placebo	Laughing	0.478	[0.304, 0.652]	0.29	0.466	0-1.8	0.221
Active	Laughing	1.295	[0.789, 1.801]	0.9	1.355	0-4.6	0.354
Placebo	Non-Speech	0.196	[0.098, 0.294]	0	0.263	0-0.8	0.002
Active	Non-Speech	0.288	[0.118, 0.459]	0.2	0.458	0-2	0.009
Placebo	Paranoia	*					
Active	Paranoia	0.05	[0.01, 0.089]	0	.107	0-0.4	< 0.001

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

*Variable is constant.

Movement. Data for yawning, movement while sitting, movement while standing, physical contact with the researcher, and un-coordination are shown in Table 17. Movement while sitting was subject to a main effect of dose, $F(1,28) = 15.44$, $p = .001$, partial $\eta^2 = .36$, $r = .6$. People moved while sitting on average 12 times with a placebo, and 21 times with an active

dose. An almost-significant effect for dose on physical contact with the monitor was noted, p = .006. No participants with a placebo dose touched the researcher, and on an active dose participants touched the researcher 0.65 times per session on average.

Table 17

Movement Effects Noted in MRQ

Dose	Measure	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Placebo	Yawning	0.124	[-0.008, 0.255]	0	0.362	0-1.4	< 0.001
Active	Yawning	0.147	[-0.052, 0.346]	0	0.533	0-2.2	< 0.001
Placebo	Movement Sitting	2.2	[1.786, 2.613]	2	1.108	0.6-5.25	0.616
Active	Movement Sitting	3.772	[3.053, 4.49]	3.325	1.924	0.8-8.4	0.861
Placebo	Standing	0.111	[-0.116, 0.338]	0	0.608	0-3.33	< 0.001
Active	Standing	0.46	[-0.022, 0.942]	0	1.29	0-5	< 0.001
Placebo	Contact	*					
Active	Contact	0.093	[0.0321, 0.155]	0	0.164	0-0.6	< 0.001
Placebo	Uncoordination	*					
Active	Uncoordination	0.013	[-0.006, 0.032]	0	0.051	0-0.2	< 0.001

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

*Variable is constant.

Excretion. Data for runny nose and sweating are presented in Table 18. No significant different were noted between dose for either measure.

Table 18

Excretion Effects Noted in MRQ

Dose	Measure	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Placebo	Runny Nose	0.017	[-0.017, 0.051]	0	0.091	0-0.5	< 0.001
Active	Runny Nose	0.013	[-0.139, 0.041]	0	0.073	0-0.4	< 0.001
Placebo	Sweating	0.011	[-0.012, 0.034]	0	0.06	0-0.33	< 0.001
Active	Sweating	0.04	[0.004, 0.076]	0	0.097	0-0.4	< 0.001

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

In summary, an active session lasted longer, and during an active session people exhibited more talking, laughing, and movement while sitting. No differences were noted by sex, and no interaction effects were noted.

HRS scores for active and placebo dose conditions. The Hallucinogen Rating Scale (HRS) is a self-report each participant filled out immediately after vital signs were recorded at the end of each experimental session. HRS subscale scores were assessed along with MRQ scores as described above; normally distributed scores were analyzed with a 2 x 2 (Sex [female, male] x Dose [active, placebo]) repeated measures ANOVA looking for a main effect of dose, a main effect of sex, and an interaction effect between dose and sex (Appendices L and M). Non-normally distributed scores were analyzed using a Wilcoxon Signed Rank Test (Appendix N) to assess for differences by dose and a Mann Whitney U Test (Appendix O) to assess differences by sex.

Affect scores, defined as emotional/affective responses (Strassman et al., 1994), are shown in Table 19. A main effect of dose, $F(1,28) = 35.157$, $p < .001$, partial $\eta^2 = .58$, $r = .75$ was noted. No effect was found between sex, and no interaction was noted between sex and dose. Scores rose by 0.75 from placebo to active conditions.

Table 19

HRS Affect Scores by Dose

Dose	*M*	95% CI	*SD*	Range	*KS*
Active	1.4947	[1.2799, 1.7096]	0.57544	0.53-2.76	0.913
Placebo	0.7496	[0.5737, 0.9256]	0.47112	0.18-2.06	0.370

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Cognition scores, defined as alterations in thought processes or content (Strassman et al., 1994), are described in Table 20. Scores rose by 1.23 between dose conditions, a significant difference: $F(1,28) = 71.177$, $p < .001$, partial $\eta^2 = .72$, $r = .85$. An almost-significant effect for sex on cognition scores was noted, $p = .035$, women mean 0.39, men mean 1.51.

Table 20

HRS Cognition Scores by Dose

Dose	*M*	95% CI	*SD*	Range	*KS*
Active	1.6071	[1.3052, 1.9091]	0.80864	0-3.58	0.533
Placebo	0.3732	[0.2188, 0.5277]	0.41365	0-1.55	0.097

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Intensity scores, defined as strength of the various aspects of the experience (Strassman et al., 1994), are described in Table 21. These scale scores were not normally distributed (KS $<$ 0.05) for the placebo dose. As such, the median may be a better indicator of central tendency, and so non-parametric tests were used to assess differences between groups. A Mann-Whitney U Test indicated no differences by sex, and a Wilcoxon Signed Rank Test indicated a significant

difference by dose: $z = -4.786$, $p < .001$, $r = -.62$. Median scores rose by 2.63 between dose conditions.

Table 21

HRS Intensity Scores

Dose	*M*	95% CI	*Mdn*	*SD*	Range	*KS*
Active	2.8986	[2.6106, 3.1866]	3	0.77138	1-4	0.253
Placebo	0.7083	[0.4234, 0.9933]	0.375	0.76306	0-2.5	0.038

Note. *M* = Mean, CI = Confidence Interval, *Mdn* = Median, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Perception scores, defined as visual, auditory, gustatory, and olfactory experiences (Strassman, et al., 1994), are shown in Table 22. A two-way ANOVA suggested a significant difference by dose, $F(1,28) = 95.285$, $p < .001$, partial $\eta^2 = .77$, $r = .88$, and no difference by sex or an interaction between dose and sex. There was a difference of 1.38 between conditions.

Table 22

HRS Perception Scores

Dose	*M*	95% CI	*SD*	Range	*KS*
Active	1.7086	[1.4358, 1.9814]	0.73053	0.14-2.88	0.918
Placebo	0.3271	[0.1915, 0.4627]	0.3632	0-1.35	0.262

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Somaesthesia scores, defined as interoceptive, visceral, and cutaneous/tactile effects (Strassman, et al., 1994), are shown in Table 23. A significant difference of 0.96 was found between dose conditions, $F(1,28) = 72.043$, $p < .001$, partial $\eta^2 = .72$, $r = .85$.

Table 23

HRS Somaesthesia Scores

Dose	*M*	95% CI	*SD*	Range	*KS*
Active	1.2733	[1.0723, 1.4743]	0.53829	0.31-2.77	0.732
Placebo	0.3128	[0.19, 0.4356]	0.32881	0-1.23	0.284

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

Finally, volition scores, defined as a change in capacity to willfully interact with self, the environment, or certain aspects of the experience (Strassman et al., 1994), are shown in Table 24. A significant difference of 0.91 was found between dose conditions, $F(1,28) = 55.562$, $p < .001$, partial $\eta^2 = .67$, $r = .82$.

Table 24

HRS Volition Scores

Dose	*M*	95% CI	*SD*	Range	*KS*
Active	1.8458	[1.6751, 2.0165]	0.45714	0.88-2.5	0.385
Placebo	0.9385	[0.7392, 1.1378]	0.53384	0-2.38	0.898

Note. *M* = Mean, CI = Confidence Interval, *SD* = Standard Deviation, *KS* = Result of 1-sample Kolmogorov-Smirnov Test (2-tailed).

In summary, all six HRS subscale scores were significantly elevated after the participant was given an active dose of *S. divinorum*. This indicated the HRS accurately detects a psychoactive substance. The largest difference was in the intensity subscale (*Mdn* difference 2.63), and the smallest difference was in the affect subscale (*M* difference 0.75).

Summary of quantitative data. Sessions with active doses rather than the placebo produced observable differences along a number of variables. A session with an active dose

lasted an average of 14 minutes longer. Participants talked 18 more times, laughed 6 more times, and moved while they were sitting down 9 more times.

Three hypotheses were tested in this study. The null hypotheses were: (a) there is no significant within-group difference between the mean vital sign scores obtained at baseline and after intervention, (b) there is no significant difference between men and women on any measurement, and (c) there is no significant within-group difference between receiving and active dose and a placebo on any measurement.

For the first hypothesis the null hypothesis could not be rejected for temperature, systolic and diastolic blood pressure, and respiration rate. The null could be rejected for pulse rate, which dropped significantly between measurement times. For the second hypothesis the null could not be rejected for any measurement. There were no differences between men and women on physiological, behavioral, or subjective measurements.

For the third hypothesis the null could be rejected for all vital sign measures, length of session, three MRQ measures (talking, laughing moving while sitting), and all six HRS subscale scores. The aforementioned 10 variables all increased when participants were given an active dose.

Qualitative Data

Data related to the active dose condition, 1000 mcg salvinorin A, were considered for analysis. Material is presented in chronological order as a session proceeded and, within that framework, in order of frequency of occurrence. First, the experience of the particular altered state of consciousness created by the active dose of *Salvia divinorum* is described, using as data the interview from the experimental session and the qualitative HRS data. Second, participant reflections on their experiences at the end of the experimental session are discussed. Third, the

follow-up interviews will be described to elucidate long-term effects to the participants. Participants are referenced by a code number and letter for their sex (M or F). Of note is there are no data for participant 11F, who dropped out after screening but before the first experimental session. Quotes have been chosen based on which quote most elaborately described a particular effect.

A rush. Twenty-six participants (87%, 11 women [37%], 15 men [50%]) described a "rush," experienced as a marked shift from normal phenomenology to something different. Twelve people (40%, 5 women [17%], 7 men [23%]) described physical sensations moving up in the body toward the head: "Beginning in abdomen rising on left side peaking in the face and gently falling down to right" (9M), and "moved from chest area to head" (11M).

Eleven participants (37%, 5 women [17%], 6 men [20%]) noted physical sensations associated with the head changing: "I got like a little head rush" (3M).

> And obviously there's a rush in the head and that's what makes you sweat. The mind or the head's going, the mind was working overtime and the warmth, I don't know, maybe the blood comes to your head, it rushes to your head and causes you to sweat. (1M)

> If I could think of a feeling that I've had before, it's that feeling of a head rush like if you've been sitting down for a long time or whatever and you stand up quickly and you kind of go whoa. That is kind of how it felt, almost dizzy. (15F)

Six participants (20%, 1 woman [3%], 5 men [17%]) reported a suddenness of onset.

> I was sitting here and all of a sudden someone flipped a switch and it's like "whoa, what's going on?" and then I couldn't remember if my eyes were open or closed and all of a sudden they just took over. So it reacted faster than I expected. (1M)

> I was here one second and I was gone the next. It was so quick. I felt like I didn't even know how I handed that [pipe] to you . . . I counted and like [a] sky rocket, like I'm in a different place. I'm at this carnival and Peter [the researcher] is here somewhere. . . . It was so quick, the transition. (6F)

> I expected something much more mild that would have come up in an incline. It would've been a gradated experience instead of a fucking warp speed immediately. I had no idea it was going to happen. I've never experienced a psychedelic that has put me into an altered

> state like that. Again, I likened it to, without the injurious part, being hit in the head all of a sudden, or getting in a car accident, that feeling of shock that can immediately send you into an altered state. Of course it wasn't like that, but the transition between states was abrupt, very abrupt and that was a little unpleasant because my assumption was that if I did experience a different state that it was going to be a gradual transition instead of an abrupt one. (7M)

For 3 participants (10%, 1 woman [3%], 2 men [7%]) this suddenness made it clear that they had gotten an active dose rather than a placebo: “Oh, this is definitely happening, something is definitely happening and then it just got stronger and stronger” (5F).

> The interesting thing was when I first closed my eyes I thought “Oh, I must've got the placebo” and then it did change very fast, but in a very pleasant way. . . . At first I thought I got the placebo. It seemed like a fairly long gap between holding exhaling and sitting there. (16M)

Three people (10%, 2 women [7%], 1 man [3%]) described the rush as mental: “mentally” (8F), “mental knowing of something coming on” (10M). For two participants (7%, 2 men [7%]) the abrupt onset did not give sufficient time to become oriented: “I had a 'what the fuck is going on?' feeling” (7M).

> It was not having enough time to sit back, because I was trying to do that at that point. I’m pretty sure it was after that. I was trying to re-associate myself to my body in a sense and then observe everything. Observe, observe, observe but I couldn’t do that and then I was coming out of it so quick or what felt like so quick. . . . That came in so hard and so far. Seems like I didn’t have time to, and maybe that’s ideal too, to carry on there. I didn’t have time to really sit and observe and become aware and then really observe and take note. . . . If I was to do it again, knowing how quick, I can get a little prepared and don’t be caught off guard, so to speak. (8M)

Two (7%, 1 woman [3%], 1 man [3%]) likened it to a sense of elevation or flight: “mentally, feeling like my chair was flying” (8F), “Yeah, this is like pushing the button on the elevator–like a fast moving elevator and like, great, let’s go to the top” (10M).

Threshold. Eight people (27%, 5 women [17%], 3 men [10%]) were aware of a threshold between this reality and another reality, including one participant with a previous history of use. “It's not even like I'm sitting in this room, there's this whole other reality happening. It's very

hard to remember right now that I'm a body just sitting in this room, a person" (7M), "Oh my goodness. I just have to stop. I can't. I feel like I'm going into another world. Help me out" (12F).

> It was like these feathers . . . were piling up from below and piling up from above, and they kept moving towards each other and it felt like, once there was enough of them and once they were going to come together, we were going to get somewhere. Like that was going to be the doorway, the gateway into whatever is beyond that gate. But there wasn't quite enough momentum. I stayed here watching it happen and waiting for the opening to happen. . . . I really felt like there was going to be a transition that was going to happen. (5F)

Two people (7%, 1 woman [3%], 1 man [3%]) felt this threshold in the body.

> I was half in this world and half in this other world. . . . I remember this part of me [left side of body, side closest to researcher] was in this world and that part of me [right side of body] was in that world. (4M)

> I feel like I'm like partly in and partly out. . . . This part of my body [right side of body, side closest to researcher] feels like normal and this part of my body [left side of body] feels really cold and like it's in some other reality. . . . My left side felt totally numb and really cold and then my right side felt alive. It was like my left side felt almost dead in a way, but sort of tingly and kind of cold and numb, but then my right side felt like normal and lively. (7F)

Three people (10%, 1 woman [3%], 2 men [7%]) attributed this threshold effect to the dosage of salvinorin A being too low. All three people experienced a marked alteration in consciousness according to all objective and subjective measures. One man had several previous experiences with *S. divinorum*, the other two had no previous experience. "It just didn't have enough and I came back. . . . . It wanted to pull the curtain aside and pull me in behind the stage. But it just couldn't. Yeah, it just didn't have the horsepower" (15M).

> If I just got a little bit higher I would have gone through this thing that opened up. . . . But like I said, there wasn't quite enough momentum. . . . Well the worst part was that I didn't get to go. I wanted more Salvia from the beginning. It wasn't like, "Oh, now I could smoke more and we'd go," I needed more from the beginning to have that momentum to go. (5F)

Cognition. Twenty-seven participants (90%, 13 women [43%], 14 men [47%]) were at times aware of their own cognitive processes or egos. This theme shows that some participants

retained some or all of their awareness of their awareness: “It made me feel like outside of who I normally am, but still me” (4F), “I’m having a hard time holding on to what you’ve asked me” (6F), “At first I thought ‘Wow, I'm really starting to see some pattern things.’ Then I was thinking, ‘Why these ones in particular?’ but then I got more interested in what they were about, ‘Why this content?’” (16M).

Eleven participants (37%, 6 women [20%], 5 men [17%]) described thinking about or being aware of time perception.

> I don't know how long that lasted from the beginning. . . . I don't know how long we've been sitting here, 20 minutes maybe . . . I don't have a very good sense of time right now. My normal gauge of time is, I don't trust it. (7M)

> I was thinking about time and how there was none. There was no time, but I was feeling like there was some borrowed time. I got a little bit nervous for a second about, I was thinking if there’s enough time and that this is the time right now for Peter’s [the researcher’s] experiment and that was the time that I was being given and I was nervous, I guess, about not understanding that. . . . It was certainly interesting to experience feeling timeless. (9F)

> The whole thing from after I exhaled to when it wore off was maybe a minute or two. I wasn't really keeping track of it. I think it was building for 30 seconds, lingered for another 15, and I started to notice it was starting to end. (15M)

Among the cognitive processes reported were various relations to the sense of self or ego (“ego” being used in a lay sense, not tied to any particular psychological or philosophical construct). Eight people (27%, 1 woman [3%], 7 men [23%]) described holding onto their ego and resisting the altered state experience: “I was trying to pull back, make sense of it, come back because it did feel like something was going to take me away and I didn’t want to go, and that was what was scary about it” (15F).

> I feel like my ego wanted to take control. Almost like it wanted to stand up and struggle for some kind of control. . . . Initially my ego was like “What the fuck is happening right now? Is this me?” (7M)

> Felt like my ego kicked in, no other thought other than “Okay, every thing's fucked up,

> how can I fix it?" . . . Yeah, the "Oh shit" feeling. Getting beyond the ego stepping in and going "That's not what we're used to," but I think that might require some spiritual or mental exercise to get there. (10M)

Six participants (20%, 4 women [13%], 2 men [7%]) felt out of control for part of their experience, which produced mixed feelings: "There's something delightful about not being in control. I actually really enjoy that experience of just being witness to my own mental experience" (1F), "I didn't feel like it was under my control, which I guess was also kind of scary" (3F).

> There was that feeling out of control. It was a little scary and not knowing, and I think that unknown of "where am I going to go and how am I going to get back?" That sort of worry was a little scary, but it was all really intriguing, cool, while it was [also] whoa, scary. (7F)

Five people (17%, 4 women [13%], 1 man [3%]) described surrendering into the experience: "When you said just relax, didn't you say something about surrender or something? Don't fight with it. I wasn't getting in the way. There's no way I could have gotten in the way. It was just surprise" (12F).

> I can surrender to a process, but I was like "Wow. That's a lot." . . . But with this I surrendered more to experiencing what is. . . . I thought, just breathe through it the prayer was really beautiful that you said ahead of time. I really liked it and it helped me hold in my mind, "I'm here for the next half-hour to surrender to what is and see or experience whatever is there." (2F)

> I was really open to surrender. . . . There was that moment of consciously wanting to open to the journey, to the trip. . . . The real having to surrender to it and feeling like something bigger is coming. (5F)

Five people (17%, 2 women [7%], 3 men [10%]) noted a change in quality of thinking: "Obsessive/nonsensical" (3F), "Like I wasn't thinking, I was being thought" (8M).

> It was more sense of pure perception [instead of] cognition. Understanding is a tool on top of my consciousness that I usually I am pretty well engaged in, but it just wasn't really there as a choice. I was disengaged from it, so I was just perceiving. (7M)

Four people (13%, 2 women [7%], 2 men [7%]) referred specifically to their ego, without

the sense of resisting the experience noted above: “I maintained lucid awareness of my place in the room, and the intentions of the study and my thoughts. In regards to self, my ego remained intact” (6M), “I was very aware of my ego being like Let’s stay here' and monitoring me and wanting to maintain the stability here and that’s when I held your hand and that was like my ego feeling safe” (7F).

> My realm of awareness was just this tiny little closed circle. Very ego-oriented, like I was worried about being embarrassed in front of you, and those were my concerns. I was very much in my ego and that’s where I am most of the time. Most of us are and it’s just such a small place, so I think Salvia could be really great for helping us, it’s a very transpersonal drug. (5F)

Four people (13%, 3 women [10%], 1 man [3%]) described feeling dead or dying: “[dying] from this chosen reality” (4F).

> My left side felt totally numb and really cold and then my right side felt alive. My left side felt almost dead in a way, but tingly and cold and numb, but then my right side felt normal and lively. (7F)

> It was like dying, it really was. It was very interesting, because everything about the physical body and everything about the physical world was all peeling away. . . . The separation from the body, and the sense [that] this is what it feels like to die. I've had at least one near-death experience . . . but I haven't had that sensation for a long, long time. For me the best part was “Oh this is what it feels like to die.” . . . I could see how this could certainly have some benefit in terms of research for people who are terminal and for anybody who might have a fear of dying, I mean, it's not an experience people look forward to. They really cling to having this physical body, but it could be used to help people learn to not fear death, because even though it felt like the body was dying I was still aware and awake and there. (12M)

Physical sensations. Twenty-six participants (87%, 12 women [40%], 14 men [47%]) experienced physical sensations. Eight people (27%, 3 women [10%], 5 men [17%]) expressed an abnormal sense of touch or being touched; “It felt like something going into my mouth. . . . There’s some kind of strange thing going on in my mouth, as though there was a tongue depressor in there, more than once” (15F).

> The motion of my every muscle, scrubbed. Being cleaned. . . . The very intense,

> scrubbing sensation coursing, almost abrasive, inward energy . . . I felt it as well when I closed my eyes, and the eyelids themselves felt to be, to shake and this abrasive sort of scrubbing sensation. . . . No the scrubbing sensation can become very uncomfortable, although it was mild, I know how it can get. It was mildly uncomfortable. (6M)

> It felt like I was being touched by this outside thing, at a cellular level. It was like a meta-sense of touch. That felt like a very physical thing, but not a normal sensory thing you'd normally feel in your body. It was an extrasensory thing, but it seemed to be if I had to pick one sense that was most acute, it would be that sense, the sense of touch. Not in a normal sense, it felt like I was being touched by this thing at every cell, literally. It felt like my consciousness was material, and that it [this external thing] was moving that [my consciousness] as well. So the non-material things were also moved by this force. (14M)

People's experience of their body temperature varied considerably during the session. Seven people (23%, 5 women [17%], 2 men [7%]) became cold during the experience: "Oh, I'm so cold. I'm cold. Can I get a blanket?" (4F), "So cold. . . . It's like my body's shivering, oh it's so cold" (10M), "My hands felt and still feel a little cold" (13F). Seven people (23%, 4 women [13%], 3 men [10%]) became hot during the session: "Except for getting hot and wet, it was an intense experience, which I like" (1M), "The region around my face right here was burning like it was hot. . . . My body feels warm. My temperature might be slightly up" (8F), "It [the air] felt warm all around me. I was blended in [with the air]. . . . I felt very warm and melted" (9F).

Four people (13%, 2 women [7%], 2 men [7%]) talked about sweating during the experience: "cycling in waves: hot sweaty to cold" (10M).

> At first I wanted to start moving because I was sweating. I was feeling wet like I was in something wet. . . . So did the drug go to my head and then make my head, the glands or whatever, start to sweat? . . . The sweat is drying away, so back there I was feeling a little weird that I was all wet. . . . So intense and sweating. . . . And obviously there's a rush in the head and that's what makes you sweat. . . . Nothing was going on but the sweat. (1M)

> This is funny, including my sweaty armpits. That's where the sensation is, and the palms of my hands. Where the sweaty parts of my body are, that's getting pulled sideways. . . . I was aware of all the sweaty places on my body. I was acutely aware of them. (5F)

Three people (10%, 2 women [7%], 1 man [3%]) reported clammy hands: "I feel okay right now, my hands are a little clammy" (3F), "My palms are clammy" (7M).

Six people (20%, 3 women [10%], 3 men [10%]) described their bodies being pulled by some thing or force, and also expressed a sense that their bodies moved pliably with the force of the pulling.

> Everything's getting pulled that way, including my head. . . . Everything was still getting pulled this way. . . . Pulled and stretched, but not in a gross way. It wasn't like "Oh my God, my body is being pulled apart." It was an extension of my body or it had these spider webs that were attached and being pulled, but they were actually part of my body. It wasn't like something that was attached to me and pulling on my body. It was like I was rubber girl and it was being pulled. (5F)

> This lip, and somewhere in this [right] arm, and it started going. It was being pulled from the inside. It wanted to go that way, and I thought that was funny so I started to smile. I didn't think it [the altered state of consciousness] would start with my lip and my arm, and I thought "Oh God I'm being pulled from the inside out into this other realm." There was a line between it like a big key slot, a big screwdriver prying me open. I was not enjoying that, [I] started to vibrate. (15M)

> I had a tremendous sense of being pulled. I was being twisted. As this pattern was moving I could feel it in my body. It's hard to describe. If my body was a sticky liquid, something a little more liquid than Jello, and someone was pulling it like peanut butter, and it was stretching as it was being pulled. I could feel that stretching pulling thing going on. It was a very strong force, but it was a force like gravitational spin. (16M)

Six people (20%, 2 women [7%], 4 men [13%]) described their bodies as twisting or spinning.

> Have you ever seen fractals on a computer? When people make fractals move, it was like that. That's what it felt like. I didn't get a big visual about that but that's what it physically felt like in my being, in my body. (2F)

> I just smoked something and put the [pipe] down and very slowly felt this on come. From the ground [came] this moving spiraling energy. There's a feel of the force pushing in the same direction that the whole visual perceptual patterning seems to be moving. . . . There's a real mechanical sense in a lot of the visuals. . . . The visuals are moving around. (2M)

> It was like there was an augur out here, that was turning me and my consciousness and everything into it. . . . I felt like literally I was being fed into this device that was slowly spinning. . . . It was very real in terms of this feeling, like I was being churned, slowly augured by something physical. . . . It was an overall spiral feeling. (14M)

> The whole time space continuum was bending and I could feel it in my body a lot; it was

> almost twisting me. There was a strong force twisting me, it was actually twisting my brains and as it was doing that the image was distorting in a very geometric, orderly way. . . . I was being twisted [and] as this pattern was moving I could feel it in my body. (16M)

Four people (4 men [13%]) mentioned their bodies tingling: "An inward musculature tingling in every muscle that can move. This coursed down through [my body], and essentially anywhere that I would focus on or any part of me that moved would feel this" (6M), "It's like a tingle or something different. . . . Like a light tingling sensation" (9M), "My hands, everything felt tingly a little bit" (10M).

Three participants (10%, 2 women [7%], 1 man [3%]) expressed being tired or sleepy; "The body feels a little tired, like you just went through something. It has a little bit of fatigue" (1M), "I'm feeling tired. . . . I just feel so sleepy" (8F).

Three people (10%, 1 woman [3%], 2 men [7%]) felt paralyzed or unable to move for a portion of the experience.

> I was stuck in my chair and couldn't really move to get out. . . . Anytime I thought in my mind "Get up, get up," something kept me from getting up. . . . It [the visuals] had a paralyzing effect, just like "well don't move." You can't move. You're stuck. (1M)

> That minute when I was saying it to myself before I said it out loud, that was probably the worst, because I was like paralyzed. And I didn't think, I knew I had to say it out loud to make sure it was okay. I don't know why it's so upsetting (3F)

Three people (10%, 1 woman [3%], 2 men [7%]) reported great bodily pleasure; "At the peak of it, my body felt wonderful. Really a beautiful body sensation . . . pure relaxed bodily pleasure" (5F).

> Very light. My entire body felt very open. I was still very much embodied, not in a typical normal manner. Kind of like a light tingling sensation. Light tingling. Just felt very open and relaxed. There was definitely a different, I just felt differently of being in my body. I just felt very much in my body. . . . Just the shift in my, the shift in my somatic experience and particularly intensely positive or anything, it was just very different and felt comfortable. (9M)

Three participants (10%, 2 women [7%], 1 man [3%]) noted an alteration in the perceived

shape or makeup of their body.

> I felt like my entire body became curves, layers of curves. Have you ever seen lettuce that's really ruffly, or curved at one end? My body kept going into these repeated patterns of these curves. . . . There were waves of my body changing form. I didn't feel that I was in the same form. I was splitting off into layers of form that was very curvy. . . . It took me over and I became that form. So I didn't feel held and embraced by it. I felt reformed, re-patterned in its patterning. My body wasn't this human form but was almost like cross-sections of curvaceous layers. It was almost as if it was breaking down my own physical patterning and reforming to what felt like its pattern. (2F)

> I was kind of embarrassed because I was smiling this hunk of lip was like a fishhook being folded up, but I couldn't put it back down. And I thought "that's got to be silly looking." . . . It was just like at this one spot, and I actually went and tried to feel it and it wasn't out of place, and that's funny, and I was smiling and giggly. (15M)

Closed-eye visuals. Twenty-five participants (83%, 11 women [37%], 14 men [47%]) described images when their eyes were closed: "Garden images morphing into spirals" (2M), "What had been a bit of light entering through the bottoms of the eye mask became two voluminous hills or waves, and then they were supplemented by others that extended outwards into a horizon" (6M).

> At one point I started looking for visuals and I got a visual of a wolf. It was chewing something, it had its prey, and [the prey] kind of looked like my cat and then it didn't look like my cat it looked like a baby deer. But he was chomping away at it. . . . It was almost like a picture on the wall, only he was moving. (2F)

Twenty-three participants (77%, 10 women [33%], 13 men [43%]) described movement within their visions: "Rubber, stretched rubber. Those were going like that and their tips were getting pulled like that [motioning with hands]. Everything was going somewhere, all to the same place. I wanted to go there, too" (5F), "There was definitely some movement that was pulling that blanket over me" (15F).

> When I closed my eyes I had this vision of an umbrella type tent. As I tried to look at it, it started bending. . . . It was like this bend in the tent top. This pole, as it bent it would morph and another one would appear and there were a bunch of them morphing. . . . Canopy type top. It was yellow, and some other dark colors, and it was striped and as I looked at it it was definitely morphing. (16M)

Six participants (20%, 2 women [7%], 4 men [13%]) described their visuals as kaleidoscopic: “If you are looking through a kaleidoscope only there are a whole bunch of little diamond shapes in this whole kaleidoscope that was the world” (12M).

> All these images turning like a kaleidoscope. That’s exactly what it was like. The same pattern, but over and over. I was being folded in the same sheet. . . . It was a kaleidoscope of colors and feelings. (1M)

> When you look at a kaleidoscope and you see things move around and it's a multiple of the same thing and you see it all over twisting. I've had that happen a couple of times already. When I first took it and closed my eyes the last thing I saw were my feet, I kept seeing the tips of the shoes twirling like in a kaleidoscope. . . . I've seen things like I described, kaleidoscope colored images. (8F)

Four people (13%, 2 women [7%], 2 men [7%]) described their visuals as swirling: “Everything was swirling and dividing right here. . . . There was a clear line here, these paintings were swirling” (3F), “Away from me, swirling down, out and around, in colors that look very much like tree branches. . . . Whatever the foliage was, was blurred and swirling around and out that way” (14F).

Three people (10%, 2 women [7%], 1 man [3%]) expressed that their closed-eye visuals were beautiful: “It was beautiful and it was expanded. It was light filled, it was peaceful. It was beautiful, but it didn't have any form, like nothing I recognize” (12F).

> There was something very beautiful about it even though, it’s incredible power and strength, plus in a dangerous situation, it was something incredibly beautiful in the likes. . . . It was like that water; it’s showing me that it’s got this really beautiful peaceful side to it. (8M)

Immersion. Twenty-four participants (80%, 11 women [37%], 13 men [43%]) were immersed in another reality.

> It’s more daylight looking. Oh God, I get these things, for a little while it looks [like] the back fence, white house with planter wires on it. There’s a real mechanical sense in a lot of the visuals . . . The visuals are moving around. (2M)

> It felt like these curtains opened up into another world that was out there. It wasn't behind the curtains, it was in the curtains, you know? . . . You see where the curtains end, where they're hanging over? That was the ground, and it opened up . . . that way, and there was this whole world over there and I felt like I was laying on the ground looking up. (4M)

> Well, to put it in the simplest terms, it felt a bit like being swept up into the heart and consciousness of a redwood tree, watching things, the energy flowing around me. . . . I was inside a plant. . . . I was definitely inside a plant. (14F)

> I had this brief fleeting feeling, this unusual feeling that my whole life, all my reality, everything had been an illusion, and I was going to come into a totally different reality when this wore off. In other words, I might as well be a different being, a different creature on another planet. When I came down I was going to be totally different. My entire life, all my reality was just an illusion of this experience. It was very profound. Again, I wasn't afraid or startled, I just thought "Oh, well here we go this explains a lot." I thought "well hopefully it'll be better." . . . My whole story would be recounted as like a dream almost by this other character. (14M)

> It seems so enamored with the feeling of 1890s, 1880s, theme about it, like a summer picnic. I almost had a feeling of women and parasols and guys wearing suits. It was almost like that, but none of it was visible. It was just this mental feel. . . . Even though I didn't have any visual clues that said that. I just had a sense of that, even to the point of grassy fields. Not necessarily visual just sensing. (16M)

Eleven people (37%, 5 women [17%], 6 men [20%]) sensed other people or beings during their experiences; "I got the impression that other people could hear me and they were around. Almost like people were saying 'It's okay.' It wasn't you saying it, it was other people saying 'It's okay.'" (6F).

> I wasn't sure, was someone else was in this room? What are they doing? What's happening? Yeah I still feel it. I do still feel that there is another being in this room. I almost feel like there's a being in this room that's having a very jovial attitude and wanting to fuck with us and wanting to, in a playful way, make a mess of things. (1F)

> I remember women that dress in sheets, linen that they drape themselves in. It was just like I thought, I was with people dressed like that and they had their cloths and they were folding it over me and folding me in. (1M)

> I think there was a person in this other world, and it was looking down at me. I couldn't see that well. They have a lot of hair. I think it was a girl. I was on the ground looking up this way, the sun was behind them and it was shadows mainly. I could tell the person had a lot of hair though. (4M)

> It seems that there was some entity that was taking me on a trip and there was something to look forward to. That was the most interesting part. . . . It was more like a cluster of sentient beings, but very undefined and . . . not some person or being that I could have a conversation with. It was more like they had a job and the job was to take me on a journey if I wanted to go, but they were not there to interact with me and I was like, "I guess, let's go." (5M)

Nine people (30%, 5 women [17%], 4 men [13%]) were completely in another reality with a loss of their awareness of being in the here-and-now of the experimental session: "I was so much of part of it there was no part of a person that had been. I was just the fabric. I wasn't watching it or witnessing it I was it" (10F).

> It was amazing to me that we were still in this room and this was happening. There [were] a few times when I wasn't in the room. I was in this [other] realm and then I would bring myself back and be talking and I opened my eyes at one point. (5F)

> I felt like I was in a whole other place. I really felt like I could see this [room], but then I really thought I was in South America. I felt like I was walking into a hut and it was a thatched roof right here and there [were] people outside of it that were inviting me inside and I really thought I was there. I was convinced that I was there. (7F)

Eight people (27%, 3 women [10%], 5 men [17%]) were immersed in their experience: "I didn't have a sense of being in a position to observe myself. There was no third person observation point. I was really in it. So that was different" (5M).

> My experience was that this was happening to the world around me and not an internal perception. Not a perception of the world, it was actually happening. . . . I was so absorbed in the perception I had no sense of distance. I was so immersed in it. (7M)

> I'm trying to think of the order because it seems like for a while, the normal witness was gone. That's when this other idea creeped in, a sense of another being and that everything was a projection of this other being. . . . To have that normal witness gone and then that flash of insight "Wow it feels like I'm waking up" in this other world. (14M)

Five people (17%, 1 woman [3%], 4 men [13%]) specifically described carnival scenes.

> There was a [carousel] or something in the background. . . . I knew that there was a [carousel], a big one. . . . I was looking up from the ground this way and there was a [carousel] over here and there was some person looking down at me. . . . I felt this sense of childhood joy, maybe because of the [carousel]. (4M)

> It's like some sort of weird carnival game, like something just hit me like I'm in a carnival and we should be playing a game. . . . It feels like it's a carnival ride. . . . it really did feel like a carnival. . . . It felt like a carnival kind of game. Kind of fun, trippy. . . . I couldn't stop laughing and it felt like it was really carnivalesque. (6F)

> I was on a roller coaster. . . . I thought it was funny how I was riding this ride. . . . I was on the ride and you are in the control booth, like "how is the ride?" . . . I was enjoying it like a ride, and this music was part of the ride music. It was like a psychedelic ride. . . you go in and pay money and get in something and you go on it. (11M)

> The pattern is like a circus tent. So it's almost like I'm in a carnival. . . . A summertime setting in a carnival but the carnivals they had in the 1800s. . . . I was outside the tent, and you know how tents have a pole in the middle and they swoop down and the normally parallel lines looked curved because of the curvature. (16M)

Three people (3 men [10%]) mentioned water in their other reality: "I felt myself getting wetter and wetter and I kept [thinking], 'Am I in water?'" (1M).

> It seemed like there was more to life, there was movement of water . . . It was almost like the water was up to my neck in the sense that I lost my body. . . . Crazy like dramatic river scene. (8M)

Two people (7%, 1 woman [3%], 1 man [3%]) believed the other reality was "more real" than consensual reality: "More real than here, this feels very transitional very temporary and that was what I am going back to eventually" (4M), "Like I was waking up to something, not like it was still, not like it happened to me while I was here awake" (15F).

Two people (7%, 1 woman [3%], 1 man [3%]) described this other reality as familiar, that they had been there before: "It's like I took a break from it. It seemed familiar" (4M).

> I felt like I was connecting with something that I missed and I forgot about and was happy to be reconnecting with. It was like seeing a loved one that you hadn't seen in a long time and you reunite with them and it's just so nice. It had that kind of feeling. (7F)

Two people (2 women [7%],) felt their experience was ineffable, beyond words to describe.

> The ineffable experience, the feeling of something happening and not being able to talk about it, and feeling that if I even begin talking about it I'll lose it, and that my mind just can't run fast enough to come up with the words to speak it. Even just feeling there's no

> way I can make you understand, so sort of like there's even a futility of it. (1F)
>
> That place, at the peak of it, it was a very positive place and I felt really high. I don't know how else to describe it. It's hard to describe, because it's an altered state of consciousness, so it's high. I wish I had better words for it. It's sort of beyond. There was definitely a moment of being beyond. (5F)

This reality. Twenty-two participants (11 women [37%], 11 men [37%]) made references to consensual reality while they were in the *S. divinorum* state: "The room was beginning to become movable. Things were not stable anymore. . . . Moving. The room was less stable" (5M), "Probably because of your [the researcher's] presence and you're very grounded and stable, so my [the participant's] presence was keeping reality in check, but then over here [in the other reality] it was almost like a distraction" (7F).

> I was aware of a lot visually, there is a huge amount of information. The room looked very similar. I looked around to see if there was any patterning going on, if I focused on different things. I was more interested in what was going on internally, so I did a quick scan of the room. It looked the same so I thought I'd go back into what I was doing, which was a lot more interesting. (16M)

Twelve people (40%, 5 women [17%], 7 men [23%]) mentioned the researcher with them in the room. For 10 of those people the researcher's presence was calming or reassuring.

> I looked at you because I thought . . . "Am I sinking or something? You went "No, we're okay." . . . I looked over at you so I got my frame of reference. I said "Okay, let's go with it." . . . I only really remember looking at you once when I was right in the middle of it. (1M)
>
> One of my immediate responses was "are you [the researcher] experiencing the same thing that I am?" But I don't think so. . . . I'm glad I had a little bit of insight into that, I said "Peter's calm, he's just sitting. So it must be okay." You were instrumental in that. I'm glad you were here maintaining that calm demeanor, because I would have been so disoriented. I might have tried to get up and go somewhere. (7M)
>
> I knew I was on a ride. I knew I was on a trip, that you are giving me something so that I could go on this ride. Then [the] room disappeared [and] I knew we had this agreement. . . . I wasn't even thinking about reality. The only thing that was real was our agreement. . . . There was an agreement that you were going to let me go on this trip, and you would be there observing like a safety net. You're the ride master. That's what it felt like. I was like "Okay, I'm going on the ride and you're the ride master." When I was in the ride, I

> kept trying to get a glimpse of you to make sure I don't go too far and I don't get lost. I would sometimes get a quick glimpse of you, like, “Whoa, I saw him.” (11M)

For two of the 12 people (7%, 1 woman [3%], 1 man [3%]), the researcher's presence brought suspicion or was perceived as distant: “I thought that you couldn't hear me” (3F).

> My perception of looking at your neck, the shape of your body. Your neck looked elongated, you looked a lot taller. . . . I got angry because I felt “My world is going totally crazy and why have you done this to me? You’re just sitting there smiling.” . . . It brought up that fear of how you perceived me. (10M)

Three people (1 woman [3%], 2 men [7%]) remarked upon having physical contact with the researcher: “No. I didn’t feel that [holding hands]. I was so busy, so intense and sweating, you know, intense in doing that, that I didn’t notice” (1M).

> [The experience] was definitely nice, but it felt like too much for me and that’s when I reached out for you, and I was like, “I need to stay over here [in consensual reality].” The visions in my mind’s eye were really vivid. . . . I could feel your hand, and it felt good to hold your hand. I could go explore a little over there, but you kept me stable over here. I felt like a little kid wanting to go play and you’re letting me go look at it, but you’re like “Okay, let’s just stay over here and be safe.” (7F)

> [Holding hands] was the only thing I could think of that would make me feel better in that seat of mine, for a second there. It was my tether to the world I had known right before that second. If you hadn’t been here, if I had just done that by myself, I think I might have freaked out, and I think it could have been a bad trip in a way, but just knowing that you’re here as a presence, a sober guide. (10M)

Twelve people (40%, 8 women [27%], 4 men [13%]) mentioned being able to remind themselves of being in a research setting: “I maintained lucid awareness of my place in the room, and the intentions of the study and my thoughts” (6M).

> The part of me that knew [the experience] wasn't really happening is what ruined it for me truthfully, because there's a part of me that was like, “No you need to be sane right now.” An instinct of the experience was, “Go insane, go crazy, let it happen, just go and hallucinate,” and there was a part of me that was aware that you were watching me and this whole thing was being tape-recorded. It was like, “We need to not be crazy right now, otherwise I'm going to be diagnosed, and I'm going to be a paranoid schizophrenic.” (1F)

> I took a deep breath and felt myself in the chair and [thought], “Oh, yeah, that guy, you

> [the researcher], is next to me. So we're here." And I knew I felt really normal a minute ago, and yet now how could this be happening? There was that observer of, "Okay, well, this is a drug and you're in this room and you're definitely tripping out." (5F)

Three people (2 women [7%], 1 man [3%]) wrote about a change in emotional closeness to the researcher: "I already feel close. Now, closer" (4F), "Like I was alone" (15F), "Feelings of guilt + selfishness" (15M).

Sounds. Sounds were an inevitable part of the research setting. Sounds from outside the room could be heard intermittently during the sessions, such as people walking and talking down the hallway or in the next room and the building's air conditioning system. In order to help mask these unpredictable and potentially distracting sounds, a classical music CD was played (see chapter 3). Participants remarked upon hearing ambient sounds as well as the music in the room. Participants also commented on other sounds unobserved by the researcher.

Twenty participants (67%, 9 women [30%], 11 man [3%]) discussed hearing sounds during their experience. Most common were mentions of sounds in the room. Six people (20%, 2 women [7%], 4 men [13%]) described the music playing in the room as calming: "[The music] was very peaceful during all the time it was on" (1M), "The lady singing [on the CD] was very soothing. It felt calming. . . . Because I already heard it before, it did give me a sense of knowing some predictability of what was happening" (4F), "The music was nice. I can't say with any certainty whether it affected me or not. It was pleasant. [The experience] was so abrupt, it was shocking. [The music] was nice to have calming down" (7M).

Four people (13%, 1 woman [3%], 3 men [10%]) said the music playing in the room was grounding. "The music kept me well grounded and it did hinder me. The potential of leaving the room [for another reality] is dependent on having nothing keeping you attached to the room, like sounds" (6M); "It gave a nice reference point because of time flowing, and if you turn off the

music you don't know that time flows or stops. It gave some continuity, and a sense of time" (15M).

> [The music] gave me an external object. The object of my experience seemed to be so somatic that [the music] created an external object that allowed me to be present for the process or be the subject of what was going on inside of me. (9M)

Two people (7%, 1 woman [3%], 1 man [3%]) heard echoes of other sounds that were in the room: "It was like a chamber of echoes or mirrors or something. . . . Echoing, the repetitiveness of it. . . . I could hear the echo come back to me" (6F).

> I started to hear echoes, phrases of things that repeated. . . . The last thing you said I think, it was a couple syllables of the sentence cycling. . . . Speech and whatever sounds accompany that speech. There was a second and a half window of time. (15M)

In addition to hearing sounds in the room, five participants (17%, 3 women [10%], 2 men[7%]) also heard things the researcher did not hear; "A voice telling us all to come along and leave the door open" (2M), "Voice chanting 'it's not the same'" (3F), "Not physical sounds, but the sense of a lot going on around me, sense of sound" (7F), "Sense of hearing bodily feelings" (7M).

> I really thought I heard banging, like someone was in the room and they were banging and they were going to remove this [pipe]. . . . I definitely heard banging. This [pipe in the room] isn't even metal. I heard metal banging. (1F)

Six participants (20%, 1 woman [3%], 5 men [17%]) referred to not hearing anything: "The deafening sound of quiet. I didn't really hear a noise for some reason" (1M), "Because of the setting here, because it's really quiet, I didn't have any other senses orienting me. I got completely in it and completely lost my orientation of where I was" (10F).

> I don't remember hearing [music]. The music was on, but I don't recall much sound. The music was muted. It seemed like there wasn't much of a sound dimension to it. . . . I didn't notice the music until I started coming back to it [consensual reality]. It seemed like my ears were shut off. (14M)

Disorientation. Eighteen participants (60%, 8 women [27%], 10 men [33%]) described aspects of the experience to be disorienting. Nine people (30%, 2 women [7%], 7 men [23%]) attached this disorientation to the suddenness of onset and shortness of the experience. “It was so quick and unexpected, but why is it even unexpected because I’m the one smoking it, and that’s not unexpected. You never know what you’re going to get” (10M).

> It was so short, because I think that if it lasted longer I know I would have been able to make better use of it. I think that because I didn't know what to expect that I didn't know how to make it useful for me. (1F)

> It's very short-lived. . . . Everything got jumbled and started to repeat for a few seconds . . . and I was just starting to understand the changes that were starting to happen, and just as I was trying to get a grasp of what was going on it started to fade back out. It was very short. (15M)

Six people (3 women [10%], 3 men [10%]) felt disoriented due to a disconnection with their bodies: “Disconnected from body, only 'head' awareness” (4F).

> At the beginning, right after I smoked, I was in my body, but I also almost had a sense of being disembodied. My consciousness was mostly located in my head, and it was the center of awareness. . . . I'm a very strongly embodied somatic person, and it wasn't really there. (7M)

> I tried to hold it in [the Salvia smoke] and then it was like I was no longer aware of myself and trying to hold it in. . . . I couldn’t – I mean, I lost my body. My head was severed. . . . There was a moment that it was like I was gone and had no identity. (8M)

Six people (3 women [10%], 3 men [10%]) described their experience as “crazy”: “It was crazy how quick, it all just happened really fast” (7F), “It was crazy, but I'm like 'I'm okay I need to have a corporeal reality here'” (8F), “That’s crazy. I’ve never felt anything like that. . . . It was like a crazy like dramatic river scene” (8M).

In contrast, four people (3 women [10%], 1 man [3%]) described themselves as “crazy” due to their disorienting experience: “I'll bet I sound crazy, don't I?” (4F), “You think I’m crazy weird. . . . I thought, 'Are you going to think I’m crazy now?'” (6F).

> I feel kind of crazy. . . . There was a part of me that was aware that you were watching me and this whole thing was being tape-recorded. It [said] "We need to not be crazy right now, otherwise I'm going to be diagnosed, and I'm going to be a paranoid schizophrenic." I wonder if that's what a schizophrenic experiences. That's why I kept saying, "I feel like I'm going crazy." (1F)

Two participants (2 men [7%]) were unable to locate themselves spatially with regard to gravity and were confused about which way was up: "Everything was disorienting and in a way opening. The way [the closed eye visuals were] folding over, I was disoriented as to which way was up" (1M), "I couldn't tell which way was up" (10M).

Synesthesia. Seventeen participants (57%, 6 women [20%], 11 men [37%]) described two or more sensory channels mixing. Seven people (23%, 2 women [7%], 5 men [17%]) experienced a mixture of visual and tactile sensations: "I think it looks the same way that it felt" (9F), "Seeing a few feet out from me like a bubble around your body but being like an eyeball and your whole body is seeing the room around you, perceiving it" (10M).

> I was being wrapped in a rug. I was in the patterns totally. My body felt it. My mind felt it. I saw it and it wasn't scary, it was kind of fun. . . . My whole reality was just warped . . . but it was also visceral . . . that was the real interesting thing was that it was so visceral. . . . I saw the whole room turn into this rug, and it was combined with the feeling I had in my body. (11M)

> There was a strong force twisting me, it was twisting my brains and as it was doing that the image was distorting in a very geometric, orderly way. . . . It seemed like the visual was creating the feeling . . . if I had to put them in order. (16M)

Six people (2 women [7%], 4 men [13%]) referred to this synaesthesia as "kaleidoscopic": "It was a kaleidoscopic visual thing going on; a general body buzz" (13M).

> All these images turning like a kaleidoscope. That's exactly what it was like. Yeah. The same pattern, but kind of over and over. I was being folded in the same sheet. . . . it was kind of a kaleidoscope of colors and feelings. (1M)

> Its like my vision as well as a kinesthetic sense of things becoming fractional, breaking into fractions, but not visual ones. Like looking through a re-fractional kaleidoscope, but it wasn't just visual, it was a kinesthetic sense, that's what was happening. (7M)

Four people (4 men [13%]) saw things being folded, and simultaneously felt themselves being folded: “The field was solid, but I was falling through the field and then there was a diamond shaped pattern. I was falling through the pattern, and it was all folding in, and it was falling away from me” (12M).

> The same pattern over and over. I was being folded in the same sheet. . . . They were folding it over me and folding me in and folding me in. . . . Just that sheet folding over me like somebody was pulling it down to you and they were just bringing it down and folding it. (1M)

> There is a felt thing. There is a visual part to it and I felt it. It was the same energy, and I felt it and I saw it . . . It rippled through me, and it rippled through the air, and I saw that. I didn't notice a distinction between feeling this folding movement in my body and seeing it represented visually; it was the same thing. One didn't precede the other; it was just all there. . . . I watched and felt it. It was colors folding with reds and oranges mostly. . . . [And] my body could feel these ripples, and this folding and unfolding. . . . My thoughts were waved by that as well as everything else. (13M)

Three people (2 women [7%], 1 man [3%]) described merging with inanimate objects: “I was blended in with the air around me. I think it looks the same way that it felt. Everything was moving” (9F), “I couldn’t tell if I was part of the carpet, or you’re part of the chair” (10M).

> The process was like being in an expensive dark restaurant with sofas with upholstery, and I became the sofas and upholstery and I was coming apart from them. I kept waiting for it to completely come apart so that I could interact with you, but it just kept coming apart. It's totally crazy. I was part of a sofa with upholstery, and I was splitting open, like a zipper unzipping. I kept waiting for that process to be completing up to the point that I and you or you and I could get up, because we were separating like a piece of cloth being unzipped. . . . But we weren't people we were fabric. We were part of the upholstery. (10F)

Psychonaut exploration. Fifteen people (8 women [27%], 7 men [23%]) talked about exploring the state of consciousness facilitated by *S. divinorum*. Six of these participants (4 women, 2 men) had previously used *S. divinorum*. “There’s a lot more to explore about it and now I have a little bit more of a sense of . . . what it’s like” (7F),

> It feels like there was perhaps that I was introduced to that I could explore more [and] get more insight. It was a unique thing, and it seems like there was a tantalizing little glimpse

> into something that is potentially bigger or even more profound. (14M)
>
> I want to know more about it and in the process learn more about me. . . . It's a potentially useful tool for exploring. . . . We've got to explore consciousness, and be able to use it in creative ways, wholesome healthy ways. It's important stuff, it's not just trivial stuff to me it's truly important. (16M)

Four people (2 women [7%], 2 men [7%]) discussed future experiences with *S. divinorum* being easier or more productive due to their experience in the study, including two men with a previous history of use: “Every trip becomes more intense, because you're using the history of all the previous ones as a springboard” (6M), “Now that I've done it and I know more of what to expect it will be smoother. I can come in more prepared and I can come in with more intention” (8F).

> What I felt like re-patterning of my being may have been “Let's tune your frequencies so you can talk to me in the near future.” . . . I feel the re-patterning was taking place almost as a way for me to have a deeper experience with it next time. It was aligning me so I could get it more deeply the next time. (2F)

Five people (4 women [13%], 1 man [3%]), including two with a previous history of use, perceived a benefit from their experience of a broader perspective of reality, which they encountered during their salvinorin A-facilitated altered state: “I definitely got some information and understanding. It was definitely very deep. That was cool. There’s a lot to process about it” (7F); “I’m getting information from every part of this, even the fact that that is chosen” (14F).

> It was healing this place inside me. I was so deeply wounded around marriage and family. I feel like I've never quite gotten over it and I’ve always kept things at arm’s length so that I'd have a lot more control in my life and safety in my life. . . . It felt very healing. . . . It definitely felt like bringing that positive physical experience back into my body was healing. (2F)
>
> This other reality is the realm where the higher self lives. [Consensual reality] is an illusion, like a dream. Maybe that is the reminder I was supposed to get and that all these challenges, these frustrations, are just lessons. On this other plane it's all light and lovely and without issue. . . . There is this feeling like, “Wow, what if this would have gone on for 15 minutes even?” What other insights? Maybe I would've had a longer hit on that underlying ultimate reality. More insight, maybe I would've gone there more, [had a]

stronger presence there and been able to bring back more insight. (14M)

Three people (3 men [10%]) were curious about the experience, including one with a previous history of use: “It was kind of exciting, I was wondering where it was going to go” (15M).

> It's the first time I've ever had that specific feeling and I'm now very curious to know if I ever smoked again, would it be a similar thing. . . . I wonder if it's the same every time or if it's different, depending on amount . . . and it brings up a lot of questions for me. (14M)

> I was curious, if I open my eyes, what the room would look like, and the room looked similar to what it is now and then I went back and I lost a lot of it. I lost the depth of it, particularly the body feelings associated with it. . . . Once the process started, it was more of a feeling of “Aha,” curiosity. . . . That shift it's totally curious. (16M)

Unique experience. Fifteen participants (6 women [20%], 9 men [30%]) described aspects of their experiences as unique, novel, or strange. “It's a very unique psychedelic, and I've never had anything else that induces that same even somewhat similar state. Just the sudden intensity and the short duration” (6M).

> I think the best part of it was the feeling the experiencing of a totally different state of consciousness, because I've never experienced anything like that even remotely [compares] with all the different experiences I've had. . . . It was a unique experience, which I was a little surprised at, that it was so unique. (14M)

> The raw power that comes to you when something is totally new and totally strange. At first, at some point you feel like you've never done or seen anything before. It's cool to be there, it's like “wow”, but at the same time you're still you. (16M)

Six people (3 women [10%], 3 men [10%]) referred to their unique experiences as “crazy” in nature. “It was crazy how quick…it all just happened really fast, but there was some information going on. It was cool. . . . It doesn’t necessarily just take me over and takes me to this like crazy place” (7F), “It was crazy, but I'm like ‘I'm okay I need to have a corporeal reality here’” (8F), “That’s crazy. I’ve never felt anything like that. . . . It was like a crazy dramatic river scene” (8M).

Comparison of *S. Divinorum* state to other ASCs. Twenty-three participants (77%, 11 women [37%], 12 men [7%]) compared their experience to other experiences of altered states of consciousness. Thirteen people (43%, 8 women [27%], 5 men [17%]) compared their experience to that of dreaming: "It was more like a dream than, it was either like the most intense part of a psychedelic experience or a dream because I didn't feel like I was witnessing" (10F).

> In dreaming, my reasoning is kind of shut down. . . . Just like here, there was no judgment about what was happening. There was a little bit of judgment about "what do I look like?" but actually that I have in dreams, too. (5M)

> You know when you're like in a dream and it's like you want to speak but you can't or you want to do something but you can't, it was like that. It was exactly like that. I wanted to say things and there's like there's certain things going on and I was feeling that I wanted to react to it but I couldn't. . . . It was like I was having a dream but I was not asleep. (8M)

Four people (13%, 1 woman [3%], 3 men [10%]) likened their experience to LSD experiences: "It's almost like an acid hit, but smoked or something" (1M), "I recall sitting in a chair and not being able to move, like my body's gone again, similar to . . . it was acid [LSD] of some sort" (8M), "Maybe a little bit towards LSD, but LSD definitely keeps going" (15M).

Three people (3 women [10%]) referred to experiences they had with psilocybin mushrooms.

> Maybe a mushroom trip, because of all the geometric kind of patterns and colors. That sometimes happens on mushrooms, all that visual stuff. There was tons of visual stuff, but then there was also a lot of physical stuff. With mushrooms is more like nausea and dizziness. (5F)

> It reminded me of mushrooms a little bit, of feeling the presence of beings or spirits. Something that you can't see visually with your eyes, but feeling something is there and seeing it in my mind's eye, but not seeing it physically. (7F)

Three people (1 woman [3%], 2 men [7%]) compared their experience to marijuana: "Like pot in the sense of smoking and the immediate feeling. I've had some ineffable experiences with pot too, that there's some shit happening and not being able to talk about it" (1F), "It was

more body oriented. If you ever took marijuana and ate it as opposed to smoking it, it affects your body like that" (3M).

Three people (2 women [7%], 1 man [3%]) compared their experience to being on MDMA ("ecstasy"): "The feeling of when the high was coming on was maybe like ecstasy, having to surrender to it and feeling like something bigger is coming" (5F), "Ecstasy is like that for me, knowing something's there and feeling the presence of it, but not physically seeing it" (7F).

Follow-up interviews. Follow-up interviews were conducted an average of 56 days after the second experimental session. Interviews were conducted with all 30 participants. However, seven recordings (1 woman, 6 men) were lost due to filing errors or technical difficulties. Twenty-three (13 women [57%], 10 men [43%]) interviews were transcribed and analyzed.

After-effects lasting less than 24 hours. Twenty participants (87%, 11 women [48%], 9 men [39%]) reported after-effects lasting less than 24 hours. Five participants (22%, 2 women [9%], 3 men [13%]) felt reflective or curious after the experience, or actively tried to integrate their experience: "My general mood was that of curiosity and a little bit exuberant. . . . It was actually more elevated slightly. . . . It made me feel engaged or interested" (16M).

> I was in a daze for an hour or two, and then it went away and I felt very contemplative and introspective after that. My mind was hazy, I wasn't all here, kind of spaced out. I changed my plans for that day because the experience was so powerful for me that I really wanted to reflect on it, so I took a trip west to the redwood forest and reflected there. I enjoyed it and it was very helpful. Very relaxing. (04M)

Five participants (22%, 4 women [17%], 1 man [4%]) reported feeling more emotionally sensitive or empathic. Two people described greater empathy: "I felt more sensitive to people's suffering. . . . I was like, 'Oh, I see where I suffer and God, everyone suffers.' Just was really feeling it or feeling that empathy" (05F), "I did feel a greater sense of empathy for a bit. Not

dramatic, but subtle and a greater sense of connectiveness which I associate with the spiritual experience anyway. . . . This feeling of greater connectiveness and empathy" (14M).

Two women (9%) felt they were more intuitive: "Far more receptive on an intuitive reflective introspective level, and really slowed down so I could really appreciate where I am. Much more reflective peaceful internally focused state" (2F), "The next day with my clients being totally intuitive. Like my intuition was like a razor. My intuition seems actually to be increasing" (12F). One person felt generally more sensitive: "More sensitive and a little more emotionally fragile" (8F).

Four participants (17%, 3 women [13%], 1 man [4%]) reported general positive after-effects: "I did feel like a sense of being in awe with how concrete I make this reality to be" (4F), "The laughter. It does feel almost like a place that I can go back to if I remember myself in that session. . . . I guess things just become funny all of a sudden" (6F), "I did feel a little euphoric I would say, kind of an antidepressant euphoric effect" (10F), "I went home amazingly calm and relaxed. . . . I was less concerned and more calm. . . . I was calm and peaceful and happy. . . . I got more done like that day than I did in a couple other days" (15M).

Three people (13%, 2 women [9%], 1 man [4%]) experienced a headache: "I think I did have a dull ache in my head" (7F), "I do remember having a slight headache, but you told me that was possible and I am prone to headaches anyway, but it was really minor" (10F), "I might have had a slight headache. If I did, it was slight" (15M).

Three people (13%, 2 women [9%], 1 man [4%]) reported fatigue: "I really just didn't want to do anything productive. I just wanted to go home and get grounded. And, that's what I really wanted to, do. I just wanted to ground myself" (1F), "There is a little bit of fatigue, because I had a physical rush so there is a little fatigue after that. I was a little tired" (01M), "I

felt a little slower. Not quite drowsy, but slightly more sluggish" (8F).

Three people (13%, 3 men [13%]) had difficulty concentrating: "I was in a daze for an hour or two . . . My mind was hazy, I wasn't all here, kind of spaced out" (4M), "I kind of felt a little spacey in my head, not quite able to attend to all the details, and felt little remnants of the buzz that the Salvia gave me" (9M), "Mentally exhausted. It was just really an intense experience" (10M).

Two people (9%, 2 women [9%]) described feelings of floating or lightness: "I felt kind of lighter on my feet. . . . It's a subtle change, very subtle. . . . I didn't have as much substance" (1F), "I was floating" (2F).

Two participants (9%, 2 women [9%]) were more aware of beauty: "I was more aware of beauty and color and movement" (5F), "I felt a little brighter, and it stayed with me. Things seemed brighter and the molecules around the air seemed more charged somehow" (13F).

After-effects lasting more than 24 hours. Sixteen participants (70%, 10 women [43%], 6 men [26%]) reported after-effects lasting more than 24 hours. These effects included perceived changes to one's studies, work, or relationships. Four people (17%, 2 women [9%], 2 men [9%]) reported general positive changes in themselves: "I had a general sense of well-being for a while, it lasted a number of days, just made me feel really positive" (4M), "I think just personal enhancement, which I think filters into all of that [studies, work and relationships]" (7F), "When I recall the feeling . . . I like to remember things that align me with the stars or with wholesome feelings, and when I can remember to start any project feeling that way, it's a good thing" (13F), "I felt more grounded and less anxious. . . . There's a better sense of presence" (16M).

Five participants (22%, 4 women [17%], 1 man [4%]) reported positive changes in their relationships with living family members. "I felt that I had a better sense in my relationships and

by that I mean I felt more grounded and less anxious" (16M), "I feel like I have more meaningful thoughts about my work and relationships . . . I'm seeing things from a more open eye" (3F)

> My relationship with my parents is much better now than it has been in a long time. . . . Being at peace with my relationships, especially close family relationships, and my place in that realm. (2F)

Two people (9%, 1 woman [4%], 1 man [4%]) mentioned deepening relationships with people other than living family members. "Well, my relationship to the saint that I've been in relationship my whole life, it seems likes its better" (9F).

> Coming to a nice place with my relationship with my long past mother, just sort of deepening that bond. . . . I've come to a point where I know that we're still together, even though I'm incarnate and she's disincarnate. I know that she's still a big part of my life. . . . Knowing that she was there for me in a nice way during this experience was really heartwarming. (2M)

Three people (13%, 3 women [13%]) reported increased empathy or sensitivity. "I work with kids 6 to 10-year-olds, and it helped remind me of that place, that imagination, [tapped] me back into that side of me. It helped me go deeper into the work with kids and their imaginations" (7F).

> Enhanced sensitivity and periods to reflect on what was happening for me, what was coming up for me. It did enhance some things: the session where I talked about my relationship with my partner. . . . It helped to create a new frame to hold that relationship and it feel much more confident about it. (8F)

Five people (22%, 3 women [13%], 2 men [9%]) described reflecting on and integrating their experience: "Mulling over [the experience and] desiring to try it again" (2M), "It's that exciting feeling. It was fun to constantly reflect on, 'Oh wow I just had this cool experience.' It enhanced my mood for a few days" (7F), "Integrating the experience into my awareness with the lessons that I talked about" (7M), "I spent more than 24 hours reflecting about it and writing about it and talking about it" (10F).

Two people (9%, 1 woman [4%], 1 man [4%]) reported receiving lessons. “Enhanced sensitivity and periods to reflect on what was happening for me, what was coming up for me” (8F).

> Internal experience does not lend itself nearly as well to verbal description. It can be radically different. Honoring that can be very important, especially as a therapist, especially maybe dealing with somebody that's diagnosed with a psychotic disorder. It can be very important to be able to recognize internal experiences can be radically different. . . . It was a really good reminder of how drastic different states of awareness can be and not to judge them. (7M)

Three people (13%, 3 women [13%]) reported negative effects: “A persisting headache for about 3 days and that was a low grade headache” (6F), “I did feel a little bit funny. . . . Walking around and feeling a little bit unsure of things. . . . I felt funny about things for couple of days, maybe a week at the most” (9F).

> My ears have been popping a lot. . . . I have been much more ready to cry. . . . My lack of patience and my lack of appreciation for what society thinks is important. . . . I haven't been very verbal with a lot of my emotions. (3F)

No participants reported seeking professional help as a result of their experiences, although one participant requested information on local counseling centers relating to issues with her intimate partner.

Reflections on Salvia divinorum. Twenty participants (87%) stated they would like to use *S. divinorum* again, and three (13%) were unsure.

Eleven participants (48%, 3 women [13%], 6 men [26%]) could be described as psychonauts, including four with a previous history of use; they were curious and interested in exploring this unique state of consciousness. This group stated that one experience with *S. divinorum* was not enough to form a complete picture of the substance’s capabilities.

Four people (17%) stated that they could not draw any conclusions about the plant without multiple experiences, including one with a previous history of use.

> I'd like to experience that again and get a better feel for it. Having just done it once I wouldn't really have a whole lot of insight into it. . . . It seems that if it was going to do that it would have to be after you've done it a few times before something like that can really take effect (1M)

> I'm wondering if what I experienced was a onetime thing or if it would do the same thing to me all over again if I try it again. . . . I don't know if this was representative of Salvia in general and its effect on me, in particular (5M)

> I'd like to try the strongest dose available and try it several times and see if there's a vector to it, if there's a direction or if it's a random walk. . . . I have one data point with it and I can't really draw a line until I have two data points. (14M)

Three people (13%) expressed curiosity, including one with a previous history of use: "I am curious as to what I can learn from Salvia, what I can experience in myself" (4F), "I'd like to know more about what that energy space is about and what part of it you can attribute to the substance itself and which part is part of your own psychology or psychic energy" (16M).

> Curiosity about the effect of set and setting, and dosage, and what it would be like if other people were with me doing it at the same time, if we would feed into each other's experience, like other drugs do. So, just more curiosity and desire for experimentation, self experimentation. (1F)

Three people (13%) expressed a desire to explore the place facilitated by Salvia, including one with a previous history of use. "I wished to explore it further and learn what it has to teach" (2M), "I would have a focused question in mind. I don't think it's a fun kind of experience [but rather] an insight kind of experience. It's not discovered. It's not a group thing. It is a very individual kind of exploration" (6F), "I don't want to make a hobby of it, but it certainly is something that I wouldn't mind exploring" (16M).

Six participants (26%, 5 women [22%], 1 man [4%]), including two with a previous history of use, liked the psychedelic effects of the plant. They noted an increase in creativity, self-awareness, and positive transformation."I would do it because I had a very subtle, positive and transformational effect with it. . . . It just felt very consistently nurturing and supportive of

awakening awareness transformation" (2F), "I would use it in the context of self-healing and self-awareness work" (8F).

> Every now and then it's good to . . . check in and see what's in the subconscious and whether or not it's scary. If it's scary you've got a lot more work to do. There's no reason to be afraid. . . . I'd be compelled back just because of the sheer strength of the experience, but when the scary [experience] comes it's . . . just a mirror. (14F)

Five participants (22%, 4 women [17%], 1 man [4%]), including one with a previous history of use, liked the transpersonal effects, enjoying an experience of "a greater reality" and opening into other realms or dimensions of self. "For the self-awareness expansion and understanding and just to tap into other realms and realities and explore that more" (7F), "To learn about myself. Actually, I'd like to learn about more than just myself. Actually, I'm very interested in learning about many things and other dimensions" (10F).

> I would use it when I would feel my perception of the world was becoming too narrow again. I would use it probably as a reminder. . . . There are these alternate realities out there; they're just different ways of experiencing your life. (4M)

Three participants (13%, 2 women [9%], 1 man [4%]), including two with a previous history of use, emphasized that this plant should be treated with respect, and that it should only be used in a ritualized setting with a specific intention.

> It's an amazing teacher and a beautiful plant. . . . I want to pray, I want to create a sacred space. . . . It would have to be a very respectful setting and with people who are willing to participate in that because I really feel like you're forging a relationship with a being. (5F)

> I would be especially inclined to try it again in the midst of a ritual setting, conducted by a shaman or some sort of spiritual leader with a set intent. That would be my most ideal. I would definitely do it in those circumstances. (7M)

> It depends on the context. If I were to sit down, perhaps with a friend or two with the intention of doing journey work. I think that's what I would do it in. I wouldn't want to be alone, and I would want to use it to be open to spirits and to what I need to get in tune with within myself. (8F)

Three people (13%, 2 women [9%], 1 man [4%]) did not know if they would ever use the

plant again, but they were not essentially opposed to the idea, including one with a previous history of use. “Not yet is the best answer I can give you. I wouldn't feel comfortable going into it yet. Possibly in the future, yes. Definitely maybe. I don't think it would have any benefit right now” (3F), “Possibly. After my experience, it really didn’t leave me with anything to say, 'Oh yeah, I definitely want to do that again,' but also nothing that said, 'Oh gosh no, I never want to do that again,' so, possibly” (9M).

> Maybe if it was under the right circumstances and I felt the need to. I don’t feel I need to at this moment. I don’t have a reason right now but I think there could be a reason. I just don’t know it. If a reason presented itself, that’s why I’d use it. (9F)

Of the 20 people who said they would take *S. divinorum* again, only two people (9%, 1 woman [4%], 1 man [4%]) mentioned the experience being enjoyable or pleasant: “Well, I liked it” (13F), “The side effects of being calm and focused were actually positives” (15M). In summary, most people felt they would might use the plant again, for a specific reason or in a specific setting.

Each participant compared and contrasted *S. divinorum* and marijuana. All 23 participants (100%, 13 women [57%], 10 men [43%]) reported differences between the experiences facilitated by *S. divinorum* and marijuana. Eight participants (35%, 6 women [26%], 2 men [9%]) reported their experience was more intense or potent than a marijuana experience, including three with a previous history of use. “I think Salvia is much more intense an experience” (4F), “I think it’s far more potent” (6F), “Marijuana is very different; the experience is much more mellow. It’s not a very intense thing” (14M).

Six participants (26%, 3 women [13%], 3 men [13%]), including two with a previous history of use, stated in contrast to marijuana, *S. divinorum* “opens you up” and provides a reflective, insightful experience where you can learn about yourself: “[Marijuana has] a real

negative effect. It doesn't open you up. It doesn't take you into a different area" (8M), "[Salvia has] a lot to integrate and process" (9F), "It's more interesting to think you actually learn something about yourself in [the Salvia] experience, whereas I don't think there's anything to be learned with marijuana" (16M).

Five people (22%, 2 women [9%], 3 men [13%]) noted *S. divinorum* altered consciousness for a shorter period of time than does marijuana, including two with a previous history of use: "The upside of Salvia is that it's so short lived, it doesn't require a huge time commitment" (5F), "The effect was really brief" (9M), "The effects were so short-lived" (15M).

Five people (22%, 2 women [9%], 3 men [13%]), including one with a previous history of use, referred to *S. divinorum* as an entheogen, psychedelic, or hallucinogen, and noted that marijuana was not: "I would classify it more as a hallucinogenic and no one ever hallucinates on marijuana" (1M), "[Salvia is] a psychedelic and I would need to prepare myself and set a certain context for using Salvia, whereas when I was smoking pot it would just be recreational" (8F), "Marijuana doesn't really create the hallucinations that Salvia can" (9M).

Four people (17%, 3 women [13%], 1 man [4%]) believed *S. divinorum* did not allow them to function in a social setting, including two with a previous history of use,whereas marijuana did allow such functionality: "I couldn't possibly drive while I'm having a Salvia experience" (14F).

> With marijuana you can function through everyday reality, where I think if I did Salvia . . . I don't think I could function. It's more of sitting in a room and having an inner journey experience then being able to move around and do things. I feel like you need to be in a safe environment while you're doing it because it can take you somewhere. (7F)

> Marijuana is a very social drug. . . . Salvia is very not social. It's very introspective. So instead of suddenly becoming an extrovert and being loud and running around and partying like marijuana, you become very introverted and very introspective and you look at yourself and the universe. (15M).

Three people (13%, 1 woman [4%], 2 men [9%]) mentioned *S. divinorum* having more of a stimulant effect than marijuana: “Marijuana for me is more of a relaxant, and [Salvia] is very much the opposite. It's like a stimulant; it broadens and alters your awareness whereas marijuana for me has never really accomplished that” (4M), “I didn’t find [Salvia] relaxing” (05M), “[Salvia] didn’t zap my energy” (6F).

Three participants (13%, 2 women [9%], 1 man [4%]) noted similarities, including one with a previous history of use: “They can both act as spiritual teachers” (5F), “It has some effects that were maybe similar to marijuana in the sense that it could have toned down the cognitive aspect, made things a little bit more fuzzy reality for sure” (5M), “It does help me see things from a different perspective, which is similar” (7F).

Summary of qualitative data. In summary, inhaling 1000 mcg salvinorin A produced a unique, intense, and often disorienting altered state of consciousness. This altered state usually begins with a sudden rush, often felt in the body. After this initial rush most participants experienced another reality that was felt to be equally as real as, if not more real than, consensus reality. This other reality was “known” in an abstract mental way, felt in the body, and seen visually. Characteristics of this other reality variously include a carnival-esque feeling, moving spiraling imagery, and the understanding that the plant *Salvia divinorum* is altering one's physical body in some way.

Unusual physical sensations and closed-eye visuals occur throughout the experience. These may be combined in one of two types of synesthesia: Objects perceived visually may be felt with the body, and sensations in the body may have visual correlates. The experience is often immersive, with the participant experiencing another reality, akin to a lucid dream.

Cognitive functions usually remain intact, although altered. The experience begins so

suddenly and intensely that the mind often surrenders to the experience and lets go of attempting to control or categorize it. The experience is seen as beyond the individual's ability to control. This lack of control can be welcome or unwanted.

Positive after-effects and changes in one's life are reported more frequently than negative after-effects and changes. As a result of a single experience participants have discussed greater understanding and curiosity about themselves and the world around them. No short or long term damage was mentioned by any participant, nor was any decrease in functioning noted by researchers between the experimental sessions and the 8 week follow-up meeting.

Chapter 5: Discussion

This study investigated the subjective experiences facilitated by inhalation of 1000 mcg salvinorin A in healthy participants in a controlled setting, as well as aftereffects noted 8 weeks later. This was the first study to analyze themes based upon the experiences of the participants and also the first to use a quantitative measure, the Hallucinogen Rating Scale, to describe user experiences within 1 hour of inhalation. Based upon results of the current study and comparing with research discussed in Chapter 2, it is likely that salvinorin A is a selective Kappa Opioid Receptor (KOR) agonist in humans, affects volition, and that subjective experiences facilitated by the chemical are highly influenced by set and setting, which were carefully controlled in this experiment. Aftereffects of a single use included enhanced positive mood and a deeper appreciation of life.

First, the demographics of the study participants will be discussed, including possible ways demographic variables might have affected the results. Second, the design of the study will be considered, along with a discussion of quantitative and qualitative data gathering and analysis. Finally, the relationship between this study using salvinorin A will be brought into the literature about other KOR agonists and potential research and clinical benefits of continued study.

Demographics

Demographics of study participants may have affected the results. For example, all but three participants reported regularly engaging in spiritual activities such as yoga and meditation. Such activities may give participants more experience observing internal states. When comparing this study to surveys of *Salvia divinorum* users, age difference may be a factor as well. The mean age of participants here was 39 (volunteers needed to be 25 years old to participate in the current study), while in surveys the mean age of users was reported as 25 (Gonzalez et al., 2006), 23

(Baggott et al., 2004), and 21 (Albertson & Grubbs, 2009).

Participants in this study had first used *S. divinorum* in 2003 (mean year reported), earlier than the mean year of first use reported in the survey of Gonzalez et al. (2006), which was 2005. This suggests nontraditional use of the plant became popular in the United States earlier than in Spain.

The selection of participants for this study was a major limitation. Factors beyond the researcher's control included the location-bound nature of the study. Residents of the San Francisco bay area are often stereotyped as being more accepting of both substance use and altered states of consciousness than the national population, and since this study deliberately selected people who had had those experiences and were willing to re-experience them, this population may well reflect a positive bias and openness to such experiences that cannot be generalized to other populations. Volunteers with no previous experience of psychedelic substance use may have given very different descriptions of their experience due to heightened unfamiliarity and lack of verbal constructs about such experiences. Participants with a history of recreational or “street” drug use may have a different neurochemistry and/or neuroanatomy than people who have never used such substances, which could in turn affect the generalizability of the present findings.

Participants were recruited by convenience sampling, resulting in a non-representative group. Individuals were middle-aged, spiritually-inclined, experienced with psychedelics (11 had previous experience with *S. divinorum*), comfortable with smoking, and well educated. All of these variables influenced the psychological mindset a participant brought with him or her to the experimental sessions. It is likely these participants were more mature and had a more concrete intention for taking the plant than an average nontraditional user. Additionally, only 30 people

were recruited which may further limit generalizability. With a larger sample outliers would make less of an impact and trends would be easier to determine. A small number of conveniently available volunteers was chosen for the current study. It is too early to tell how such selection bias influences results.

Protocol

Regarding studies or other information available on *S. divinorum* in human participants, it is difficult to compare with the current study results. The present study used a standardized dose of 1000 mcg, whereas *S. divinorum* available in "head shops" is unstandardized (Wolowich, Perkins, & Cienki, 2006). Using thin-layer chromatography and gas chromatography-mass spectroscopy, Wolowich et al. analyzed five products advertised as *Salvia divinorum*, which were purchased online and in local "head shops," only to discover that all products were mislabeled: three contained other chemicals (vitamin E and caffeine), and all five contained dosages different than advertised. Scientific surveys (Albertson & Grubbs, 2009, Baggot et al., 2004, Gonzalez et al., 2006), case reports (Hanes 2001, 2003) and emergency room reports (Bucheler et al., 2005; Gleiter, Schwoerer, & Gaertner, 2005) describe people who have most likely taken an unspecified amount of salvinorin A, possibly in combination with other chemicals or psychoactive substances. As such, it is difficult to compare the subjective experiences between participants in the present study and those of the general population purportedly involving *S. divinorum*.

Other important limitations concerned set and setting. While the Institute of Transpersonal Psychology is generally a quiet environment, it was not always. No guarantees could be made regarding the uniformity of sound across sessions. For example, in four or five sessions the researcher could hear people talking in the next room, although individual words

were indistinct. Discussing such external noises during the session was rare, but after the altered state experience was over there was sometimes a discussion about the distracting nature of the noises.

The inclusion of classical music in each session was an attempt to minimize this factor. Gorecki's *Symphony No. 3* (Gorecki, 1976) was played in its entirety during the session, portions of which contain Polish lyrics. The choice of music was the most controversial aspect of the protocol. Many participants discussed the music spontaneously during the experience and after as either helping or hindering their experience. The consensus was that music without vocals would be preferable as it would be less distracting. Additionally, some of the participants had a pre-existing aversion to classical or opera music, with which they identified Gorecki's symphony.

The double-blind was not easy to keep. All 30 participants were able to accurately guess the correct condition when asked at the end of the study. Some participants remarked that the active and placebo doses tasted different; the active dose was described as harsher tasting. Participants were told they would receive two doses out of a range of several possible doses ranging from placebo to an active dose of 1500 mcg. In reality, all participants received a placebo dose and an active dose of 1000 mcg. This was done so participants could expect an active dose every session in an attempt to keep expectation effects at a minimum.

Screening and follow-up were based entirely on participant self-reports. Participants are capable of misrepresenting their experiences and behaviors. Future research could include some form of triangulation, such as reports from members of the community, as used in the study by Griffiths et al. (2006) when assessing spiritual experiences facilitated by psilocybin.

One unexpected limitation was that the pipe slowly became clogged with smoke residue.

As the pipe became clogged more forceful breathing or sucking was needed to inhale the smoke, which may have contributed to a less intense experience. Roughly half-way through the study the pipe was thoroughly cleaned by (a) disassembling the pipe into four pieces, (b) soaking the pieces in 70% isopropyl alcohol for 24 hours, (c) rinsing the pieces with water, (d) allowing pieces to dry completely, (e) reassembling pipe, and (f) inserting a new screen onto the bowl. In future studies involving a smoking apparatus, it should be cleaned regularly to prevent build-up.

It would be useful for future researchers to consider alternative methods of intake. The experience of smoking *S. divinorum* is disorienting, perhaps because of the sudden onset and short duration of effects. In a non-research setting this disorientation can lead to fear or dangerous movement. Traditional Mazatec methods, (chewing leaves or making a water-based infusion of the leaves to drink), intravenous or intramuscular injection, and sublingual absorption could be compared to smoking to elucidate the safest, most beneficial way to experience this substance. Further, limiting the protocol to smoking limits generalizability to people comfortable with and adept at smoking and increases the risk of respiratory effects.

Quantitative Data

Two ANOVAs were used to compare the differences between means of the different groups. Using the mean as a measure of central tendency is the default choice in statistical analysis, but it may not always be the best choice. Modern robust statistical methods could have been used in addition to the traditional tests to yield a clearer picture of the experiences brought about by *S. divinorum* (for a discussion see Erceg-Hurn & Mirosevich, 2008). Additional analyses can be conducted at any time and might be better measures of central tendency within groups, while reducing the effects of outliers.

Vital signs were taken too long after the participants smoked *S. divinorum*, so that they

were back to baseline consciousness and behavior by that point. In order for such measurements to be useful, they would have to be taken perhaps every 5 to 10 minutes, but the procedures would be distracting and intrusive to the participants. One way to deal with this issue would be to have one protocol where participants are probed and measured frequently and a separate protocol for exploring clinical potential. It is likely that having a psychedelic experience during invasive medical procedures is not the optimum way to assess therapeutic potential of said experience.

The Monitor Rating Questionnaire (MRQ), used to assess objective behaviors of the participants during their experience by the researcher, has not been tested for reliability or validity. The majority of items analyzed (16 out of 19) turned out to be nonsignificant. These items may truly be nonsignificant, or the questionnaire might not be very good at measuring what it is supposed to measure. There are no other studies with which to compare results.

MRQ scores were analyzed by adding the number of times a participant was observed engaging in a certain behavior and then dividing by the length of the session to create a ratio score. There are other ways to analyze the data. As one example, only scores for the first 20 minutes could be analyzed, as by all accounts phenomenology had returned to normal consciousness after the 20-minute mark. Thus, during more than half of the 50 or 60 minutes during which the MRQ was being filled out, the participant being measured was sober. The three MRQ variables that were significantly different between dose conditions (number of times talking, laughing, and moving while sitting) might have different relationships between groups if a different time period is used.

The MRQ was an attempt to create an instrument to record direct observations of the effects of a psychedelic. Another study that came out during the time this one was being conducted (Lange, Daniel, Homer, Reed, & Clapp, 2010) created an instrument to analyze

observable effects of *S. divinorum* inebriation. This study analyzed 34 privately produced, publicly available videos from video-sharing website YouTube of people who were videotaped smoking *S. divinorum*. The 34 records were analyzed according to a 42-item checklist, resulting in five categories or themes:

> (1) hypo-movement (e.g., slumping into a slouched position, limp hands, facial muscles slack or relaxed and falling down), (2) hyper-movement (e.g., uncontrolled laughter, restlessness, touching or rubbing the face without apparent reason or thought), (3) emotional effects included being visibly excited or afraid, (4) speech effects (unable to make sense, problems with diction, problems with fluency, inability to speak, and having problems recalling words) and finally (5) heating effects related to being hot or heated (e.g., flushed, or user makes a statement about being hot or sweating). (Lange et al., 2010, p. 139)

Four of these five themes were confirmed in the present study using both objective (MRQ) and subjective (HRS, interviews) data collection. Participants were not observed exhibiting hypo-movement, likely because all participants were reclining and relaxed before inhaling *S. divinorum* as part of the controlled conditions for safety reasons. As discussed above, participants were observed laughing and moving more often according to the MRQ. People were visibly afraid as evidenced by asking to hold hands with the researcher, but this activity was not significant, according to quantitative analysis of the MRQ. Similarly, people were observed having difficulty speaking or later described difficulty speaking, but these speech effects were not significant. Finally, participants described being hot in the present study and, unlike in the analysis of Lange et al., just as many participants described being cold.

The Hallucinogen Rating Scale (HRS) was not analyzed in its entirety. It consists of six subscales made up of a total of 71 items. Fifty-two items are filled out but not included in any subscale, and therefore are not included in any quantitative analysis (feel heart skipping beats or beating irregularly, nausea, sweating, forgiving your self or others, etc.). More nuanced differences between psychoactive substances could be determined if all items are included in

analysis. Furthermore, the Intensity subscale was not normally distributed in the current study nor was it in the study by Riba, Rodriguez-Fornells, Strassman, et al. (2001). This is likely due to the fact that the scale is only comprised of 3 or 4 items, and that researchers dispute how many items comprise the subscale.

In addition to the present study, two others used the Hallucinogen Rating Scale (HRS) to measure the subjective experiences of *S. divinorum* inebriation. Albertson and Grubbs (2009) and Gonzalez et al. (2006) administered the scale retrospectively. Comparison of the present study and Gonzalez et al. is shown in Table 25. The report written by Albertson and Grubbs only gives a graph of HRS scores; it does not report mean scores. Albertson and Grubbs explain of their HRS scores, "Both studies show similar scores on each of the six HRS subscales, indicating comparable general hallucinogenic experiences" (p. 216). The accompanying graph suggests scores between the two surveys are within 0.25 of each other on all six subscales.

Table 25

Mean Scores for the Hallucinogen Rating Scale

Subscale	Mean (SD) in Present Study[a]	Mean (SD) in Gonzalez et al., 2006[b]	Difference
Affect	1.49 (0.58)	1.66 (0.53)	-0.16
Cognition	1.61 (0.81)	1.32 (0.7)	0.29
Intensity	2.9 (0.77)	2.5 (0.53)	0.4
Perception	1.71 (0.73)	1.53 (0.88)	0.18
Somaesthesia	1.27 (0.54)	1.42 (0.62)	-0.15
Volition	1.85 (0.46)	1.98 (0.55)	-0.13

[a] $n = 30$. [b] $n = 32$.

The largest differences between the present study and that of Gonzalez et al. (2006) were between Intensity scores, where the present study reported a more intense experience, and

Cognition scores, where the present study reported more modifications in thought processes or content. It is likely that participants in the present study had higher scores due to the research protocol. Participants were encouraged to close their eyes and pay attention to their experiences, which could lead to a more intense experience with more changes in cognitive processes. Another key difference is that Gonzalez et al. administered the HRS retrospectively instead of immediately after a *S. divinorum* experience.

The Hallucinogen Rating Scale has the potential to quantitatively compare and contrast different chemically-facilitated altered states of consciousness. It has been used in 15 studies (Bowdle et al., 1998; Gonzalez et al., 2006; Gouzalez-Mayfrank et al., 2005; Griffiths, Richards, McCann, & Jesse et al., 2006; Grob et al., 1996; Krupitsky et al., 2002; Lofwall, Griffiths, & Mintzer, 2006; Moreno, Wiegand, Taitano, & Delgado, 2006; Riba, Anderer, Jane, Saletu, & Barbanoj, 2004; Riba et al., 2002; Riba, Rodriguez-Fornells, Strassman, & Barbanoj, 2001; Riba et al., 2001; Strassman, Qualls, & Berg, 1996; Strassman, Qualls, Uhlenhuth, & Kellner, 1994; Tancer & Johanson, 2007) assessing various doses of seven psychoactive compounds to provide 27 instances of HRS data on psychoactive substances, and eight instances of data on placebo doses. However, no meta-analysis exists from which to create a way to standardize scores across conditions. It is beyond the scope of the present paper to conduct such a meta-analysis, but mean scores can be compared to each other, after which tentative conclusions will be offered.

The present study with salvinorin A had a mean Affect score of 1.49, the 11th highest Affect score out of 27 scores. Similarly, the present study had a mean Cognition score of 1.61, the 11th highest Cognition score out of 27 scores. Mean Intensity for this study was 2.9, the second highest Intensity score reported out of 31 total scores. Perception scores for this study averaged 1.71, 11th highest out of 27 scores. This study had a mean Somaesthesia score of 1.27,

placing it 13 out of 27 with other studies. Volition scores for this study were 1.85 on average, eighth place out of 26. Participants in the present study had higher scores in all six scales than the mean and median scores of all other studies.

To summarize this comparative HRS data, the experiences in the present study were the most intense ever reported in the literature with one exception, 0.4 mg/kg i.v. DMT (Strassman et al., 1994). Volition scores, which indicate a lack of volition, were also higher than most others, in line with previous discussions in this dissertation about salvinorin A and volition. Five of the seven Volition scores that were higher than the present study involved ketamine, one study involved DMT, and one study involved a retrospective assessment of *Salvia divinorum*. The other four subscales all reported scores roughly in the middle of other available data (11th place out of 27 and 13th place out of 27). This suggests Affect, Cognition, Perception, and Somaesthesia are all altered to a similar degree on salvinorin A as with other psychedelics. These results are extremely tentative, and only further evaluation of HRS data from multiple sources using multiple substances and dosages can yield any meaningful comparative data.

Applicable clinical aspects should be investigated. Administering scales such as the Symptom Checklist 90 (SCL-90-R) or other such clinical inventories before and after a course of *S. divinorum* intake could yield insight into possible ways this substance can help people become more whole.

Qualitative Data

The current research confirms six of the seven themes reported by Siebert (1994): a sense of "becoming objects; visions of various two-dimensional surfaces, films and membranes; loss of the body and/or identity; various sensations of motion, or being pulled or twisted by forces of some kind; uncontrollable hysterical laughter; and overlapping realities" (p. 55). The only theme

Siebert reported that this study did not confirm was of "revisiting places from the past, especially childhood" (p. 55).

Current research led to additional details about these six themes. People became objects, specifically a tree in a forest, a couch in a hotel lobby, and the air in the room. Most two-dimensional objects were described as geometric, or moving in spirals or fractal patterns. Loss of one's identity was considered scary for three participants and not scary or even welcome for three participants. There were many sensations of motion, almost all of which involved being pulled or twisted. Frequently, participants described being pulled in a spiraling direction by an outside force. Laughter that might be called "hysterical" or a fit of uncontrolled laughter, occurred twice. Both participants described life and existence as being inherently funny. Overlapping realities were unique to each person, but frequently there was an obvious disconnect between the consensual reality of being in an experiment with a researcher, and being somewhere else. Both realities were experienced at the same time, overlapping or side by side.

This research described experiences previously unreported in scholarly literature. More than half (57%) of participants reported synesthesia between visual imagery and a kinesthetic, proprioceptive, or otherwise felt sense. While Siebert (1994) listed overlapping realities, participants in the present study also described being completely immersed in another reality. These other realities were unique to each person, but five people reported carnival or circus-like imagery in another reality, and two people reported being in the Amazon rain forest.

Antidepressant effects were not specifically explored in this study, but participants did note improved mood during the 8 week follow-up interview. Overall, 13 participants (57%, 7 [30%] women, 6 [26%] men) reported improved mood. This is in contrast to the survey of Baggott et al. (2004) in which only 26% of respondents reported improved mood. Thirteen

percent of people in the current study reported negative effects lasting more than 24 hours, while in Baggott et al. only 4.4% of survey respondents reported such effects. This may be due to the larger participant pool of 500 used in the survey, the purity of the *S. divinorum* extract in the current research, set and setting, or other factors.

Eighty-seven percent of participants in this study said they would like to use *S. divinorum* again, and 13% responded “maybe” meaning they had no strong desires to use or not use in the future. Similarly, in Baggott et al.'s survey (2004) 81% of respondents said definitely yes or probably yes, and 13% said maybe. No participants in the current study said no, while seven percent said definitely no or probably no in Baggott et al.'s survey.

Participants in this study compared their experience to other experiences of altered states of consciousness. Participants in the surveys by Albertson and Grubbs (2009), Baggott et al. (2004), and Gonzalez et al. (2006) were also asked to compare experiences. Comparative results are shown in Table 26. In the present study, Baggott et al., and Gonzalez et al., the most comparable substance-facilitated experience was that of a serotonergic psychedelic such as LSD or psilocybin. In Albertson and Grubbs, marijuana was the most comparable experience, followed by psilocybin.

Table 26

Comparison of Salvia Divinorum Experience to Other Altered States of Consciousness

Experience	Percent of Participants in Addy 2010[a]	Percent of Participants in Albertson & Grubbs 2009[b]	Percent of Participants in Gonzalez et al. 2006[c]	Percent of Participants in Baggott et al. 2004[d]
Unique	50	29		39
Dreaming	43			7
LSD	13	9	20	18*
Psilocybin	10	22	55	18*
Marijuana	10	44	20	7
MDMA	10		15	
Meditation/Yoga /Trance	7			23
NMDA antagonist (DXM, ketamine, nitrous oxide)	7		20	7
Ayahuasca			20	

Note. [a]$n = 30$. [b]$n = 34$. [c]$n = 32$. [d]$n = 500$. *Baggott et al. combined LSD and psilocybin into one category.

Albertson and Grubbs note that survey respondents had similar HRS profiles to respondents of Gonzalez et al., yet conclude their experiences are more similar to marijuana instead of LSD. It is possible that set, setting, and/or dosage were inconsistent between these three surveys and the present experiment. In the present study, 37% of participants used marijuana 4 or more times in the previous month, which averages to at least once in the last week. Albertson and Grubbs reported 100% of their respondents had used marijuana in an average week. The population with more regular experience with marijuana likened *S. divinorum*

to marijuana more often. Again, Wolowich et al. (2006) has shown that at least sometimes botanical products sold as *Salvia divinorum* may be mislabeled in terms of potency and/or purity. This makes comparisons between users who purchase things online or in "head shops" difficult.

Salvia divinorum seems relevant to transpersonal psychology purely based on the subjective results of this study since it involves at least two out of three of the distinctions for transpersonal psychology, according to Hartelius, Caplan, and Rardin (2007): "transpersonal as *content* of a beyond-ego psychology, transpersonal as *context* for integrative psychology of the whole person, and transpersonal as *catalyst* for human transformation" (p. 144). Salvinorin A facilitates transpersonal content as demonstrated in this study, such as contacting people who were not in the room, visiting the land of the dead, and identifying with a tree. Further, it acted as a catalyst for transformation, as people reported wanting to learn more about themselves, having more empathy and compassion for others, and deepening their relationships with others.

Kappa Opioid Receptors

The mechanism of action of salvinorin A is unique, and the subjective experience is unique, which has at least two implications for future research. First, understanding the phenomenological and behavioral effects of salvinorin A will help scientists understand the role of the KOR system in the human brain. Second, understanding of the correlation of brain states and psychedelic or holotropic states of consciousness must be reconsidered.

As mentioned briefly in the literature review, salvinorin A is a potent and selective agonist of the KOR system. Salvinorin A has been proven to be a KOR agonist in vitro and in animal models, but not in human models. A simple test would be to replicate the animal models in humans by administering human participants with a KOR antagonist before administering salvinorin A and recording alteration in consciousness. It could be that a KOR antagonist

completely or partially blocks effects, or has no mediating effect on the psychoactive nature of salvinorin A. Understanding how salvinorin A works in the brain would have implications for studying clinical and research potential, such as antipsychotic or antidepressant drugs.

KOR agonists such as salvinorin A may have antinociceptive and analgesic properties, which could be investigated easily. Several analgesia protocols exist, which involve causing pain to human participants in a safe and controlled manner, for example, by asking participants to hold their hand in ice water and measuring how long they are able to do so (e.g., Younger et al., 2008). Simply substituting salvinorin A as the chemical of study would answer the question of whether or not salvinorin A produces analgesia. If sub-psychedelic doses of salvinorin A reduce pain reliably without addiction, it may prove extremely useful for pain management.

This study showed that participants were capable of moving around in their chairs and while standing: salvinorin A did not lead to paralysis, supporting evidence in animals that salvinorin A affects volition rather than movement itself (Carlezon et al., 2006).

The results of this study seem to support the contention that salvinorin A is a selective KOR agonist in humans. Synthetic KOR agonists have been developed and administered to people, resulting in “psychotomimetic symptoms” (Pfeiffer et al., 1986). In the current study, participants given the natural KOR agonist salvinorin A reported high scores in the Somaesthesia and Perception subscales of the HRS. Also, people reported moving lines, colors, depersonalization, loss of self-control, and were observed laughing significantly more often. Thirty percent of participants reported losing awareness of the experimental situation. More participants compared the experience to dreaming (43%) than to another psychoactive substance. Compare these descriptions of salvinorin A to a summary of experiences of the synthetic selective KOR agonist MR 2034:

> The high dose [3.8 mg/kg i.v.] resulted in somesthetic changes and disturbances in the perception of space and time. Abnormal visual experiences reported by most subjects consisted of moving lines or walls or color phenomena. There were symptoms of depersonalization, derealization, and loss of self-control. For example, one subject had frequent episodes of unmotivated and uncontrolled laughter during a 90-minute period. Two subjects became unaware of the experimental situation for periods of 20 to 30 minutes and later described their experiences as dreamlike. Although pseudohallucinations were reported, true hallucinations did not seem to occur. (Pfeiffer et al., 1986, p. 774)

There is clear overlap between the subjective effects of salvinorin A and other KOR agonists. Salvinorin A, in the present study, led to few symptoms of dysphoria and psychotomimesis. This can be explained by the control of set and setting in the current protocol, the spiritual and psychedelic orientation, and the maturity of the participants. Also, *S. divinorum* contains at least nine unique chemicals (Munro, 2006) which may or may not affect consciousness in a synergistic manner, making comparisons between one synthetic KOR agonist and a botanical preparation tentative.

Substance-facilitated psychedelic, holotropic, or peak states of consciousness have been studied for over 60 years. LSD is considered the prototypical psychedelic chemical. LSD affects the serotonin (5-HT) system, and so mainstream understanding of hallucinations follow the role of 5-HT. *S. divinorum* occasions hallucinations and mystical-type experiences of a similar, yet unique, nature to those occasioned by LSD, but by an independent pathway in the brain. The significance of the KOR system to altered-state experiences and transpersonal psychology is at present unknown.

If So, So What?

S. divinorum contains several unique chemicals, at least one of which is a potent and novel psychoactive, which produces psychedelic and transpersonal effects under controlled conditions. As shown in the present study, this drug may be administered safely in a research

setting if a responsible protocol is used. Participants report intense, often disorienting experiences of altered perception and cognition. Many participants expressed an altered sense of bodily awareness. Awareness of another reality was also commonly reported. It is possible to conduct ethical research on *S. divinorum* with human participants. A safe design was created and implemented which allowed preliminary description of salvinorin A-facilitated inebriation and lasting effects.

The scientific community knows little about the KOR system, negative physical aftereffects of *S. divinorum* use, other lasting effects, or usage patterns. This research demonstrated that salvinorin A can be safely administered to a small set of experienced users in a lab setting. Participants in this study considered *S. divinorum* to have a low potential for abuse and dependence. They do not consider it to be a party or club drug, but rather feel that it should be treated with respect.

The United States Controlled Substances Act (CSA) (1970) alleges to control psychoactive substances by placing them in one of five schedules or categories. The most restrictive category is Schedule I, which includes other psychedelic substances. According to the CSA, Schedule I is defined as:

> The drug or other substance has a high potential for abuse. The drug or other substance has no currently accepted medical use in treatment in the United States. There is a lack of accepted safety for use of the drug or other substance under medical supervision. (§ 812[b][1])

S. divinorum and salvinorin A do not meet the criteria for placement in Schedule I. The first criteria is potential for abuse, however nowhere in the CSA is the term “abuse” defined. Without knowing what this word means, it is impossible to accurately assess salvinorin A for abuse potential. (In 1970 the current DSM was the DSM-II, which did not have a listing for substance abuse.)

However, 87% of participants in the current study said they would like to use *S. divinorum* again. There was uniform agreement that the plant should be used with a specific intention. Participants reported that the plant should be used with respect and a sober "sitter" to watch for any negative reactions. Only 2 participants (9%) described their experience as fun and enjoyable. This complements earlier research. Animal studies show conditioned place aversion (Zhang, Butelman, Schlussman, Ho, & Kreek, 2005), meaning that mice will avoid salvinorin A rather than administer it compulsively as happens with addictive drugs such as heroin. Surveys of nontraditional *S. divinorum* users (Baggott et al., 2004; Gonzalez et al., 2006) suggest that most users do not want to use the plant again. The discrepancy between the current research and previous surveys has been discussed above, the present point being that *Salvia divinorum* has a low potential for abuse in all populations studied. Longitudinal studies would provide additional information about the abuse potential of *S. divinorum*.

Regarding the second and third criteria for schedule I inclusion, there is no current accepted medical use of salvinorin A. This is due to a lack of research rather than a lack of efficacy. More research is needed to elucidate any possible medical use of the plant. This study has shown there is a safe way to use the substance under supervision. In fact, it is the third study to use human participants (Bucheler et al., 2005; Siebert, 1994) and the most thorough in considering proper set and setting. Existing evidence suggests salvinorin A should not become a prohibited substance.

Observable behavior only partially correlates with internal experience. In the best of studies, there is a disconnection between external and internal, between what is observable and what is experienced. The current study attempted to compensate for this by seeking phenomenological descriptions of experience in addition to quantified behavioral observations,

and to observe this disparity. For example, does salvinorin A produce immobility or avolition? Externally the states look similar, yet through a combination of interviews and observations this study showed salvinorin A to induce avolition, a lack of will to move, rather than a lack of ability to move. It is hoped that future research with *S. divinorum* will also keep in mind the complementary nature of documenting both behavior and experience. Only through understanding both can either be understood.

In discussing altered states of consciousness, particularly those facilitated by external substances, discussion often degenerates to an argument about whether the psychedelic and transpersonal experiences are "real," an argument that has been going on for decades in the United States. In William James's time the main argument in philosophy was between rationalism (what today might be called spiritualism and Integral Theory) and empiricism (today materialism and reductionism). James described these two schools of thought:

> Rationalism tends to emphasize universals and to make wholes prior to parts in the order of logic as well as in that of being. Empiricism, on the contrary, lays the explanatory stress upon the part, the element, the individual, and treats the whole as a collection and the universal as an abstraction. (2003, p. 22)

Both views assume the implicit primacy of one aspect of reality over the other, and both views therefore present an *a priori* theory of consciousness to which facts must be fit. Examining experiences of *Salvia divinorum* inebriation, one can take a spiritualism viewpoint that the plant contains a spirit, which the Mazatec believe, and that ingestion of this plant brings people into transpersonal and spiritual realms. The reductionism viewpoint is that these same experiences are psychotomimetic, are *merely* the result of KOR agonism, and have no value except perhaps in understanding neurochemistry. James presented a third option, which he called radical empiricism. Radical empiricism consists primarily of a methodological postulate:

> Nothing shall be admitted as fact, it says, except what can be experienced at some

> definite time by some experient; and for every feature of fact ever so experienced, a definite place must be found somewhere in the final system of reality. In other words: Everything real must be experienceable somewhere, and every kind of thing experienced must somewhere be real. (2003, p. 83)

People who smoke *S. divinorum* leaves have a pure experience of their body's being pulled and twisted by invisible forces, contact with entities which takes place in another reality, and perhaps uncontrolled laughter. These experiences are real, as is, because they are experienced as real. At the same time, neurochemical action of the KOR system at the nucleus accumbens and ventral tegmental area is also real because this brain activity is, as James wrote, "taken to be more ultimately real than the immediate content of the perceptive moment" (2003, p. 128). The former experience is of rationalism, the latter of empiricism. The important point is that these are not contradictory.

It may seem difficult to reconcile that a psychedelic experience can be exactly as it appears to be, and simultaneously be the result of something else. To again quote James, this is

> at bottom just the puzzle of how one identical point can be on two lines. It can, if it be situated at their intersection; and similarly, if the "pure experience" . . . were a place of intersection of two processes. (pp. 6-7)

This dissertation does not attempt to, for one example, offer proof of the existence of life after death just because one participant (4M) experienced that. Nor does this dissertation attempt to disprove life after death by reducing such an experience to being an artifact of KOR stimulation. The situation may be "both and" instead of "either or," and in fact the situation may be more complicated than even that. This dissertation research has, from the beginning, striven to be atheoretical so as to document the pure experiences of the participants rather than how those experiences fit into a particular pet theory of consciousness and the world. Or, as one participant summed it up:

> I went into it feeling apprehensive and a little fearful and then during [the experience] it

brought me to a sense of self that is very empowered. . . . It was like getting in touch with a soul [or] Higher Self side of me that always knows why I do what I'm doing and has no doubt about myself. It reminded me of that part of myself. It gave me a glimpse; it was very empowering for me. It shed the layers of the ego that are very fearful sometimes. It's a reminder of that deep internal voice [that] is true and right. (7F)

References

Aardvark, D. (2002). *Salvia divinorum and salvinorin A: The best of the entheogen review 1992-2000*. (2nd ed.). Sacramento, CA: The Entheogen Review.

Addy, P. (2007). Facilitating transpersonal experiences with dextromethorphan: Potential, cautions, and caveats. *Journal of Transpersonal Psychology, 39*(1), 1-22.

Albertson, D. N., & Grubbs, L. E. (2009). Subjective effects of Salvia divinorum: LSD-like or marijuana-like? *Journal of Psychoactive Drugs, 41*(3), 213-217.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Ansonoff, M. A., Zhang, J., Czyzyk, T., Rothman, R. B., Stewart, J, Xu, H., et al. (2006). Antinociceptive and hypothermic effects of salvinorin A are abolished in a novel strain of K-opioid receptor-1 knockout mice. *Journal of Pharmacology and Experimental Therapeutics, 318*(2), 641-648. doi:10.1124/jpet.106.101998

Baggott, M., Erowid, E., & Erowid, F. (2004). A survey of Salvia divinorum users. *Erowid Extracts, 6*, 12-14.

Bowdle, T. A., Radant, A. D., Cowley, D. S., Evan, K., Strassman, R., & Roy-Byrne, P. (1998). Psychedelic effects of ketamine in healthy volunteers: Relationship to steady-state plasma concentrations. *Anesthesiology, 88*(1), 82-88.

Braida, D., Limonta, V., Pegorini, S., Zani, A., Guerini-Rocco, C., Gori, E., et al. (2006). Hallucinatory and rewarding effect of salvinorin A in zebrafish: K-opioid and CB1-cannabinoid receptor involvement. *Psychopharmacology (Berl), 190*(4), 441-448. doi: 10.1007/s00213-006-0639-1

Bucheler, R., Gleiter, C. H., Schwoerer, P., & Gaertner, I. (2005). Use of nonprohibited hallucinogenic plants: Increasing relevance for public health? *Pharmacopsychiatry, 38*, 1-5. doi: 10.1055/s-2005-837763

Butelman, E. R., Harris, T. J., & Kreek, M. J. (2004). The plant-derived hallucinogen, salvinorin A, produces k-opioid agonist-like discriminative effects in rhesus monkeys. *Psychopharmacology, 172*, 220-224. doi: 10.1007/s00213-003-1638-0

Carlezon, W. A., Beguin, C., DiNieri, J. A., Baumann, M. H., Richards, M. R., Todtenkopf, M. S., et al. (2006). Depressive-like effects of the k-opioid receptor agonist salvinorin A on behavior and neurochemistry in rats. *Journal of Pharmacology and Experimental Therapeutics, 316*(1), 440–447. doi:10.1124/jpet.105.092304

Controlled Substances Act, 21 U.S.C. § 812 (1970).

Dittrich, A. (1998). The standardized psychometric assessment of altered states of consciousness (ASCs) in humans. *Pharmacopsychiatry, 31*(Suppl. 2), 80-84.

The Entheogen Review. (n.d.). *Home Page*. Retrieved July 1, 2010, from http://www.entheogenreview.com/

Erceg-Hurn, D. M., & Mirosevich, V. M. (2008). Modern robust statistical methods: An easy way to maximize the accuracy and power of your research. *American Psychologist, 63*(7), 591-601. doi: 10.1037/0003-066X.63.7.591

Fantegrossi, W. E., Kugle, K. M., Valdes, L. J., Koreeda, M., & Woods, J. H. (2005). Kappa-opioid receptor-mediated effects of the plant-derived hallucinogen, salvinorin A, on inverted screen performance in the mouse. *Behavioural Pharmacology, 16*, 627–633.

Federal Food, Drug, and Cosmetic Act of 2004, 21 U.S.C. § 321 (2004).

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B.W. (2002). *Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Non-Patient Edition. (SCID-I/NP).* New York: Biometrics Research, New York State Psychiatric Institute.

Gonzalez, D., Riba, J., Bouso, J. C., Gomez-Jarabo, G., & Barbanoj, M. J. (2006). Pattern of use and subjective effects of Salvia divinorum among recreational users. *Drug and Alcohol Dependence, 85*, 157-162. doi:10.1016/j.drugalcdep.2006.04.001

Gorecki, H. (1976). *Symphony No. 3*. [Recorded by D. Upshaw, London Sinfonietta, and D. Zinman]. [CD]. Tampa, FL: Nonesuch Records. (1992)

Gouzoulis-Mayfrank, E., Heekeren, K., Neukirch, A., Stoll, M., Stock, C., Obradovic, M., et al. (2005). Psychological effects of (s)-ketamine and N,N-dimethyltryptamine (DMT): A double-blind, cross-over study in healthy volunteers. *Pharmacopsychiatry, 38*, 201-311. doi:10.1055/s-2005-916185

Griffiths, R. R., Richards, W. A., McCann, U., & Jesse, R. (2006). Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance. *Psychopharmacology, 187*(3), 268-283. doi:10.1007/s00213-006-0457-5

Grob, C. S., McKenna, D. J., Callaway, J. C., Brito, G. S., Neves, E. S. Oberlaender, G., et al. (1996). Human psychopharmacology of hoasca, a plant hallucinogen used in ritual context in Brazil. *Journal of Nervous and Mental Disease, 184*(2), 84-96.

Hanes, K. R. (2001). Antidepressant effects of the herb Salvia divinorum: A case report. *Journal of Clinical Psychopharmacology, 21*(6), 634-635.

Hanes, K. R. (2003). Salvia divinorum: Clinical and research potential. *MAPS Bulletin, 13*(1), 18-20.

Hartelius, G., Caplan, M., & Rardin, M. A. (2007). Transpersonal psychology: Defining the past, divining the future. *The Humanistic Psychologist, 35*(2), 135-160.

James, W. (2003). *Essays in radical empiricism*. New York, NY: Dover.

Johanson, C., Kilbey, M., Gatchalian, K., & Tancer, M. (2006). Discriminative stimulus effects of 3,4-methylenedioxymethamphetamine (MDMA) in humans trained to discriminate among d-amphetamine, meta-chlorophenylpiperazine and placebo. *Drug and Alcohol Dependence, 81*, 27-36. doi:10.1016/j.drugalcdep.2005.05.003

John, T. F., French, L. G., & Erlichman, J. S. (2006). The antinociceptive effect of salvinorin A in mice. *European Journal of Pharmacology, 545*, 129-133. doi:10.1016/j.ejphar.2006.06.077

Johnson, M. W., Richards, W. A., & Griffiths, R. R. (2008). Human hallucinogen research: Guidelines for safety. *Journal of Psychopharmacology, 22*(6), 603-620. doi:10.1177/0269881108093587

Krupitsky, E., Burakov, A., Romanova, T., Dunaevsky, I., Strassman, R., & Grinenko, A. (2002). Ketamine psychotherapy for heroin addiction: Immediate effects and two-year follow-up. *Journal of Substance Abuse Treatment, 23*, 273-283.

Lange, J. E., Daniel, J., Homer, K., Reed, M. B., & Clapp, J. D. (2010). Salvia divinorum: Effects and use among YouTube users. *Drug and Alcohol Dependence, 108*, 138-140. doi: 10.1016/j.drugalcdep.2009.11.010

Lofwall, M. R., Griffiths, R. R., & Mintzer, M. Z. (2006). Cognitive and subjective acute dose effects of intramuscular ketamine in healthy adults. *Experimental and Clinical Psychopharmacology, 14*(4), 439-449. doi:10.1037/1064-1297.14.4.439

Martin, W. R., Sloan, J. W., Sapira, J. D., & Jasinski, D. R. (1971). Physiologic, subjective, and behavioral effects of amphetamine, methamphetamine, ephedrine, phenmetrazine, and methylphenidate in man. *Clinical Pharmacological Therapy, 12*, 245-258.

McCurdy, C. R., Sufka, K. J., Smith, G. H., Warnick, J. E., & Nieto, M. J. (2006). Antinociceptive profile of salvinorin A, a structurally unique kappa opioid receptor agonist. *Pharmacology, Biochemistry, and Behavior, 83*, 109-113. doi:10.1016/j.pbb.2005.12.011

Mithoefer, M. (2006-2007). MDMA-assisted psychotherapy in the treatment of Posttraumatic Stress Disorder (PTSD): Ninth update on study progress. *MAPS Bulletin, 16*(3), 14-15.

Mojeiko, V. (2006). MAPS prepares to launch MDMA/PTSD study in Israel. *MAPS Bulletin, 16*(2), 8.

Mojeiko, V. (2007, Winter). Psychedelic emergency services: Report from Burning Man 2007. *MAPS Bulletin, 17*(3), 15-18.

Moreno, F. A., Wiegand, C. B., Taitano, E. K., & Delgado, P. L. (2006). Safety, tolerability, and efficacy of psilocybin in 9 patients with obsessive-compulsive disorder. *Journal of Clinical Psychiatry, 67*, 1735-1740.

Mowry, M., Mosher, M., & Briner, W. (2003). Acute physiologic and chronic histologic changes in rats and mice exposed to the unique hallucinogen salvinorin A. *Journal of Psychoactive Drugs, 35*, 379-382.

Munro, T. A. (2006). *The chemistry of Salvia divinorum*. Unpublished doctoral dissertation, University of Melbourne, Victoria, Australia.

Ortega, A., Blount, J. F., & Manchand, P. S. (1982). Salvinorin, a new trans-neoclerodane diterpene from Salvia divinorum (Labiatae). *Journal of the Chemical Society, Perkin Transactions 1: Organic and Bio-Organic Chemistry*, 2505–2508. doi: 10.1039/P19820002505

Oehen, P. (2006-2007). MDMA/PTSD psychotherapy: Study in Switzerland launched. *MAPS Bulletin, 16*(3), 15.

Ott, J. (1995a). *The age of entheogens and the angel's dictionary*. Occidental, CA: Natural Products.

Ott, J. (1995b). Ethnopharmacognosy and human pharmacology of Salvia divinorum and salvinorin A. *Curare, 18*, 103-129.

Ott, J. (2001). Pharmanopo-Psychonautics: Human intranasal, sublingual, intrarectal, pulmonary and oral pharmacology of bufotenine. *Journal of Psychoactive Drugs, 33*(3), 273-281.

Pahnke, W. (1963). *Drugs and mysticism: An analysis of the relationship between psychedelic drugs and the mystical consciousness*. Unpublished doctoral dissertation, Harvard University, Cambridge, MA.

Pfeiffer, A., Brantl, V., Herz, A., & Emrich, H. M. (1986). Psychotomimesis mediated by k opiate receptors. *Science, 233*(4765), 774-776.

Pichini, S., Abanades, S., Farre, M., Pellegrini, M., Marchei, E., Pacifici, R., et al. (2005). Quantification of the plant-derived hallucinogen salvinorin A in conventional and non-conventional biological fluids by gas chromatography/mass spectrometry after Salvia divinorum smoking. *Rapid Communications in Mass Spectrometry, 19*, 1649-1656. doi:10.1002/rcm.1970

Riba, J., Anderer, P., Jane, F., Saletu, B., & Barbanoj, M. J. (2004). Effects of the south American psychoactive beverage ayahuasca on regional brain electrical activity in humans: A functional neuroimaging study using low-resolution electrical tomography. *Neuropsychobiology, 50*, 89-101. doi:10.1159/000077946

Riba, J., Anderer, P., Morte, A., Urbano, G., Jane, F., Saletu, B., et al. (2002). Topographic pharmaco-EEG mapping of the effects of the South American psychoactive beverage ayahuasca in healthy volunteers. *British Journal of Clinical Pharmacology, 53*, 613-628.

Riba, J., Rodriguez-Fornells, A., Strassman, R. J., & Barbanoj, M. J. (2001). Psychometric assessment of the hallucinogen rating scale. *Drug and Alcohol Dependence, 62*, 215-223.

Riba, J., Rodriguez-Fornells, A., Urbano, G., Morte, A., Antonijoan, R., Montero, M., et al. (2001). Subjective effects and tolerability of the South American psychoactive beverage ayahuasca in healthy volunteers. *Psychopharmacology, 154*, 85-95. doi:10.1007/s002130000606

Roth, B. L., Baner, K., Westkaemper, R., Siebert, D., Rice, K. C., Steinberg, S., et al. (2002). Salvinorin A: A potent naturally occurring nonnitrogenous K opioid selective agonist. *PNAS, 99*(18), 11934-11939. doi:10.1073□pnas.182234399

Schmidt, M. S., Prisinzano, T. E., Tidgewell, K., Harding, W., Butelman, E. R., Kreek, M. J., et al. (2005). Determination of salvinorin A in body fluids by high performance liquid chromatography–atmospheric pressure chemical ionization. *Journal of Chromatography B, 818*(2), 221–225. doi:10.1016/j.jchromb.2004.12.041

Schmidt, M. D., Schmidt, M. S., Butelman, E. R., Harding, W. W., Tidgewell, K., Murry, D. J., et al. (2005). Pharmacokinetics of the plant-derived k-opioid hallucinogen salvinorin A in nonhuman primates. *Synapse, 58*, 208-210. doi:10.1002/syn.20191

Segal, D.L., Kabacoff, R.I., Hersen, M., Van Hasselt, V.B., & Ryan, C.F. (1995). Update on the reliability of diagnosis in older psychiatric outpatients using the Structured Clinical Interview for DSM-III-R. *Journal of Clinical Geropsychology,1*, 313-321.

Sewell, R. A., Halpern, J. H., & Pope, H. G. (2006). Response of cluster headache to psilocybin and LSD. *Neurology, 66*(12), 1920-1922. doi:10.1212/01.wnl.0000219761.05466.43

Siebert, D. J. (1994). Salvia divinorum and salvinorin A: New pharmacologic findings. *Journal of Ethnopharmacology, 43*, 53-56.

Siebert, D. J. (2004). Localization of salvinorin A and related compounds in glandular trichomes of the psychoactive sage, Salvia divinorum. *Annals of Botany, 93*, 763-771. doi: 10.1093/aob/mch089

Skre, I., Onstad, S., Torgersen, S., & Kringlen, E. (1991). High interrater reliability for the Structured Clinical Interview for DSM-III-R Axis I (SCID-I). *Acta Psychiatrica Scandinavica, 84*(2), 167-173.

Shear, M. K., Greeno, C., Kang, J., Ludewig, D., Frank, E., Swartz, H. A., et al. (2000). Diagnosis of nonpsychotic patients in community clinics. *American Journal of Psychiatry, 157*(4), 581-587.

Steiner, J. L., Tebes, J. K., Sledge, W. H., & Walker, M. L. (1995). A comparison of the structured clinical interview for DSM-III-R and clinical diagnoses. *Journal of Nervous and Mental Disease, 183*(6) 365-369.

Stolaroff, M. J. (2004). The secret chief revealed: Conversations with a pioneer of the underground psychedelic therapy movement. Sarasota, FL: Multidisciplinary Association for Psychedelic Studies (MAPS).

Strassman, R. (2001). *DMT: The spirit molecule*. Rochester, VT: Park Street Press.

Strassman, R. J. (1996). Human psychopharmacology of N,N-dimethyltryptamine. *Behavioural Brain Research, 73*, 121-124.

Strassman, R. J., & Qualls, C. R. (1994). Dose-Response study of N,N-dimethyltryptamine in humans: I. Neuroendocrine, autonomic, and cardiovascular effects. *Archives of General Psychiatry, 51*(2), 85-97.

Strassman, R. J., Qualls, C. R., & Berg, L. M. (1996). Differential tolerance to biological and subjective effects of four closely spaced doses of N,N-dimethyltryptamine in humans. *Biological Psychiatry, 39*, 784-795.

Strassman, R. J., Qualls, C. R., Uhlenhuth, E. H., & Kellner, R. (1994). Dose-Response study of N,N-dimethyltryptamine in humans: II. Subjective effects and preliminary results of a new rating scale. *Archives of General Psychiatry, 51*(2), 98-108.

Stolaroff, M. J. (1997). *The secret chief: Conversations with a pioneer of the undergroup psychedelic therapy movement*. Charlotte, NC: Multidisciplinary Association for Psychedelic Studies.

Tancer, M., & Johanson, C. (2007). The effects of fluoxetine on the subjective and physiological effects of 3,4-methylenedioxymethamphetamine (MDMA) in humans. *Psychopharmacology, 189*, 565-573. doi:10.1007/s00213-006-0576-z

Tart, C. T. (2001). *Waking up: Overcoming the obstacles to human potential.* Lincoln: NE: I Universe.

Turner, D. M. (1996). Salvinorin: The psychedelic essence of salvia divinorum. San Francisco, CA: Panther Press. Retrieved July 1, 2010 from http://www.lavondyss.com/donut/toc.html

U.S. Department of Health and Human Services. (2004). *Guidance for industry: Botanical drug products*. Retrieved July 1, 2010 from http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/ucm070491.pdf

Valdes, L. J., Diaz, J. L., & Paul, A. G. (1983). Ethnopharmacology of Ska Maria Pastora (Salvia divinorum, Epling and Jativa-M.). *Journal of Ethnopharmacology, 7*, 287-312.

Vastag, B. (2003). Medical marijuana center opens doors. *JAMA, 290*(7), 877-879. doi:10.1001/jama.290.7.877

Wang, Y., Tang, K., Inan, S., Siebert, D., Holzgrabe, U., Lee, D. Y. W., et al. (2005). Comparison of pharmacological activities of three distinct k ligands (salvinorin A, TRK-820 and 3FLB) on k opioid receptors in vitro and their antipruritic and antinociceptive activities in vivo. *Journal of Pharmacology and Experimental Therapeutics, 312*(1), 220-230. doi:10.1124/jpet.104.073668

Wasson, R. G. (1962). A new Mexican psychotropic drug from the mint family. *Botanical Museum Leaflets, Harvard University, 20*(3), 77-84. Retrieved July 1, 2010 from http://sagewisdom.org/wasson1.html

Williams, J. B. W., Gibbon, M., First, M. B., Spitzer, R. L., Davis, M., Borus, J., et al. (1992). The Structured Clinical Interview for DSM-III-R (SCID) II. Multi-site test-retest reliability. *Archives of General Psychiatry, 49*, 630-636.

Wolowich, W. R., Perkins, A. M., & Cienki, J. J. (2006). Analysis of the psychoactive terpenoid salvinorin A content in five Salvia divinorum herbal products. *Pharmacotherapy, 26*(9), 1268-1272. doi:10.1592/phco.26.9.1268

Younger, J., Barelka, P., Carroll, J., Kaplan, K., Chu, L., Prasad, R., et al. (2008). Reduced cold pain tolerance in chronic pain patients following opioid detoxification. *Pain Medicine, 9*(8), 1158-1163. doi: 10.1111/j.1526-4637.2008.00475.x

Zanarini, M. C., & Frankenburg, F. R. (2001). Attainment and maintenance of reliability of axis I and axis II disorders over the course of a longitudinal study. *Comprehensive Psych, 42*(5), 369-374. doi:10.1053/comp.2001.24556

Zanarini, M. C., Skodol, A. E., Bender, D., Dolan, R., Sanislow, C., Schaefer, E., et al. (2000). The collaborative longitudinal personality disorders study: Reliability of axis I and II diagnoses. *Journal of Personality Disorders, 14*(4), 291-299.

Zhang, Y., Butelman, E. R., Schlussman, S. D., Ho, A., & Kreek, M. J. (2005). Effects of the plant-derived hallucinogen salvinorin A on basal dopamine levels in the caudate putamen and in a conditioned place aversion assay in mice: agonist actions at kappa opioid receptors. *Psychopharmacology, 179*, 551-558. doi:10.1007/s00213-004-2087-0

Appendix A: Monitor Rating Questionnaire

Participant _____ Session ___ Date _____

Behavior (rate 0-10)	0- 10	10-20	20-30	30-40
Runny nose				
Sneezing				
Vomiting				
Eyes open				
Eyes closed				
Watery eyes				
Talking				
Laughter				
Non-speech noises				
Paranoid thinking				
Yawning				
Movement while sitting				
Movement while standing				
Physical contact with monitor				
Check if present: (yes/no)				
Dilated pupils				
Goosebumps				
Sweating				
Lack of coordination				
Unresponsive				

Appendix B: Flyer

Volunteers Needed for Research Study on the Effects of Salvia divinorum

Peter Addy, student in the clinical psychology Ph.D.program at the Institute of Transpersonal Psychology, Palo Alto, is conducting a research study on states of consciousness brought about by a naturally occurring psychoactive dietary supplement used sacramentally in some cultures.

This study involves exploring states of consciousness and reporting what you experience. The non-ordinary states of consciousness may be similar to other psychedelic substances or meditation or prolonged prayer. You will be asked to inhale the smoke of dried Salvia divinorum leaves. Smoking this dietary supplement may affect general well-being, as by temporarily changing your mood or your ability to focus.

You may be able to participate if you:
- are 25 to 65 years old,
- are fluent in English,
- can travel to Palo Alto four times in a 10-week period,
- are not taking medication for high blood pressure,
- have previous experience with psychedelic or entheogenic substances,
- are basically mentally and physically healthy.

Peter Addy is the investigator for this study. If you are interested in learning more about this study, please leave a message for Mr. Addy at 650-776-9043 or email salvia.itp@gmail.com

Salvia divinorum has not been evaluated by the Food & Drug Administration. It is not intended for use in the diagnosis, treatment, curing, or prevention of disease.

Appendix C: Telephone Screening

The purpose of this screening interview is to see if you meet the narrow criteria for taking part in my research study investigating *Salvia divinorum*. This interview will take around 10 minutes. I am going to go through a list of questions. You may choose not to answer these questions. You also may choose to stop participating in this interview at any time; if you want to stop, please tell me.

If you are eligible to participate in the study and want to participate, we will talk again at another time about what is involved. You will have a choice at that time about whether you want to proceed. Today, all I want to do is try to determine whether you meet the qualifications for inclusion.

The risk to taking part in this interview is very small. The screening interview is not designed to ask you for sensitive personal information, but it is possible that some people may feel uncomfortable answering these questions with a person they do not know. If you qualify to take part in the study and are interested in taking part in it, then I will record your name and information; this will be kept confidential. If you are not interested in the study, then I will destroy the personal information you give me.

The benefit to you of taking part in this interview is that you will find out whether you can take part in the study on Salvia divinorum. This study involves exploring states of consciousness and reporting what you experience.

This study involves smoking a psychoactive substance called salvinorin A. I am making no claim that this substance is safe or effective for any clinical purpose or that it is similar to any other known psychoactive substance. You will not be charged or paid any money for your participation. If you participate, you will need to commit to around five hours of your time, spread out over 10 weeks. I cannot guarantee or promise that you will receive any benefits from this study.

Do you have any questions so far? OK, I will now ask you [six/seven] questions.

1. How old are you?
2. Are you fluent in writing and speaking English?
3. Would you be willing and able to come to the Institute of Transpersonal Psychology in Palo Alto four times in a 10-week period?
4. Have you ever taken medication for high blood pressure?
5. [If female: Are you now or do you intend on becoming pregnant during the next three months?]
6. Have you experienced psychedelic states of consciousness in your past?
7. Are you participating in other research studies at this time?

[Notice, but don't ask directly about, level of articulation and possible psychotic symptoms, such as neologisms, disorganized speech, or flat affect.]

ELIGIBLE - SCRIPT 1
Based on the information you gave me, it looks like you are eligible for the in-person formal screening session. At this point, you have three choices. (1) we can set up the next appointment, which will take place at ITP and run 60-120 minutes; or (2) you can call to set up an appointment yourself later; or (3) if you are not interested in learning more about the study, you should say that and I will not keep the information collected in this interview.
_____ OK TO CONTACT (collect contact info)
_____ SUBJECT TO CONTACT (give contact info)
_____ NOT INTERESTED (destroy all information collected)
Thank you for your time. Good-bye.

INELIGIBLE – SCRIPT 2
Based on the information you gave me, you are not eligible for this study. I will destroy all the information I have collected during this conversation. Thank you for your interest.

Appendix D: Informed Consent

PURPOSE OF RESEARCH
The purpose of this research study is to gather information on the experiences that may be caused by the psychoactive dietary supplement Salvia divinorum, a substance that has been taken by an untold number of people for centuries but that has not yet been well researched in any formal way. Salvia divinorum has been used for thousands of years as a means of inducing non-ordinary states of consciousness for psychological self-exploration and spiritual or religious purposes. This study is for the sole purpose of understanding better how the plant may affect a person's general well being. Salvia divinorum has not been evaluated by the Food & Drug Administration. It is not intended to diagnose, treat, cure, or prevent disease.

Your participation is entirely voluntary. **If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without penalty or prejudice to you**.

The study will consist of four sessions, outlined below, that will take place at the Institute of Transpersonal Psychology in Palo Alto. Your total time commitment will be about 3.5-6.5 hours spread over 10 weeks. Sessions 1, 2, and 3 each may last 60-120 minutes. Session 4 may last 15-30 minutes.

Sessions 2 and 3 will involve inhaling a substance. During at least one of the sessions you will be given a dose of salvinorin A, possibly up to 1500 mcg (or 1.5 mg). For comparison, you should know that an active dose of salvinorin A can be as low as 200 mcg. The highest inhaled dose that has been taken and documented was 2600 mcg. This dose was considered safe, and no negative effects were noted at the time. Salvinorin A is not known to have a significant potential for addiction or dependence in individuals, although more research needs to be done on the matter.

In the other session you may be given an inactive placebo, which is a substance that is not psychoactive, or an active placebo, which is a substance that is psychoactive but is not the substance being studied. You may also be given a different dose of salvinorin A.

For your safety a nurse will be present during Sessions 2 and 3. The nurse will observe your vital signs (pulse, temperature, breathing rate, and blood pressure) before and 40 minutes after you are given the substance. He or she will not be in the room with you while you take it, but will remain directly outside the room until called for. This nurse is trained and certified in emergency medical services. If the nurse determines that your vital signs are outside the suggested comfort zone, we will have to cancel your visit and reschedule.

PROCEDURE

Step 1

This is the current visit.

You will be given a complete description of the study. After you have signed the informed consent, you will be asked a series of questions. There are no right or wrong answers to this questionnaire. You will then be given a chance to practice smoking dried Salvia divinorum leaves. This will help make you familiar with the taste and texture of the smoke. You will then be randomly assigned to a group that will determine what substances you will be given and in what order. Neither you nor Mr. Addy will know which group you are in until the entire study has been completed, including all follow-up interviews.

Step 2

Meet at the Institute of Transpersonal Psychology (ITP) in Palo Alto for an experimental session. This session will be audiotaped.

You will be introduced to the nurse. If you are a woman who can become pregnant, a urine pregnancy test will be given to protect your health and that of any unborn child. Results of the test must be negative in order for the study to proceed.

You will meet with the researcher, Mr. Addy. You will be asked some questions and will have the opportunity to talk, draw, or otherwise express yourself as you prepare for the session.

You will then meet briefly with a nurse, who will record your vital signs. The nurse will stay directly outside the room for the duration of the session.

You will receive a single dose of the substance to be smoked. You will be encouraged to sit or lie down for the experience. Mr. Addy will be in the room with you, quietly observing.

After the majority of effects have subsided you will be asked to recount your experience using words, pictures, or whatever ways of expressing your experience feel best describe it. You will then be asked to fill out a paper-and-pencil assessment about your experience.

You will be asked to contact Mr. Addy if you have any concerns, particularly in the first 24 hours after you receive the substance.

Step 3

One week after Step 2. Same as Step 2.

Meet at ITP for an experimental session. This session will be audiotaped.

Step 4

Six weeks after Step 3.

Meet at ITP for a final conversation about your general well being and final thoughts on the study. This session will take around 20 minutes and will be audiotaped.

FOLLOW-UP CONTACTS
Once this study is completed, there will not be additional follow-up contacts. However, you may obtain a summary of the overall results for this study. Would you like to obtain results from this research study?

_____YES, I would like to obtain results at the following electronic or mailing address:
(initial)

_____

_____NO, I would not like to obtain any results
(initial)

WOMEN OF CHILDBEARING POTENTIAL
If you are a woman who is able to become pregnant, it is expected that you will use an effective method of birth control to prevent exposing a fetus to a substance of unknown risk. If you are pregnant or currently breast feeding, you may not participate in this study. You understand that if you are pregnant, if you become pregnant, or if you are breast-feeding during this study, you or your child may be exposed to an unknown risk.

To confirm to the extent medically possible that you are not pregnant, you agree to have a pregnancy test done before beginning each session. You must agree to avoid sexual intercourse or use an effective birth control. You must accept the risk that pregnancy could still result despite the responsible use of a reliable method of birth control. You agree to notify Mr. Addy if you become pregnant, which will result in your being withdrawn from the study.

YOUR RESPONSIBILITIES
•Keep your study appointments. If it is necessary to miss an appointment, please contact Mr. Addy to reschedule as soon as you know you will miss the appointment.
•Tell Mr. Addy about any side effects, doctor visits, or hospital visits that you may have.
•Ask questions as you think of them. Your questions should be answered clearly and to your satisfaction.
•Tell Mr. Addy if you change your mind about staying in the study. You should not feel obligated to agree to participate or answer individual questions.
•While participating in this research study, you should not take part in any other research project without approval from both researchers. This is to protect you from potential hazards.

You must be willing to refrain from taking the following substances during the study period, unless with prior approval of the research team or with the permission of your physician:
1. Prescribed medications (excepting birth control, thyroid hormones, and other medications approved by the research team),
2. Other psychoactives (excepting caffeine and nicotine),
3. Nonprescribed medications, including herbal supplements (excepting non-steroidal anti-inflammatory drugs or acetaminophen).

WITHDRAWAL FROM STUDY
You are free to withdraw your consent and stop your participation at any time. Mr. Addy may also withdraw you from the study without your consent for one or more of the following reasons:
•Failure to follow the instructions of the researcher and/or study staff.
•Mr. Addy decides that continuing your participation could be harmful to you.
•Pregnancy (if applicable).
•You need treatment not allowed in the study.
•The study is canceled.
•Unanticipated circumstances.

You will be told of any important new information that is learned during the course of this research study, which might affect your condition or your willingness to continue participation in this study.

POSSIBLE RISKS, DISCOMFORTS, AND INCONVENIENCES
There are risks, discomforts, and inconveniences associated with any research study. These deserve careful thought. You should talk with Mr. Addy if you have any questions. The discomforts with this study include possible physical and/or psychological reactions to the substance. With all research studies, there may be other unknown side effects associated with the study participation.

All forms of research—whether routine or experimental—involve some risk of injury. In spite of all precautions, you might develop complications from participating in this study. If such complications arise, Mr. Addy will assist you in obtaining appropriate treatment but this study does not provide financial assistance for additional medical or other costs. Additionally, the Institute of Transpersonal Psychology is not responsible for any risks or benefits associated with this study. Salvia divinorum may involve risks to the participant which are currently unforeseeable.

The act of smoking is risky in itself. If you have any disease of the respiratory system, such as asthma, this risk increases. Also, one previous study showed a rise in blood pressure after taking large doses of Salvia divinorum. This may be a risk for people who have hypertension, or high blood pressure. By participating in this study you are agreeing that you are in good physical health to the best of your knowledge. If you are unsure of your physical health, of if your health changes during the course of this study, please let Mr. Addy know as soon as possible.

POTENTIAL BENEFITS
We cannot and do not guarantee or promise that you will receive any benefits from this study. Some people have reported an overall increase in mood and psychological and/or spiritual wellbeing.

ALTERNATIVES
The alternative is not to participate.

PARTICIPANT'S RIGHTS

You may withdraw from this study, or refuse to answer individual questions, at any time without penalty or prejudice. Your questions should be answered clearly and to your satisfaction. If you decide not to participate, tell Mr. Addy. You will not lose any benefits to which you would otherwise be entitled. You will be told of any important new information that is learned during the course of this research study, which might affect your condition or your willingness to continue participation in this study.

CONFIDENTIALITY

Your identity will be kept as confidential as possible as required by law. You will not be identified by name, address, telephone number, or any other direct personal identifier. Your research records may be disclosed outside of the study, but in this case you will be identified only by a unique code number. Information about the code will be kept in a secure location and access limited to research study personnel. The results of this research study may be presented at scientific or medical meetings or published in scientific journals. However, your identity will not be disclosed.

3 sessions will be audiotaped. These tapes will then be transcribed by a professional, who will be required to sign a confidentiality agreement forbidding him or her to discuss the contents of the tapes. Content from the tapes will be grouped together to identify common themes in your experiences. After the study is completed all tapes will be destroyed. A nurse will be present during sessions 2 and 3 as well. He or she will be required to sign a similar confidentiality agreement.

FINANCIAL CONSIDERATIONS

You will not be paid to participate in this research study.
There is no cost to you for participating in this study.
Financial support is being provided by private donations. Salvinorin A is being provided by the Salvia divinorum Research and Information Center.
No consultative or financial relationships exist for the researcher and/or any investigators in this study.

CONTACT INFORMATION

Questions, Concerns, or Complaints; Injury Notification; Appointment Contact: If you have any questions, concerns or complaints about this research study, its procedures, risks and benefits, or alternative courses, you should ask Mr. Addy. You may contact him now or later at [phone number]. If you feel you have been hurt by being a part of this study, or if you need to change your appointment, please contact Mr. Addy. I will do my best to address your questions and concerns, and if I cannot I may refer you to an independent contact or a local low-cost counseling center.

Independent Contact: If you are not satisfied with how this study is being conducted, or if you have any concerns, complaints, or general questions about the research or your rights as a participant, please contact Dr. Kartik Patel, Ph.D., chair of the Institute of Transpersonal Psychology Research Ethics Committee or Dr. Jenny Wade, Ph.D., dissertation chairperson, at 650-493-4430.

For more information about the Salvia divinorum being provided for this study, see the provider's website at http://www.sagewisdom.org

PARTICIPANT'S BILL OF RIGHTS
As a participant you have the following rights. These rights include but are not limited to the right to:

•be informed of the nature and purpose of the experiment;
•be given an explanation of the procedures to be followed in the experiment;
•be given a description of any attendant discomforts and risks reasonably to be expected;
•be given an explanation of any benefits to the subject reasonably to be expected, if applicable;
•be given a disclosure of any appropriate alternatives;
•be informed of the avenues of medical treatment, if any available to the subject after the experiment if complications should arise;
•be given an opportunity to ask questions concerning the experiment or the procedures involved;
•be instructed that consent to participate in the experiment may be withdrawn at any time and the subject may discontinue participation without prejudice;
•be given a copy of the signed and dated consent form;
•and be given the opportunity to decide to consent or not to consent to an experiment without the intervention of any element of force, fraud, deceit, duress, coercion or undue influence on the subject's decision.

Your signature indicates that you have read and understand the above information, that you have discussed this study with Mr. Addy, that you have decided to participate based on the information provided, and that a copy of this form has been given to you. **Your participation is entirely voluntary and no pressure has been applied to encourage participation.**

_____ _____
Signature of Participant Date

_____ _____
Signature of Primary Researcher Date

Appendix E: First Interview

Step 1: Description/informed consent

Step 2: SCID

Step 3: Interview:

Are you currently taking any medications, herbal supplements, or over-the-counter drugs?

What are they?

Do you have experience smoking things?

Do you have a history of high blood pressure or other heart conditions?

History of asthma or other respiratory problems?

Have you used *S. divinorum* before?

What was the form/method?

Alone or with others?

Why?

Where did it come from?

When was the first and last time you used Salvia?

Have you used psychedelic drugs before?

Which ones?

Alone or with others?

Why?

When was the first and last time?

Did you feel that you ever got any value from your previous experiences?

What valuable things have you gotten?

What do you know about Salvia?

History, method of use, legal status, where to get it

Do you consider Salvia a “marijuana alternative”?

Have you had any other nonordinary or “higher” states of consciousness, maybe from being in nature or through meditation?

Tell me about it.

Why do you want to participate in this study?

What are you looking for?

What are your expectations?

What would you like to get from this experience?

Are you in any kind of therapy right now?

I highly recommend you talk to your therapist about this study before we schedule the next session. Are you willing to bring this up with your therapist?

Have you seen a doctor in the last year?

Tell me about it. For what did you see a doctor?

[save until the end so s/he has a chance to bring it up first] Do you currently practice any spiritual or religious disciplines?

Now I'd like to show you the room we'll be using and give you a chance to practice smoking dried *Salvia* leaves so can get familiar with the smell and taste.

Step 4: Practice smoke

Step 5: Make next two appointments

Step 6: Final information:

Be sure to fast for six hours before you come in. I encourage you to write about your expectations, any dreams you may have, and anything else that may relate to this upcoming session. Feel free to call me at any time if you have any questions or concerns, or if you need to change your appointment.

Appendix F: Nurse Confidentiality

As a nurse, I agree to maintain confidentiality with regard to all participant information, specifically the interview sessions, but also the assessments and any other related material. I will also help to aid the researcher in protecting the identity of participants to ensure anonymity.

_____ _____

Nurse's Signature Date

_____ _____

Researcher's Signature Date

Appendix G: Transcriber Confidentiality

As a transcriptionist, I agree to maintain confidentiality with regard to all participant information, specifically the tapes from the interview sessions, but also the assessments and any other related written material. I will also help to aid the researcher in protecting the identity of participants to ensure anonymity.

_____ _____

Transcriber's Signature Date

_____ _____

Researcher's Signature Date

Appendix H: Pre-Session Interview

Step 1: Meet with EMT (pregnancy test if applicable)

Step 2: Remind participant of protocol for the day

Step 3: EMT takes vitals

Step 4: Everyone turn off your cell phone

Step 5: Orient to room, offer creative expression

Step 6: Interview:

[Second time only: Have you had a chance to reflect on last week's session?

Tell me about that.]

What do you think might happen today?

What would you like to happen today?

What are your expectations?

What are your hopes?

What if that doesn't happen?

[First time only: What do you like about psychedelic experiences?

What do you not like about psychedelic experiences?]

What do you notice in your body?

What is your prevailing mood?

Did you have any dreams last night?

Tell me about it.

Do you have any preparatory rituals before a psychedelic or meditative experience?

Do you mediate, pray, or practice yoga?

Would you like to perform any rituals today?

Step 7: Final instructions:

Since you have used other psychoactive substances, you might know that when you go along through the transition from one stage of consciousness to another one, you may run into difficulties. If you do, like if you get frightened or something like that, all you have to do is put out your hand. I'll see it, I'll be sitting right here; you'll never be left alone. If not just say, "Peter." If you get frightened, stay with it. Don't try to do anything about it, just let yourself be afraid. I will be here all the time, and I will protect your physical safety at all times. You can always reach out for my hand, or if you're OK with it I can hold your hand if you seem to be in distress.

Would that be OK with you? What you're going through is a process. All you have to do is not get in its way.

I encourage you to become comfortable and relaxed while I read a short relaxation script.

Step 8: Relaxation Script

To start, close your eyes. Then move your body into a comfortable position so there is the least stress or strain. Do this now. [pause]

And now, as I count slowly from one to higher numbers, you can relax more and more. The higher the number the more deeply relaxed you become. I'm going to start now. [pause]

One. Your breath. Notice your breath as it moves in and out of your nose, and as your belly rises and falls. You don't have to control it, just be aware of your breath. [pause]

Two. Your feet. Look with your closed eyes at each foot and each toe, and tell the muscles and nerves in your feet and toes to relax, let go. Let the nerve signals from them become less and less. [pause]

Three. Your legs. Look with your closed eyes up and down each leg from your ankles up through your hips, and tell each muscle and each nerve to relax, let go. Let the nerve signals from them become less and less. [pause]

Four. Your lower body, from just below your chest down to your hips, and tell each muscle and

nerve to relax, let go. Let the nerve signals from them become less and less. [pause]

Five. Your upper body from your diaphragm to your shoulders. Look with your closed eyes at your lungs and heart, and tell each muscle and each nerve to relax, let go. Let the nerve signals from them become less, and less. [pause]

[Press play on the CD player with Gorecki, 1992, track 1]

Six. Your arms and hands. Look with your closed eyes at each part in each arm, at each hand and each finger. Tell each nerve and muscle to relax. Let the nerve signals from them become less and less. [pause]

Seven. Your shoulders and your neck. Look with your closed eyes at each shoulder and your neck and say to each nerve and each muscle, relax. Let go. Let nerve signals from each become less and less. [pause]

Eight. Your spine. Look up and down your back, and say to each nerve and each muscle, relax, let go. Let the nerve signals from them become less and less. [pause]

Nine. Your head and scalp. Look with your closed eyes at the muscles and nerves in each. Tell them to relax, let go. Let the nerve signals from each become less, and less. [pause]

Ten. The muscles and nerves in every part of your face. Tell each part to relax, let go. Let each nerve signal from them become less, and less. [pause]

Now you are much more relaxed, much more. Let this total body relaxation flow into your brain and all parts, and your mind relaxes more and more. More relaxed, more rested. [pause]

Step 9: Continue to pay attention to your breath while I read a prayer to you.

> [Lord/Goddess/Higher Self/, etc.] I know not what I ought to ask of you; You only know what I need; You love me better than I know how to love myself.
> Give to me that which I myself know not how to ask.
> I dare not ask either for challenges or for consolations; I simply present myself before You with an open heart.
> Behold my needs which I know not myself; see and do according to Your tender mercy.
> Smite, or heal; depress me or raise me up; I adore all Your purposes without knowing them; I am silent; I offer myself in sacrifice; I yield myself to You: I would have no other desire than to be at one with Your will.
> Teach me to be open.
> Open Yourself in me.

[**Step 9.5**, optional: if participant wants to do their own exercise or practice, offer space for him

or her to engage in that now.]

Step 10: Pack the bowl, hand it to the participant.

Now you can open your eyes. Take this pipe and lighter. In a moment, you can burn the material and inhale the smoke, as you practiced before. Try to hold the smoke in your lungs for 10 or 15 seconds, if you can. What you are about to go through is a process. All you have to do is not get in its way.

Step 11: Fill out MRQ

Appendix I: Post-Session Interview

Step 12: Post-session interview about 15 or 20 minutes post-smoking:

What just happened?

What were you aware of visually?

In terms of sounds?

Smells?

Tastes?

Your sense of touch?

Your sense of your body?

How did you feel emotionally?

What seemed to happen to your way of thinking?

What was the best part of the experience?

What was the worst part of the experience?

Would you repeat this experience?

Why or why not?

How would you compare this experience to others you may have had of different states of consciousness?

Was this experience similar to a substance, or dreaming, or meditation, or

Was it unique and not like anything else?

Did the music help or hinder your experience, or did it not affect [effect?] you?

Is there anything else you'd like to add before I call the EMT in again?

Step 13: Call in EMT for post-session vitals

Step 14: Move to outer room for HRS and snacks

Step 15: Confirm next appointment

Step 16: Final information:

You may want to write about your experience tonight, before you go to sleep. Write up the whole thing, for yourself. You don't need to remember everything. Call me if you experience any symptoms or have any concerns.

Appendix J: Follow-Up Interview

How have you been for the past 6 weeks?

What reflections do you have now about your experiences during this process?

The first session?

The second session?

How have you come to understand what happened on the substance?

How do you explain what happened?

Was there a meaning or a learning for you?

If so, what?

How were the first 24 hours after taking the substance?

Did you notice any lasting effects, either physical of mental?

Were these positive or negative?

Have you experienced hangover (insomnia, fatigue, drowsiness, sore muscles, loss of balance, headaches)?

Any persisting effects lasting 24 hours or more?

Change in mood, nausea, vomiting, muscle aches, watery eyes, runny nose, diarrhea, fever, insomnia, goose bumps, or lightheadedness?

Have you sought professional help as a result of your experiences?

Have you experienced any problems with studies, work, or relationships due to your experience?

Have you experienced any enhancement with studies, work, or relationships due to your experience?

Have you re experienced one or more of the perceptual symptoms that you experienced with *S. divinorum* when you weren't using a substance?

Did this re experiencing cause distress or impairment?

Was this enjoyable or useful in any way?

How has your mood been overall since we last met?

How has your level of relaxation been overall since the last time we met?

How has your level of self-awareness been overall since the last time we met?

Would you use *S. divinorum* again, and why?

Do you consider *S. divinorum* a "marijuana alternative"?

Have you taken any psychoactive substances since our last meeting?

Is this normal for you, or is it a different pattern than before the study?

Appendix K: Two-Way Repeated Measures ANOVA

Table K1

Two-Way Repeated Measures ANOVA

Source		*df*	*F*	Eta squared	*p*	Observed power[a]
Time	Temperature	1	0.032	0.001	0.86	0.053
	Systolic	1	0.236	0.008	0.631	0.076
	Diastolic	1	4.67	0.139	0.039	0.551
	Pulse	1	**9.522***	0.247	0.004	0.847
Error (time)	Temperature	29	(0.264)			
	Systolic	29	(153.955)			
	Diastolic	29	(118.786)			
	Pulse	29	(84.646)			
Dose	Temperature	1	0.344	0.012	0.562	0.088
	Systolic	1	472.033	0.106	0.074	0.434
	Diastolic	1	2.154	0.069	0.153	0.295
	Pulse	1	0.999	0.033	0.326	0.162
Error (dose)	Temperature	29	(0.388)			
	Systolic	29	(137.137)			
	Diastolic	29	(73.683)			
	Pulse	29	(106.564)			
Time x Dose	Temperature	1	3.027	0.095	0.093	0.391
	Systolic	1	1.646	0.054	0.21	0.237
	Diastolic	1	0.064	0.002	0.802	0.057
	Pulse	1	2.293	0.073	0.141	0.31
Error (Time x Dose)	Temperature	29	(0.603)			
	Systolic	29	(136.202)			
	Diastolic	29	(62.775)			
	Pulse	29	(70.232)			

Note. Values enclosed in parentheses represent mean square errors.
[a] Computed using alpha = 0.05
*$p < 0.05$.

Appendix L: Two-Way Mixed Design ANOVA: Within-Subjects Effects

Table L1

Two-Way Mixed Design ANOVA: Within Subjects Effects

Source		*df*	*F*	Eta squared	*p*	Observed power[a]
Dose	Length	1	**47.996***	0.632	< 0.001	1
	Eyes Open	1	3.57	0.113	0.069	.0446
	Eyes Closed	1	5.381	0.161	0.028	0.61
	Talking	1	**39.37***	0.584	< 0.001	1
	Laughing	1	**12.09***	0.302	0.002	0.919
	Sitting	1	**15.44***	0.355	0.001	0.966
	Somaesthesia	1	**72.043***	0.72	< 0.001	1
	Affect	1	**35.157***	0.557	< 0.001	1
	Perception	1	**95.285***	0.773	< 0.001	1
	Cognition	1	**71.177***	0.718	< 0.001	1
	Volition	1	**55.562***	0.665	< 0.001	1
	Temp. Before	1	2.447	0.08	0.129	0.327
	Temp. After	1	1.12	0.038	0.299	0.176
	Systolic Before	1	0.151	0.005	0.7	0.066
	Systolic After	1	5.888	0.174	0.022	0.649
	Diastolic Before	1	1.232	0.042	0.277	0.188
	Diastolic After	1	0.819	0.028	0.373	0.141
	Pulse Before	1	0.012	< 0.001	0.913	0.051
	Pulse After	1	5.177	0.156	0.031	0.594
Dose x Sex	Length	1	2.51	0.082	0.124	0.334
	Eyes Open	1	0.541	0.019	0.468	0.11
	Eyes Closed	1	0.077	0.003	0.784	0.058
	Talking	1	0.874	0.03	0.358	0.147
	Laughing	1	2.348	0.077	0.137	0.316
	Sitting	1	1.635	0.055	0.211	0.235
	Somaesthesia	1	0.016	0.001	0.9	0.052
	Affect	1	0.151	0.005	0.701	0.066
	Perception	1	0.017	0.001	0.896	0.052
	Cognition	1	0.022	0.001	0.883	0.052
	Volition	1	2.306	0.076	0.14	0.311
	Temp. Before	1	0.245	0.009	0.624	0.077
	Temp. After	1	1.027	0.035	0.32	0.165
	Systolic Before	1	0.008	< 0.001	0.928	0.051
	Systolic After	1	2.791	0.091	0.106	0.365
	Diastolic Before	1	0.637	0.022	0.431	0.12

Appendix L Continued

Source		df	F	Eta squared	p	Observed power[a]
	Diastolic After	1	1.101	0.038	0.303	0.173
	Pulse Before	1	0.37	0.013	0.548	0.09
	Pulse After	1	1.774	0.06	0.194	0.251
Error (Dose)	Length	28	(225491.031)			
	Eyes Open	28	(2.967)			
	Eyes Closed	28	(3.033)			
	Talking	28	(1.091)			
	Laughing	28	(0.874)			
	Sitting	28	(2.29)			
	Somaesthesia	28	(0.192)			
	Affect	28	(0.234)			
	Perception	28	(0.3)			
	Cognition	28	(0.32)			
	Volition	28	(0.215)			
	Temp. Before	28	(0.625)			
	Temp. After	28	(0.382)			
	Systolic Before	28	(145.517)			
	Systolic After	28	(125.074)			
	Diastolic Before	28	(78.511)			
	Diastolic After	28	(58.725)			
	Pulse Before	28	(122.899)			
	Pulse After	28	(55.096)			

Note. Values enclosed in parentheses represent mean square errors.
[a] Computed using alpha = .05
*$p < 0.05$.

Appendix M: Two-Way Mixed Design ANOVA: Between-Subjects Effects

Table M1

Two-Way Mixed Design ANOVA: Between-Subjects Effects

Source	Measure	df	F	Eta squared	p	Observed power[a]
Sex	Length	1	2.903	.000	.099	.377
	Eyes Open	1	0.01	.002	.923	.051
	Eyes Closed	1	0.055	.011	.816	.056
	Talking	1	0.302	.187	.587	.083
	Laughing	1	6.444	.078	.017	.688
	Sitting	1	2.381	.097	.134	.320
	Somaesthesia	1	3.016	.031	.093	.389
	Affect	1	0.89	.033	.353	.149
	Perception	1	0.968	.149	.334	.158
	Cognition	1	4.904	.073	.035	.571
	Volition	1	2.204	.000	.149	.300
	Temp. Before	1	0.004	.001	.950	.050
	Temp. After	1	0.038	.100	.846	.054
	Systolic Before	1	3.098	.089	.089	.398
	Systolic After	1	2.742	.083	.109	.359
	Diastolic Before	1	2.535	.243	.123	.337
	Diastolic After	1	8.985	.065	.006	.825
	Pulse Before	1	1.936	.081	.175	.269
	Pulse After	1	2.479	.000	.127	.330
Error (Sex)	Length	28	(779210.25)			
	Eyes Open	28	(6.048)			
	Eyes Closed	28	(5.357)			
	Talking	28	(1.829)			
	Laughing	28	(0.958)			
	Sitting	28	(2.470)			
	Somaesthesia	28	(0.199)			
	Affect	28	(0.327)			
	Perception	28	(0.377)			
	Cognition	28	(0.454)			
	Volition	28	(0.258)			
	Temp. Before	28	(1.132)			
	Temp. After	28	(0.923)			
	Systolic Before	28	(365.252)			
	Systolic After	28	(318.494)			
	Diastolic Before	28	(219.730)			
	Diastolic After	28	(139.472)			
	Pulse Before	28	(206.461)			
	Pulse After	28	(256.262)			

Note. Values enclosed in parentheses represent mean square errors.
[a] Computed using alpha = .05

Appendix N: Mann-Whitney U Test

Table N1

Mann-Whitney U Test

Pair (Female – Male)	U	z
Respiration Before	438.5	-0.15
Respiration After	291.5	-2.443
Runny Nose	416	-1.525
Watery Eyes	384	-2.193
Non-speech Noises	401.5	-0.743
Paranoia	411.5	-1.039
Yawning	383	1.63
Standing	424	-0.638
Contact	392	-1.337
Dilated Pupils	434	-0.935
Sweating	396.5	-1.466
Uncoordination	446	-0.095
Intensity	383	-0.97

Appendix O: Wilcoxon Signed Rank Test

Table O1

Wilcoxon Signed Rank Test

Pair (Active – Placebo)	z	p
Respiration Before	-0.888	0.375
Respiration After	-2.523	0.012
Runny Nose	-1	0.317
Non-speech Noises	-0.325	0.745
Paranoia	-2.232	0.026
Yawning	-0.405	0.686
Standing	-1.527	0.127
Contact	2.724	0.006
dilated Pupils	-1	0.317
Sweating	-1.786	0.074
Uncoordination	-1.414	0.157
Intensity	-4.786	**< 0.001***

*p < 0.05.